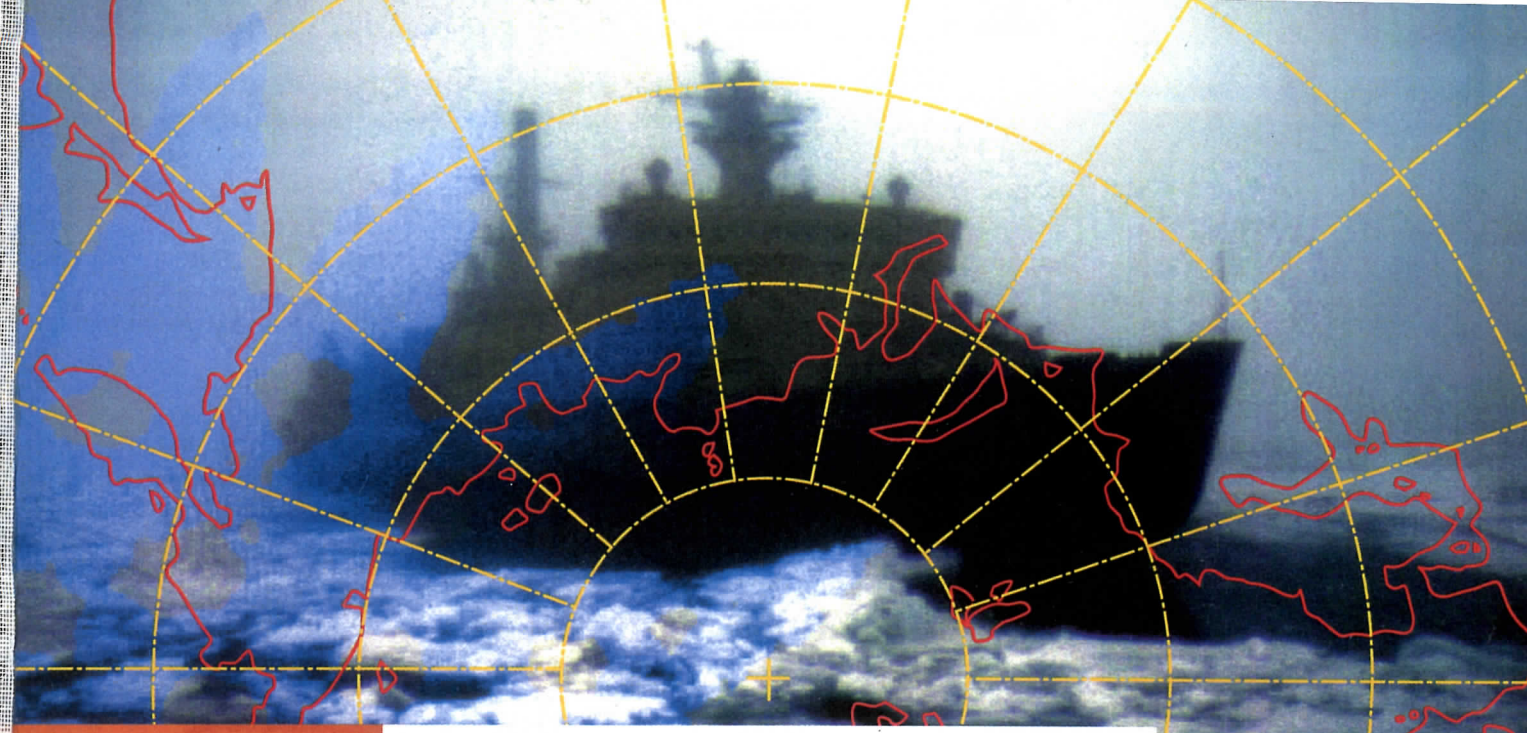


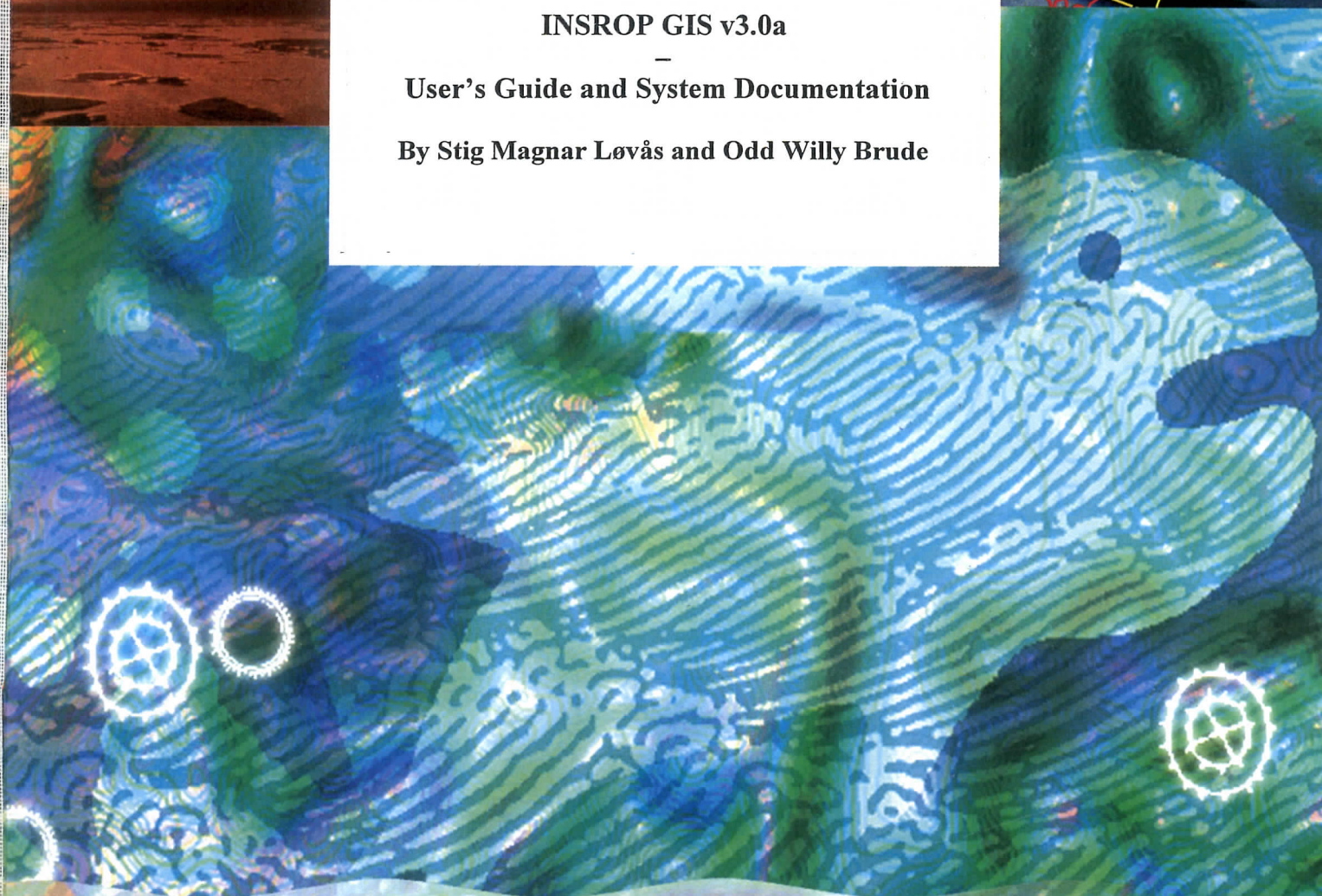
INSROP WORKING PAPER NO. 165 - 1999, I.3.2

INSROP GIS v3.0a

–

User's Guide and System Documentation

By Stig Magnar Løvås and Odd Willy Brude



INSROP International Northern Sea Route Programme

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship and Ocean Foundation, Japan

International Northern Sea Route Programme (INSROP)

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship & Ocean Foundation, Japan

INSROP WORKING PAPER NO. 165-1999

Box A: INSROP Integration / INSROP GIS

Project I.3.2: Arrangement and expansion of INSROP GIS

Supervisor: Stig Magnar Løvås

Title: **INSROP GIS v3.0a – User's Guide and System Documentation**

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Date: 15 March 1999

Reviewed by: David Henry, UNEP/GRID-Ottawa, Canada; and Igor Lysenko, World Conservation Monitoring Centre, Cambridge, United Kingdom.

What is an INSROP Working Paper and how to handle it:

FOREWORD - INSROP WORKING PAPER

INSROP is a five-year multidisciplinary and multilateral research programme, the main phase of which commenced in June 1993. The three principal cooperating partners are **Central Marine Research & Design Institute (CNIIMF)**, St. Petersburg, Russia; **Ship and Ocean Foundation (SOF)**, Tokyo, Japan; and **Fridtjof Nansen Institute (FNI)**, Lysaker, Norway. The INSROP Secretariat is shared between CNIIMF and FNI and is located at FNI.

INSROP is split into four main projects: 1) Natural Conditions and Ice Navigation; 2) Environmental Factors; 3) Trade and Commercial Shipping Aspects of the NSR; and 4) Political, Legal and Strategic Factors. The aim of INSROP is to build up a knowledge base adequate to provide a foundation for long-term planning and decision-making by state agencies as well as private companies etc., for purposes of promoting rational decisionmaking concerning the use of the Northern Sea Route for transit and regional development.

INSROP is a direct result of the normalization of the international situation and the Murmansk initiatives of the former Soviet Union in 1987, when the readiness of the USSR to open the NSR for international shipping was officially declared. The Murmansk Initiatives enabled the continuation, expansion and intensification of traditional collaboration between the states in the Arctic, including safety and efficiency of shipping. Russia, being the successor state to the USSR, supports the Murmansk Initiatives. The initiatives stimulated contact and cooperation between CNIIMF and FNI in 1988 and resulted in a pilot study of the NSR in 1991. In 1992 SOF entered INSROP as a third partner on an equal basis with CNIIMF and FNI.

The complete series of publications may be obtained from the Fridtjof Nansen Institute.

SPONSORS OF INSROP

- Nippon Foundation/Ship & Ocean Foundation, Japan
- The government of the Russian Federation
- The Norwegian Research Council
- The Norwegian Ministry of Foreign Affairs
- The Norwegian Ministry of Industry and Energy
- The Norwegian Ministry of the Environment
- The Central and Eastern Europe programme
- State Industry and Regional Development Fund, Norway
- Phillips Petroleum Company, Norway
- Kværner a.s.
- Norwegian Federation of Shipowners
- Norsk Hydro
- Fridtjof Nansen Institute

PROFESSIONAL ORGANISATIONS PERMANENTLY ATTACHED TO INSROP

- Ship & Ocean Foundation, Japan
- Central Marine Research & Design Institute, Russia
- Fridtjof Nansen Institute, Norway
- National Institute of Polar Research, Japan
- Ship Research Institute, Japan
- Murmansk Shipping Company, Russia
- Northern Sea Route Administration, Russia
- Arctic & Antarctic Research Institute, Russia
- Norwegian Polar Research Institute
- SINTEF (Foundation for Scientific and Industrial Research - Civil and Environmental Engineering), Norway.

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PREFACE

In order to facilitate storage, retrieval and analysis of information obtained *within the* INSROP programme, an INSROP Information System has been developed using GIS technology. This Working Paper presents the current version of the system – INSROP GIS v3.0a. A previous version of the system was presented in INSROP Working Paper 47 (Løvås and Brude, 1996).

In INSROP Phase 2, the system development and implementation of data within Sub-programmes I, III and IV has been carried out within Project I.3.2 – *Arrangement and Expansion of INSROP GIS*, while Project II.3.10 - *Geographical Information System* has been responsible for implementing all data within Sub-programme II.

Since the INSROP Phase 1 project work, Version 3.0a and also 3.1 of ArcView have been released and have provided new capabilities for INSROP GIS development. Also, changes in the ArcView programming language, Avenue, required several modifications to the INSROP GIS version from INSROP Phase 1. INSROP GIS is now an ArcView 3.0a Extension available for PCs running Microsoft **Windows 95 or Windows NT 4.0.**

The authors would like to thank the reviewers, David Henry and Igor Lysenko, for their valuable comments.

Note for users of a previous version of INSROP GIS:

As INSROP GIS is now an ArcView Extension, the file 'default.apr', which comprised the customised INSROP GIS interface, is no longer used and should be deleted from the INSROP GIS folder on your harddisk.

Trondheim, March 10,1999,

Stig Magnar Løvås,
Supervisor, Project I.3.2

INSROP GIS REQUIREMENTS

ArcView on PC requires minimum an 80486/66 Intel-based microprocessor, but we strongly recommend Pentium 133 MHz as a minimum. The PC must have at least 18 MB RAM, but we recommend minimum 64 MB (at least for Windows NT 4.0).

The part of INSROP GIS that needs to be installed on a harddisk requires approx. 1.4 Mb available harddisk space. In addition, a few menu options which creates temporary files (on the catalogue referred to by the TEMP system environment variable) require harddisk space. The INSROP GIS database may be run from the CD, but if you want to run it from a harddisk drive, approx. 150 Mb is required.

ESRI, the makers of ArcView, no longer supports Windows 3.x, and as INSROP GIS also makes use of the extended capabilities of Windows 95 / Windows NT 4.0, one of these Windows systems are needed to run INSROP GIS.

TABLE OF CONTENTS

1. INTRODUCTION

The aim of INSROP is to build up a scientific knowledge base on possibilities for, and consequences of, commercial navigation along the Northern Sea Route. The purpose of this knowledge base is to provide a foundation for long-term planning and rational decision-making by Russian and non-Russian public authorities and private interests regarding the use of the Northern Sea Route (NSR) for transit and regional development.

The NSR is a vast area, and INSROP encompasses a variety of topics. In the world of today, decision-makers are often literally 'drowned' by information, and it may therefore be tough always to make decisions based on a sound evaluation of all relevant issues of a case. To improve the quality of decision-making from a variety of information, the information must be organised and communicated effectively. Maps and photos (e.g. from remotely sensed data) communicate information far more rapidly than any text-based description.

The multi-disciplinary aspect of INSROP also requires a flow of information between INSROP projects. INSROP sub-programmes focusing on the physical and biological environment already in the planning of INSROP realised the advantages of co-operating on the design and development of a GIS. This GIS was intended to serve as a tool for storage, retrieval and analysis of information from the two sub-programmes. By co-operating, duplication of work was minimised, and data of common interest could be shared without having to reformat the data.

Provided the source information is organised properly, current Geographic Information Systems (GIS) technology enables decision-makers access to textual documentation, tables, charts and maps which can be retrieved and studied depending on the problem at hand. Once organised into a GIS, the information is also more readily available for further processing and analysis. During the course of the INSROP GIS projects, new software developments have enabled us to develop INSROP GIS as an integrated information system based on GIS technology. As such it has the potential of serving as base or part of an NSR information system for an operational NSR situation, but the current version of INSROP GIS is limited to the needs of the INSROP programme and within the financial and temporal frames of the GIS development projects.

The development of INSROP GIS is therefore intended to serve two correlated purposes: 1) during INSROP, to serve as a tool for organisation and storage of INSROP data and for project-related analysis work; and 2), to grow into a computerised up-to-date realisation of the INSROP knowledge base.

This documentation is primarily intended to document INSROP GIS in its present state, and provide guidance for use of INSROP GIS. Although some basic ArcView information is also included, the INSROP GIS documentation is not intended to replace the ArcView documentation. Hence, any user of INSROP GIS should first get familiar with ArcView and the ArcView user documentation before learning to make use of the additional INSROP GIS functionality.

The paper is organised into several chapters, where Chapter 2 provides background information about the INSROP GIS concept and Chapter 3 includes brief information about the INSROP GIS components. Chapter 4 deals with installation issues, while Chapter 5 describes how to start using INSROP GIS. Chapter 6 describes the INSROP GIS user interface, and Chapters 7 - 11 include information about use of the system and especially additions to the basic ArcView interface and capabilities. Especially Chapter 11, INSROP GIS Queries, is a good starting point for a new INSROP GIS user. Chapters 12 and 14 include detailed information for users wanting to use their own data on how to implement and document these data so they can be used in INSROP GIS.

2. BACKGROUND

2.1 What is INSROP GIS?

INSROP GIS is an ArcView 3.0a Extension. This means that all ArcView 3.x capabilities are available in INSROP GIS. In addition INSROP GIS provides a customised user interface including access to the INSROP GIS hypertext documentation, a set of special options for INSROP purposes, and INSROP GIS layout templates to ease creation of INSROP hardcopy output.

INSROP GIS is developed to provide INSROP projects with the power to visualise, explore, query and analyse geographic INSROP data, and also to enable decision makers to gain easy access to organised INSROP information. Use of INSROP GIS requires basic knowledge on how to use ArcView 3.x.

Note: INSROP GIS is a software concept developed primarily for purposes within the frameworks of the INSROP. How GIS technology is to be introduced, organised and utilised within an institution involved in INSROP is however beyond the scope of the GIS development projects. As INSROP GIS is not a commercial product; any support depends on the financial and temporal frameworks of the INSROP GIS development projects. The INSROP GIS distribution policy is decided by the INSROP partners and is available from the INSROP Secretariat.

2.2 What is ArcView?

ArcView is a commercial software product made by Environmental Systems Research Institute (ESRI), Redlands, California, USA, the makers of ARC/INFO. It is a powerful, easy-to-use tool that enables you to visualise, explore, query and analyse geographic data spatially.

ArcView is not provided as a part of INSROP GIS, but needs to be purchased separately from national vendors of ESRI products. National vendors of importance to INSROP include:

Japan:
PASCO Corporation
Phone: +81-3-3715-1601
Fax: +81-3-3715-1607

Norway:
Geodata AS
Phone: +47-22901800
Fax: +47-22901890

Russia:
Data+
Phone: +7-095-238-9111
Fax: +7-095-230-2090

Other vendors can be found form the ESRI homepage (http://www.esri.com).

2.3 The design and development process

The process of designing an INSROP information system using GIS technology has been a challenging task. The system should, in principle, address the critical factors affecting navigation along the Northern Sea Route (NSR), including the possible consequences of such navigation. Additionally, the system applications should be developed to serve project needs during the course of the program. Since the INSROP data acquisition and analysis projects are progressing in parallel with the system design, there is limited information on data availability, amount, and format. Therefore, the design team identified the following initial guidelines:

- The system structure should be flexible to permit modifications without restructuring the overall design. This applies to the structure of the database, the analysis methods, the output products, and the system infrastructure.

- The system should be useful both for applications within a single project and for executing applications that require data from several projects. Consequently, the system should be useful to users with minimum requirements, but at the same time serve the needs of users performing complex analyses involving large amounts of data.

- The hardware and software components for the system should be internationally available and provided by vendors that offer technical support and routine product upgrades. Additionally, the GIS software component should support data exchange (e.g., import/export of ASCII files) in formats (e.g., comma-delimited) common to popular software applications, such as word processing, spreadsheet and database programs.

2.4 The INSROP GIS development strategy

Most software products today claim that they are user-friendly. This is generally true, but even the simplest product requires some knowledge by the user. And in many cases there is a conflict between ease-of-use and user-flexibility. One may develop software that solves a specific problem, even a complex one, by a limited amount of user-interaction, but such programs can only solve the problem it was created for and hence has a low level of user-flexibility. In INSROP there are users with different needs for problem solving, different levels of computer availability and knowledge, and different needs for result presentation.

As the purpose of INSROP is to build up a knowledgebase for decision-making, a critical aspect of the success of INSROP is the communication of the knowledge to decision-makers. It is widely accepted that visualised knowledge is more easily communicated than pure text-based knowledge. Maps and charts therefore represent a high level of information communication efficiency. Hence, the ability to prepare easy-to-understand maps and charts is a clear must from INSROP projects. Common spreadsheets are powerful for creation of standard charts, but have no link to maps. Map-printing software is more limited, but most graphical presentation software may create maps using a local co-ordinate system. Such maps are however not geo-located, that is, the map elements are just graphical objects and the software does not know where in the world the map is located. To achieve this one needs to use GIS software. And since ArcView also has a chart-creation capability (although limited compared to powerful spreadsheets), most of the visualised results from INSROP can be prepared by an ArcView application.

Hardcopy prints are good and easy communication media, but their drawback is that they cannot be modified. To show various situations or conditions, several maps/charts are needed. Current computer technology allows putting software and data onto a powerful portable computer and present maps and charts directly from the computer. One may start by showing the decision-maker a set of pre-made maps/charts, but the software will also allow modification, e.g. zooming, of the map upon requests or to visualise changes. This level of communication requires more in terms of computer resources and user knowledge, but also give a higher level of user flexibility. Also here we feel that ArcView provides a good compromise between user-friendliness and user-flexibility.

In order to communicate visualised information, one must also be able to prepare source data suitable for visualisation. A basic requirement here is that the source data are digital and up-to-date, but in addition the following steps are required:

1 Structure the data in a format the software can import
2 Import the data and store them in a format used by the software
3 Prepare the data for display

The first step can either be done manually, by using/developing conversion software, or if the data originates from another software package, the data may be exported in a suitable format. The second step affects how easy it is to import data and make them useable by the software, while the last step may involve a range of sub-steps from simple colour assignment (e.g. via classification)

to actual manipulation of the source data. This step may also include processing of data through selections and analyses. As we want to produce results with a minimum of required computer and software-specific knowledge, and still allow a high degree of flexibility, we have chosen to develop INSROP GIS in a way that may accommodate different user categories, including decision-makers.

First of all, with the release of ArcView 2.0, we felt that many of the purposes of developing an INSROP information system could be realised on a PC. Prior to this most available GISs were UNIX-based, costly and required skilled users, or had very limited functionality. ArcView 2.0 provided a lower threshold for users in terms of purchase costs and use, as software interfaces adhering to the Microsoft Windows user interface provides a high degree of familiarity to most PC users. In addition, an object-oriented programming language (AVENUE) is associated with ArcView, and this enables development of customised ArcView interfaces and functionality. Hence, while maintaining the flexibility of the standard ArcView version, we could develop special scripts for importing source data (from special ASCII formats) and guide the user through the importing process (Step 2). We have also developed scripts for automating the display process, and we have developed special query and analysis scripts. This is one step in simplifying the preparation of visualised information, while still maintaining a high degree of flexibility. The process may also be simplified further, as ArcView use projects (*.apr-files) to store information about how to display a prepared sets, or sub-sets, of data. The project files do not include any data, but links to data, hence the user may have a range of project files combining and displaying source data in different ways depending on the purpose. Hence, a decision-maker (information receiver) having a copy of a project file and the relevant source data sets may study the information just as the source user prepared it. In a way this is similar to a hardcopy map, but the decision-maker will also be able to process the information further, depending on his own wishes, and he may also add his own data.

The ArcView application, including the AVENUE scripts, is the main part of the INSROP GIS concept, and the part generally referred to when using the term INSROP GIS. However, not all GIS requests can be solved in ArcView. For more sophisticated GIS analyses and especially for manipulation of spatial source data, ARC/INFO is required (chosen for its capabilities, widespread use and because ArcView can use ARC/INFO data directly). To also take advantage of more powerful computers, the UNIX-version of ARC/INFO is used. There are also some analyses, especially time series analyses of gridded data, which are inefficient to analyse in ARC/INFO. Here we have chosen developed tailor-made FORTRAN or C programs, and in a few cases also combining FORTRAN and C programs. The FORTRAN/C-programs are either run separately or in combination with ARC/INFO. This part of the INSROP GIS project work requires more in terms of computer resources and programming knowledge, and the programs are not developed for general use, but with the purpose of preparing analysed data for use in ArcView. These programs are therefore not included in the INSROP GIS distribution version.

To conclude this chapter, we, the developers of INSROP GIS, feel that developing INSROP GIS as an ArcView application enables the development of a powerful, flexible and user-friendly software product for visualising a variety of INSROP results. We also feel that the power and flexibility of ArcView justifies the purchase costs compared to other software capable of producing run-time versions for free distribution. The option of developing all new software from scratch to enable free distribution, while still retaining equal flexibility, was soon ruled out as unrealistic within the existing financial and temporal frameworks, and a waste of money compared to purchasing a commercial product. Self-developed general-purpose software also tends to become rapidly dated compared to the development pace in large commercial software companies. Self-developed software is however valuable for extending the functionality of the more general-purpose software, especially for solving user-specific problems and automating common user-specific processes.

3. INSROP GIS COMPONENTS

3.1 ArcView Basics

INSROP GIS is a customised GIS application based on ArcView® 3.x software. ArcView works with *views*, *tables*, *charts*, *layouts*, and *scripts*, stored in one file called a *project*. A project file stores information about the contents and status of each project component, including storage locations of the data sets used in the project. The actual data are not stored in the project file. Hence, if any data set is updated, the updates are also reflected in the ArcView project. However, this also means that data sets cannot be moved to another location without updating the project file. Project files are stored with an '.apr' extension.

A view is an interactive map that enables display, exploration, queries and analysis of geographic data. The view defines the geographic data and how to display them, but does not contain the actual data themselves; only references to these data. The spatial part of a database stores information about where the data are located, while the tabular part of the database provides descriptive information about the elements contained in the database. This information can be used to choose how (colour, symbol, text etc.) the data are to be displayed. The data sets to be included in a view are included as themes, and must be prepared in ARC/INFO format, as a raster image, or created as ArcView shapefiles from X-Y co-ordinates. Each theme can be thought of as a geographic information layer. The options for manipulating images are limited, and images are primarily intended for use as background (unless you have an ArcView Extension).

Tables and charts work in a fairly similar manner as a simple spreadsheet in the sense that the tables include data records with several columns, and that charts can be created from the values in data columns. Data values in a column can also be calculated from values in other columns. However, pure spreadsheet tasks are better performed in state-of-the-art spreadsheets. The strength of the ArcView tables and charts is the connection to the geographic data in the view. Spatial data sources such as ARC/INFO coverages have attribute tables comprising descriptive information about the geographic features they contain. Any selection of spatial features in a view also means that the tabular records of these spatial features are selected. Any statistical analysis of data columns in the attribute table or displayed charts will now only include the values from the selected features. This is particularly useful to analyse features satisfying certain spatial criteria, e.g. being within a limited area or within a limited distance from another feature, e.g. a ship track. Also, any selections made in an attribute table mean that the corresponding spatial features are selected. This is particularly useful for seeing where features satisfying certain descriptive criteria are located. In addition to the attribute tables, other tables (in dBase, INFO, or delimited ASCII format) can be joined (one-to-one relation) or linked (one-to-many relation) to an attribute table, provided they both include a suitable data column. Linked tables can be linked to other tables and thereby enabling many-to-many relations.

A layout is the framework for preparing graphical output, such as maps, charts, and table records, for hardcopy printing or to be saved on files for import into word processors or publishing applications. The elements of a layout can be dynamically linked to the view, table and/or chart windows, so changes in any of these windows are reflected in the layout. In addition the layout may include various graphical elements such as graphical files, text, frames, north arrow, scale bar and legend box. The scale bar and legend box are as default linked to the view to reflect map scale and legends of the selected themes in the view. The layout may also include several views, charts etc.

A script is the component of an ArcView project that contains AVENUE code. AVENUE is an object-oriented programming language, from which ArcView is developed, and AVENUE can be used to customise ArcView or to program special analysis tasks not available from the default ArcView interface. INSROP GIS is developed using AVENUE scripts, but AVENUE is not required to use INSROP GIS.

The ArcView components are run in separate windows. The ArcView window is the main window and serves as the background for all other ArcView operations. The project window allows management of the individual components of the project.

The project files also include information on the display status, screen location, size etc. of the various component windows. The ArcView user's interface also includes menu, button and tool bars at the top of the ArcView window. These vary for each ArcView component, and the menu,

button and tool bars shown in the ArcView window are always the ones for the active window. The ArcView window also includes a status bar at the bottom of the window. The ArcView interface is stored in the file 'default.apr' in the 'etc' sub-directory below the ArcView installation folder.

3.2 Contents of the INSROP GIS CD

The INSROP GIS CD contains two main folders:

\INSROP_GIS
\dKartCatalogueClient

The \dKartCatalogueClient folder includes data bundled with INSROP GIS. This data has been compiled from the "Electronic Catalogue of Charts and Publications", which contains information on all paper charts, electronic charts and publications published by the Head Department of Navigation and Oceanography (HDNO), Russian Federation Ministry of Defence. The "Electronic Catalogue of Charts and Publications" includes the data retrieval software "dKart Catalogue Client" developed by HydroSERVICE A/S. See Appendix B and the 'catalogue.html' file in the dKartCatalogueClient folder for further information.

The **\INSROP_GIS** folder is the main INSROP GIS folder and includes the INSROP GIS hypertext documentation, the INSROP logo stored in TIFF and EPS format, and an ArcView palette file with the colours defined in Appendix C. The hypertext documentation consists of a set of pre-made Microsoft Windows helpfiles. Below the main INSROP GIS folder (e.g. G:\INSROP_GIS, identified by the system environment variable, NSR_PATH) there are five basic INSROP GIS sub-directories:

\INSROP_GIS
- \INSTALL
- \DATABASE
- \PROJECTS
- \SOURCEDATA

The **\INSROP_GIS\INSTALL** folder contains the files that should or may be installed to use INSROP GIS (See Section 4.1). This includes the INSROP GIS Extension and template layouts. The folder also includes the additional INSROP EIA Extension (See Appendix A).

The **\INSROP_GIS\DATABASE** folder is the main database folder. Similar to the main INSROP GIS folder, this folder is identified by a system environment variable, NSR_DATA. INSROP GIS may be run from the CD-ROM, but this possibility also means that the database can be stored on a network server, while the INSROP GIS software is stored on the local disk. The INSROP GIS data sets are organised into information topics and stored in a sub-directory structure below the main database folder. See Section 12.4 for further documentation on the database folder structure and organisation of data sets.

The **\INSROP_GIS \PROJECTS** folder includes the INSROP GIS project library. It is recommended that all INSROP GIS projects (*.apr) are stored in this folder. The project files may be organised into sub-directories.

The **\INSROP_GIS \SOURCEDATA** folder includes the main source data sets provided within INSROP, and may include data not implemented in INSROP GIS. This especially applies to images, either stored in image files or included in Word files. See especially the **AARI-SOF 1996\Maps** folder and the **Box_B\WorkPackage8** folder.

3.3 The INSROP GIS Interface

The INSROP GIS interface is included in a tailor-made ArcView Extension stored in the file 'insrop_gis.avx'. This file includes the basic ArcView interface, all INSROP GIS modifications to the menu, button and tool bars, and All AVENUE scripts providing extended INSROP GIS functionality.

The INSROP GIS AVENUE scripts are triggered from menu choices, or from clicking on buttons or tools. Several of the scripts are developed for simplifying manual operations or to guide

the user through steps in the information processing/analysis process. In addition there are scripts enabling access to the INSROP hypertext documentation from the INSROP GIS interface. The INSROP GIS Interface is described in more detail in Chapter 6.

3.4 INSROP GIS Layout Templates

Layout templates used by ArcView are stored in a file called 'template.def' in the ETC folder below the directory where ArcView is installed. If a user prepares and stores new or modified layout templates, a file with the same name is created or updated.

The INSROP GIS layout templates are stored in the file 'template.def' in the INSROP GIS INSTALL folder (i.e. G:\INSROP_GIS\INSTALL). The INSROP GIS layout templates are modified from the default ArcView layouts and include the INSROP logo. As new layout templates are easy to create by modifying existing ones, we have not put priority into providing a range of layout templates. The present version of INSROP GIS includes one Landscape and one Portrait INSROP GIS layout template in addition to the layout templates included in ArcView Version 3.0a/3.1

At present ArcView cannot use templates from more than one 'template.def' file. When ArcView is started the one in the <ArcView>\ETC folder is read first. Then, if another 'template.def' file is found in the folder referred to by the **HOME** environment variable (See Section 4.3) the layout templates in this file replaces the ones already loaded. Hence, to enable use of the INSROP GIS layout templates the 'template.def' file included on the INSROP GIS CD must be copied to the folder referred to by the HOME environment variable (recommended) or the <ArcView>\ETC folder.

3.5 INSROP Hypertext Documentation

The INSROP hypertext documentation includes basic information about INSROP, such as programme organisation (Sub-programmes, projects and committees, publishing procedures, and executive information about INSROP projects and institutions involved in INSROP. In addition, information about INSROP GIS and INSROP GIS data sets and projects are included.

The use of hypertext means that the information is searchable (through predefined keywords) and organised as information topics with links to related topics. The hypertext documentation is prepared as MS Windows hypertext files using RoboHELP® (©Blue Sky Software Corporation, La Jolla, California, USA). This means that ArcView is not required to access the hypertext documentation, as, in addition to being accessible from the menus in the INSROP GIS interface, the information is accessed by double-clicking the proper icons in e.g. Windows Explorer.

3.6 INSROP GIS Database

The database module organises and stores INSROP data for retrieval and analysis. This involves both storage of structural data (i.e., actual data) and descriptive data (i.e., metadata). A prime objective for organising data from several sources into a database is to make it available to users other than the original data supplier. To support this objective, it is equally important to include information about the data set. This section provides basic information about the INSROP GIS database. A separate report (Brude *et al*, 1999) describes the database in more detail. In addition, the INSROP GIS database metadata provide documentation on each INSROP GIS data set.

3.6.1 Core Database

Although INSROP GIS may utilise data sets from any location a disk, all INSROP GIS data sets are organised in sub-directories of the DATABASE folder, which again is a sub-directory of the main INSROP GIS folder (i.e. G:\INSROP_GIS). The DATABASE sub-directories include information themes which was originally created with 8-character abbreviated names, e.g. BASECART for Base Cartographic data, to comply with current DOS restrictions. The individual base cartographic data sets are stored as sub-directories below the BASECART directory. E.g., the special INSROP extracts of the Digital Chart of the World in 1:1 mill. is found as ARC/INFO coverages in the G:\INSROP_GIS \DATABASE\ BASECART\DCW_1 folder. However, this storage structure is primarily only important for system development or updates. On the INSROP GIS CD, the data are stored in the proper location, and INSROP GIS enables access to the data by

selecting the requested information theme from a menu providing proper descriptive names (e.g. Base Cartography).

Note: The menu choice 'Create database listing ASCII file' in the Projects window will list the entire contents of an INSROP GIS database to an ASCII file.

3.6.2 Metadata

Data stored within a GIS are inherently complex. Data sets may be defined by a variety of parameters from data structures (e.g. raster, vector, triangulated irregular networks, etc.) to geographic environments (e.g. spheroid, datum, projection, co-ordinate system, etc.) to sources and processing procedures (e.g. remotely sensed, rectified, classified, digitised, etc.). Consequently, there must be an organised method available to store, query, and retrieve information. Therefore, it is the role of metadata to provide the GIS user with documented information describing basic data characteristics and allow for the assessment of GIS data sets within the core database. For example, once a metadata database has been established the information can support user interface applications by providing documentation on data sets. Also, the metadata database serves a strategic role in supporting the GIS database by providing the capability to assess data quality, determine missing or suspect information, and survey the history of processing steps (i.e., lineage) associated with the GIS data.

The documentation of an INSROP GIS data set shall provide a user with enough information to enable a decision of whether the data set suits the users needs and satisfy the users requirements. The documentation standard chosen for INSROP GIS data sets is a modified version of the documentation layout that are used for the ArcView Sample Data (see Guide to ArcView Sample Data in the online ArcView Help documentation).

The documentation of an INSROP GIS project file shall provide information on where to find the project file, which data sets are included in the project, and any other information which may be important to a user. The project file documentation provides links to the data sets used in the INSROP GIS project to provide the requested information. Similar to the data set documentation it is organised with one part showing the contents of the INSROP GIS project, and a second part with several elements documenting the various components of the project file.

For more information about how to document INSROP GIS data sets and projects, see Brude *et al.* 1998.

3.7 INSROP GIS Projects Library

While the INSROP GIS database provides organised data for use in INSROP GIS (ArcView), the project files provide a higher organisation level, in the sense that the project files include an organised and classified subset of the INSROP GIS database. Project files may also include the end result of analyses, allowing the user to study the results and e.g. zoom in on special areas or get additional information about certain features. The INSROP GIS Project Library comprises all project files stored in the PROJECTS sub-directory, i.e. G:\INSROP_GIS\PROJECTS. Using the **Open INSROP Project**-button in the customised projects button bar enables the user to directly select a project from this folder.

Note: The menu choice 'Create Metadata ASCII file' in the Projects window will write metadata for the active project to an ASCII file.

4. Installation of INSROP GIS

4.1 Installing INSROP GIS

The INSROP GIS (ArcView) Extension is stored in a file named 'insrop_gis.avx', which is located in the **\INSROP_GIS\INSTALL** folder on the INSROP GIS CD. This file needs to be copied to the \EXT32 folder in the folder where ArcView is installed (i.e. C:\ESRI\AV_GIS30\ArcView\EXT32 for ArcView 3.0a). If you also want to use the additional INSROP EIA Extension (See Appendix A), the file named 'insrop_eia.avx' should also be copied to the \EXT32 folder.

The INSROP GIS layout templates are stored in the file 'template.def', which also is located in the **\INSROP_GIS\INSTALL** folder on the INSROP GIS CD. To enable use of the INSROP GIS layout templates the 'template.def' file included on the INSROP GIS CD must be copied to the folder referred to by the **HOME** environment variable (recommended) or the <ArcView>\ETC folder. See Sections 3.4 and 4.3 for further important information on where to copy the 'template.def' file.

The two files described above are the only ones that need to be copied to a harddisk. However, in order to store new projects into the INSROP GIS projects folder it is recommended that the folder referred to by the NSR_PATH environment variable (See Section 4.2) is located on a harddisk. If you choose to do so, you must first create a folder on the harddisk where INSROP GIS is to be stored (e.g. C:\INSROP_GIS). Then all ***files*** (approx. 2 MB) and the ***Projects*** folder should be copied from the INSROP_GIS folder on the CD to the folder created on the harddisk (The folder to be referred to by the NSR_PATH environment variable).

4.2 Set INSROP GIS System Environment variables

As the INSROP GIS software and database can be accessed from different storage locations (CD-ROM, local or network drive), two system environment variables must be set to identify the storage location of the INSROP GIS Software and the INSROP GIS Database. How to set these depends on you windows system. Assuming C:\INSROP_GIS to be the location where the INSROP GIS software is installed and that you are using the INSROP GIS Database from the CD (assuming G:\ to be your CD-ROM drive), the description below shows how to set these variables.

In Windows 95 the following two lines must be added to your autoexec.bat file:

```
SET NSR_PATH=C:\INSROP_GIS
SET NSR_DATA=G:\INSROP_GIS\DATABASE
```

After the modified autoexec.bat file is saved the computer must be rebooted.

In Windows NT 4.0 you may also set the system environment variables in the autoexec.bat file, but you can also set them via the Control Panel (Click the *Start Button* and choose *Settings* and *Control Panel*). Double-click the *System* icon, and click on the *Environment* tab. Here you first enter NSR_PATH as *variable* and C:\INSROP_GIS as *value*, and click the <*Set*> button. Then enter NSR_DATA as *variable* and G:\INSROP_GIS\DATABASE as *value*, and click the <*Set*> button. Then click the <Apply> and <OK> buttons to finalise the setting of the system environment variables. In Windows NT 4.0 there is no need to reboot the computer.

The HOME system environment variable (See Section 4.3) can be declared similarly.

4.3 Replacing the standard ArcView startup file

This step is only necessary if you want to use the special layout templates prepared for INSROP, and you do **not** want to do one of the following:

1. Replace the 'template.def' file that comes with ArcView with the one that comes with INSROP GIS (See Section 3.4)

2. Copy the 'template.def' file that comes with INSROP GIS to the folder referred to by the TEMP system environment variable.
3. Declare the HOME system environment variable (See Section 4.2) and let it refer to a folder where you store the 'template.def' file that comes with INSROP GIS (e.g. C:\INSROP_GIS\HOME).

When ArcView is started, a startup script is executed. This startup script is an AVENUE script stored in the file named **startup**, located in the *etc* sub-directory below the main ArcView folder (default ArcView location: c:\esri\avgis_30\arcview\etc). The main purpose of the startup script is to specify the **HOME** system environment variable. The main purpose of the **HOME** system environment variable is to identify a writable folder to store any temporary files created by ArcView (e.g. when tables are joined or linked).

If HOME is not specified before ArcView is started (e.g. in the AUTOEXEC.BAT file), the startup script will search for the existence of **TEMP**, **AVHOME** or **windir** system environment variables. When developing INSROP GIS we did not consider this an optimum solution. Hence, we modified the script so that when the HOME variable is not defined, the *Start in* folder (as defined in the INSROP GIS Shortcut Properties, See Section 4.3.1) is used as the HOME folder. The importance of the HOME 'folder' is e.g. that any customised layout templates (stored in a file called template.def) are read from this folder. If there are no such customised files in the HOME folder, the basic ArcView layout templates are used. When installing the INSROP GIS software for the first time you must replace the existing startup file (**startup**) with the INSROP GIS startup file (**startup.nsr**), which is included on the INSROP GIS CD. Remember to make a backup copy of the old startup file before replacing it.

4.3.1 Create a shortcut to INSROP GIS

Start by making a copy of the ArcView shortcut icon on your desktop. This is done by first selecting the icon by clicking once on the ArcView icon with the left mouse button. Then, by clicking once on the right mouse button a popup menu appears. Select the 'Create Shortcut' menu choice. This will create a copy of the ArcView shortcut icon.

Select the copied shortcut icon, click once on the right mouse button and select the 'Rename' menu choice in the popup menu that appears. Type **INSROP GIS** to rename it to INSROP GIS. Click the right mouse button again and select *Properties*. Click the *Shortcut* tab, and enter the same in the *Start in* field as you entered for the NSR_PATH system variable (e.g. C:\INSROP_GIS).

5. HOW TO GET STARTED

5.1 Starting INSROP GIS

INSROP GIS is started by double-clicking the ArcView shortcut icon on the desktop or via the Start. After ArcView is activated you must click on the *File* menu in the *Project* Window and select *Extensions*. This will bring up a list of available ArcView extensions. Click on the frame in front of the INSROP GIS Extension (putting a checkmark there) to load it. If you load a project saved when INSROP GIS was loaded the INSROP GIS Extension loads automatically.

5.2 Creating, opening or saving a project

When starting ArcView, a new project (called Untitled) is "created". If you want to work on an existing project, you must select **Open Project** or **Open INSROP Project** from the *File* menu in the *Project* window, or press the **Open INSROP Project**-button in the *Project* button bar. The difference between these options is that the **Open INSROP Project** option, as default, enables choosing project files from <NSR_PATH>\PROJECTS folder, while the **Open Project** option, as default, enables choosing project files from the current working folder.

To save a project with its current name, you have three options (which are available in all ArcView windows):

i. Choose **Save Project** in the *File* menu.
ii. Type Ctrl+S as a shortcut for the Save Project menu choice.
iii. Press the **Save Project** button (The leftmost button in each button bar)

To save a project with a new name, you must make the Project window active, and choose the **Save Project As...** menu choice in the *File* menu.

5.3 Using data from the INSROP GIS database

The simplest way to use and display data from the INSROP GIS database is to use INSROP GIS Queries (See Chapter 11). However, to use data in a way not covered by the INSROP GIS Queries the description presented in the following should be followed.

The INSROP GIS database (see also Section 3.6) includes data sets prepared for use in an ArcView application, i.e. INSROP GIS. To find out whether there are, or which, data in the INSROP GIS database that may be useful for your purpose, please study the INSROP GIS database documentation (The hypertext version should be the most updated one, see Section 3.5, or study Brude *et al*, 1998).

The INSROP GIS database includes mainly spatial data sets, but also some non-spatial data sets. Spatial data sets are for use in a view document, while non-spatial data sets are for use in a table document. Spatial data may consist of one (ArcView) theme or a set of themes, where a theme include a set of spatial features (with attributes) of one feature type (Point, Multipoint, Line, Polyline, Polygon) or an image. Non-spatial data are organised into tabular files in one of the following formats: INFO, dBase, TAB-delimited ASCII file.

5.3.1 Add an INSROP theme to a view document

To add a theme from the INSROP GIS database into a view, choose **Add INSROP Theme** in the *View* menu. This will initiate the following actions:

1. Get the thematic list of INSROP GIS data sets
2. Select a topic from which to add an INSROP GIS data set
3. Get the list of INSROP GIS data sets within the selected topic
4. Select an INSROP GIS data set within this topic
5. Get the definition file associated with the selected data set
6. Select one or several data themes within the selected INSROP GIS data sets
7. Set theme name and field name aliases

These steps are described in more detail in the following:

Get the thematic list of INSROP GIS data sets

The thematic list of INSROP GIS data sets is read from the overall data set definition file, *datasets.def*, see Section 12.4.1.

Select a topic from which to add an INSROP GIS data set

Based on the information acquired in Step 1, the user is presented a list of data set topics, from which one topic may be selected. If you want to use data sets from another location than the one defined for INSROP GIS, you must choose <Other datasets>. You are the prompted to select a definition file (*.def). This may be a data set definition file, in which case your next step is Step 6. However, you may also choose to organise your alternative database(s) similar to the INSROP GIS database, in which case you should select the proper *datasets.def* file at this step. Then you may use data sets (e.g. non-public ones) from your own database in the same way you use data sets from the INSROP GIS database.

Get the list of INSROP GIS data sets within the selected topic

Based on the user's choice in Step 2, INSROP GIS goes to the proper database sub-directory. This sub-directory includes a topic data set definition file, see Section 12.4.2, which is read by INSROP GIS.

Select an INSROP GIS data set within this topic

Based on the information acquired in Step 3, the user is presented a list of data sets, from which one data set may be selected.

Get the definition file associated with the selected data set

Based on the user's choice in Step 4, INSROP GIS goes to the proper data set folder. This folder includes a data set definition file, see Section 12.4.3, which is read by INSROP GIS.

Select one or several data themes within the selected INSROP GIS data sets

A data set may include one or several data set themes. INSROP GIS opens an "Add Theme"-dialogue window, where the user may select one or more themes to add to the view. This step is similar to the standard ArcView "Add Theme" menu choice. However, in addition to adding the selected themes, INSROP GIS gives the themes the names defined in the data set definition file read in Step 5.

Set theme name and field name aliases

Since dBase tables only can store field names with max. 10 characters, INSROP GIS includes a possibility to define field name aliases in Data set member attribute definition files (*.fld), see Section 12.4.4. When a *.fld file as defined in the Data set member definition files (see Section 12.4.3) exists, filed name aliases are read from this file when the data sets are added to the project. Also an alias name for the theme is set (instead of the default one, which is just the file name).

5.3.2 Add a tabular file as a table document

The **Add INSROP Table** menu choice works similar to the ADD INSROP Theme menu choice (see Section 5.3.1), but is accessed from the Project menu in the Projects window.

5.4 Accessing metadata

The purpose of metadata is to provide information about *something*, and thereby enables a potential user to decide on the usefulness of *something* for any given purpose. The INSROP GIS metadata consist of two main parts: INSROP GIS projects metadata and INSROP GIS database metadata. A version of INSROP GIS should include updated versions of the metadata as hypertext.

However, as the database or projects library is likely to be updated between new versions of INSROP GIS, the metadata may also be accessible as a set of ASCII files.

The INSROP GIS hypertext metadata are accessed through the *INSROP GIS Help* menu (available from all INSROP GIS (ArcView) windows or directly by double-clicking the proper hypertext file in the INSROP GIS folder. The INSROP GIS project library metadata are accessed from the hypertext program item labelled **INSROP GIS Projects**, while the database metadata are accessed from the hypertext program item labelled **INSROP GIS Data**.

Opening them in a text editor accesses the metadata ASCII files.

Note: The database ASCII metadata files are located in the main sub-directory of each data set. The project library ASCII metadata files are located in the <INSROP_GIS>\PROJECTS sub-directory. The files are stored with <data set name>**.inf** or <project name>**.inf** filename.

6. INSROP GIS INTERFACE

In INSROP GIS, similar to ArcView, you work with views, tables, charts (and scripts), stored in one file called a project. All project files are stored with a '.apr' extension. You work with one project at a time. Projects enable keeping together all components required for a task or application and available from a common window interface. The main window is called the ArcView window, and serves as the framework for all ArcView/ INSROP GIS operations. Normally you will not see this window without at least the Projects window open. When starting INSROP GIS (or ArcView), that is the standard startup interface (see Figure 6.1).

The project window lists all components of a project. When you open one of the components of the project, it is displayed inside its own window. You can have any number of windows open in ArcView, but there is only one active window at any time.

The ArcView window includes a Menu bar, a Button bar, a Tool bar and a Status bar. The menu, button and tool bar includes controls that are specific for each type of window, and only the controls of the active window are visible at any time. The status bar displays various messages or the progress of certain operations. The following sections show the ArcView window for the various active window types and describe the added or modified controls, which extend the functionality of INSROP GIS compared to the basic ArcView configuration.

6.1 Projects window

The menu bar includes one new pull-down menu: **INSROP GIS Help**. In addition, the *File* menu includes one additional item: **Open INSROP Project**, and the *Project* menu includes three additional items (see Table 6.1). The button bar includes three additional buttons (see Figure 6.1). There are no tools. Table 6.1 documents the modified menu bar, while the added buttons are described below:

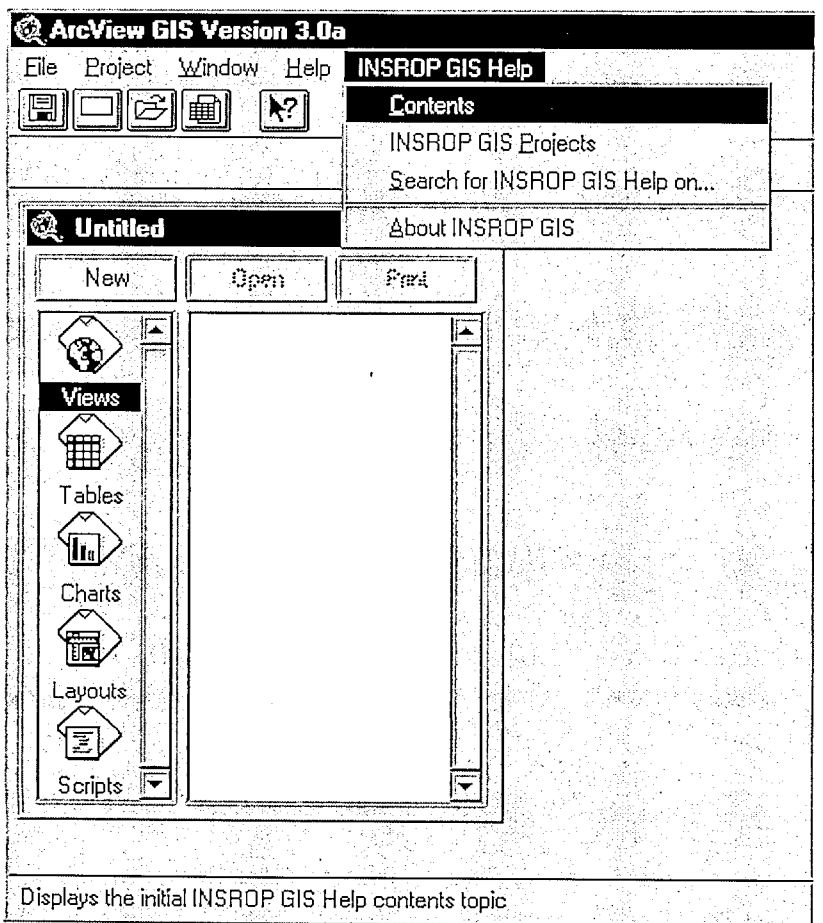

Figure 6.1 Projects window interface

Button bar modifications:

Icon: 
Function: Select and open a project from the INSROP GIS project library

Icon: 
Function: Add a 'delimited text' table (comma-delimited) to the project

Icon: 
Function: Resize the ArcView background window to the maximum fit within the screen.

Menu bar modifications:

Table 6.1 Menu bar modifications

Menu	Menu choice label	Function
File	Open INSROP Project	Select and open a project from the INSROP GIS project library
Project	Add INSROP Table	Insert table(s) from the INSROP GIS database into the project
	Create Metadata ASCII FILE	Create/Update ASCII file with metadata for the active project
	Create database listing ASCII FILE	Create/Update ASCII file listing the contents of an INSROP GIS database
INSROP GIS Help	Contents	Displays the initial INSROP GIS (hypertext) Help contents topic
	INSROP GIS Projects	Displays the INSROP GIS Projects Library topic
	Search for INSROP GIS Help on...	Opens the search dialog box for an INSROP GIS keyword to search on
	About INSROP GIS	Provides basic information about this version of INSROP GIS

6.2 Views window

The menu bar includes three new pull-down menus: **INSROP GIS Queries, INSROP GIS Tools** and **INSROP GIS Help**. In addition, the *View* and *Theme* menus include additional items. The button bar includes four additional buttons (See Figure 6.2). There is one additional tool. Table 6.2 documents the modified menu bar, while the added buttons are described below:

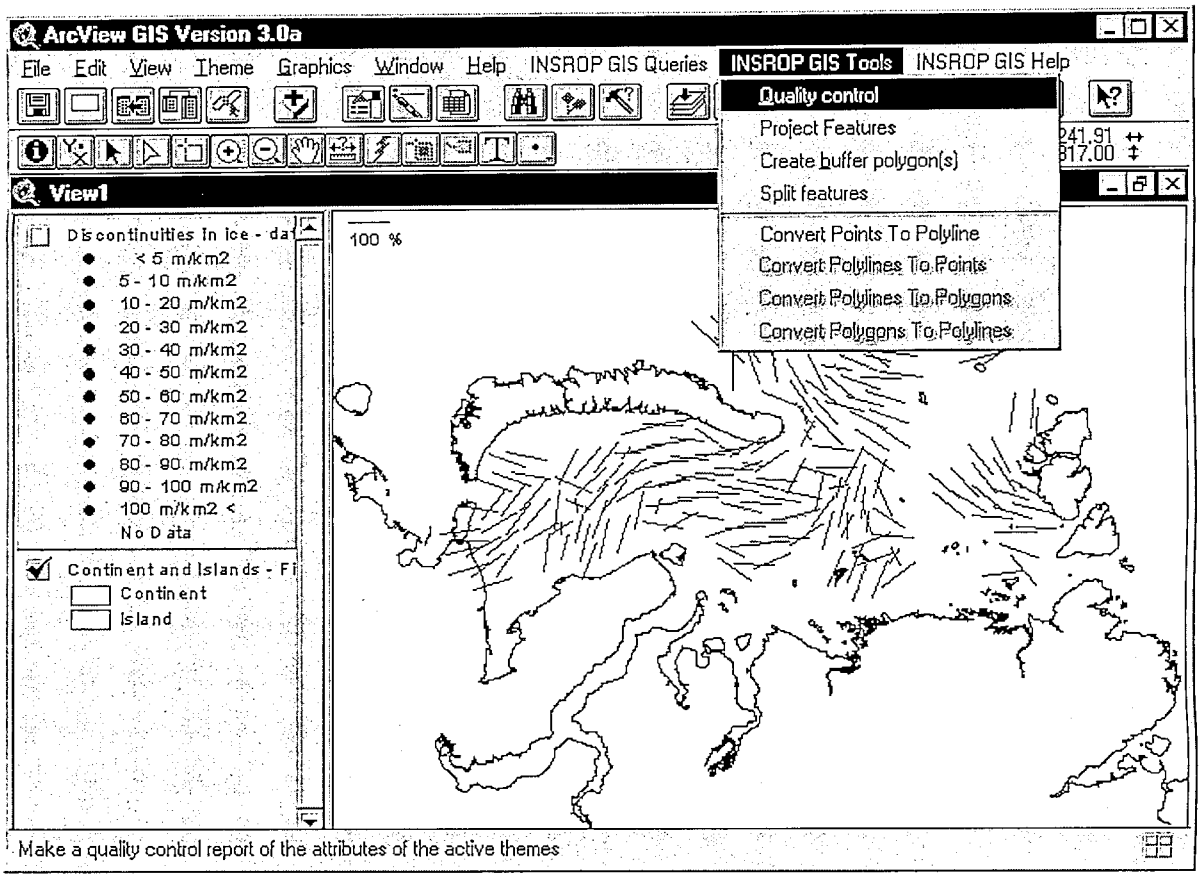

Figure 6.2 View window interface

Button bar modifications:

Icon: 
Function: Specify tables and fields and join them

Icon: 
Function: Specify tables and fields and link them

Icon: 
Function: Create a buffer theme around the selected features

Icon: 
Function: Resize the ArcView background window to the maximum fit within the screen.

Tool bar modifications:

Icon: 
Function: Display the unprojected Y/X (e.g. Latitude/Longitude) co-ordinates of the mouse location (when clicked)

Menu bar modifications:

Table 6.2 Menu bar modifications

Menu	Menu choice label	Function
View	Use INSROP Projection	Set the projection to the default INSROP projection (see Section 7.2.1). All data must be stored in decimal degrees to use this function.
	Add Graticule	Specify and add a graticule to the view
	Remove Graticule	Removes an existing graticule
	Add INSROP Theme	Inserts data set(s) from the INSROP data base into the view
	New Theme from ASCII file	Create a new Shapefile Theme based on feature data in an ASCII file
Theme	Display metadata ASCII file	Display metadata file for the active theme in a text window
	Display attribute (with a legend)	Select a theme attribute to classify and display with a pre-defined legend
	Display 'linked' attribute (with a legend)	Display an attribute in an associated table. Enables display of attributes in a one-to-many related table.
	Classify attribute (with a legend)	Display attribute with a user-defined or a pre-defined classified legend
	Display Vector Arrows	Display arrows based on vector specifications in a point theme attribute table
	Remove Vector Arrows	Remove created vector arrows
	Convert to ASCII	Write the spatial and tabular data in the active theme to an ASCII file in the INSROP GIS ASCII file format.
	Update Feature Sizes	Update or add projected Area/Perimeter or Length measures to the theme attribute table
	Create Field Definition file	Create/Update ASCII file with data on each field in the active theme
	Create Metadata ASCII file	Create/Update ASCII file with metadata for the active theme
INSROP GIS Queries	Various query topics	Select a query on the chosen query topic
	Display charts in colour/Display charts in black/white	Toggle whether to display charts in colour or black/white
INSROP GIS Tools	Quality control	Make a quality report of the attributes of the active themes
	Project Features	Project all selected features in the active themes (Creates new theme with projected line segments)
	Create Buffer Theme	Create a buffer theme around the selected features in the active themes
	Split features	Split an editable polygon or polyline theme by the selected features in the active polyline theme
	Convert Points to Polyline	Convert selected points in a point theme to one polyline in a new polyline theme
	Convert Polylines	Convert selected polylines in a polyline theme to points in a new

Menu	Menu choice label	Function
	to Points	point theme
	Convert Polylines to Polygons	Convert selected polylines in a polyline theme to polygons in a new polygon theme
	Convert Polygons to Polylines	Convert selected polygons in a polygon theme to polylines in a new polyline theme
INSROP GIS Help	Contents	Displays the initial INSROP GIS (hypertext) Help contents topic
	Search for INSROP GIS Help on...	Opens the search dialog box for an INSROP GIS keyword to search on
	About INSROP GIS	Provides basic information about this version of INSROP GIS

6.3 Tables window

The menu bar includes two new pull-down menus: **Tools** and **INSROP GIS Help**. The Table menu includes two new menu choices, and the button bar includes one additional button (See Figure 6.3). There are no additional tools. Table 6.3 documents the modified menu bar, while the added button is described below:

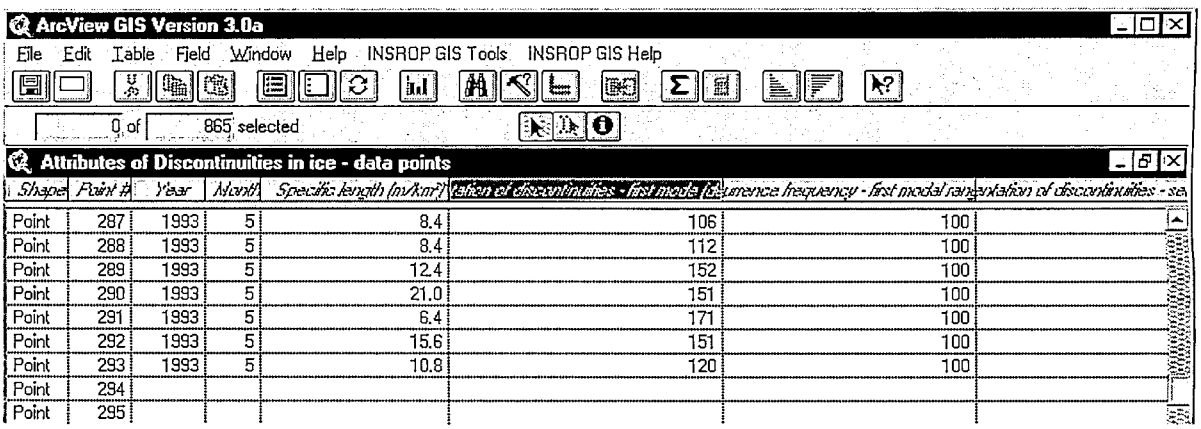

Figure 6.3 Top part of Table window interface

Button bar modifications:

Icon: 

Function: Resize the ArcView background window to the maximum fit within the screen.

Menu bar modifications:

Table 6.3 Menu bar modifications

Menu	Menu choice label	Function
Table	Display Metadata ASCII file	Display metadata file for the active table in a text window
	Create Field Definition file	Create/Update ASCII file with data on each field in the active table
	Create Metadata ASCII file	Create/Update ASCII file with metadata for the active table
Tools	Quality control	Make a quality report of the attributes of the active tables
INSROP GIS Help	Contents	Displays the initial INSROP GIS (hypertext) Help contents topic
	Search for INSROP GIS Help on...	Opens the search dialog box for an INSROP GIS keyword to search on
	About INSROP GIS	Provides basic information about this version of INSROP GIS

6.4 Charts window

The menu bar includes one new pull-down menu: **INSROP GIS Help**. The button bar includes one additional button. There are no additional tools. Table 6.4 documents the modified menu bar, while the added button is described below:

Button bar modifications:

Icon: 

Function: Resize the ArcView background window to the maximum fit within the screen.

Menu bar modifications:

Table 6.4 Menu bar modifications

Menu	Menu choice label	Function
INSROP GIS Help	Contents	Displays the initial INSROP GIS (hypertext) Help contents topic
	Search for INSROP GIS Help on...	Opens the search dialog box for an INSROP GIS keyword to search on
	About INSROP GIS	Provides basic information about this version of INSROP GIS

6.5 Layouts window

The menu bar includes one new pull-down menu: **INSROP GIS Help**. In addition, the *Layout* menu includes two new menu choices (See Figure 6.4). The button bar includes one additional button. There are no additional tools. Table 6.5 documents the modified menu bar, while the added button is described below:

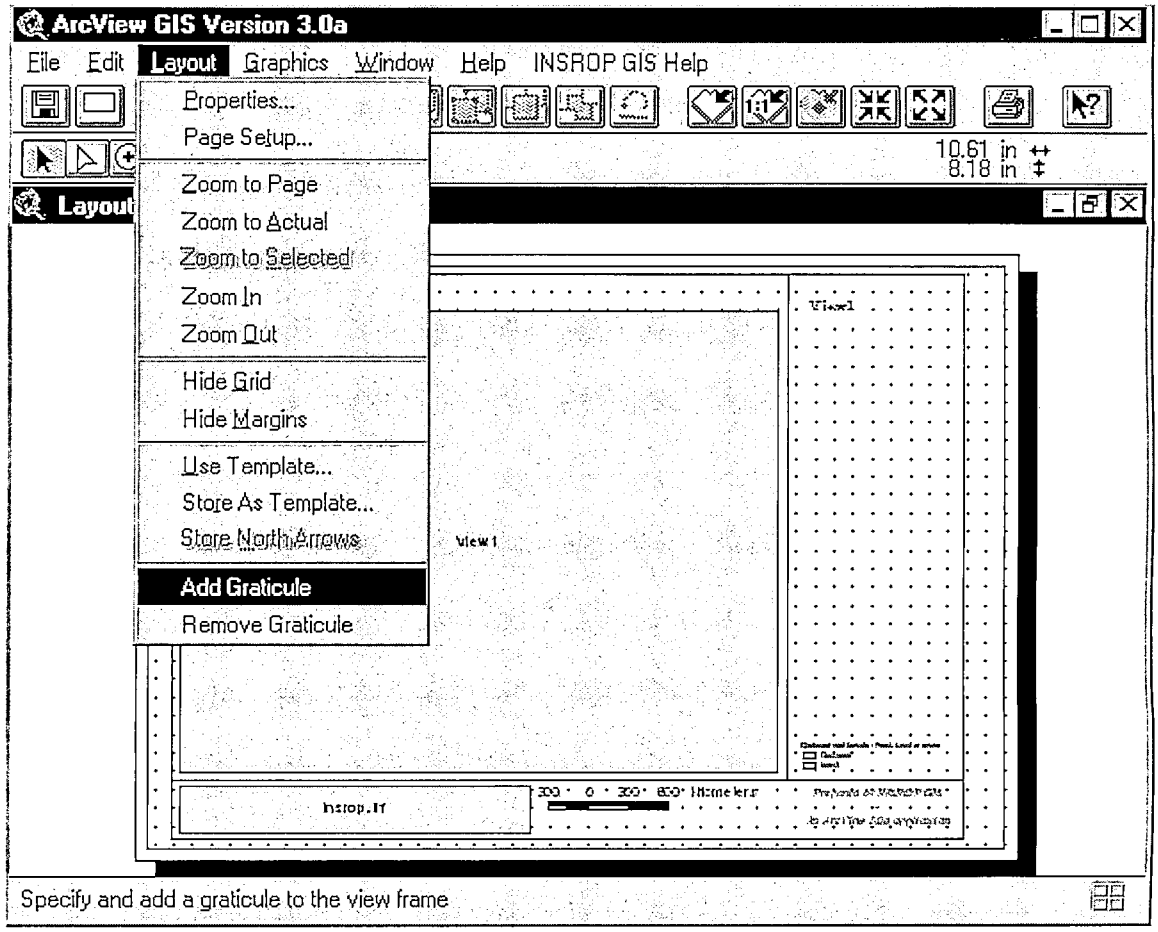

Figure 6.4 Layout window interface with the Layout menu open

Button bar modifications:

Icon: 

Function: Resize the ArcView background window to the maximum fit within the screen.

Menu bar modifications:

Table 6.5 Menu bar modifications

Menu	Menu choice label	Function
Edit	Simplify LegendFrame	Simplify the legendframe by converting it into a graphical object, and thereby enabling editing (i.e. deleting) selected legend items
Layout	Add Graticule	Specify and add a graticule to the layouts view frame
	Remove Graticule	Removes an existing graticule
INSROP GIS Help	Contents	Displays the initial INSROP GIS (hypertext) Help contents topic
	INSROP GIS Layouts	Displays the INSROP GIS Layout topic
	Search for INSROP GIS Help on...	Opens the search dialog box for an INSROP GIS keyword to search on
	About INSROP GIS	Provides basic information about this version of INSROP GIS

6.6 Scripts window

The menu bar includes no new pull-down menus and no new menu choices. The button bar includes one additional button. There are no tools. The added button is described below:

Button bar modifications:

Icon: 
Function: Resize the ArcView background window to the maximum fit within the screen.

7. VIEWS: EDIT, DISPLAY, QUERY AND ANALYZE SPATIAL DATA

7.1 Creating or opening a View

A new view is created from the Project window by double-clicking the View icon, while an existing view is opened by double-clicking a view name in the list of view documents in the project. In addition, these options are also available from the **File** menu when the Project window is the active window.

7.2 INSROP GIS view options

The view options described in this section are included in the View menu in the Views menu bar. In addition to the menu choices for adding or creating INSROP themes (see Chapter 12), the View menu includes the following menu choices affecting the display of spatial data:

- Use INSROP Projection
- Add Graticule
- Remove Graticule

7.2.1 Use INSROP Projection

When the source data are stored in geographic co-ordinates (latitude and longitude), ArcView may display the data in a range of projections. For most INSROP purposes we recommend the Lambert Equal-Area Azimuthal projection. Hence we have chosen this projection, with 120 degrees East as Central Meridian and 71 degrees North as Reference Latitude, as the default INSROP projection. The default distance units are set to kilometres.

When you are projecting a view, make sure all data themes in the view are stored in geographic co-ordinates. As reminder, when choosing the **Use INSROP Projection** menu choice, the user is asked whether this is true.

7.2.2 Creating a Latitude-Longitude graticule in a view

A latitude-longitude graticule can be added to a view by choosing the **View-Add Graticule** menu choice. The user is asked to specify graticule resolution in degrees and minutes. The graticule is displayed as 0.3-mm wide black lines. If you want to change the graticule, just specify a new one. The old one is automatically removed. If you want to just remove an existing graticule, choose the **View-Remove Graticule** menu choice.

Note: A graticule can only be added to a projected view. This again requires that the spatial data are stored as decimal degrees.

7.3 INSROP GIS theme display options

The theme display options described in this section are included in the Theme menu in the Views menu bar. In addition to the standard ArcView menu choices, the following menu choices affect the display of spatial data:

- Display attribute (with a legend)
- Display 'linked' attribute (with a legend)
- Classify attribute (with a legend)
- Display Vector arrows
- Remove Vector arrows

The Theme menu also includes other menu choices operating on one or more active themes:

- Display Metadata ASCII file
- Convert to ASCII

- Update Feature Sizes
- Create Field Definition file
- Create Metadata ASCII file

7.3.1 Display attribute (with a legend)

The process of displaying an attribute with a legend as defined in the attribute value look-up-table (see Section 12.4.5) involves the following steps:

1. Get colour name definitions
2. Get a list of active themes
3. Get a list of all attributes in the active theme
4. Get the proper data set member definition file
5. Get the definitions of the active theme
6. Get the data set member attribute definition file of the active theme
7. Select the attribute to display
8. Get the proper attribute value look-up-file
9. Update the legend and theme display based on the contents of the attribute value look-up-table

These steps are described in more detail in the following:

Get colour name definitions

The colour names used by this INSROP GIS function is defined in an AVENUE script called INSROP.RGBColorNameDictionary (see Appendix C). These colour name definitions are similar to the UNIX colour name definitions. This step requires no user input.

Get a list of active themes

If there are active themes, they are put in a list and processed one at a time. If no themes are active the user is asked to make a theme active and try again. If there is more than one active theme, the following sequence of steps is repeated for each active theme. This step requires no user input.

Get a list of all attributes in the active theme

This step is useful when there are more than one active theme. If subsequent active themes have the same attributes, Steps 4-8 are only carried out for the first of these themes, and the information obtained then is used for all the remaining themes in the sequence. This step requires no user input.

Get the proper data set member definition file

This step searches for a data set member definition file in the folder where the active theme is stored. If more than one is found, the user is prompted to select the proper data set member definition file. If none is found, INSROP GIS assumes that the data set member attribute definition file is called *alias.fld* and Step 5 is skipped.

Get the definitions of the active theme

A theme is a data set member, and the data set member definition file from Step 4 may include the theme definitions as described in Section 5.4.3. Only the *Theme-ID* is a mandatory definition parameter. If no *Theme-ID* satisfying the active theme is found, or the *Aliasfile* column value is empty, INSROP GIS assumes that the data set member attribute definition file is called *alias.fld*.

Get the data set member attribute definition file of the active theme

If not already existing in the project, this file is added to the project as a table document. To determine whether the file already exists, INSROP GIS checks whether the table name and

comments (see Table-Properties) are identical. The table comments are taken from the comment line (Line 2) in the data set member attribute definition file when the table is added to the project. If no suitable data set member attribute definition file is found, the user is prompted for one.

Select the attribute to display

The data set member attribute definition file should include definition parameters for the attributes the user is allowed to display with this INSROP GIS function. As the function is intended for unique classification, there should only be a limited set of possible attribute values. If the number of different attribute values is large, we recommend using *Theme-Classify Field* instead.

The user is prompted to select one attribute to display.

Note: To use a specified default symbol/colour (not depending on a particular attribute value), use "Default" in the attribute *Fieldname* column in the data set member attribute definition file and in the *Value* column in the attribute value look-up-file.

Get the proper attribute value look-up-file

The name of this file was defined in the data set member attribute definition table. If not already existing in the project, this file is added to the project as a table document. To determine whether the file already exists, INSROP GIS checks whether the table name and comments (see Table-Properties) are identical. The table comments are taken from the comment line (Line 2) in the attribute value look-up-file when the table is added to the project. If no suitable attribute value look-up-file is found, the user is prompted for one.

Update the legend and theme display based on the contents of the attribute value look-up-table

Based on the actual attribute values in the active theme and the attribute value look-up-table, the display of features in the theme and the associated legend is updated. If there are more than one active theme, the process will now start over at Step 3 until all active themes are processed, or the user has *Cancelled* the process.

7.3.2 Display 'linked' attribute (with a legend)

The main purpose of this option is to enable display of one-to-many related attributes. Such attributes can be linked to a theme attribute table, but the theme legend cannot display symbols/colours based on an attribute in a linked table. One-to-one related attributes can be joined to the active theme and displayed directly, but one-to-many related attributes must be reduced to a one-to-one relation first. The process of displaying an attribute in an associated table therefore involves the following steps:

1. Choose the table with the ('linked') attribute to display
2. Query the table to enable one-to-one join of selected records
3. Export the selected records to a temporary table
4. Join the temporary table to the attribute table of the active theme
5. Select the attribute to display
6. Display the theme with a legend based on the 'linked' attribute

These steps are described in more detail in the following:

Choose the table with the ('linked') attribute to display

The first step creates a list of table documents that are not feature attribute table of themes. The user is then prompted to select the table comprising the attribute he wants to display.

Query the table to enable one-to-one join of selected records

This step opens the Query window and enables the user to specify a query to reduce a one-to-many related table to a one-to-one relation on selected records. E.g. if a table includes 12 monthly values for each location, a query selection one particular month will enable display of this monthly value at each location.

Export the selected records to a temporary table

The user is first prompted to create a temporary table. Existing tables can be overwritten if they are not active. Then the selected records are exported to this temporary table.

Join the temporary table to the attribute table of the active theme

The user is prompted to select the attribute in the temporary (associated) table and the attribute table of the active theme that are common and therefore enables a join of the two tables.

Select the attribute to display

The user is prompted to select the associated ('linked') attribute to display.

Display the theme with a legend based on the 'linked' attribute

Now that the attribute is joined to the theme attribute table, the legend can be displayed based on the attribute values of the originally one-to-many related attribute. First a unique classification is attempted, but if there are too many unique attribute values, the user is prompted to select *Quantile* or *Equal interval* classification and number of intervals.

7.3.3 Classify attribute (with a legend)

Attributes with many different values (e.g. percentages) are not suited for display with a unique legend. For such attributes this menu choice is necessary or may at least be more suited than the Display attribute menu choice. The process of classifying an attribute involves the following steps:

1. Get colour name definitions
2. Get a list of active themes
3. Get a list of all attributes in the active theme
4. Get the proper data set member definition file
5. Get the definitions of the active theme
6. Get the data set member attribute definition file of the active theme
7. Select the attribute to display
8. Select the legend to use for this attribute
9. Select whether to display legend in colour or grey-scale
10. Update the legend and theme display based on the contents of the selected legend

These steps are described in more detail in the following:

Get colour name definitions

The colour names used by this INSROP GIS function is defined in an AVENUE script called INSROP.RGBColorNameDictionary (see Appendix C). These colour name definitions are similar to the UNIX colour name definitions. This step requires no user input.

Get the active theme

If there is more than one active theme, the user is asked to activate only one theme. This step requires no user input.

Get a list of all attributes in the active theme

This step requires no user input.

Get the proper data set member definition file

This step searches for a data set member definition file in the folder where the active theme is stored. If more than one is found, the user is prompted to select the proper data set member definition file. If none is found, INSROP GIS assumes that the data set member attribute definition file is called *alias.fld* and Step 5 is skipped.

Get the definitions of the active theme

A theme is a data set member, and the data set member definition file from Step 4 may include the theme definitions as described in Section 5.4.3. Only the *Theme-ID* is a mandatory definition parameter. If no *Theme-ID* satisfying the active theme is found, or the *Aliasfile* column value is empty, INSROP GIS assumes that the data set member attribute definition file is called *alias.fld*.

Get the data set member attribute definition file of the active theme

If not already existing in the project, this file is added to the project as a table document. To determine whether the file already exists, INSROP GIS checks whether the table name and comments (see Table-Properties) are identical. The table comments are taken from the comment line (Line 2) in the data set member attribute definition file when the table is added to the project. If no suitable data set member attribute definition file is found, the user is prompted for one.

Select the attribute to display

The user is prompted to select one attribute to display.

Select the legend to use for this attribute

The user is presented a list of predefined legends and is prompted to select one.

Select whether to display legend in colour or grey-scale

The user is prompted to confirm whether to use a grey-scale legend or not.

Update the legend and theme display based on the contents of the selected legend

Based on the actual attribute values in the active theme and the attribute value look-up-table, the display of features in the theme and the associated legend is updated.

7.3.4 Display vector arrows

Vector arrows can be displayed for point themes where the attribute table includes attributes defining length and direction of a vector or the vector components. For projected views (requires source data in decimal degrees), the direction is the compass direction from each point, and the vector components are along the north and east direction from each point. If the source data are projected, the vector direction and components must be in the X-Y co-ordinate system of the projected source data. It is required that both the *Map units* and the *Distance units* are defined in the *View properties*, as the map units define the actual length of a vector, while the display units define the corresponding display length of the vector.

The display of vector arrows involves the following steps

1. Make the requested theme(s) active
2. Specify line width of the arrow
3. Select type of vector definition
4. Select the proper attribute fields
5. Specify maximum display length of arrows
6. Specify arrow scale
7. Select arrow direction
8. Create arrows

These steps are described in more detail in the following:

Make the requested theme(s) active

The theme(s) for which to display vector arrows must be active, and they must all be point themes comprising attributes defining the vectors. Also, as the arrow colours are taken from the legend of each theme (see Step 6), each legend should be classified in the way the user wants the arrows to appear.

Specify line width of the arrow

Only one type of arrow is currently available, and this is a solid-line arrow, where the arrowhead is drawn at 45 degree angles and extending 0.25 of the size of the vector. The user is prompted to specify the line width, in millimetres, of the arrow.

Note: The user's choice of arrow line width will be used for all active themes. If the user wants to vary the line width for different themes, only the themes with the same line width should be made active and then processed at a time.

Select type of vector definition

For each active theme, the user is prompted to select how the vectors are defined. The choices are:

- Length/Speed and direction
- X/Y (E/N) components

Select the proper attribute fields

Depending on the choice made in the previous step, the user is presented with a list of attribute fields within the current active theme and prompted to select the required vector definition attribute fields (one at a time).

Specify maximum display length of arrows

The user is prompted for how long the longest arrow should be when displayed in the view. The figure is in distance units. If e.g. the measurement points are stored in a 100-km mesh, it might be advantageous not to let the longest arrow be longer than 100 km.

Specify arrow scale

To establish the display length of the arrows, the display scale of the arrows must be known. For the current active theme, the user is prompted to specify how many vector units are to be represented by 1 distance unit. If the distance units are km, and the user specifies 2, this means that a vector with length 10 (of units used in the theme attribute table) will be displayed as a 5-km long arrow. The user should select a scale that fits the display scale, the distance between the data points, and the maximum vector length.

The default value is calculated from the specified maximum display length and the maximum vector length (as derived from the data in the attribute table). Entering a *smaller* number than the default value means that the longest arrow will be *longer* than the specified maximum display length and vice versa.

Select arrow direction

For some data (e.g. wind data) the direction specified by the vector data may be the *from* direction and not the *to* direction. As default the arrows will point in the *to* direction, but the user is prompted to answer Yes or No whether the arrows should be pointing in the reverse direction.

Create arrows

To create an arrow, the location, length, direction, colour and width of the arrow must be specified. The location is determined from the co-ordinates of the selected points in each active theme. If no points in a theme are selected, all points in this theme are used. The display length is taken from the vector attribute(s) and the user-specified arrow scale. The direction is determined from the vector attribute(s), and for project views the direction is in the X-Y co-ordinate system specified by the local North-East co-ordinate system in each point. The width of the arrow was specified by the user in the previous step.

The colour of an arrow is taken from the legend of the theme. This may seem as an unnecessary approach, as it may appear easier to automatically update the legend based on the vector length. However, as different users may want to classify the arrows differently, we have not found it beneficial to use this latter approach. Taking the colours from the legend classification also means

that the point theme can be classified by any attribute, not just the arrow length. This may be quite useful for some purposes. For instance, if a point theme include both ice concentration and ice drift vectors, the vectors may be displayed based on ice drift speed and with colours based on classified ice concentration values. Also, vector arrows can be used to show migration routes and with colours showing number of migrating species.

To display vector arrows it is not necessary that the active theme(s) be displayed in the view (switched on). If the themes are displayed, both the legend symbols and the vector arrows will be displayed. To only display arrows, switch the theme(s) off. The vector arrows will anyway be displayed in the viewframe in a layout, but to include the theme legend in the legendframe in a layout, the theme must be displayed in the view.

7.3.5 Remove vector arrows

To remove all vector arrows displayed from one or several point themes, make the theme(s) active and choose the **Remove Vector Arrows** menu choice in the *Theme* menu.

7.3.6 Display Metadata ASCII file

Selecting this menu choice will display the metadata ASCII file associated with the active theme. A metadata file is stored with an *.inf extension, and INSROP GIS will first search for a file with the same basename as the active theme, but with .inf instead of .shp as extension. If no such file is found INSROP GIS will then search for a file with the same basename as the field definition file of active theme, but with .inf instead of .fld as extension. If no such file is found either, INSROP GIS will then search for a file with the folder name of the active theme as basename and with a .inf extension.

As indicated above, one ASCII file may be used as metadata ASCII file to all themes in a folder, or a few ASCII files may be used as metadata ASCII files to several similar themes in a folder.

7.3.7 Convert to ASCII

This choice will write co-ordinate and attribute data for the selected features in active themes to ASCII files using the INSROP GIS ASCII format (see Section 14.1). If no features in the theme is selected the user is prompted to verify if all features should be written to an ASCII file.

7.3.8 Update Feature Sizes

Data sets created by ARC/INFO include feature size attributes calculated when the topology was established. Line themes include the length of each line feature (ARC/INFO arc), while polygon features include the area and perimeter of each polygon. However, as these measures are based on source data co-ordinates (ArcView Map units), the size of features defined by decimal degree co-ordinates has no meaning. For data sets created as new shapefiles, e.g. by importing spatial ASCII data, no feature size attributes are calculated and included. Hence, for classification of features based on size, or to make calculation involving a feature size, e.g. areal density, attributes showing real feature sizes must be included.

To achieve this, make the theme(s) to update active and choose the **Update Feature Sizes** menu choice in the *Theme* menu. This utility will check whether the active theme(s) has proper feature size attribute fields, and if not it will create and add such attribute fields. Then the size of each feature will be calculated and entered into the proper attribute field records. For Line themes the feature size attribute field is named "Length", while for Polygon themes the feature size attribute fields are named "Area" and "Perimeter". The feature sizes are in *Map units* and are specified with 3 decimals.

Note: You must have write access to the files of the active theme to use this menu choice.

7.3.9 Create Field Definition file

Selecting this menu choice will enable creating a data set member attribute definition file for the active theme. For each attribute, the user is prompted to specify field name alias, whether to allow using the Display attribute menu choice, name of an attribute value look-up file, and a brief free-text description of the attribute. The information is written to an ASCII file with the same basename as the active theme, but with .fld instead of .shp as extension.

Note: You must have write access to the folder of the active theme to use this menu choice.

7.3.10 Create Metadata ASCII file

Selecting this menu choice will create a metadata ASCII file for the active theme. The metadata file is stored with the same basename as the active theme, but with .inf instead of .shp as extension. If you want to let the created metadata file be representative to several themes, you may rename the file according to the explanation in Section 7.3.6.

Note: You must have write access to the folder of the active theme to use this menu choice.

7.4 INSROP GIS queries

This section describes the general INSROP GIS query process, while the actual queries are documented further in Chapter 11. It is important to remember that the INSROP GIS queries represent a set of queries tailored to special data sets or data types. Basic queries of the type "What is where?" or "Where is what?" are meant to be answered by using the inherent ArcView thematic or spatial selection, classification and/or display capabilities.

INSROP GIS queries are initiated from the INSROP GIS Queries menu in the Views menu bar. Some queries requires that the proper theme(s) is already in the view, while most queries will check whether the proper theme is already in the view, and add it if not. For queries utilising the hotlink tool, the necessary preparations for using the hotlink tool are made. Some queries require that a selected subset of a data set be exported to a temporary dBase file, which is then joined to a theme to display an attribute. The user is here prompted for the name of the temporary file.

For the queries producing charts, the status of the toggle menu choice: Query-Display charts in colour / Query-Display charts in black/white, determines whether charts are prepared in colour or black/white. The latter is recommended before printing to a non-colour printer.

The main steps in the INSROP GIS query process are as follows:

1. Choose an information topic to query
2. Select an information sub-topic
3. Select data set (if necessary)
4. Select a query
5. Run the query to provide the requested information

A more detailed description of these steps is included in the following:

Choose an information topic to query

The INSROP GIS Queries menu lists a set of information topics. Select one of the topics to initiate the query sequence.

- Administrative Boundaries
- Base Cartography
- Coastal Zone
- Environmental Impacts
- Environmental Impact Assessment
- Ice and Snow
- Icing on structures at sea
- Indigenous Peoples

- Infrastructure
- Marine Birds
- Marine and Anadromous Fish and Invertebrates
- Marine Mammals
- Meteorology
- Navigation
- Ocean and Rivers

Select an information sub-topic

Within each of the overall information topics, there may be a range of information sub-topics. The user is presented with a list of information sub-topics and may select one of them.

Select data set (if necessary)

Within each of the information sub-topics topics, there may be a range of data sets. The user is presented with a list of data sets and may select one of them.

Select a query

If there is only one query, this step may be omitted. Instead the user may be informed that the hotlink tool should be utilised in the next step.

Run the query to provide the requested information

Now INSROP GIS will initiate the selected query. For some queries additional input is required, in which case the user is prompted for this information. The results of the queries may be displayed in a range of ways, e.g. with a classified legend, as a report in a message window, or as a Chart. This depends on the selected query. See Chapter 11 for more details.

7.5 INSROP GIS tools

The tools described in this section are included in the **INSROP GIS Tools** menu in the Views menu bar (they should not be confused with the tools in the Toolbar).

7.5.1 Quality control

The quality control works on the contents of the attribute table of one or more themes in a view. The purpose is to get statistics on the contents of the attribute fields, as well as to check the range of the attribute values. The following steps are involved:

1. Select the theme(s) to control
2. Specify a table to store the outcome of the quality control
3. Specify the attribute table field(s) to be controlled
4. Specify legal value range of each attribute table field
5. Run the quality control
6. Report results

These steps are described in more detail in the following:

Select the theme(s) to control

Any active themes in the view will be quality controlled. If none are active, the user is asked to select one of the themes in the view.

Specify a table to store the outcome of the quality control

The user is prompted for a name of the file where the quality control results will be stored. The file will be created as a dBase table with the following fields:

- Field The name of a controlled field
- Type The type of the field

- #Records Number of records in the table
- MinLim The specified minimum limit of the legal value range
- MaxLim The specified maximum limit of the legal value range
- Min. Value The minimum data value in the field
- Max. Value The maximum data value in the field
- #values < MinLim Number of records with data value less than the specified minimum limit of the legal value range
- #values > MaxLim Number of records with data value greater than the specified maximum limit of the legal value range
- #Nodata The specified Nodata value
- #Empty records The number of empty (without data value) records in the field

Specify the attribute table field(s) to be controlled

The user may choose to control all fields in the table, or one particular field. In the latter case the user is asked to select which field to control.

Specify legal value range of each attribute table field

For numeric fields, the user may specify the lower and upper limits of a legal value range, as well as a Nodata (Unknown/Undetermined) value. By default these values are *nil*, in which case any data value will be accepted as a legal value.

Run the quality control

In this step the value in each record in each field is checked and the various control parameters updated. For non-numeric fields only the Field, Type and #Records fields will be filled with information.

Report results

In this step, the table created in Step 2 is filled with the outcome of Step 6 and opened in a Table window so the results may be inspected.

7.5.2 Project Features

As default, ArcView (similar to any other GIS software) displays line and polygon features as a set of straight lines connecting the point co-ordinates defining the feature. When the source data are stored as decimal degrees, ArcView can project the points, but the lines are still straight. This is not always acceptable, e.g. latitudinal or longitudinal lines connecting point co-ordinates defining the zone vertices often define administrative zones. In a map using the Mercator projection (common for sea charts) latitudinal and longitudinal lines form a Cartesian co-ordinate system, and the default display using straight lines is correct. However, if one chooses to use more area- and/or distance-correct projection, the straight lines will deviate from the corresponding projected lines. To solve this problem, we have included a utility to project entire features, not just the vertex co-ordinates.

The utility will project all line segments (spanning more than 1° latitude or longitude) of the selected features in the active themes. If no features are selected in an active theme, the user is prompted to verify whether all features in the theme should be projected. New shapefiles including all features (selected/ projected and unselected/unprojected) from the active themes are created. The user is prompted for the name of each new shapefile. The original themes are deleted from the view and the new ones added. The new projected themes use the similar legend as the corresponding source theme, and the name is the same as the name of the source theme + the string 'projected'.

Note 1: This utility will only work if the View has a projection.

Note 2: Do not delete the shapefile with the unprojected features. The projected features are only valid for the projection they were created for. The resolution of the projected features is also scale-dependent. Hence, if you zoom in to a larger scale or you change the projection, you should start over again from the original feature theme. Remember also that you cannot reuse a shapefile that is included in the active

project. Hence, to reuse one or several shapefiles with projected features, you must delete the theme(s) from the view and save the project. You must also add the original themes again and set up the proper legends. We recommend that you prepare all unprojected feature themes in a source project file, and that you import this project file into the project where you need to project the features.

7.5.3 Create a buffer theme

The main purpose of this utility is to enable analyses of features appearing (or not) within a certain distance from other features. A typical use is to select features within one theme that are within a certain distance from the selected features of another theme. The features selected by a buffer criterion can then be analysed further. Hence, a buffer analysis generally requires two main steps:

- Create a buffer theme
- Use the buffer theme for some purpose

There is also another reason for developing this utility. The ArcView's *Theme-Select by Theme* option in the View window works on source data co-ordinates. This doesn't matter for users wanting to select features of a theme based on whether they intersect or completely contains the selected features of another theme. However, for users wanting to select features of a theme based on whether they are within a distance of the selected features of another theme, there is a critical difference. The reason is that despite ArcView requests a distance in Distance units, the distance measure is converted to source data units. Then the features within the distance in source data units are selected. This is correct for projected source data (unprojected view), but when the source data are in decimal degrees this is incorrect as the real length represented by a decimal degree unit is not the same along the latitude and longitude axis. As a workaround to this problem, a user may create a buffer theme covering a user-specified distance around the selected features of the active themes, and then select features of a theme based on whether they intersect or completely contains the selected features of the created buffer theme.

The steps involved in creating a buffer theme are as follows:

1. Specify the buffer distance
2. Specify name of buffer theme to create
3. Create the buffer theme attribute table
4. Create the buffer features for each active theme
5. Merge overlapping buffer features into non-overlapping features
6. Update the buffer theme legend

These steps are described in more detail in the following:

Specify the buffer distance

The user is prompted to specify a buffer distance in the *Distance units* of the *View*. As the buffer distance is a non-directional measure it must be a positive number.

Specify name of buffer theme to create

The user is prompted to specify a shapefile to create.

Create the buffer theme attribute table

The buffer features are given three attributes: **Buffer-ID**, **Theme**, and **Buffer Distance**. The Buffer-ID includes an ID-number of a feature, the Theme includes the name of the theme which selected feature this buffer feature was created from, and the Buffer Distance includes the specified buffer distance used to create the buffer.

Create the buffer features for each active theme

This step processes one active theme at a time, and the creation of a buffer polygon differs depending on whether the active theme includes point, line or polygon features. The common part is that for each of the selected features in the active theme, one buffer polygon is created. If there are no selected features in the active theme, the user is prompted for whether all features are to be buffered. The reason for having the user to confirm this is to avoid time-consuming buffering of large themes due to the user forgetting to select the features of interest first.

For *point* features, a circular polygon centred on each point and with radius equal to the buffer distance is created.

For *line* features, the buffer polygon includes an area whose outline is one buffer distance from each line.

For *polygon* features, the buffer polygon includes an area whose outline is one buffer distance from the outline of each polygon. A positive buffer distance creates a buffer polygon larger than the source polygon, while a negative buffer distance creates a buffer polygon smaller than the source polygon.

Merge overlapping buffer features into non-overlapping features

As the final buffer theme should only include non-overlapping polygons, overlapping buffer polygons should be joined into one buffer polygon.

Update the buffer theme legend

As default, the buffer theme features are displayed with only a red outline, and with the buffer distance as legend label. If necessary, you may use the Legend Editor to change this display.

7.5.4 Split Features

The purpose of this utility is to enable selected polyline or polygon features in an editable theme to be split by selected polyline features in the active themes. It works similar to the ArcView splitting tool in the View toolbar, but the INSROP GIS tool uses existing polylines rather than a line drawn on the screen.

Note 1: A polygon can only be split by a continuous polyline crossing the polygon outline at least twice.

Note 2: The projection of the view should be temporarily set to 'Standard – Geographic' for the splitting to work.

7.5.5 Convert Points to Polyline

This menu choice is only available for active point themes. The co-ordinates of the selected points will be connected into one polyline and stored in a shapefile. The polyline gets the attributes of the first selected point.

7.5.6 Convert Polylines to Points

This menu choice is only available for active polyline themes. For each of the selected polylines, the co-ordinates of the points defining the polyline will be written to a shapefile. Each point gets the attributes of the polyline it was created from.

7.5.7 Convert Polylines to Polygons

This menu choice is only available for active polyline themes. For each of the selected polylines, the co-ordinates of the points defining the polyline will be used to create a polygon, which is written to a shapefile. Each polygon gets the attributes of the polyline it was created from. The user is prompted whether to force closure on all polylines. If the user responds "No", only polylines where the first and last point is equal (i.e. closed polylines) can be converted to polygons.

7.5.8 Convert Polygons to Polylines

This menu choice is only available for active polygon themes. For each of the selected polygons, the co-ordinates of the points defining the polygon will be used to create a polyline, which is written to a shapefile. Each polyline gets the attributes of the polygon it was created from.

7.6 INSROP GIS View Tools

INSROP GIS includes one additional tool in the *Tool Bar* of the *View* window. This tool is described in the following section. The on-screen digitising tool that was included in INSROP GIS v1.0a has been omitted as a similar capability is now included in ArcView.

7.6.1 Getting the source data location of a point in a view

The *Map unit* co-ordinates of the location of the mouse cursor are constantly updated and displayed in the rightmost part of the *Tool Bar*. For unprojected views the map unit co-ordinates and the source data co-ordinates are identical. However, for projected views the tool bar displays the cursor co-ordinates in projected map units, while the source data are stored in decimal degrees. In many cases it is interesting to see the decimal degree co-ordinates of a point in the view. For this purpose we have added a YX-tool in the Tool Bar of the View. When this tool is active, the location of the cursor when a mouse button is clicked is displayed in source data co-ordinates in the leftmost part of the Statusbar. For projected views this means that the co-ordinates of the point are displayed as decimal degrees and in Degrees, Minutes and Seconds. For unprojected views, the advantage of this tool is that the co-ordinates of the point are only updated when a mouse button is clicked and remains unchanged in the Statusbar until a mouse button is clicked again, or another message appears in the Statusbar.

The tool is activated like any other tool; by clicking the tool button. Activating another tool deactivates it.

7.6.2 Customised Hotlink tools

Some INSROP GIS queries include customised scripts utilising the hotlink capability. The utilities are executed by activating the relevant theme and the hotlink tool and clicking on a feature in the theme. In most cases this will initiate a Chart display of a time series for the feature clicked at. For example, this utility may be used to display minimum, mean and maximum monthly air temperatures for the measurement station clicked at, of monthly time series of river flowrates at the measurement station clicked at.

The typical data model when such customised hotlink tools are useful, are when a feature theme includes a set of spatial features and their attributes, incl. a feature ID, and the actual time series data are stored in a database file which also includes the feature ID. The feature theme will then be stored with only one record per feature, while the database file will have a set of time series records for each feature ID.

If you instead of displaying time series for one location, want to show the values at a give point in time for all locations, you must use the Theme - Display 'linked' attribute menu choice (See Section 7.3.2).

In the INSROP GIS Queries (See Chapter 11) both these options are utilised and are carried out automatically depending on the user's choice.

8. TABLES: ATTRIBUTE DATA

8.1 Creating or opening a Table

A table can be added to the project in two ways; From the Project window, or from the View window. From the Project window a table document is created by double-clicking the Table icon or by choosing the **Project-Add Table** or **Project-Add INSROP Table** menu choice. An existing table document is opened by double-clicking a table name in the list of table documents in the project. From the view, making the theme active and choosing the Open table button in the view's button bar opens the attribute table of a theme.

A table document is only a viewer to the contents of a table file (dBase, INFO, or Tab-delimited text file). It is possible in ArcView to edit elements in a dBase table file and also to create a new table, but for all but minor edits a spreadsheet (e.g. MS Excel) is must better suited for table editing.

8.2 INSROP GIS Tools

The tools described in this section are included in the **INSROP GIS Tools** menu in the Tables menu bar.

8.2.1 Quality control

The quality control of a table works similarly to the quality control of a theme in a view (see Section 7.5.1).

9. CHARTS: DISPLAY AND QUERY ATTRIBUTE DATA

9.1 Creating or opening a Chart

A Chart is primarily created from the Table window, and works pretty much like charts created from a spreadsheet, but an existing chart may be opened from the Project window by double-clicking a chart name in the list of chart documents in the project. INSROP GIS has no extended functionality in the Chart window, but in some cases, charts are created directly from a View (see Chapter 7).

Note: There is a bug in ArcView that will cut the right side of large-sized charts when displayed in a Chartframe in a Layout. A workaround to display the entire chart is to reduce the chart window to a width that is about 3/5 of the screen width.

10. LAYOUTS: PREPARING AND PRINTING PLOTS

10.1 Creating or opening a Layout

A layout can be created in two ways; from the Project window, or from a View. From the Project window double-clicking the Layout icon creates a new layout. An existing layout is opened by double-clicking a layout name in the list of layout documents in the project. From the view choosing the View - Layout... menu choice creates a layout.

A layout can be created with a pre-defined layout template. When creating a layout from a view, the user is automatically requested to select a layout template. In the Layout window, a layout template can be selected by the **Layout-Use Template ...** menu choice.

10.2 Components of a Layout

A layout may include ArcView elements (Views, Tables, Charts) and ancillary objects such as legends and scale bars in special frames. To get data into these frames, they must be linked to an ArcView element and will then depend on properties in the linked element (e.g. the scale of a view). In addition, created graphics (points, lines, polygons, polylines, rectangles and circles) and text can be added.

As the frames in a layout are linked to ArcView elements, and do not include any data, any updates in the linked elements are reflected in the Layout.

Note: The scale of a view is determined from the scale of the View window when the window's *Maximise button* is visible (and not the *Restore* button) in the upper right corner of the window frame.

Tip: To maximise a View window, press the Maximise button in the upper right corner of the window frame. This changes the Maximise button to the Restore button. By closing and reopening the window (from the project window), the Restore button will be changed to the Maximise button without resizing the window.

10.3 Editing the legend of a viewframe

When using one of the layout templates, each viewframe is associated with a legendframe. By default the legendframe includes the non-hidden legends of the active themes in the view linked to the viewframe. In some cases it might be preferable to modify some elements in the legendframe. To enable editing of elements, the legend must be simplified, which means that the link to the view is cut, and the legends are converted to a collection of simple graphical elements. These graphical elements can now be selected and edited similarly to any other basic graphical element in a layout.

Note: Once the legendframe has been simplified, the link to the view no longer exists, and any updates in the view will not be reflected in the legendframe. Hence, it is recommended that simplification of a legend is the final editing step before the map is printed. If you ever need to recreate the legend after simplification, delete all parts of the simplified legend and create a new legendframe linked to the view in the viewframe.

10.4 Creating a Latitude-Longitude Graticule

A latitude-longitude graticule can be added to a view frame by choosing the **Layout-Add Graticule** menu choice. The user is asked to specify graticule resolution in degrees and minutes. The graticule is displayed as 0.3-mm wide black lines. If you want to change the graticule, just specify a new one. The old one is automatically removed. Also any existing graticule in the View linked to the view frame is also removed. If you want to just remove an existing graticule, choose the **Layout-Remove Graticule** menu choice.

Note 1: A graticule can at present only be added to a projected view. This again requires that the spatial data are stored as decimal degrees.

Note 2: When adding a graticule to a view frame without an existing graticule, the size of the view frame will be reduced to allow printing graticule labels (degrees and minutes) without exceeding the original view frame area. When removing an existing graticule the original size of the view frame will be restored.

11. INSROP GIS Queries

The INSROP GIS queries provide a fast and easy way of preparing information from the INSROP GIS database. This chapter describes the implemented queries and provides information about user interaction, data sources and result presentation.

The main steps in the INSROP GIS query process are as follows:

1. Make sure you are in a View window
2. Make sure the View is projected (See Section 7.2.1)
3. Add some base cartographic data (if necessary)
4. Choose an information topic to query
5. Select an information sub-topic
6. Select data set (if necessary)
7. Select a query
8. Run the query to provide the requested information

11.1 Administrative Boundaries queries

These queries may produce information within the following categories:

- Baselines
- Baseline analysis
- Protected areas

11.1.1 Baselines

The following information is available within this category:

- Show Russian baselines
- Show definition points for Russian baselines

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.1.1.1 Show Russian baselines

Running this query will add the 'Russian baselines' theme to the View.

11.1.1.2 Show definition points for Russian baselines

Running this query will add the 'definition points for Russian baselines' theme to the View, and set up the hotlink properties to enable use of the hotlink tool to show the source decree reference for a definition point.

11.1.2 Baseline analysis

The following information is available within this category:

- Calculate statistics for bays within baselines
- Calculate statistics for islands within baselines

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.1.2.1 Calculate statistics for bays within baselines

The purpose of this query is to carry out an analysis of a set of bays within the Russian baselines. The analysis requires a polygon shapefile defining the bays and a polyline shapefile defining the baseline. The user may use his own data for the bays, but they must be structured similarly as the predefined bays, and the line segments defining the bay mouths must be a part of the polyline shapefile defining the baseline. The predefined bay polygons were created by joining line

segments from the Russian baselines data set (polyline shapefile) and the coastline from the World Vector Shoreline (1:250 000).

For each of the selected bays (all bays if none are selected), the straight baseline segments (segments classified as Type 1) equal to the lines defining the bay mouth will be selected. In the polygon shapefile defining the bays, fields for the following parameters will be created (or updated if already existing): "Width of bay (nm)", "Halfcircle area from Width of bay (nm^2)", "Total area of bay (nm^2)", and "Total area / Halfcircle area".

Source data set: Predefined or to be provided by user

Result: An updated view, where the updated polygon shapefile defining the bays is added as a theme and where the user may use the identify tool to see the results for any single outline area.

11.1.2.2 Calculate statistics for islands within baselines

The purpose of this query is to carry out an analysis of a set of island areas within the Russian baselines. The analysis requires a polygon shapefile defining the outlines of island areas and a polygon shapefile defining the islands. The user may use his/hers own data for the outlines of island areas. The predefined outlines were created by joining line segments from the Russian baselines data set (polyline shapefile) and the coastline from the World Vector Shoreline (1:250 000).

For each of the selected outlines (all outlines if none are selected), all islands within the outline polygon will be selected. In the polygon shapefile defining the outlines of island areas, fields for the following parameters will be created (or updated if already existing): "Total area (nm^2)", "Area of islands (nm^2)", "Total water area (nm^2)", and "Water area / Land area".

Source data set: Predefined or to be provided by user

Result: An updated view, where the updated polygon shapefile defining the outlines of island areas is added as a theme and where the user may use the identify tool to see the results for any single outline area.

11.1.3 Protected Areas

Running the query will add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified according to the status of the protected areas according to the IUCN categories.

Source data set: Russian protected areas

Result: The result is an updated view. The protected areas are displayed with colours from the legend associated with the theme.

11.2 Coastal Zone

These queries may produce information within the following categories:

- Shoreline

11.2.1 Shoreline

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user will then be asked to select which sediment type to show, and the theme will then be classified according to the percentage distribution of this sediment type.

Source data set: NSR shoreline

Result: The result is an updated view. The sediment composition is displayed with colours from the legend associated with the theme.

11.3 Environmental Impacts queries

These queries may produce information within the following categories:

- Oil spill simulations

11.3.1 Oil spill simulations

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on one of the starting points for an oil spill simulation.

After clicking on a data point with the hotlink tool, the theme showing the spatial statistics from the oil spill simulations is added to the view and two charts showing statistics for stranding of oil is prepared.

Source data set: INSROP Project I.5.7

Result: An updated view where the theme showing the spatial results of the oil spill simulations is included, and two XY-scatter charts. One XY-scatter chart shows probability (%) of arrival times (days) and the other XY-scatter chart shows probability (%) of stranded amounts (tonnes) of oil.

11.4 Environmental Impact Assessment queries

A separate ArcView Extension is created within this category. See Appendix A for more details.

11.5 Ice and Snow queries

These queries may produce information within the following categories:

- Ice charts
- Ice growth and decay
- Distribution of ice conditions
- Ice concentration
- Ice type/thickness
- Floe size
- Ice pressure
- Hummocked ice
- Ridges
- Polynyas
- Discontinuities in ice (leads)

11.5.1 Ice charts

In the present version of INSROP GIS this category is a demonstration query. It will prompt the user for the ice chart files (prepared by AARI) to be used and will then load and display the ice charts. If the user answers yes when prompted, the ice information will also be shown using the WMO Egg code.

11.5.2 Ice growth and decay

This category include the following sub-categories:

- Stable ice formation
- Ice reaching 20-25 cm thickness
- Ice reaching 50 cm thickness
- Fast ice breakup
- Fast ice breakup in straits

Further information about these sub-categories is provided in the following sections.

11.5.2.1 Stable ice formation

This information can be provided in three ways:

- Dates of ice growth and decay
- Time series for one region
- Spatial distribution for one attribute

Dates of ice growth and decay

This choice will just provide a message to the user. The message tells the user to use the Identify Tool to see the average, earliest and latest date of the various ice growth and decay parameters.

Time series for one region

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on an ice region centre point.

After clicking on a point with the hotlink tool, the user is given a list of categories. The reason for this is that several data from Project I.4.2 are structured similarly and the same script is used to display the results.

Source data set: INSROP Project I.4.2

Result: A bar chart showing frequency of occurrence (%) for the included time periods. The chart title also includes number of observations used to create the data shown in the chart.

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of attributes and must select one of them. Except for the 'Number of Observations' attribute, the other attributes include frequency of occurrence (%) for a range of time periods. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The points are displayed with colours from the probability (%) legend.

11.5.2.2 Ice reaching 20-25 cm thickness

This information can be provided in three ways:

- Dates of ice growth and decay
- Time series for one region
- Spatial distribution for one attribute

Dates of ice growth and decay

This choice will just provide a message to the user. The message tells the user to use the Identify Tool to see the average, earliest and latest date of the various ice growth and decay parameters.

Time series for one region

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on an ice region centre point.

After clicking on a point with the hotlink tool, the user is given a list of categories. The reason for this is that several data from Project I.4.2 are structured similarly and the same script is used to display the results.

Source data set: INSROP Project I.4.2

Result: A bar chart showing frequency of occurrence (%) for the included time periods. The chart title also includes number of observations used to create the data shown in the chart.

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of attributes and must select one of them. Except for the 'Number of Observations' attribute, the other attributes include frequency of occurrence (%) for a range of time periods. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The points are displayed with colours from the probability (%) legend.

11.5.2.3 Ice reaching 50 cm thickness

This information can be provided in three ways:

- Dates of ice growth and decay
- Time series for one region
- Spatial distribution for one attribute

Dates of ice growth and decay

This choice will just provide a message to the user. The message tells the user to use the Identify Tool to see the average, earliest and latest date of the various ice growth and decay parameters.

Time series for one region

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on an ice region centre point.

After clicking on a point with the hotlink tool, the user is given a list of categories. The reason for this is that several data from Project I.4.2 are structured similarly and the same script is used to display the results.

Source data set: INSROP Project I.4.2

Result: A bar chart showing frequency of occurrence (%) for the included time periods. The chart title also includes number of observations used to create the data shown in the chart.

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of attributes and must select one of them. Except for the 'Number of Observations' attribute, the other attributes include frequency of occurrence (%) for a range of time periods. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The points are displayed with colours from the probability (%) legend.

11.5.2.4 Fast ice breakup

This information can be provided in three ways:

- Dates of ice growth and decay
- Time series for one region
- Spatial distribution for one attribute

Dates of ice growth and decay

This choice will just provide a message to the user. The message tells the user to use the Identify Tool to see the average, earliest and latest date of the various ice growth and decay parameters.

Time series for one region

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on an ice region centre point.

After clicking on a point with the hotlink tool, the user is given a list of categories. The reason for this is that several data from Project I.4.2 are structured similarly and the same script is used to display the results.

Source data set: INSROP Project I.4.2

Result: A bar chart showing frequency of occurrence (%) for the included time periods. The chart title also includes number of observations used to create the data shown in the chart.

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of attributes and must select one of them. Except for the 'Number of Observations' attribute, the other attributes include frequency of occurrence (%) for a range of time periods. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The points are displayed with colours from the probability (%) legend.

11.5.2.5 Fast Ice Breakup in Straits

The following information is available within this category:

- Dates of fast ice breakup

Further information about user interaction, data sources and result presentation is provided in the following:

Dates of fast ice breakup

Running the query will add the proper table to the project (if necessary). The user is prompted to select whether to present results as "Number of observations" or "Frequency of occurrence".

Source data set: INSROP: AARI – SOF data transfer 1996

Result: A bar chart showing "Number of observations" or "Frequency of occurrence" of Fast Ice Breakup within given date ranges for the available straits, and a message window showing mean date of breakup and standard deviation for the available straits.

11.5.3 Distribution of ice conditions

The following information is available within this category:

- Probability of encountering various sea ice types within an area.

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.3.1 Probability of encountering various sea ice types within an area.

This query involves a spatial and statistical analysis of the results of the statistical analysis of the AARI Sea Ice Chart database. Running this query will produce charts showing probabilities of encountering various types of sea ice in various concentrations within specified areas.

The user is first given a list of polygon themes in the active view, and must select one of them. If one or several of the polygons in the polygon are selected, only the selected polygons are included in the analysis. As the source data contain results from single- and multiyear analyses, the user is now prompted to whether to use results from the multiyear analysis or from a special year. The user is then prompted to specify the temporal period by entering the first and last month to include in the analysis. By entering e.g. 8 and 4 the months from August to April will be included.

As this query provides new information, the outcome of the analysis must be stored on a file before the charts are created. The user is therefore prompted to specify a dBase file for storing the results. An existing non-used file may be reused. The program will now open the monthly files one by one, extract the data points within the selected areas, and calculate the requested probabilities.

Source data set: AARI Sea Ice Chart Statistics (as prepared by INSROP Project I.3.1)

Result: Three charts are created. The charts show average probability of 'Total ice concentration', 'Old ice concentration', and 'Ice thickness', Each of them include stacked column bars for the various data ranges (e.g. ice concentration) and shows probabilities (%) for each of the months included in the analysis.

11.5.4 Ice concentration

The following information is available within this category:

- Monthly ice concentration statistics (Russian Arctic)
- Monthly ice concentration statistics (INSROP Box B simulation route points)
- Monthly ice type concentration statistics (INSROP Box B simulation route points)
- Ice concentration statistics by month or age category code
- Mean concentration – new ice, nilas, young and first year ice
- Mean concentration – Old, second-year and multi-year ice
- Minimum value of total ice concentration
- Maximum value of total ice concentration

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.4.1 Monthly ice concentration statistics (Russian Arctic)

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. Then the user must select whether to show statistics for Total ice concentration, Old ice, or Fast ice. The user must also select whether to use statistics based on data from all analysed years or from a single year.

Now the user must select which parameter to display. Table 11.1 shows the available options.

Table 11.1 Parameters to display for the various types of ice concentration

Ice concentration	Parameter
Total ice concentration (Ct)	Number of source data values Minimum ice concentration Mean ice concentration Median ice concentration Maximum ice concentration Probability of Ct > 10% Probability of Ct > 40% Probability of Ct > 70%
Old ice concentration (Coi)	Number of source data values Minimum old ice concentration Mean old ice concentration Median old ice concentration Maximum old ice concentration Probability of Coi > 10% Probability of Coi > 40% Probability of Coi > 70%
Fast ice concentration (Cfi)	Number of source data values Probability of Cfi > 10%

After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: AARI Sea Ice Chart Statistics (as prepared by INSROP Project I.3.1)

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the theme.

11.5.4.2 Monthly ice concentration statistics (INSROP Box B simulation route points)

This information can be provided in two ways:

- Time series for one route point
- Spatial distribution for one attribute

Time series for one route point

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a route point.

Source data set: INSROP Project I.4.2

Result: A line chart showing "Number of Observations" for each month and a cumulative bar chart showing frequency of occurrence (%) for each month for the included ice concentration categories (Open water, 1/10 – 3/10, 4/10 – 6/10, 7/10 – 8/10, 9/10 – 10/10)

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Then the user must select which attribute to show: "Number of Observations" or frequency of occurrence (%) for an ice concentration category (Open water, 1/10 – 3/10, 4/10 – 6/10, 7/10 – 8/10, 9/10 – 10/10). After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the attribute.

11.5.4.3 Monthly ice type concentration statistics (INSROP Box B simulation route points)

This information can be provided in two ways:

- Time series for one route point
- Spatial distribution for one attribute

Time series for one route point

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a route point.

After clicking on a point with the hotlink tool, the user is given a list of ice type levels (Total ice concentration, Multi-year ice concentration, First-year ice concentration, Thin ice concentration, Fast ice concentration) and must select one of them.

Source data set: INSROP Project I.5.8

Result: A cumulative bar chart showing frequency of occurrence (%) for each month for the included ice concentration categories (Ice free, 10 – 30 %, 40 – 60 %, 70 – 80 %, 90 – 100 %)

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is first given a choice of whether to show statistics for concentration within 5 ice type levels or for total ice concentration only. The user is then given a list of ice concentration ranges (Ice free, 10 – 30 %, 40 – 60 %, 70 – 80 %, 90 – 100 %) and must select one of them. If the user chose to show statistics for concentration within 5 ice type levels, he is now given a list of ice type levels (Total ice concentration, Multi-year ice concentration, First-year ice concentration, Thin ice concentration, Fast ice concentration) and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

The user is then given a list of months with data and must select one of them. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I. 5.8

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the attribute.

11.5.4.4 Ice concentration statistics by month or age category code

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

After having clicked on a data point with the hotlink tool the user is prompted to select ice concentration resolution, 2/10 or 1/10, and then to select whether to show results by month (for one Age category code) or by age category codes (one month). In the first case the user is the prompted to select an age category code and in the second to select a month.

Source data set: INSROP: AARI – SOF data transfer 1996

Result: One line chart and one stacked-bar chart are created with data for the selected point.

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If the results were to displayed by month (one age category code), the line chart shows minimum, mean and maximum values of ice concentration (x/10) and the stacked-bar chart shows frequency of occurrence (%) within ice concentration ranges the for the selected age category code. Both charts show information for the months with data and the entire year (indicated as month no 13).

If the results were to displayed by age category code (one month), the line chart shows minimum, mean and maximum values of ice concentration (x/10) and the stacked-bar chart shows frequency of occurrence (%) within ice concentration ranges the for the selected month. Both charts show information for age category code numbers. A message window shows what the age category code numbers represent.

11.5.4.5 Mean concentration – new ice, nilas, young and first year ice

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Mean concentration (x/10) – new ice, nilas, young and first year ice'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.4.6 Mean concentration – Old, second-year and multi-year ice

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Mean concentration (x/10) – Old, second-year and multi-year ice'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate

a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.4.7 Minimum value of total ice concentration

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Minimum value (x/10) of total ice concentration'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.4.8 Maximum value of total ice concentration

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Maximum value (x/10) of total ice concentration'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a

selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.5 Ice type/thickness

The following information is available within this category:

- Monthly ice thickness statistics derived from the AARI Sea Ice Chart database
- Monthly statistics from measured or estimated ice thickness
- Monthly ice thickness statistics 1 (INSROP Box B simulation route points)
- Monthly ice thickness statistics 2 (INSROP Box B simulation route points)
- Level ice thickness by cold sum
- Weighted thickness mean of all age categories
- Minimum thickness of all age categories
- Maximum thickness of all age categories

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.5.1 Monthly ice thickness statistics derived from the AARI Sea Ice Chart database

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. The user must also select whether to use statistics based on data from all analysed years or from a single year.

Now the user must select which parameter to display. The available options are:

- Number of source data values
- Minimum ice thickness
- Mean ice thickness
- Median ice thickness
- Maximum ice thickness
- Probability of 70cm < Th > 120cm
- Probability of 120cm < Th > 200cm
- Probability of 200cm < Th

After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: AARI Sea Ice Chart Statistics (as prepared by INSROP Project I.3.1)

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the theme.

11.5.5.2 Monthly statistics from measured or estimated ice thickness

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

After having clicked on a data point with the hotlink tool the user is prompted to specify whether to show ice thickness statistics 'from measurements' or 'estimated from dependencies', and then to select which month to show statistics from. Then the user is prompted to select whether to present results as "Number of observations" or "Frequency of occurrence".

Source data set: INSROP: AARI – SOF data transfer 1996

Result: A bar chart showing "Number of observations" or "Frequency of occurrence" of ice thickness within given thickness ranges.

11.5.5.3 Monthly ice thickness statistics 1 (INSROP Box B simulation route points)

This information can be provided in two ways:

- Time series for one route point
- Spatial distribution for one attribute

Time series for one route point

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a route point.

Source data set: INSROP Project I.4.2

Result: A line chart showing "Number of Observations" for each month and a cumulative bar chart showing frequency of occurrence (%) for each month for the included ice thickness categories (< 30 cm, 30 – 70 cm, 70 – 120 cm, 120 – 200 cm, 200 – 250 cm).

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Then the user must select which attribute to show: "Number of Observations" or frequency of occurrence (%) for an ice thickness category (< 30 cm, 30 – 70 cm, 70 – 120 cm, 120 – 200 cm, 200 – 250 cm). After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the attribute.

11.5.5.4 Monthly ice thickness statistics 2 (INSROP Box B simulation route points)

This information can be provided in two ways:

- Time series for one route point
- Spatial distribution for one attribute

Time series for one route point

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a route point.

After clicking on a point with the hotlink tool, the user is given a list of ice type levels (Total ice concentration, Multi-year ice concentration, First-year ice concentration, Thin ice concentration, Fast ice concentration) and must select one of them.

Source data set: INSROP Project I.5.8

Result: A line chart showing "Maximum", "Minimum", and "Mean" ice thickness for each month and a cumulative bar chart showing frequency of occurrence (%) for each month for the included ice thickness categories (No ice, < 120 cm, 120 – 180 cm, 180 – 240 cm, > 240 cm)

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Then the user must select which attribute to show: "Maximum", "Minimum", or "Mean" ice thickness or frequency of occurrence (%) for an ice thickness category (No ice, < 120 cm, 120 – 180 cm, 180 – 240 cm, > 240 cm). After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I. 5.8

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the attribute.

11.5.5.5 Level ice thickness by cold sum

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

INSROP Project I.3.2

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Level ice thickness (cm) by cold sum'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.5.6 Weighted thickness mean of all age categories

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Weighted thickness mean (cm) of all age categories'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.5.7 Minimum thickness of all age categories

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Minimum thickness (cm) of all age categories'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.5.8 Maximum thickness of all age categories

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Maximum thickness (cm) of all age categories'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is

given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.6 Floe size

The following information is available within this category:

- Prevailing ice floe size

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.6.1 Prevailing ice floe size

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Floe size (km)'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate

a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.7 Ice pressure

The following information is available within this category:

- Monthly ice pressure statistics 1 (INSROP Box B simulation route points)
- Monthly ice pressure statistics 2 (INSROP Box B simulation route points)

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.7.1 Monthly ice pressure statistics 1 (INSROP Box B simulation route points)

This information can be provided in two ways:

- Statistics for one point
- Spatial distribution for one attribute

Time series for one route point

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a route point.

After clicking on a point with the hotlink tool, the user is given a list of months and must select one of them.

Source data set: INSROP Project I.4.2

Result: A line chart showing frequency of occurrence (%) for the included ice pressure intensities (0-1 point, 1 point, 1-2 point, 2 point, 2-3 point, and 3 point).

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. Then the user must select which ice pressure intensity (0-1 point, 1 point, 1-2 point, 2 point, 2-3 point, and 3 point) to show statistics for. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the attribute.

11.5.7.2 Monthly ice pressure statistics 2 (INSROP Box B simulation route points)

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. Then the user must select which ice pressure category to show: "No pressure", "Light", "Medium", or "High" pressure. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I. 5.8

Result: The result is an updated view. The data points are displayed with colours from the legend associated with the attribute.

11.5.8 Hummocked ice

The following information is available within this category:

- Hummocked ice statistics

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.8.1 Hummocked ice statistics

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

Source data set: INSROP: AARI – SOF data transfer 1996

Result: Two line charts are created with data for the selected point and for the months with data and the entire year (indicated as month no 13). One line chart shows minimum, mean and maximum values of area covered by hummocked ice (%), while the second line chart shows frequency of occurrence of areal coverage within predefined ranges.

11.5.9 Ridges

The following information is available within this category:

- Ridge density statistics
- Mean ridge density
- Minimum ridge density
- Maximum ridge density
- Mean ridge height
- Maximum ridge height – 1% exceedance probability
- Maximum ridge height – 0.1% exceedance probability

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.9.1 Ridge density statistics

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

INSROP Project I.3.2

Source data set: INSROP: AARI – SOF data transfer 1996

Result: Two line charts are created with data for the selected point and for the months with data and the entire year (indicated as month no 13). One line chart shows minimum, mean and maximum values of No. of ridges/km, while the second line chart shows frequency of occurrence of No. of ridges/km within predefined ranges.

11.5.9.2 Mean ridge density

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Mean ridge density (N/km)'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.9.3 Minimum ridge density

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Minimum ridge density (N/km)'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.9.4 Maximum ridge density y

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Maximum ridge density (N/km)'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.9.5 Mean ridge height

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Mean ridge height (cm)'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.9.6 Maximum ridge height – 1% exceedance probability

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Maximum ridge height (cm) – 1% exceedance probability'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.9.7 Maximum ridge height – 0.1% exceedance probability

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Maximum ridge height (m) – 0.1% exceedance probability'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.5.10 Polynyas

The following information is available within this category:

- Polynya size statistics

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.10.1 Polynya size statistics

This information can be provided in two ways:

- Time series for one polynya
- Spatial distribution for one attribute

Time series for one polynya

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a polynya (centre point).

Source data set: INSROP Project I.4.2

Result: Three line charts are prepared. One shows : "Number of observation years" and "Frequency of occurrence of polynya (%)", while the other two shows "Average", "Maximum", and "Minimum" values for length (km) and width (km).

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then given a list of months with data and must select one of them. Then the user must select which attribute to show: "Number of observation years", "Frequency of occurrence of polynya (%)", "Average", "Maximum", or "Minimum" length (km) or "Average", "Maximum", or "Minimum" width (km). After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The data points (polynya centres) are displayed with colours from the legend associated with the attribute.

11.5.11 Discontinuities in ice (leads)

The following information is available within this category:

- Specific length (time series for one point)
- Specific length (one year and month)
- Modal data (one year and month)
- Discontinuities in ice statistics

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.5.11.1 Specific length (time series for one point)

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

After clicking on a data point with the hotlink tool, the user is prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP: AARI – FNI data transfer 1996

Result: A bar chart showing distribution of specific length (m/km^2) for the selected time periods (by month, by year, or both).

11.5.11.2 Specific length (one year and month)

Running the query will add the proper theme to the project (if necessary). The user is given a list of month with data and must select one of them. Then the user is given a list of years with data for the selected month and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to

use colour or grey-scale legend, a legend showing specific length (m/km^2) ranges is created, and the theme is displayed using the associated colours.

Source data set: INSROP: AARI – FNI data transfer 1996

Result: The result is an updated view. The points with legal values are displayed with colours from the legend associated with the theme.

11.5.11.3 Modal data (one year and month)

Running the query will add the proper theme to the project (if necessary). The user is given a list of month with data and must select one of them. Then the user is given a list of years with data for the selected month and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Then the user must specify how long (in distance units) a line representing a frequency of occurrence of 100 % should be. After the user has confirmed whether to use colour or grey-scale legend, a legend showing specific length (m/km^2) ranges is created, and the lines are displayed using the colours associated with the data points.

Source data set: INSROP: AARI – FNI data transfer 1996

Result: The result is an updated view. Lines showing frequency of occurrence and orientation of the first and second mode of discontinuities are added to the points with legal values. The lines are displayed with colours from the legend associated with the discontinuities in ice theme.

11.5.11.4 Discontinuities in ice statistics

This information can be provided in two ways:

- Time series for one analysis square
- Spatial distribution for one attribute

Time series for one analysis square

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on an analysis square (centre point).

Source data set: INSROP Project I.4.2

Result: Three line charts and two cumulative bar charts are prepared. One line chart shows number of observations for specific length data, while another chart shows number of observations for the first orientation mode data. The third chart shows total length (km) of discontinuities in ice of the first orientation mode. One cumulative bar chart shows frequency of occurrence (%) within the following specific length ranges (0 – 19 m/km^2, 20 – 39 m/km^2, 40 – 59 m/km^2, 60 – 79 m/km^2, 80 – 99 m/km^2) for the months with data. The other bar chart shows frequency of occurrence (%) within 20-degree ranges of the first orientation mode for the months with data.

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. First the user is then given a choice of whether to show "Specific length statistics" or "First orientation mode statistics". Then the user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Then the user must select which attribute to show: "Number of observations", or Frequency of occurrence within the following specific length ranges (0 – 19 m/km^2, 20 – 39 m/km^2, 40 – 59

m/km^2, 60 – 79 m/km^2, 80 – 99 m/km^2). After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: INSROP Project I.4.2

Result: The result is an updated view. The data points (centre of analysis squares) are displayed with colours from the legend associated with the attribute.

11.6 Icing on structures at sea

These queries may produce information within the following categories:

- Monthly probability of icing

Further information about user interaction, data sources and result presentation is provided in the following:

11.6.1 Monthly probability of icing

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. After the user has confirmed whether to use colour or grey-scale legend, the theme is displayed using the associated legend.

Source data set: INSROP Project I.5.8

Result: The result is an updated view. The route points are displayed with colour from the legend associated with the theme.

11.7 Indigenous peoples

Running the query will add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified according to the geographical distribution of indigenous peoples language groups.

Source data set: Russian Indigenous Peoples

Result: The result is an updated view. The indigenous peoples language groups are displayed with colours indicating the residence areas with a significant portion of indigenous population of the North, Siberia and the Far East.

11.8 Infrastructure

These queries may produce information within the following categories:

- Navigational infrastructure
- NSR ports

11.8.1 Navigational infrastructure

The following information is available within this category:

- Show outline of Communication centre service areas
- Show NSR Region

11.8.1.1 Show outline of Communication centre service areas

Running the query will add the proper theme to the view (if necessary) and make it the active one.

Source data set: Communication centre service areas

Result: The result is an updated view. The outlines of the Communication centre service areas are displayed with different colours for the different areas.

11.8.1.2 Show NSR Region

Running the query will add the proper theme to the view (if necessary) and make it the active one.

Source data set: Communication centre service areas

Result: The result is an updated view. The outlines of the Communication centre service areas are displayed with different colours for the different NSR regions (East and West).

11.8.2 NSR ports

The following information is available within this category:

- Textual information on ports
- Permanently open ports
- Temporarily open ports and points

11.8.2.1 Textual information on ports

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a point representing a port with textual information.

Source data set: NSR Ports

Result: A text information window will appear with textual information on the port clicked at with the hotlink tool.

11.8.2.2 Permanently open ports

Running the query will add the proper theme to the view (if necessary) and make it the active one.

Source data set: NSR Ports

Result: The result is an updated view.

11.8.2.3 Temporarily open ports and points

Running the query will add the proper theme to the view (if necessary) and make it the active one.

Source data set: NSR Ports

Result: The result is an updated view.

11.9 Marine birds

These queries may produce information within the following categories:

- General distribution
- Trend
- Data reliability
- First registration
- Last registration
- Actual numbers

11.9.1 General distribution

Running the query will ask the user to select a species. It will then add the proper theme(s) to the view (if necessary) and make it the active one. The theme(s) will then be classified with a standard classification according to which type of distribution status the different locations have.

Source data set: INSROP Marine Birds

Result: The result is an updated view. The species locations are displayed with colours from the legend for distribution status.

11.9.2 Trend

Running the query will ask the user to select a species. It will then add the proper theme(s) to the view (if necessary) and make it the active one. The theme(s) will then be classified with a standard classification according to the population trend in the different locations.

Source data set: INSROP Marine Birds

Result: The result is an updated view. The species locations are displayed with colours from the legend for trend status.

11.9.3 Data reliability

Running the query will ask the user to select a species. It will then add the proper theme(s) to the view (if necessary) and make it the active one. The theme(s) will then be classified with a standard classification according the data reliability on the different locations.

Source data set: INSROP Marine Birds

Result: The result is an updated view. The species locations are displayed with colours from the legend for data reliability.

11.9.4 First registration

Running the query will ask the user to select a species. It will then add the proper theme(s) to the view (if necessary) and make it the active one. The theme(s) will then be classified with a unique colour according to which year the first registration in the different locations was made.

Source data set: INSROP Marine Birds

Result: The result is an updated view. The species locations are displayed with unique colours for registration year.

11.9.5 Last registration

Running the query will ask the user to select a species. It will then add the proper theme(s) to the view (if necessary) and make it the active one. The theme(s) will then be classified with a unique colour according to which year the last registration in the different locations was made.

Source data set: INSROP Marine Birds

Result: The result is an updated view. The species locations are displayed with unique colours for registration year.

11.9.6 Actual numbers

This query utilises the hotlink tool. Running the query will ask the user to select a species. It will then add the proper theme(s) to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. If two themes apply for the species chosen, the user will be

prompted to select one active theme. The user must then use the hotlink tool to click on a location. After clicking on a location with the hotlink tool, the actual numbers for that location is shown in the status window in the lower left on the screen. The values shown is minimum, maximum and mean value together with the counting unit (P = pairs, I = Individuals)

Source data set: INSROP Marine Birds

Result: The result is an updated view. The species locations are displayed unclassified and the status area (lower left on screen) are updated according to actual numbers for the given species location.

11.10 Marine mammals

These queries may produce information within the following categories:

- General distribution
- Actual numbers (minimum)
- Actual numbers (mean value)
- Actual numbers (maximum)
- Trend
- Data quality

11.10.1 General distribution

Running the query will ask the user to select a species and a month from a list. It will then add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified with a standard classification according to which type of distribution status the different areas have.

Source data set: INSROP Marine Mammals

Result: The result is an updated view. The species locations are displayed with colours from the legend for distribution status.

11.10.2 Actual numbers (minimum)

Running the query will ask the user to select a species and a month from a list. It will then add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified with a standard classification according to minimum population numbers in the different areas.

Source data set: INSROP Marine Mammals

Result: The result is an updated view. The species locations are displayed with colours from the legend for actual numbers.

11.10.3 Actual numbers (mean value)

Running the query will ask the user to select a species and a month from a list. It will then add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified with a standard classification according to mean population numbers in the different areas.

Source data set: INSROP Marine Mammals

Result: The result is an updated view. The species locations are displayed with colours from the legend for actual numbers.

11.10.4 Actual numbers (maximum)

Running the query will ask the user to select a species and a month from a list. It will then add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified with a standard classification according to maximum population numbers in the different areas.

Source data set: INSROP Marine Mammals

Result: The result is an updated view. The species locations are displayed with colours from the legend for actual numbers.

11.10.5 Trend

Running the query will ask the user to select a species and a month from a list. It will then add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified with a standard classification according to population trend in the different areas.

Source data set: INSROP Marine Mammals

Result: The result is an updated view. The species locations are displayed with colours from the legend for population trend.

11.10.6 Data quality

Running the query will ask the user to select a species and a month from a list. It will then add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified with a standard classification according to the data quality in the different areas.

Source data set: INSROP Marine Mammals

Result: The result is an updated view. The species locations are displayed with colours from the legend for data quality.

11.11 Marine and Anadromous Fish and invertebrates

These queries may produce information within the following categories:

- Fish catching areas
- Fish catch statistics
- Benthic sampling stations

11.11.1 Fish catching areas

Running the query will ask the user to select a fish species. It will then add the proper theme to the view (if necessary) and make it the active one. The theme will then be classified according to which type of distribution status the different catching areas have.

Source data set: INSROP marine and anadromous fish

Result: The result is an updated view. The species locations are displayed with colours from the legend for catch area status.

11.11.2 Fish catch statistics

Running the query will ask the user first to select a fish species and then to select a catch area from a list.

Source data set: INSROP marine and anadromous fish

Result: The result is a bar chart showing catch values in tons for the selected species and catch area.

11.11.3 Benthic sampling stations

This query utilises the hotlink tool. Running the query will add the benthic invertebrates sampling stations to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a sampling station. After clicking on a station, a message window will open to report the attributes of this station.

Source data set: INSROP marine and anadromous fish

Result: The result is an updated view. The sampling stations are displayed and a message window is displayed for each time the user uses the hotlink tool.

11.12 Meteorology queries

These queries may produce information within the following categories:

- Wind speed and direction
- Surface wind direction
- Cold sum
- Air temperature
- Air Pressure
- Fog
- Snowstorms

11.12.1 Wind speed and direction

The following information is available within this category:

- Time series for one route point
- Spatial distribution for one attribute

Further information about user interaction, data sources and result presentation is provided in the following:

Time series for one route point

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a route point.

After clicking on a route point with the hotlink tool, the user is given a list of months and must select one of them.

Source data set: INSROP Project I.5.8

Result: Two charts are prepared. The first is a line chart showing "probability of wind direction", "Max. simulated wind speed (m/s)" and "Mean wind speed (m/s)" within a set of wind direction ranges.. The other is a cumulative bar chart showing frequency of occurrence (%) of wind speed (m/s) within a set of wind direction ranges.

Spatial distribution for one attribute

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months and must select one of them. Then the user is given a list of 45-degree direction ranges for the selected month and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

The user is then given a list of available attributes to display and must select one of them. After the user has confirmed whether to use colour or grey-scale legend, and the theme is displayed using the associated legend.

Source data set: INSROP Project I.5.8

Result: The result is an updated view. The route points are displayed with colour from the legend associated with the theme.

11.12.2 Surface wind direction

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Further information about user interaction, data sources and result presentation is provided in the following:

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Surface wind direction'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing surface wind directions (degrees) for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing surface wind directions (degrees) for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing surface wind directions (degrees) for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend showing main surface wind directions (N, NE, ..., NW) is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colour from the legend associated with the theme.

11.12.3 Cold sum

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Further information about user interaction, data sources and result presentation is provided in the following:

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Cold sum'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing cold sum values for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing cold sum values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing cold sum values for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend with cold sum ranges is created, and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.12.4 Air temperature

The following information is available within this category:

- Spatial distribution of air temperature in January

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.12.4.1 Spatial distribution of air temperature in January

Running the query will add the proper theme to the view (if necessary) and make it the active one.

Source data set: AARI – Project I.4.1, WP no. 42

Result: The result is an updated view. A legend showing air temperature ranges is created, and the theme is displayed using the associated colours.

11.12.5 Air Pressure

The following information is available within this category:

- Time series for one segment
- Spatial distribution in one month

Further information about user interaction, data sources and result presentation is provided in the following:

Time series for one segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

After clicking on a data point with the hotlink tool, the user is then given a list of years with data and must select one of them.

Source data set: INSROP: AARI – FNI data transfer 1996

Result: A bar chart showing minimum, mean and maximum air pressure (mbar) by month for the selected year.

Spatial distribution in one month

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. Then the user is prompted to select which parameter to show. The options are Maximum, Mean, Minimum and Standard deviation.

After the user has confirmed whether to use colour or grey-scale legend, a legend showing air pressure ranges is created, and the theme is displayed using the associated colours.

Source data set: INSROP: AARI – FNI data transfer 1996

Result: The result is an updated view. A legend showing air pressure ranges is created, and the theme is displayed using the associated colours.

11.12.6 Fog

The following information is available within this category:

- Monthly probability of fog

Further information about user interaction, data sources and result presentation is provided in the following:

11.12.6.1 Monthly probability of fog

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. After the user has confirmed whether to use colour or grey-scale legend, the theme is displayed using the associated legend.

Source data set: INSROP Project I.5.8

Result: The result is an updated view. The route points are displayed with colour from the legend associated with the theme.

11.12.7 Snowstorms

The following information is available within this category:

- Monthly probability of snowstorms

Further information about user interaction, data sources and result presentation is provided in the following:

11.12.7.1 Monthly probability of snowstorms

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. After the user has confirmed whether to use colour or grey-scale legend, the theme is displayed using the associated legend.

Source data set: INSROP Project I.5.8

Result: The result is an updated view. The route points are displayed with colour from the legend associated with the theme.

11.13 Navigation queries

These queries may produce information within the following categories:

- Ship routes
- Historical sailings
- Ship transit speed statistics

11.13.1 Ship routes

The following information is available within this category:

- Select route by endpoints
- Show navigational hydrographic description of route
- Show total sailing distance along selected route
- Show outline of navigational charts along the routes
- Select points with information on navigation dangers
- Select points with depth less than a give depth
- Select Ports of Call

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.13.1.1 Select route by endpoints

The purpose of this query is to select the Work Package 1 route segments that connects the selected ports of call. The user is first prompted to select start port and destination port from a list of ports. If there are any possible intermediate ports of call, the user is prompted to select <none>, one or several from a list. If there are several route alternatives between the selected ports of call, the user is prompted to select the ones to use.

Source data set: INSROP Box B - Work Package 1

Result: A message window displaying the total sailing distance, as well as the sailing distance between the selected ports of call. In addition the selected route segments will be displayed in the selection colour (default: yellow) when the theme is turned on.

11.13.1.2 Show navigational hydrographic description of route

Running this query will add the 'Work Package 1 routes' theme to the View, and set up the hotlink properties to enable use of the hotlink tool to show the navigational hydrographic description of a route as described in Section 3 of Working Paper 108.

11.13.1.3 Show total sailing distance along selected route

The purpose of this query is to calculate total sailing distance along the Work Package 1 route segments.

Source data set: INSROP Box B - Work Package 1

Result: A message window displaying the total sailing distance along the selected route segments.

11.13.1.4 Show outline of navigational charts along the routes

The purpose of this query is to load and enable display of the outlines of the navigational charts along the Work Package 1 route segments.

Source data set: INSROP Box B - Work Package 1

Result: The result is an updated view. The outlines of the navigational charts along the Work Package 1 routes are displayed with colours depending on the scale of each map. The user may the use the identify tool to get further information (catalogue# and year issued) for any map.

11.13.1.5 Select points with information on navigation dangers

The purpose of this query is to load and enable display of the points along the Work Package 1 route segments. The points with information on navigation dangers will be displayed in the selection colour (default: yellow) when the theme is turned on.

Source data set: INSROP Box B - Work Package 1

Result: The result is an updated view.

11.13.1.6 Select points with depth less than a give depth

The purpose of this query is to load and enable display of the points along the Work Package 1 route segments where the depth is less than the depth provided by the user when prompted for it. These points will be displayed in the selection colour (default: yellow) when the theme is turned on.

Source data set: INSROP Box B - Work Package 1

Result: The result is an updated view.

11.13.1.7 Select Ports of Call

The purpose of this query is to show the location of the Ports of Call along the Work Package 1 routes. The points representing these ports will be displayed in the selection colour (default: yellow) when the theme is turned on, and their name will be added as a label for each of the selected points.

Source data set: INSROP Box B - Work Package 1

Result: The result is an updated view.

11.13.2 Historical sailings

This category was originally intended to include a set of relevant historical sailings. However, not much information for this category became available to the INSROP GIS development theme. Hence, at present only two historical sailings associated with INSROP are included (a sailing from 1991 and the NSR Trial Sailing in 1995). For this reason the queries were not developed further and although they are fully functional they should be regarded more as examples/prototypes and they are not further described in detail. Common results are charts showing e.g. speeds vs. date/time along the selected part of a sailing and sailing duration.

11.13.3 Ship transit speed statistics

The following routes/ships are available within this category:

- Southern route: 25 000 DWT type bulk/container
- Northern route: 40 000 DWT type bulk/container
- Northern route: 50 000 DWT type bulker

For each combination of route and ship the information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a route segment.

The user is the prompted whether to present the data for the selected segment "By Month (one Year)" or "By Year (one Month)".

Source data set: Ship transit speed from INSROP - Box B - Work Package 8

Result: A bar chart showing ship transit speed (knots) for each month (one year) or year (one month).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: Ship transit speed from INSROP - Box B - Work Package 8

Result: A cumulative bar chart showing ship transit speed (knots) for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: Ship transit speed from INSROP - Box B - Work Package 8

Result: A cumulative bar chart showing ship transit speed (knots) for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created, and the theme is displayed using the associated colours.

Source data set: Ship transit speed from INSROP - Box B - Work Package 8

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the transit speed values.

11.14 Ocean and Rivers queries

These queries may produce information within the following categories:

- Ocean currents
- Sea Surface Density
- Sea Surface Salinity
- Sea Surface Temperature
- River Flowrates

11.14.1 Ocean currents

The following information is available within this category:

- Source data information for each data location
- Current vectors
- Total currents direction

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.14.1.1 Source data information for each data location

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then told to use 'Theme – Display attribute" menu choice.

Source data set: INSROP: AARI – FNI data transfer 1996

Result: The result is an updated view. A legend is created showing the various methods for calculating current values, and the theme is displayed using the associated colours.

11.14.1.2 Current vectors

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is then told to use the 'Theme – Display vector arrows" menu choice. The current vectors are stored as Speed and Direction.

Source data set: INSROP: AARI – FNI data transfer 1996

Result: The result is an updated view. The vectors are displayed with colour(s) from the legend associated with the theme.

11.14.1.3 Total currents direction

This information can be provided in four ways:

- Time series for one route segment
- Time series by month for entire route
- Time series by year for entire route
- Spatial distribution for one month in one year

Time series for one route segment

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a segment of the INSROP Work Package 1 routes.

After clicking on a route segment with the hotlink tool, the user is given a list of all parameters from INSROP Box B - Work Package 2. The reason for this is that all data from INSROP Box B - Work Package 2 are structured similarly and the same script is used to display the results. To show current information the user must select 'Total currents direction'. The user is then prompted to select how to display the data (be aware that the choice 'All years and months' should only be used for segments with few data).

Source data set: INSROP Box B - Work Package 2

Result: A bar chart showing current directions (degrees) for the specified time periods (by month, by year, or both).

Time series by month for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. This will initiate a selection of records with data for the selected year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing current directions (degrees) for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Time series by year for entire route

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of months with data and must select one of them. This will initiate a selection of records with data for the selected month, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused.

Source data set: INSROP Box B - Work Package 2

Result: A cumulative bar chart showing current directions (degrees) for each month (one year) or year (one month) for all route segments. If some route segments are selected before running the query, you may choose to present data only for the selected route segments.

Spatial distribution for one month in one year

Running the query will add the proper theme to the view (if necessary) and make it the active one. The user is given a list of years with data and must select one of them. Then the user is given a list of months with data for the selected year and must select one of them. This will initiate a selection of records with data for the selected month and year, and the user is prompted to specify a dBase file for storing the selected records. An existing non-used file may be reused. After the user has confirmed whether to use colour or grey-scale legend, a legend is created showing main current directions (N, NE, ..., NW), and the theme is displayed using the associated colours.

Source data set: INSROP Box B - Work Package 2

Result: The result is an updated view. The route segments are displayed with colours from the legend associated with the theme.

11.14.2 Sea Surface Density

The following information is available within this category:

- Sea Surface Density distribution in a given month

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.14.2.1 Sea Surface Density distribution in a given month

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

After clicking on a data point with the hotlink tool, the user is prompted to select a month to present results for, and to select whether to display results as "Number of observations" or "Frequency of occurrence".

Source data set: INSROP: AARI – SOF data transfer 1996

Result: A bar chart showing "Number of observations" or "Frequency of occurrence" of Sea Surface Density (kg/m^3 above 1000) within the ranges used in the data set at the selected location.

11.14.3 Sea Surface Salinity

The following information is available within this category:

- Sea Surface Salinity distribution in a given month

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.14.3.1 Sea Surface Salinity distribution in a given month

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

After clicking on a data point with the hotlink tool, the user is prompted to select a month to present results for, and to select whether to display results as "Number of observations" or "Frequency of occurrence".

Source data set: INSROP: AARI – SOF data transfer 1996

Result: A bar chart showing "Number of observations" or "Frequency of occurrence" of Sea Surface Salinity (‰) within the ranges used in the data set at the selected location.

11.14.4 Sea Surface Temperature

The following information is available within this category:

- Sea Surface Temperature distribution in a given month

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.14.4.1 Sea Surface Temperature distribution in a given month

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a data location.

After clicking on a data point with the hotlink tool, the user is prompted to select a month to present results for, and to select whether to display results as "Number of observations" or "Frequency of occurrence".

Source data set: INSROP: AARI – SOF data transfer 1996

Result: A bar chart showing "Number of observations" or "Frequency of occurrence" of Sea Surface Temperature (°C) within the ranges used in the data set at the selected location.

11.14.5 River Flowrates

The following information is available within this category:

- Water discharge distribution in a given month

Further information about user interaction, data sources and result presentation is provided in the following sections.

11.14.5.1 Water discharge distribution in a given month

This query utilises the hotlink tool. Running the query will add the proper theme to the view (if necessary) and make it the active one, and associate the proper hotlink script with the theme. The user is then told to use the hotlink tool to click on a river flowrate measuring station.

After clicking on a station with the hotlink tool, the user is prompted to select a month to present results for, and to select whether to display results as "Number of observations" or "Frequency of occurrence".

Source data set: INSROP: AARI – SOF data transfer 1996

Result: A bar chart showing "Number of observations" or "Frequency of occurrence" of total water discharge (km^3) within the ranges used in the data set at the selected location.

12. MAKING YOUR OWN DATA USEFUL IN INSROP GIS

GIS data consists of a spatial component and a tabular component. The spatial component includes spatial co-ordinates (e.g. latitude and longitude) describing the location and shape of spatial features. The tabular component includes attributes describing the characteristics of the spatial features. In ArcView, the spatial features are displayed in a view, while the attributes can be used to classify the spatial features and thereby defining how they should be displayed.

ArcView can handle both spatial and non-spatial data sets. With spatial data we mean GIS data where the spatial and tabular components are stored permanently in a unified set of files (i.e. ARC/INFO coverages or ArcView shapefiles). However, non-spatial tabular data can be joined or linked (through common IDs) to a spatial data set and will then serve as an extended attribute table.

In INSROP GIS we have prepared a set of AVENUE scripts allowing creation of spatial data sets (ArcView shapefiles) by importing spatial co-ordinates and attribute data organised in an ASCII file. If you in addition store and document the data sets you create according to the INSROP GIS requirements, these data sets becomes part of your local INSROP GIS data base.

12.1 Creating a new feature theme from an ASCII file

12.1.1 General procedure for creating new feature themes by importing spatial ASCII data

A geographic feature is characterised by its location and descriptive attributes. INSROP GIS can create new feature themes by importing spatial data (feature data) stored in delimited ASCII table files. The steps involved when importing spatial ASCII data are as follows:

1. Select type of spatial feature to create
2. Select input file
3. Select delimiter
4. Select spatial co-ordinate units
5. Specify output shapefile name
6. Specify the ID attribute and number of other attributes to include
7. Confirm whether the file columns are defined in headerline(s)
8. Specify which columns include the X and Y co-ordinates
9. Define attribute field names and specify the fields
10. Read the input file and create the features

These steps are further described in the following:

Select type of spatial feature to create

The spatial features may be of type point, multipoint, line, multiline, polygon, multipolygons or "route". The "route" feature type is not the same as an ARC/INFO route, see Section 12.1.8. The user is prompted to select one of these feature types.

Select input file

The user is presented a file selection dialogue window, and must navigate the folder tree to find and select the proper ASCII file.

Select delimiter

The ASCII files specifying the co-ordinates and attributes of the spatial features include this information in delimited columns. As delimiter, comma, semi-colon or space may be used. Two commas or semi-colons in a row are interpreted as an empty column value. Hence, there must never be more than one comma or semi-colon between each column, unless the column value really should be empty. There can also not be more than one type of delimiters in each file. If a comma or semi-colon is used as delimiter, any spaces on either side of the delimiter are ignored.

Select spatial co-ordinate units

The input data may be stored as decimal degrees (DD), degrees and minutes (DM), degrees minutes and seconds (DMS), or some projected co-ordinates. Input co-ordinates stored as degrees and minutes or degrees, minutes and seconds will be converted to decimal degrees.

Specify output shapefile name

The user is presented a file creation dialogue window, and must navigate the folder tree to find and select the proper storage location and specify the file name. An existing file may be selected (and overwritten) if the file is not in use.

Specify the ID attribute and number of other attributes to include

Although not strictly required by ArcView, the INSROP GIS development team has found it useful to require that an ID be assigned to each spatial feature. In most cases this ID is just a serial (integer) number, but it may also be a character string. In principle the ID may also be e.g. a location name, but we recommend that the ID attribute is kept short. For string IDs the table field is created as a variable-length character field (see Section 12.1.9), and the user is prompted for maximum number of characters in the string. For number IDs the table field is created as a LONG integer field.

The specification of the ID attribute includes "ID-column label", "ID-column #" and "ID-type (String/Number)", and the user is prompted for these values. The default values are:

<string in column #1 of first line in ASCII file> or "Feature-ID",
"1",
"N",

which means that the IDs are stored in column #1 in the ASCII file and consist of Integer values. The ID column does not have to be the first column, but all columns to the left of the ID column are ignored.

In addition to the specification of the ID column, the user is prompted for the number of attributes to include in the created shapefile. The default value is the number of attributes INSROP GIS has identified in the ASCII file, but the user may specify a smaller number if some of the rightmost attribute columns should be ignored.

Confirm whether the file columns are defined in headerline(s)

The user is prompted to confirm whether the ASCII file column names are included in headerline(s).

Specify which columns include the X and Y co-ordinates

The spatial co-ordinates must be in two sequential columns, but it doesn't matter whether the X- or the Y-co-ordinate column is the first of the two. For geographic co-ordinates the longitude (+ = East) represents the X co-ordinate and the latitude (+ = North) represents the Y co-ordinate. If the ASCII file includes a headerline with N and E included in the two co-ordinate column names (i.e. North and East), INSROP GIS use this to determine which co-ordinate columns include which co-ordinate. If not, the user is prompted to specify the column numbers for the two co-ordinate columns.

Define attribute field names and specify the fields

If the ASCII file includes a headerline, the attribute field names are read from the headerline, and the user is prompted for the type of each attribute. If not, the user is prompted for attribute table field names and specifications. For decimal and string attributes, the user is also prompted for some additional field specifications (see Section 12.1.9).

Read the input file and create the features

Based on the given user input, the ASCII file is read and the shapefile created. During this process the system checks that line features are defined by a minimum of two points and polygon features by a minimum of three points.

12.1.2 Importing ASCII point features

A point feature is characterised by its location and descriptive attributes. The ASCII file may have zero or one header line. A headerline must include the ID column name, co-ordinate column names and attribute field names. The following lines must include the actual ID, co-ordinates, and attribute values for each point feature.

To import point features from an ASCII file, choose the **New Theme from ASCII file** menu choice in the *View* menu in the view window.

12.1.3 Importing ASCII multipoint features

A MultiPoint feature is characterised by a set of points sharing the same descriptive attributes. The ASCII file may have zero or two header lines. The first headerline must include the ID column name and attribute field names, while the second headerline include the co-ordinate column names. The next lines define the multipoint features, where each feature is defined with an attribute line, one co-ordinate line for each point in the multipoint feature, and an 'end-of-feature' line. The attribute line includes the feature ID and other attribute values for the multipoint feature. The 'end-of-feature' line just includes the word END in the beginning of the line. After reading this line, INSROP GIS interprets the next line as the attribute line of the next multipoint feature.

To import multipoint features from an ASCII file, choose the **New Theme from ASCII file** menu choice in the *View* menu in the view window.

12.1.4 Importing ASCII line features

A line feature is characterised by a continuous line, whose location and shape is specified by a set of points, and descriptive attributes. The ASCII file may have zero or two header lines. The first headerline must include the ID column name and attribute field names, while the second headerline include the co-ordinate column names. The next lines defines the line features, where each feature is defined with an attribute line, one co-ordinate line for each point defining the line feature, and an 'end-of-feature' line. The attribute line includes the feature ID and other attribute values for the line feature. The 'end-of-feature' line just includes the word END in the beginning of the line. After reading this line, INSROP GIS interprets the next line as the attribute line of the next line feature.

To import line features from an ASCII file, choose the **New Theme from ASCII file** menu choice in the *View* menu in the view window.

12.1.5 Importing ASCII multiline features

A Multiline feature is characterised by a set of discontinuous lines, where the location and shape of each line is specified by a similar number of point sets, and sharing the same descriptive attributes. The ASCII file may have zero or two header lines. The first headerline must include the ID column name and attribute field names, while the second headerline include the co-ordinate column names. The next lines define the multiline features, where each feature is defined with an attribute line, one co-ordinate line for each point defining the multiline feature, a number of 'newpart' lines, and an 'end-of-feature' line. The attribute line includes the feature ID and other attribute values for the multiline feature. The 'newpart' line just includes the word NEW in the beginning of the line. After reading this line, INSROP GIS interprets the next line as the first point co-ordinate in the next line part of the multiline feature. The 'end-of-feature' line just includes the word END in the beginning of the line. After reading this line, INSROP GIS interprets the next line as the attribute line of the next multiline feature.

To import multiline features from an ASCII file, choose the **New Theme from ASCII file** menu choice in the *View* menu in the view window.

12.1.6 Importing ASCII polygon features

A polygon feature is characterised by a closed line, whose location and shape is specified by a set of points, and descriptive attributes. The ASCII file may have zero or two header lines. The first headerline must include the ID column name and attribute field names, while the second headerline include the co-ordinate column names. The next lines define the polygon features, where

each feature is defined with an attribute line, one co-ordinate line for each point defining the polygon feature, and an 'end-of-feature' line. The attribute line includes the feature ID and other attribute values for the polygon feature. The 'end-of-feature' line just includes the word END in the beginning of the line. After reading this line, INSROP GIS interprets the next line as the attribute line of the next polygon feature.

To import polygon features from an ASCII file, choose the **New Theme from ASCII file** menu choice in the *View* menu in the view window.

12.1.7 Importing ASCII multipolygon features

A MultiPolygon feature is characterised by a set of polygons, whose location and shape is specified by a similar number of point sets, and sharing the same descriptive attributes. The ASCII file may have zero or two header lines. The first headerline must include the ID column name and attribute field names, while the second headerline include the co-ordinate column names. The next lines define the multipolygon features, where each feature is defined with an attribute line, one co-ordinate line for each point defining the multipolygon feature, a number of 'newpart' lines, and an 'end-of-feature' line. The attribute line includes the feature ID and other attribute values for the multipolygon feature. The 'newpart' line just includes the word NEW in the beginning of the line. After reading this line, INSROP GIS interprets the next line as the first point co-ordinate in the next polygon of the multipolygon feature. The 'end-of-feature' line just includes the word END in the beginning of the line. After reading this line, INSROP GIS interprets the next line as the attribute line of the next multipolygon feature.

To import multipolygon features from an ASCII file, choose the **New Theme from ASCII file** menu choice in the *View* menu in the view window.

Note: If a multipolygon includes overlapping polygons, ArcView interprets the overlap zone as a hole. Unless this is the user's intention, multipolygon features should be created from non-overlapping polygons. For non-overlapping polygons, a multipolygon feature is conceptually similar to an ARC/INFO Region feature.

12.1.8 Importing ASCII "route" features

A "route" data set is created from one ASCII file, but consists of two data set members: a point theme and a line theme. The point theme includes the location of points along the "route", e.g. a ship route or historical voyage, and has attribute values describing some aspects of each point along a route. The line theme is created as lines through each set of point co-ordinates and with attributes describing some aspects valid for each route feature.

The procedure for importing "route" features is fairly similar to the general procedure for importing spatial ASCII data (see Section 12.1.1), but as two themes are created, the specified filename is used as basename, where the point theme name is extended with **_p**, and the line theme name with **_l**. In this way the two themes are stored in different shapefiles (which they must be), but it is easy to identify the two shapefiles making up a "route" feature.

After the "route" shapefiles are created they are added to the view as new themes. The point theme is given a name consisting of the basename + "Waypoints", while the line theme is given a name consisting of the basename + "Route". Table 12.1 shows how the user's choice of shapefile name is utilised.

Table 12.1 Example of naming conventions for "route" features

User's shapefile name	Feature type	Actual shapefile names	Theme names
sail95.shp	point	sail95_p.shp	sail95 Waypoints
	line	sail95_l.shp	sail95 Route

To import route features from an ASCII file, choose the **New Theme from ASCII file** menu choice in the *View* menu in the view window.

12.1.9 Attribute field specifications

An ArcView table field, e.g. an attribute field, is defined by its *Name*, *Type*, *Width* and *Precision*. The Name is the true name of the field on the disk, while the Type is the data type of the field. The Width is the number of characters the data in the field occupies, while the Precision is the decimal precision of the field. Note that a decimal point is included in the field width (e.g. 12.34567 has a field width of 8 and precision of 5). Table 12.2 shows a list attribute table field types (used by INSROP GIS) and associated field width and decimal precision. The field type column includes the field type choices available to the user of INSROP GIS, while the FieldEnum is the associated field type created by ArcView. The Width and Precision columns show the values used in INSROP GIS to create the table fields. An asterisk (*) means that the user is prompted for this value. The field width must be large enough to include the largest/longest foreseen attribute value.

Table 12.2 ArcView attribute table field specifications

Field type	FieldEnum	Width	Precision
Integer - 1 byte	#FIELD_BYTE	3	0
Integer - 2 bytes	#FIELD_SHORT	5	0
Integer - 2 bytes	#FIELD_LONG	10	0
Real - 4 bytes	#FIELD_FLOAT	*	*
Real - 8 bytes	#FIELD_DOUBLE	*	*
String - fixed length	#FIELD_CHAR	*	0
String - variable length	#FIELD_VCHAR	*	0
Boolean - Y/N	#FIELD_LOGICAL	1	0
Date - 'yyyymmdd'	#FIELD_DATE	8	0
Date - yyyy-mm-dd'	#FIELD_ISODATE	10	0
Time - 'hh:mm:ss:dd.nnn'	#FIELD_ISOTIME	10	0
Date and Time - 'yyyy-mm-dd hh:mm:ss:dd.nnn	#FIELD_ISODATETIME	24	0

12.2 Importing tabular ASCII data

Delimited ASCII tables can be imported using the ArcView's *Add Table* menu choice in the Project window. By default .txt filename extensions are expected, but the filename (pattern) is easily modified in the "Add Table"-dialogue window which appears.

12.3 Using and documenting your own data

You may extend your INSROP GIS database by adding your own data, either data prepared in ARC/INFO format or as ArcView shapefiles, or by creating ArcView shapefiles using the procedure described in Sections 12.1 or 12.2. If you store and document the data sets you obtain or create according to INSROP GIS requirements, these data sets become part of your INSROP GIS database and are then available for use as any other data set in the INSROP GIS database. The INSROP GIS requirements for storage and documentation are described in the following sections.

12.3.1 Storage locations of INSROP GIS data

The INSROP GIS database is divided into a set of information topics, and all data sets within each information topic are organised in sub-directories below the proper database information topic sub-directory (see Section 12.4). To include your own data into your INSROP GIS database

you must decide into which information topics your data sets belong. If necessary you may establish a new information topic.

After location the proper information topic database folder, you must decide whether your data set is a new data set or if it may be included into another data set. The latter case is mainly appropriate if your data represents an update, extension or replacement to an existing data set. In most cases we foresee that your own data represents a new data set, in which case you must create a new data set folder for your data.

Note: Data in ARC/INFO format includes an INFO folder in addition to the actual data directories. This INFO folder includes information valid to the ARC/INFO workspace the data set was created from, and it is required to enable ArcView to use these data. You can add ArcView shapefiles to a folder with data in ARC/INFO format, but you cannot combine ARC/INFO data sets from different workspaces (with different INFO directories) into one folder. If you nevertheless want to combine such ARC/INFO data sets into one folder, you must either convert the data sets to ArcView shapefiles (e.g. by using the ARCSHAPE command), thereby skipping the need for the INFO folder, or you must organise the data sets into one ARC/INFO workspace.

12.3.2 Documentation of INSROP GIS data

The documentation of a new INSROP GIS data set involves the following steps:

1. Update the database topics definition file
2. Update the proper data set definition file
3. Create a data set member definition file
4. Create data set member attribute definition files
5. Create data set member attribute value look-up-files
6. Create metadata documentation

These steps are further described in the following:

Update the database topic definition file

If your data set is to be included in one of the existing database topics this step is not necessary. However, if you must create a new database information topic, you must add a new line to the database topics definition file (datasets.def) and fill in the proper contents of this file (see Section 12.4.1).

Update the proper data set definition file

If your data set represents a new data set, you must update the proper data set definition file. If you have created a new database topic, you may copy and modify an existing data set definition file. To define the new data set you must add a new line to the data set definition file and fill in the proper contents (see Section 12.4.2).

If your new data represents a modification to an existing data set you may skip this step.

Create a data set member definition file

Create a data set member definition file (see Section 12.4.3) for the data set. The easiest way to do this is by using the *Theme/Table-Create Field Definition File* menu choices. This will use existing information, prompt you for modifications and save data a file corresponding to the Theme/Table file name. Afterwards this file may be edited in a text editor, if needed. If a data set consists of several files with the same attributes, i.e. the files include the same information attributes but differ in geographic or temporal coverage, the combined set of files represents one data set member. As the files may have completely different filenames, a special file name, *Alias.fld*, should be used for the attribute definition file, and the Theme-ID should be set to *All*. However, in such cases this step may be skipped.

Create data set member attribute definition files

An attribute definition file must be created for each different data set member (see Section 12.4.4).

Create data set member attribute value look-up-files

An attribute value look-up-file must be created for each attribute to be displayed with a default legend (see Section 12.4.5).

Create Metadata documentation

Metadata ASCII files are generated using the *Theme/Table-Create Metadata ASCII File* menu choices. The information required to create proper metadata documentation come from three sources: Data set specification known by ArcView; The data set member definition file (also called field definition file), The contents of the Comments field in Theme/Table properties. The latter source can be typed into the Comments field, but if an ASCII file called <data set name>.dco exists when the data set is loaded into the project, the contents of this file is entered into the Comments field. The purpose of this is to include textual information about the data set, how it was created, etc. When creating metadata using this INSROP GIS menu choice, the *.dco file is written based on the contents of the Comments field. If the *.dco file exists, the user is prompted for whether to replace the existing file or not.

12.4 INSROP GIS definition files

12.4.1 Database topics definition file

This file must exist. It is named **datasets.def** and is stored in the $NSR_DATA (i.e. G:\INSROP_GIS\DATABASE) folder. The purpose of the file is to define database information topics and the physical (storage) names of the database sub-directories comprising the data sets within each information topic. The file also defines whether there are additional sub-directory levels. The file is used by the 'Add INSROP theme' menu choice in the Views window and the 'Add INSROP table' menu choice in the Projects window to allow the user to select data sets from information topic names rather than the more cryptic storage names with maximum 8-characters.

The file includes three comma-separated (quoted) string columns, and the first two lines (= header lines) are mandatory and must not be changed. The first column includes the physical name of each database information topic folder, while the second column include the associated descriptive name of each information topic. The third column has two legal values:

N or n The data sets within this topic is located in the data set topic folder.
Y or y The data sets within this topic is located in special data set sub-directories below the data set topic folder. THIS IS THE STANDARD DATABASE ORGANISATION.

If the column is empty, this is interpreted as N. Not all database topics include data sets, and not all data sets may be available to all users. The reason for this option is that not all users may have the complete version of the INSROP GIS database, but it may still be useful to see which data set topics exist in the complete version. The next lines include the actual information topic definitions. The following includes the first three lines in the default datasets.def:

"Directory","Alias","Subsets"
"Overall dataset directory definition file",,
"basecart","Base Cartography","Y"

12.4.2 Data set definition files

The main purpose of these files is to ease retrieval of INSROP GIS data sets. By using these files a user may select data sets by descriptive names rather than by navigating the directory structure. These files must exist, and are stored in the database information topic sub-directories specified by the database topics definition file (datasets.def, ref. Section 12.4.1). The files are named

<subdirectory name>.def, and has a similar structure and functionality as the datasets.def file. The following shows the first three lines in the basecart.def file:

"Directory","Alias","Subsets"
"Overall dataset directory definition file",,
"dcw_1","DCW 1:1 mill.","N"

The first two lines are common to all these files and must not be changed. The first column includes the physical name of each data set folder, while the second column include the associated descriptive name of each data set. The third column has two legal values:

N or n The data set files are located in the specified data set folder.
Y or y The data set files are located in a sub- directory of the specified data set folder.

If the column is empty, this is interpreted as "N". The "N" in the third column means that the actual data sets are stored in the $NSR_DATA\BASECART\DCW_1 folder and will show up in the 'Add INSROP Theme' dialogue window (if the DCW 1:1 mill base cartography data sets are selected).

12.4.3 Data set member definition files

The main purpose of these files is to give loaded data sets descriptive names rather than just filenames. These files also specify the type of spatial data or type of tabular file format, as well as provides a link to the associated attribute definition files. These files are stored in the sub-directories specified by the data set definition file (**<subdirectory name>**.def, ref. Section 12.4.2). The files are named **<data set directory name>.def**. The following shows the contents of the aari_dis.def file:

"Theme-ID","Themealias","FeatureClass","Aliasfile","CoordSys"
"AARI -> FNI data delivery 1996 - dataset definition table",,,,
"aari_dis","Discontinuities in ice - data points","Point","aari_dis.fld","dd"
"DiscontinuitiesInIce","Discontinuities in ice","Table","DiscontinuitiesInIce.fld","dbf"

The first line is common to all these files and must not be changed. The second line is a comment line identifying the data set. The four commas ending the line must be there. The third and fourth lines define two data set members. The first column ("Theme-ID") includes the storage names (ARC/INFO coverage name, ArcView shapefile basename, dBase file basename, etc.) of the data set members, e.g. aari_dis. The second column ("Themealias") specifies the theme alias name that will appear in the View's Table-of-Contents (TOC) or the document name (for a table) appearing in the Projects window. The third column ("Featureclass") specifies the type of spatial feature (point, line, polygon, or table), while the fourth column ("Aliasfile") specifies the name of the respective data set member attribute definition files. The featureclass specification is used to determine the format of the data set member attribute definition file. The fifth column ("Coordsys") is used for two purposes. For a theme it specifies the spatial co-ordinate system of the data set member. The acronym "dd" means decimal degrees and is the recommended spatial co-ordinate system for INSROP GIS. The coordsys information is in some cases used by INSROP GIS to check that a theme in a projected View is stored as decimal degrees (However, it is the user's responsibility to only include themes with similar co-ordinates systems in a View). For a table it is used to provide the extension of the table file name, which is used to identify the table format. Only the first column is mandatory, the other ones are optional.

These files are not required for all data sets, see Section 12.4.4. If you have many similar data sets in a folder, e.g. only separated in time, and you want to use a .def file for documentary purposes, you may use "All" in the *Theme-ID* column and "alias.fld" as *Aliasfile*. You may also use the same data set definition file for several data set members.

12.4.4 Data set member attribute definition files

The main purpose of these files (and the ones described in Section 12.4.5) is to automate legend classification using the same symbols for all similar data themes, but they also serve as documentation of attributes and range of attribute values of each data set member.

These files (also called field definition files) are stored in the same sub-directory as the data set member definition file (<**data set directory name**>.def, ref. Section 12.4.3). The filenames are also specified in this file, except in cases where there are e.g. many similar themes (for instance separated in time). In such cases a file named **alias.fld** may be used as valid for all themes in a data set folder, and the data set member definition file (ref. Section 12.4.3) is not necessary. The format of the files differs depending on whether the data set member is a theme or a table.

The following shows the contents of the aari_riv.fld file (theme format):

```
"Fieldname","Alias","Display","LUT-File","Description"
"Field name aliases and corresponding LUT files for Observation locations for AARI river data",,,,
"Riv_No_","Riv.No.","Y","","AARI river ID number"
"River","River","N","","Name of river"
"Obs__Loc","Observation Location","N","","Name of observation location"
"Dst__to_Mo","Distance to river mouth (km)","Y","","Distance from observation location to river
      mouth (km)"
"Watshd_Are","Watershead Area (km2)","Y","","Watershead Area (km2)"
```

The following shows the contents of the riv_runoff.fld file (table format):

```
"Fieldname","Alias","Description"
"Field name aliases and descriptions for riv_runoff.dbf",,
"Riv__no_","Riv.No.","River ID number"
"Month","Month",""
"Ll","Lower limit","Lower limit (km³)"
"Lu","Upper limit","Upper limit (km³)"
"LL_UL","Range","Lower limit - Upper limit"
"N","No. of observations","No. of observations"
"Fr","Frequency of occurrence (%)","Frequency of occurrence (%)"
```

The first line is common to all these files and must not be changed. The second line is a comment line identifying the data set member. The four/two commas ending the line must be there. The last two lines specify the descriptive attributes suitable for classification with a pre-defined default legend. The first column ("Fieldname") specifies the physical (storage) field names in the attribute table of the theme. The next column ("Alias") specifies a descriptive name for each attribute for use as field name aliases. As the dBase files cannot use field names longer than 10 characters, this utility enables using longer field name aliases when displaying field names to a user. The last column may include a short description of the contents of each field. This description is used when INSROP GIS generate metadata for a data set member.

The two additional columns in the theme format, are used to define whether the contents of a field are intended for display using the Theme-'Display attribute' menu option in the Views interface. The fourth column ("LUT-file") specifies the name of the attribute value definition file (look-up-table) associated with each attribute (if one exists). This column may be empty, in which case default symbols and random colours will be employed in the legend classification.

12.4.5 Data set member attribute value look-up-files

The main purpose of these files (and the ones described in Section 12.4.4) is to automate legend classification using the same symbols for all similar data themes, but they also serve as documentation of attributes and range of attribute values of each theme.

These files are stored in the same sub-directory as the attribute definition files (ref. Section 12.4.4). The filenames are also specified in this file. These LUT files differ in content depending on whether the theme has point, line or polygon data. The following shows the first two lines for each of the three LUT-file formats:

Point data:
"Value","Label","Symbol#","Color","Size"
"Look up table for *aTheme* point data: *anAttribute*",,,,

Line data:
"Value","Label","Symbol#","Color","Width"
"Look up table for *aTheme* line data: *anAttribute*",,,,

Polygon data:
"Value","Label","Symbol#","Color","OlWidth","OlColor","BgColor"
"Look up table for *aTheme* polygon data: *anAttribute*",,,,,,

The first line is common to all these LUT-files of each type and must not be changed. As seen, the first four columns are equal for all types, while the remaining column(s) differ, as they define the size and look of the chosen symbol. The second line is a comment line identifying the data set member and attribute. The commas ending the line must be there. The next lines in the files will specify how each attribute value should be displayed. The first column ("Value") specifies a legal value that may be included in the attribute field of this data set member. The second column ("Label") specifies what this value represents. The label will also be used in the legend to identify the symbol for each attribute value.

The third column ("Symbol#") is the number of the symbol in the ArcView symbol palette (where 0 is the number of the first symbol in the list). For point data the symbol# identifies a symbol in the *Marker* symbol palette, for line data the symbol# identifies a symbol in the *Pen* symbol palette, while for polygon data the symbol# identifies a symbol in the *Fill* symbol palette. The symbol# column must not be empty.

The fourth column ("Colour") specifies the name of the colour to be used for the symbol. This column may be empty (,,), in which case a random colour will be used. The colour names are similar to UNIX colour name table, and includes 738 colour names defined by their RGB values. Appendix C list the contents of the AVENUE script specifying the colour names. To get a transparent fill, the colour must be specified as "Transparent".

The next columns are optional. The fifth column specifies a size property of the symbol. For point data the fifth column ("Size") specifies the marker size in pt., while for line data the fifth column ("Width") specifies the line width in pt. For polygon data the fifth column ("OlWidth") specifies the outline width in pt., while the sixth ("OlColor") and seventh ("BgColor") columns defines the outline and background colour respectively. To achieve a polygon fill without an outline, the outline colour must be specified as "Transparent".

As an example, the following shows the first four and the last lines of the dnlntype.lut file:

"Value","Label","Symbol#","Color","Width"
"Look up table for DCW DNNET line data: Dnlntype",,,,
1,"Stream, river, channelized river",0,"lightblue",
2,"Inland water body shoreline",0,"lightblue",
...
9,"Tile boundary or null arc",0,"Transparent",

13. HOW TO GET HELP

13.1 ArcView On-line help

All basic ArcView on-line help is available from the **Help** menu in the INSROP GIS interface. The ArcView context-sensitive help is also maintained.

13.2 INSROP GIS On-line help

On-line INSROP GIS Help is available from the INSROP GIS Help menu in the INSROP GIS interface. There is context-sensitive help for most INSROP GIS interface components.

14. EXAMPLES

14.1 ASCII import files

The following sections show examples of ASCII import files. The header line(s) are recommended both as documentation and to speed up the import process, but they are not necessary as the content of the header lines may be given interactively.

14.1.1 Point data

```
ID;N;E;Date,Time,Speed,Dir
1;68.578;33.052;1991-9-4;21:15;5;0
2;69.19;33.33;1991-9-5;16:30;9.7;20
```

14.1.2 Multipoint data

```
ID;Range
N;E
1;13
68.578;33.052
69.19;33.33
70.03;36.45
END
2;20
77.19;43.33
79.39;48.53
78.13;53.21
END
```

14.1.3 Line data

```
ID;Depth
N;E
1;10
68.578;33.052
69.19;33.33
70.03;36.45
END
2;20
77.19;43.33
79.39;48.53
78.13;53.21
END
```

14.1.4 Multiline data

```
ID;Depth
N;E
1;10
68.578;33.052
69.19;33.33
70.03;36.45
NEW
70.578;37.052
71.19;38.33
73.03;39.45
END
2;20
```

77.19;43.33
79.39;48.53
78.13;53.21
END

14.1.5 Polygon data

ID;Species
N;E
1;Ringed seal
68.578;33.052
69.19;33.33
70.03;36.45
END
2;Bearded seal
77.19;43.33
79.39;48.53
78.13;53.21
END

14.1.6 Multipolygon data

ID;Species
N;E
1;Ringed seal
68.578;33.052
69.19;33.33
70.03;36.45
NEW
70.578;37.052
71.19;38.33
73.03;39.45
END
2;Bearded seal
77.19;43.33
79.39;48.53
78.13;53.21
END

14.1.7 Route data

ID;N;E;Date,Time,Speed,Dir
1;68.578;33.052;1991-9-4;21:15;5;0
2;69.19;33.33;1991-9-5;16:30;9.7;20

15. REFERENCES

Brude, O.W. and S.M. Løvås (1999): "INSROP GIS - Data set documentation & Information structure", INSROP Working Paper no 166, Projects I.3.2/II.3.10, Alpha Environmental Consultants, Norway

Løvås, S.M, Smith, C. and K.A. Moe (1994): "INSROP Information System - Specification and Design: Overall System Documentation", INSROP Working Paper No. 4, Projects I.3.1/II.3.1, SINTEF NHL, Trondheim, Norway, ISBN 82-7613-079-8.

Løvås, S.M, and O.W. Brude (1996): "INSROP GIS v1.0a – User's Guide and System Documentation", INSROP Working Paper No. 47, Projects I.3.1/II.3.2, SINTEF NHL, Trondheim, Norway, ISBN 82-7613-150-6.

16. Glossary

ARC/INFO

ARC/INFO is a geographic information system (GIS) software package made by Environmental Systems Research Institute (ESRI), the makers of ArcView.

ARC/INFO is used worldwide by thousands of different organisations for handling, managing and analysing geographic information. ARC/INFO is designed for users who require a complete set of tools for processing and manipulating spatial data, including digitising, editing, co-ordinate management, network analysis, surface modelling and grid cell based modelling.

ARC/INFO format spatial data includes vector coverages and raster grids. Attributes describing geographic features are stored as tabular files in INFO format (The database system built into ARC/INFO), dBase format, or other external database systems.

ArcView users can access almost any spatial data stored in ARC/INFO format for desktop mapping and analysis.

APPENDIX A: The INSROP EIA Extension

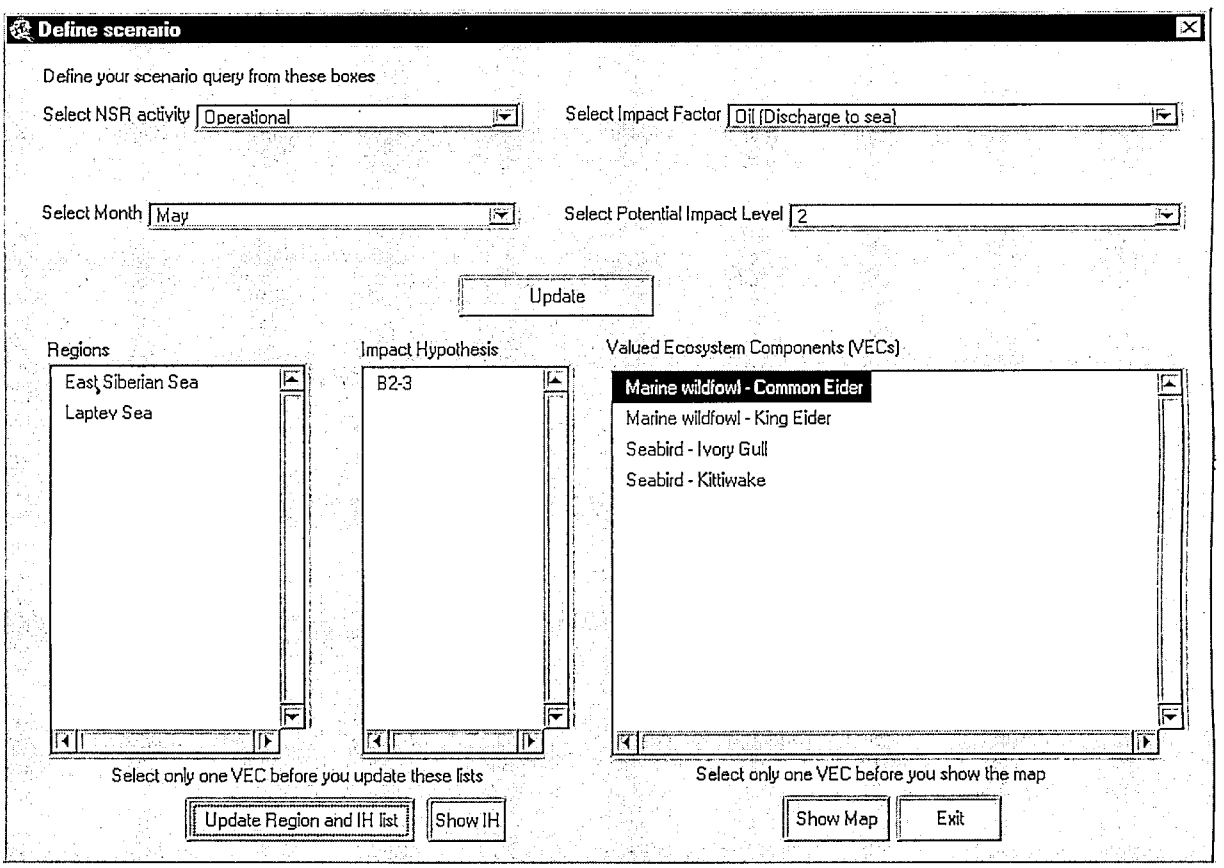
Loading the INSROP EIA Extension

1. Load the INSROP EIA extension by selecting "File", "Extension" and "INSROP EIA extension". Remember to have the INSROP GIS extension already loaded into your project.
2. Depending on your software setup, you might be asked to locate the ArcView Dialog Designer extension. Locate the dialog.avx extension in the "Esri/Av_gis*/ArcView/Ext32/" folder.
3. Depending on your setup, you might also be asked to locate to additional files, ihno.txt and res_kval.txt. Locate these files in the INSROP_GIS/DATABASE/ENVIMPAS/ folder.

Using the INSROP EIA Extension

After you have loaded the INSROP EIA extension into your project, you will find that you have a new view called INSROP EIA and a new button on your buttonbar.

 Pressing this button will give you the Scenario Dialog below:



First, define your scenario by selecting from the four drop-down boxes on top of the dialog. Then, click "**Update**" to see the list of VECs that satisfy your criteria. If the VEC list is empty, then no VEC has met your criteria for the given impact factor, potential impact level and month. If there are more than one VEC in the resulting list, then select one VEC and click "**Update Region and IH list**" in the bottom left of the dialog. This will show you for which regions the VEC is valid and list the actual impact hypothesis. Select the impact hypothesis and click "**Show IH**" to see the description of the impact hypothesis. Finally, click "**Show Map**" to show the results on the map in the INSROP EIA view. Click "**Exit**" to stop the dialog and return to the view.

APPENDIX B: Electronic Catalogue of Charts and Publications

This data has been compiled from the "Electronic Catalogue of Charts and Publications", which contains information on all paper charts, electronic charts and publications published by the Head Department of Navigation and Oceanography (HDNO), Russian Federation Ministry of Defence. The "Electronic Catalogue of Charts and Publications" includes the data retrieval software "dKart Catalogue Client" developed by HydroSERVICE A/S.

The data is updated as of 21/01/1999.

The database "Electronic Catalogue of Charts and Publications" (including "dKart Catalogue Client" software) is available from

HydroSERVICE A/S

Head Office:
PO Box 212

N-4371 Egersund
Norway

Internet: http://www.hydroservice.no
E-mail: info@hydroservice.no
Tel: +47 (51) 464960
Fax: +47 (51) 464701

Paper charts, electronic charts and publications can be ordered from:

Technical Division:
Prospekt KIMa 6
199155 St.Petersburg
Russia
Internet: http://www.dkart.com
E-mail: ntm@morintech.spb.su
Tel./Fax: +7 (812) 3254048

APPENDIX C: INSROP GIS colour names

Avenue-script: INSROP RGBColorNameDictionary'

```
RGB_Dictionary = Dictionary.Make(738)
RGB_Dictionary.Add( "alice blue", { 240, 248, 255 } )
RGB_Dictionary.Add( "aliceblue", { 240, 248, 255 } )
RGB_Dictionary.Add( "antique white", { 250, 235, 215 } )
RGB_Dictionary.Add( "antiquewhite", { 250, 235, 215 } )
RGB_Dictionary.Add( "antiquewhite1", { 255, 239, 219 } )
RGB_Dictionary.Add( "antiquewhite2", { 238, 223, 204 } )
RGB_Dictionary.Add( "antiquewhite3", { 205, 192, 176 } )
RGB_Dictionary.Add( "antiquewhite4", { 139, 131, 120 } )
RGB_Dictionary.Add( "aquamarine", { 127, 255, 212 } )
RGB_Dictionary.Add( "aquamarine1", { 127, 255, 212 } )
RGB_Dictionary.Add( "aquamarine2", { 118, 238, 198 } )
RGB_Dictionary.Add( "aquamarine3", { 102, 205, 170 } )
RGB_Dictionary.Add( "aquamarine4", { 69, 139, 116 } )
RGB_Dictionary.Add( "azure", { 240, 255, 255 } )
RGB_Dictionary.Add( "azure1", { 240, 255, 255 } )
RGB_Dictionary.Add( "azure2", { 224, 238, 238 } )
RGB_Dictionary.Add( "azure3", { 193, 205, 205 } )
RGB_Dictionary.Add( "azure4", { 131, 139, 139 } )
RGB_Dictionary.Add( "beige", { 245, 245, 220 } )
RGB_Dictionary.Add( "bisque", { 255, 228, 196 } )
RGB_Dictionary.Add( "bisque1", { 255, 228, 196 } )
RGB_Dictionary.Add( "bisque2", { 238, 213, 183 } )
RGB_Dictionary.Add( "bisque3", { 205, 183, 158 } )
RGB_Dictionary.Add( "bisque4", { 139, 125, 107 } )
RGB_Dictionary.Add( "black", { 0, 0, 0 } )
RGB_Dictionary.Add( "blanched almond", { 255, 235, 205 } )
RGB_Dictionary.Add( "blanchedalmond", { 255, 235, 205 } )
RGB_Dictionary.Add( "blue violet", { 138, 43, 226 } )
RGB_Dictionary.Add( "blue", { 0, 0, 255 } )
RGB_Dictionary.Add( "blue1", { 0, 0, 255 } )
RGB_Dictionary.Add( "blue2", { 0, 0, 238 } )
RGB_Dictionary.Add( "blue3", { 0, 0, 205 } )
RGB_Dictionary.Add( "blue4", { 0, 0, 139 } )
RGB_Dictionary.Add( "blueviolet", { 138, 43, 226 } )
RGB_Dictionary.Add( "brown", { 165, 42, 42 } )
RGB_Dictionary.Add( "brown1", { 255, 64, 64 } )
RGB_Dictionary.Add( "brown2", { 238, 59, 59 } )
RGB_Dictionary.Add( "brown3", { 205, 51, 51 } )
RGB_Dictionary.Add( "brown4", { 139, 35, 35 } )
RGB_Dictionary.Add( "burlywood", { 222, 184, 135 } )
RGB_Dictionary.Add( "burlywood1", { 255, 211, 155 } )
RGB_Dictionary.Add( "burlywood2", { 238, 197, 145 } )
RGB_Dictionary.Add( "burlywood3", { 205, 170, 125 } )
RGB_Dictionary.Add( "burlywood4", { 139, 115, 85 } )
RGB_Dictionary.Add( "cadet blue", { 95, 158, 160 } )
RGB_Dictionary.Add( "cadetblue", { 95, 158, 160 } )
RGB_Dictionary.Add( "cadetblue1", { 152, 245, 255 } )
RGB_Dictionary.Add( "cadetblue2", { 142, 229, 238 } )
RGB_Dictionary.Add( "cadetblue3", { 122, 197, 205 } )
RGB_Dictionary.Add( "cadetblue4", { 83, 134, 139 } )
RGB_Dictionary.Add( "chartreuse", { 127, 255,.0 } )
RGB_Dictionary.Add( "chartreuse1", { 127, 255, 0 } )
```

```
RGB_Dictionary.Add( "chartreuse2", { 118, 238, 0 } )
RGB_Dictionary.Add( "chartreuse3", { 102, 205, 0 } )
RGB_Dictionary.Add( "chartreuse4", { 69, 139, 0 } )
RGB_Dictionary.Add( "chocolate", { 210, 105, 30 } )
RGB_Dictionary.Add( "chocolate1", { 255, 127, 36 } )
RGB_Dictionary.Add( "chocolate2", { 238, 118, 33 } )
RGB_Dictionary.Add( "chocolate3", { 205, 102, 29 } )
RGB_Dictionary.Add( "chocolate4", { 139, 69, 19 } )
RGB_Dictionary.Add( "coral", { 255, 127, 80 } )
RGB_Dictionary.Add( "coral1", { 255, 114, 86 } )
RGB_Dictionary.Add( "coral2", { 238, 106, 80 } )
RGB_Dictionary.Add( "coral3", { 205, 91, 69 } )
RGB_Dictionary.Add( "coral4", { 139, 62, 47 } )
RGB_Dictionary.Add( "cornflower blue", { 100, 149, 237 } )
RGB_Dictionary.Add( "cornflowerblue", { 100, 149, 237 } )
RGB_Dictionary.Add( "cornsilk", { 255, 248, 220 } )
RGB_Dictionary.Add( "cornsilk1", { 255, 248, 220 } )
RGB_Dictionary.Add( "cornsilk2", { 238, 232, 205 } )
RGB_Dictionary.Add( "cornsilk3", { 205, 200, 177 } )
RGB_Dictionary.Add( "cornsilk4", { 139, 136, 120 } )
RGB_Dictionary.Add( "cyan", { 0, 255, 255 } )
RGB_Dictionary.Add( "cyan1", { 0, 255, 255 } )
RGB_Dictionary.Add( "cyan2", { 0, 238, 238 } )
RGB_Dictionary.Add( "cyan3", { 0, 205, 205 } )
RGB_Dictionary.Add( "cyan4", { 0, 139, 139 } )
RGB_Dictionary.Add( "dark goldenrod", { 184, 134, 11 } )
RGB_Dictionary.Add( "dark green", { 0, 100, 0 } )
RGB_Dictionary.Add( "dark khaki", { 189, 183, 107 } )
RGB_Dictionary.Add( "dark olive green", { 85, 107, 47 } )
RGB_Dictionary.Add( "dark orange", { 255, 140, 0 } )
RGB_Dictionary.Add( "dark orchid", { 153, 50, 204 } )
RGB_Dictionary.Add( "dark salmon", { 233, 150, 122 } )
RGB_Dictionary.Add( "dark sea green", { 143, 188, 143 } )
RGB_Dictionary.Add( "dark slate blue", { 72, 61, 139 } )
RGB_Dictionary.Add( "dark slate gray", { 47, 79, 79 } )
RGB_Dictionary.Add( "dark slate grey", { 47, 79, 79 } )
RGB_Dictionary.Add( "dark turquoise", { 0, 206, 209 } )
RGB_Dictionary.Add( "dark violet", { 148, 0, 211 } )
RGB_Dictionary.Add( "darkgoldenrod", { 184, 134, 11 } )
RGB_Dictionary.Add( "darkgoldenrod1", { 255, 185, 15 } )
RGB_Dictionary.Add( "darkgoldenrod2", { 238, 173, 14 } )
RGB_Dictionary.Add( "darkgoldenrod3", { 205, 149, 12 } )
RGB_Dictionary.Add( "darkgoldenrod4", { 139, 101, 8 } )
RGB_Dictionary.Add( "darkgreen", { 0, 100, 0 } )
RGB_Dictionary.Add( "darkkhaki", { 189, 183, 107 } )
RGB_Dictionary.Add( "darkolivegreen", { 85, 107, 47 } )
RGB_Dictionary.Add( "darkolivegreen1", { 202, 255, 112 } )
RGB_Dictionary.Add( "darkolivegreen2", { 188, 238, 104 } )
RGB_Dictionary.Add( "darkolivegreen3", { 162, 205, 90 } )
RGB_Dictionary.Add( "darkolivegreen4", { 110, 139, 61 } )
RGB_Dictionary.Add( "darkorange", { 255, 140, 0 } )
RGB_Dictionary.Add( "darkorange1", { 255, 127, 0 } )
RGB_Dictionary.Add( "darkorange2", { 238, 118, 0 } )
RGB_Dictionary.Add( "darkorange3", { 205, 102, 0 } )
RGB_Dictionary.Add( "darkorange4", { 139, 69, 0 } )
```

```
RGB_Dictionary.Add( "darkorchid", { 153, 50, 204 } )
RGB_Dictionary.Add( "darkorchid1", { 191, 62, 255 } )
RGB_Dictionary.Add( "darkorchid2", { 178, 58, 238 } )
RGB_Dictionary.Add( "darkorchid3", { 154, 50, 205 } )
RGB_Dictionary.Add( "darkorchid4", { 104, 34, 139 } )
RGB_Dictionary.Add( "darksalmon", { 233, 150, 122 } )
RGB_Dictionary.Add( "darkseagreen", { 143, 188, 143 } )
RGB_Dictionary.Add( "darkseagreen1", { 193, 255, 193 } )
RGB_Dictionary.Add( "darkseagreen2", { 180, 238, 180 } )
RGB_Dictionary.Add( "darkseagreen3", { 155, 205, 155 } )
RGB_Dictionary.Add( "darkseagreen4", { 105, 139, 105 } )
RGB_Dictionary.Add( "darkslateblue", { 72, 61, 139 } )
RGB_Dictionary.Add( "darkslategray", { 47, 79, 79 } )
RGB_Dictionary.Add( "darkslategray1", { 151, 255, 255 } )
RGB_Dictionary.Add( "darkslategray2", { 141, 238, 238 } )
RGB_Dictionary.Add( "darkslategray3", { 121, 205, 205 } )
RGB_Dictionary.Add( "darkslategray4", { 82, 139, 139 } )
RGB_Dictionary.Add( "darkslategrey", { 47, 79, 79 } )
RGB_Dictionary.Add( "darkturquoise", { 0, 206, 209 } )
RGB_Dictionary.Add( "darkviolet", { 148, 0, 211 } )
RGB_Dictionary.Add( "deep pink", { 255, 20, 147 } )
RGB_Dictionary.Add( "deep sky blue", { 0, 191, 255 } )
RGB_Dictionary.Add( "deeppink", { 255, 20, 147 } )
RGB_Dictionary.Add( "deeppink1", { 255, 20, 147 } )
RGB_Dictionary.Add( "deeppink2", { 238, 18, 137 } )
RGB_Dictionary.Add( "deeppink3", { 205, 16, 118 } )
RGB_Dictionary.Add( "deeppink4", { 139, 10, 80 } )
RGB_Dictionary.Add( "deepskyblue", { 0, 191, 255 } )
RGB_Dictionary.Add( "deepskyblue1", { 0, 191, 255 } )
RGB_Dictionary.Add( "deepskyblue2", { 0, 178, 238 } )
RGB_Dictionary.Add( "deepskyblue3", { 0, 154, 205 } )
RGB_Dictionary.Add( "deepskyblue4", { 0, 104, 139 }.)
RGB_Dictionary.Add( "dim gray", { 105, 105, 105 } )
RGB_Dictionary.Add( "dim grey", { 105, 105, 105 } )
RGB_Dictionary.Add( "dimgray", { 105, 105, 105 } )
RGB_Dictionary.Add( "dimgrey", { 105, 105, 105 } )
RGB_Dictionary.Add( "dodger blue", { 30, 144, 255 } )
RGB_Dictionary.Add( "dodgerblue", { 30, 144, 255 } )
RGB_Dictionary.Add( "dodgerblue1", { 30, 144, 255 } )
RGB_Dictionary.Add( "dodgerblue2", { 28, 134, 238 } )
RGB_Dictionary.Add( "dodgerblue3", { 24, 116, 205 } )
RGB_Dictionary.Add( "dodgerblue4", { 16, 78, 139 } )
RGB_Dictionary.Add( "firebrick", { 178, 34, 34 } )
RGB_Dictionary.Add( "firebrick1", { 255, 48, 48 } )
RGB_Dictionary.Add( "firebrick2", { 238, 44, 44 } )
RGB_Dictionary.Add( "firebrick3", { 205, 38, 38 } )
RGB_Dictionary.Add( "firebrick4", { 139, 26, 26 } )
RGB_Dictionary.Add( "floral white", { 255, 250, 240 } )
RGB_Dictionary.Add( "floralwhite", { 255, 250, 240 } )
RGB_Dictionary.Add( "forest green", { 34, 139, 34 } )
RGB_Dictionary.Add( "forestgreen", { 34, 139, 34 } )
RGB_Dictionary.Add( "gainsboro", { 220, 220, 220 } )
RGB_Dictionary.Add( "ghost white", { 248, 248, 255 } )
RGB_Dictionary.Add( "ghostwhite", { 248, 248, 255 } )
RGB_Dictionary.Add( "gold", { 255, 215, 0 } )
```

```
RGB_Dictionary.Add( "gold1", { 255, 215, 0 } )
RGB_Dictionary.Add( "gold2", { 238, 201, 0 } )
RGB_Dictionary.Add( "gold3", { 205, 173, 0 } )
RGB_Dictionary.Add( "gold4", { 139, 117, 0 } )
RGB_Dictionary.Add( "goldenrod", { 218, 165, 32 } )
RGB_Dictionary.Add( "goldenrod1", { 255, 193, 37 } )
RGB_Dictionary.Add( "goldenrod2", { 238, 180, 34 } )
RGB_Dictionary.Add( "goldenrod3", { 205, 155, 29 } )
RGB_Dictionary.Add( "goldenrod4", { 139, 105, 20 } )
RGB_Dictionary.Add( "gray", { 192, 192, 192 } )
RGB_Dictionary.Add( "gray0", { 0, 0, 0 } )
RGB_Dictionary.Add( "gray1", { 3, 3, 3 } )
RGB_Dictionary.Add( "gray2", { 5, 5, 5 } )
RGB_Dictionary.Add( "gray3", { 8, 8, 8 } )
RGB_Dictionary.Add( "gray4", { 10, 10, 10 } )
RGB_Dictionary.Add( "gray5", { 13, 13, 13 } )
RGB_Dictionary.Add( "gray6", { 15, 15, 15 } )
RGB_Dictionary.Add( "gray7", { 18, 18, 18 } )
RGB_Dictionary.Add( "gray8", { 20, 20, 20 } )
RGB_Dictionary.Add( "gray9", { 23, 23, 23 } )
RGB_Dictionary.Add( "gray10", { 26, 26, 26 } )
RGB_Dictionary.Add( "gray11", { 28, 28, 28 } )
RGB_Dictionary.Add( "gray12", { 31, 31, 31 } )
RGB_Dictionary.Add( "gray13", { 33, 33, 33 } )
RGB_Dictionary.Add( "gray14", { 36, 36, 36 } )
RGB_Dictionary.Add( "gray15", { 38, 38, 38 } )
RGB_Dictionary.Add( "gray16", { 41, 41, 41 } )
RGB_Dictionary.Add( "gray17", { 43, 43, 43 } )
RGB_Dictionary.Add( "gray18", { 46, 46, 46 } )
RGB_Dictionary.Add( "gray19", { 48, 48, 48 } )
RGB_Dictionary.Add( "gray20", { 51, 51, 51 } )
RGB_Dictionary.Add( "gray21", { 54, 54, 54 } )
RGB_Dictionary.Add( "gray22", { 56, 56, 56 } )
RGB_Dictionary.Add( "gray23", { 59, 59, 59 } )
RGB_Dictionary.Add( "gray24", { 61, 61, 61 } )
RGB_Dictionary.Add( "gray25", { 64, 64, 64 } )
RGB_Dictionary.Add( "gray26", { 66, 66, 66 } )
RGB_Dictionary.Add( "gray27", { 69, 69, 69 } )
RGB_Dictionary.Add( "gray28", { 71, 71, 71 } )
RGB_Dictionary.Add( "gray29", { 74, 74, 74 } )
RGB_Dictionary.Add( "gray30", { 77, 77, 77 } )
RGB_Dictionary.Add( "gray31", { 79, 79, 79 } )
RGB_Dictionary.Add( "gray32", { 82, 82, 82 } )
RGB_Dictionary.Add( "gray33", { 84, 84, 84 } )
RGB_Dictionary.Add( "gray34", { 87, 87, 87 } )
RGB_Dictionary.Add( "gray35", { 89, 89, 89 } )
RGB_Dictionary.Add( "gray36", { 92, 92, 92 } )
RGB_Dictionary.Add( "gray37", { 94, 94, 94 } )
RGB_Dictionary.Add( "gray38", { 97, 97, 97 } )
RGB_Dictionary.Add( "gray39", { 99, 99, 99 } )
RGB_Dictionary.Add( "gray40", { 102, 102, 102 } )
RGB_Dictionary.Add( "gray41", { 105, 105, 105 } )
RGB_Dictionary.Add( "gray42", { 107, 107, 107 } )
RGB_Dictionary.Add( "gray43", { 110, 110, 110 } )
RGB_Dictionary.Add( "gray44", { 112, 112, 112 } )
```

```
RGB_Dictionary.Add( "gray45", { 115, 115, 115 } )
RGB_Dictionary.Add( "gray46", { 117, 117, 117 } )
RGB_Dictionary.Add( "gray47", { 120, 120, 120 } )
RGB_Dictionary.Add( "gray48", { 122, 122, 122 } )
RGB_Dictionary.Add( "gray49", { 125, 125, 125 } )
RGB_Dictionary.Add( "gray50", { 127, 127, 127 } )
RGB_Dictionary.Add( "gray51", { 130, 130, 130 } )
RGB_Dictionary.Add( "gray52", { 133, 133, 133 } )
RGB_Dictionary.Add( "gray53", { 135, 135, 135 } )
RGB_Dictionary.Add( "gray54", { 138, 138, 138 } )
RGB_Dictionary.Add( "gray55", { 140, 140, 140 } )
RGB_Dictionary.Add( "gray56", { 143, 143, 143 } )
RGB_Dictionary.Add( "gray57", { 145, 145, 145 } )
RGB_Dictionary.Add( "gray58", { 148, 148, 148 } )
RGB_Dictionary.Add( "gray59", { 150, 150, 150 } )
RGB_Dictionary.Add( "gray60", { 153, 153, 153 } )
RGB_Dictionary.Add( "gray61", { 156, 156, 156 } )
RGB_Dictionary.Add( "gray62", { 158, 158, 158 } )
RGB_Dictionary.Add( "gray63", { 161, 161, 161 } )
RGB_Dictionary.Add( "gray64", { 163, 163, 163 } )
RGB_Dictionary.Add( "gray65", { 166, 166, 166 } )
RGB_Dictionary.Add( "gray66", { 168, 168, 168 } )
RGB_Dictionary.Add( "gray67", { 171, 171, 171 } )
RGB_Dictionary.Add( "gray68", { 173, 173, 173 } )
RGB_Dictionary.Add( "gray69", { 176, 176, 176 } )
RGB_Dictionary.Add( "gray70", { 179, 179, 179 } )
RGB_Dictionary.Add( "gray71", { 181, 181, 181 } )
RGB_Dictionary.Add( "gray72", { 184, 184, 184 } )
RGB_Dictionary.Add( "gray73", { 186, 186, 186 } )
RGB_Dictionary.Add( "gray74", { 189, 189, 189 } )
RGB_Dictionary.Add( "gray75", { 191, 191, 191 } )
RGB_Dictionary.Add( "gray76", { 194, 194, 194 } )
RGB_Dictionary.Add( "gray77", { 196, 196, 196 } )
RGB_Dictionary.Add( "gray78", { 199, 199, 199 } )
RGB_Dictionary.Add( "gray79", { 201, 201, 201 } )
RGB_Dictionary.Add( "gray80", { 204, 204, 204 } )
RGB_Dictionary.Add( "gray81", { 207, 207, 207 } )
RGB_Dictionary.Add( "gray82", { 209, 209, 209 } )
RGB_Dictionary.Add( "gray83", { 212, 212, 212 } )
RGB_Dictionary.Add( "gray84", { 214, 214, 214 } )
RGB_Dictionary.Add( "gray85", { 217, 217, 217 } )
RGB_Dictionary.Add( "gray86", { 219, 219, 219 } )
RGB_Dictionary.Add( "gray87", { 222, 222, 222 } )
RGB_Dictionary.Add( "gray88", { 224, 224, 224 } )
RGB_Dictionary.Add( "gray89", { 227, 227, 227 } )
RGB_Dictionary.Add( "gray90", { 229, 229, 229 } )
RGB_Dictionary.Add( "gray91", { 232, 232, 232 } )
RGB_Dictionary.Add( "gray92", { 235, 235, 235 } )
RGB_Dictionary.Add( "gray93", { 237, 237, 237 } )
RGB_Dictionary.Add( "gray94", { 240, 240, 240 } )
RGB_Dictionary.Add( "gray95", { 242, 242, 242 } )
RGB_Dictionary.Add( "gray96", { 245, 245, 245 } )
RGB_Dictionary.Add( "gray97", { 247, 247, 247 } )
RGB_Dictionary.Add( "gray98", { 250, 250, 250 } )
RGB_Dictionary.Add( "gray99", { 252, 252, 252 } )
```

```
RGB_Dictionary.Add( "gray100", { 255, 255, 255 } )
RGB_Dictionary.Add( "green yellow", { 173, 255, 47 } )
RGB_Dictionary.Add( "green", { 0, 255, 0 } )
RGB_Dictionary.Add( "green1", { 0, 255, 0 } )
RGB_Dictionary.Add( "green2", { 0, 238, 0 } )
RGB_Dictionary.Add( "green3", { 0, 205, 0 } )
RGB_Dictionary.Add( "green4", { 0, 139, 0 } )
RGB_Dictionary.Add( "greenyellow", { 173, 255, 47 } )
RGB_Dictionary.Add( "grey", { 192, 192, 192 } )
RGB_Dictionary.Add( "grey0", { 0, 0, 0 } )
RGB_Dictionary.Add( "grey1", { 3, 3, 3 } )
RGB_Dictionary.Add( "grey2", { 5, 5, 5 } )
RGB_Dictionary.Add( "grey3", { 8, 8, 8 } )
RGB_Dictionary.Add( "grey4", { 10, 10, 10 } )
RGB_Dictionary.Add( "grey5", { 13, 13, 13 } )
RGB_Dictionary.Add( "grey6", { 15, 15, 15 } )
RGB_Dictionary.Add( "grey7", { 18, 18, 18 } )
RGB_Dictionary.Add( "grey8", { 20, 20, 20 } )
RGB_Dictionary.Add( "grey9", { 23, 23, 23 } )
RGB_Dictionary.Add( "grey10", { 26, 26, 26 } )
RGB_Dictionary.Add( "grey11", { 28, 28, 28 } )
RGB_Dictionary.Add( "grey12", { 31, 31, 31 } )
RGB_Dictionary.Add( "grey13", { 33, 33, 33 } )
RGB_Dictionary.Add( "grey14", { 36, 36, 36 } )
RGB_Dictionary.Add( "grey15", { 38, 38, 38 } )
RGB_Dictionary.Add( "grey16", { 41, 41, 41 } )
RGB_Dictionary.Add( "grey17", { 43, 43, 43 } )
RGB_Dictionary.Add( "grey18", { 46, 46, 46 } )
RGB_Dictionary.Add( "grey19", { 48, 48, 48 } )
RGB_Dictionary.Add( "grey20", { 51, 51, 51 } )
RGB_Dictionary.Add( "grey21", { 54, 54, 54 } )
RGB_Dictionary.Add( "grey22", { 56, 56, 56 } )
RGB_Dictionary.Add( "grey23", { 59, 59, 59 } )
RGB_Dictionary.Add( "grey24", { 61, 61, 61 } )
RGB_Dictionary.Add( "grey25", { 64, 64, 64 } )
RGB_Dictionary.Add( "grey26", { 66, 66, 66 } )
RGB_Dictionary.Add( "grey27", { 69, 69, 69 } )
RGB_Dictionary.Add( "grey28", { 71, 71, 71 } )
RGB_Dictionary.Add( "grey29", { 74, 74, 74 } )
RGB_Dictionary.Add( "grey30", { 77, 77, 77 } )
RGB_Dictionary.Add( "grey31", { 79, 79, 79 } )
RGB_Dictionary.Add( "grey32", { 82, 82, 82 } )
RGB_Dictionary.Add( "grey33", { 84, 84, 84 } )
RGB_Dictionary.Add( "grey34", { 87, 87, 87 } )
RGB_Dictionary.Add( "grey35", { 89, 89, 89 } )
RGB_Dictionary.Add( "grey36", { 92, 92, 92 } )
RGB_Dictionary.Add( "grey37", { 94, 94, 94 } )
RGB_Dictionary.Add( "grey38", { 97, 97, 97 } )
RGB_Dictionary.Add( "grey39", { 99, 99, 99 } )
RGB_Dictionary.Add( "grey40", { 102, 102, 102 } )
RGB_Dictionary.Add( "grey41", { 105, 105, 105 } )
RGB_Dictionary.Add( "grey42", { 107, 107, 107 } )
RGB_Dictionary.Add( "grey43", { 110, 110, 110 } )
RGB_Dictionary.Add( "grey44", { 112, 112, 112 } )
RGB_Dictionary.Add( "grey45", { 115, 115, 115 } )
```

```
RGB_Dictionary.Add( "grey46", { 117, 117, 117 } )
RGB_Dictionary.Add( "grey47", { 120, 120, 120 } )
RGB_Dictionary.Add( "grey48", { 122, 122, 122 } )
RGB_Dictionary.Add( "grey49", { 125, 125, 125 } )
RGB_Dictionary.Add( "grey50", { 127, 127, 127 } )
RGB_Dictionary.Add( "grey51", { 130, 130, 130 } )
RGB_Dictionary.Add( "grey52", { 133, 133, 133 } )
RGB_Dictionary.Add( "grey53", { 135, 135, 135 } )
RGB_Dictionary.Add( "grey54", { 138, 138, 138 } )
RGB_Dictionary.Add( "grey55", { 140, 140, 140 } )
RGB_Dictionary.Add( "grey56", { 143, 143, 143 } )
RGB_Dictionary.Add( "grey57", { 145, 145, 145 } )
RGB_Dictionary.Add( "grey58", { 148, 148, 148 } )
RGB_Dictionary.Add( "grey59", { 150, 150, 150 } )
RGB_Dictionary.Add( "grey60", { 153, 153, 153 } )
RGB_Dictionary.Add( "grey61", { 156, 156, 156 } )
RGB_Dictionary.Add( "grey62", { 158, 158, 158 } )
RGB_Dictionary.Add( "grey63", { 161, 161, 161 } )
RGB_Dictionary.Add( "grey64", { 163, 163, 163 } )
RGB_Dictionary.Add( "grey65", { 166, 166, 166 } )
RGB_Dictionary.Add( "grey66", { 168, 168, 168 } )
RGB_Dictionary.Add( "grey67", { 171, 171, 171 } )
RGB_Dictionary.Add( "grey68", { 173, 173, 173 } )
RGB_Dictionary.Add( "grey69", { 176, 176, 176 } )
RGB_Dictionary.Add( "grey70", { 179, 179, 179 } )
RGB_Dictionary.Add( "grey71", { 181, 181, 181 } )
RGB_Dictionary.Add( "grey72", { 184, 184, 184 } )
RGB_Dictionary.Add( "grey73", { 186, 186, 186 } )
RGB_Dictionary.Add( "grey74", { 189, 189, 189 } )
RGB_Dictionary.Add( "grey75", { 191, 191, 191 } )
RGB_Dictionary.Add( "grey76", { 194, 194, 194 } )
RGB_Dictionary.Add( "grey77", { 196, 196, 196 } )
RGB_Dictionary.Add( "grey78", { 199, 199, 199 } )
RGB_Dictionary.Add( "grey79", { 201, 201, 201 } )
RGB_Dictionary.Add( "grey80", { 204, 204, 204 } )
RGB_Dictionary.Add( "grey81", { 207, 207, 207 } )
RGB_Dictionary.Add( "grey82", { 209, 209, 209 } )
RGB_Dictionary.Add( "grey83", { 212, 212, 212 } )
RGB_Dictionary.Add( "grey84", { 214, 214, 214 } )
RGB_Dictionary.Add( "grey85", { 217, 217, 217 } )
RGB_Dictionary.Add( "grey86", { 219, 219, 219 } )
RGB_Dictionary.Add( "grey87", { 222, 222, 222 } )
RGB_Dictionary.Add( "grey88", { 224, 224, 224 } )
RGB_Dictionary.Add( "grey89", { 227, 227, 227 } )
RGB_Dictionary.Add( "grey90", { 229, 229, 229 } )
RGB_Dictionary.Add( "grey91", { 232, 232, 232 } )
RGB_Dictionary.Add( "grey92", { 235, 235, 235 } )
RGB_Dictionary.Add( "grey93", { 237, 237, 237 } )
RGB_Dictionary.Add( "grey94", { 240, 240, 240 } )
RGB_Dictionary.Add( "grey95", { 242, 242, 242 } )
RGB_Dictionary.Add( "grey96", { 245, 245, 245 } )
RGB_Dictionary.Add( "grey97", { 247, 247, 247 } )
RGB_Dictionary.Add( "grey98", { 250, 250, 250 } )
RGB_Dictionary.Add( "grey99", { 252, 252, 252 } )
RGB_Dictionary.Add( "grey100", { 255, 255, 255 } )
```

```
RGB_Dictionary.Add( "honeydew", { 240, 255, 240 } )
RGB_Dictionary.Add( "honeydew1", { 240, 255, 240 } )
RGB_Dictionary.Add( "honeydew2", { 224, 238, 224 } )
RGB_Dictionary.Add( "honeydew3", { 193, 205, 193 } )
RGB_Dictionary.Add( "honeydew4", { 131, 139, 131 } )
RGB_Dictionary.Add( "hot pink", { 255, 105, 180 } )
RGB_Dictionary.Add( "hotpink", { 255, 105, 180 } )
RGB_Dictionary.Add( "hotpink1", { 255, 110, 180 } )
RGB_Dictionary.Add( "hotpink2", { 238, 106, 167 } )
RGB_Dictionary.Add( "hotpink3", { 205, 96, 144 } )
RGB_Dictionary.Add( "hotpink4", { 139, 58, 98 } )
RGB_Dictionary.Add( "indian red", { 205, 92, 92 } )
RGB_Dictionary.Add( "indianred", { 205, 92, 92 } )
RGB_Dictionary.Add( "indianred1", { 255, 106, 106 } )
RGB_Dictionary.Add( "indianred2", { 238, 99, 99 } )
RGB_Dictionary.Add( "indianred3", { 205, 85, 85 } )
RGB_Dictionary.Add( "indianred4", { 139, 58, 58 } )
RGB_Dictionary.Add( "ivory", { 255, 255, 240 } )
RGB_Dictionary.Add( "ivory1", { 255, 255, 240 } )
RGB_Dictionary.Add( "ivory2", { 238, 238, 224 } )
RGB_Dictionary.Add( "ivory3", { 205, 205, 193 } )
RGB_Dictionary.Add( "ivory4", { 139, 139, 131 } )
RGB_Dictionary.Add( "khaki", { 240, 230, 140 } )
RGB_Dictionary.Add( "khaki1", { 255, 246, 143 } )
RGB_Dictionary.Add( "khaki2", { 238, 230, 133 } )
RGB_Dictionary.Add( "khaki3", { 205, 198, 115 } )
RGB_Dictionary.Add( "khaki4", { 139, 134, 78 } )
RGB_Dictionary.Add( "lavender blush", { 255, 240, 245 } )
RGB_Dictionary.Add( "lavender", { 230, 230, 250 } )
RGB_Dictionary.Add( "lavenderblush", { 255, 240, 245 } )
RGB_Dictionary.Add( "lavenderblush1", { 255, 240, 245 } )
RGB_Dictionary.Add( "lavenderblush2", { 238, 224, 229 } )
RGB_Dictionary.Add( "lavenderblush3", { 205, 193, 197 } )
RGB_Dictionary.Add( "lavenderblush4", { 139, 131, 134 } )
RGB_Dictionary.Add( "lawn green", { 124, 252, 0 } )
RGB_Dictionary.Add( "lawngreen", { 124, 252, 0 } )
RGB_Dictionary.Add( "lemon chiffon", { 255, 250, 205 } )
RGB_Dictionary.Add( "lemonchiffon", { 255, 250, 205 } )
RGB_Dictionary.Add( "lemonchiffon1", { 255, 250, 205 } )
RGB_Dictionary.Add( "lemonchiffon2", { 238, 233, 191 } )
RGB_Dictionary.Add( "lemonchiffon3", { 205, 201, 165 } )
RGB_Dictionary.Add( "lemonchiffon4", { 139, 137, 112 } )
RGB_Dictionary.Add( "light blue", { 173, 216, 230 } )
RGB_Dictionary.Add( "light coral", { 240, 128, 128 } )
RGB_Dictionary.Add( "light cyan", { 224, 255, 255 } )
RGB_Dictionary.Add( "light goldenrod yellow", { 250, 250, 210 } )
RGB_Dictionary.Add( "light goldenrod", { 238, 221, 130 } )
RGB_Dictionary.Add( "light gray", { 211, 211, 211 } )
RGB_Dictionary.Add( "light grey", { 211, 211, 211 } )
RGB_Dictionary.Add( "light pink", { 255, 182, 193 } )
RGB_Dictionary.Add( "light salmon", { 255, 160, 122 } )
RGB_Dictionary.Add( "light sea green", { 32, 178, 170 } )
RGB_Dictionary.Add( "light sky blue", { 135, 206, 250 } )
RGB_Dictionary.Add( "light slate blue", { 132, 112, 255 } )
RGB_Dictionary.Add( "light slate gray", { 119, 136, 153 } )
```

```
RGB_Dictionary.Add( "light slate grey", { 119, 136, 153 } )
RGB_Dictionary.Add( "light steel blue", { 176, 196, 222 } )
RGB_Dictionary.Add( "light yellow", { 255, 255, 224 } )
RGB_Dictionary.Add( "lightblue", { 173, 216, 230 } )
RGB_Dictionary.Add( "lightblue1", { 191, 239, 255 } )
RGB_Dictionary.Add( "lightblue2", { 178, 223, 238 } )
RGB_Dictionary.Add( "lightblue3", { 154, 192, 205 } )
RGB_Dictionary.Add( "lightblue4", { 104, 131, 139 } )
RGB_Dictionary.Add( "lightcoral", { 240, 128, 128 } )
RGB_Dictionary.Add( "lightcyan", { 224, 255, 255 } )
RGB_Dictionary.Add( "lightcyan1", { 224, 255, 255 } )
RGB_Dictionary.Add( "lightcyan2", { 209, 238, 238 } )
RGB_Dictionary.Add( "lightcyan3", { 180, 205, 205 } )
RGB_Dictionary.Add( "lightcyan4", { 122, 139, 139 } )
RGB_Dictionary.Add( "lightgoldenrod", { 238, 221, 130 } )
RGB_Dictionary.Add( "lightgoldenrod1", { 255, 236, 139 } )
RGB_Dictionary.Add( "lightgoldenrod2", { 238, 220, 130 } )
RGB_Dictionary.Add( "lightgoldenrod3", { 205, 190, 112 } )
RGB_Dictionary.Add( "lightgoldenrod4", { 139, 129, 76 } )
RGB_Dictionary.Add( "lightgoldenrodyellow", { 250, 250, 210 } )
RGB_Dictionary.Add( "lightgray", { 211, 211, 211 } )
RGB_Dictionary.Add( "lightgrey", { 211, 211, 211 } )
RGB_Dictionary.Add( "lightpink", { 255, 182, 193 } )
RGB_Dictionary.Add( "lightpink1", { 255, 174, 185 } )
RGB_Dictionary.Add( "lightpink2", { 238, 162, 173 } )
RGB_Dictionary.Add( "lightpink3", { 205, 140, 149 } )
RGB_Dictionary.Add( "lightpink4", { 139, 95, 101 } )
RGB_Dictionary.Add( "lightsalmon", { 255, 160, 122 } )
RGB_Dictionary.Add( "lightsalmon1", { 255, 160, 122 } )
RGB_Dictionary.Add( "lightsalmon2", { 238, 149, 114 } )
RGB_Dictionary.Add( "lightsalmon3", { 205, 129, 98 } )
RGB_Dictionary.Add( "lightsalmon4", { 139, 87, 66 } )
RGB_Dictionary.Add( "lightseagreen", { 32, 178, 170 } )
RGB_Dictionary.Add( "lightskyblue", { 135, 206, 250 } )
RGB_Dictionary.Add( "lightskyblue1", { 176, 226, 255 } )
RGB_Dictionary.Add( "lightskyblue2", { 164, 211, 238 } )
RGB_Dictionary.Add( "lightskyblue3", { 141, 182, 205 } )
RGB_Dictionary.Add( "lightskyblue4", { 96, 123, 139 } )
RGB_Dictionary.Add( "lightslateblue", { 132, 112, 255 } )
RGB_Dictionary.Add( "lightslategray", { 119, 136, 153 } )
RGB_Dictionary.Add( "lightslategrey", { 119, 136, 153 } )
RGB_Dictionary.Add( "lightsteelblue", { 176, 196, 222 } )
RGB_Dictionary.Add( "lightsteelblue1", { 202, 225, 255 } )
RGB_Dictionary.Add( "lightsteelblue2", { 188, 210, 238 } )
RGB_Dictionary.Add( "lightsteelblue3", { 162, 181, 205 } )
RGB_Dictionary.Add( "lightsteelblue4", { 110, 123, 139 } )
RGB_Dictionary.Add( "lightyellow", { 255, 255, 224 } )
RGB_Dictionary.Add( "lightyellow1", { 255, 255, 224 } )
RGB_Dictionary.Add( "lightyellow2", { 238, 238, 209 } )
RGB_Dictionary.Add( "lightyellow3", { 205, 205, 180 } )
RGB_Dictionary.Add( "lightyellow4", { 139, 139, 122 } )
RGB_Dictionary.Add( "lime green", { 50, 205, 50 } )
RGB_Dictionary.Add( "limegreen", { 50, 205, 50 } )
RGB_Dictionary.Add( "linen", { 250, 240, 230 } )
RGB_Dictionary.Add( "magenta", { 255, 0, 255 } )
```

```
RGB_Dictionary.Add( "magenta1", { 255, 0, 255 } )
RGB_Dictionary.Add( "magenta2", { 238, 0, 238 } )
RGB_Dictionary.Add( "magenta3", { 205, 0, 205 } )
RGB_Dictionary.Add( "magenta4", { 139, 0, 139 } )
RGB_Dictionary.Add( "maroon", { 176, 48, 96 } )
RGB_Dictionary.Add( "maroon1", { 255, 52, 179 } )
RGB_Dictionary.Add( "maroon2", { 238, 48, 167 } )
RGB_Dictionary.Add( "maroon3", { 205, 41, 144 } )
RGB_Dictionary.Add( "maroon4", { 139, 28, 98 } )
RGB_Dictionary.Add( "medium aquamarine", { 102, 205, 170 } )
RGB_Dictionary.Add( "medium blue", { 0, 0, 205 } )
RGB_Dictionary.Add( "medium orchid", { 186, 85, 211 } )
RGB_Dictionary.Add( "medium purple", { 147, 112, 219 } )
RGB_Dictionary.Add( "medium sea green", { 60, 179, 113 } )
RGB_Dictionary.Add( "medium slate blue", { 123, 104, 238 } )
RGB_Dictionary.Add( "medium spring green", { 0, 250, 154 } )
RGB_Dictionary.Add( "medium turquoise", { 72, 209, 204 } )
RGB_Dictionary.Add( "medium violet red", { 199, 21, 133 } )
RGB_Dictionary.Add( "mediumaquamarine", { 102, 205, 170 } )
RGB_Dictionary.Add( "mediumblue", { 0, 0, 205 } )
RGB_Dictionary.Add( "mediumorchid", { 186, 85, 211 } )
RGB_Dictionary.Add( "mediumorchid1", { 224, 102, 255 } )
RGB_Dictionary.Add( "mediumorchid2", { 209, 95, 238 } )
RGB_Dictionary.Add( "mediumorchid3", { 180, 82, 205 } )
RGB_Dictionary.Add( "mediumorchid4", { 122, 55, 139 } )
RGB_Dictionary.Add( "mediumpurple", { 147, 112, 219 } )
RGB_Dictionary.Add( "mediumpurple1", { 171, 130, 255 } )
RGB_Dictionary.Add( "mediumpurple2", { 159, 121, 238 } )
RGB_Dictionary.Add( "mediumpurple3", { 137, 104, 205 } )
RGB_Dictionary.Add( "mediumpurple4", { 93, 71, 139 } )
RGB_Dictionary.Add( "mediumseagreen", { 60, 179, 113 } )
RGB_Dictionary.Add( "mediumslateblue", { 123, 104, 238 } )
RGB_Dictionary.Add( "mediumspringgreen", { 0, 250, 154 } )
RGB_Dictionary.Add( "mediumturquoise", { 72, 209, 204 } )
RGB_Dictionary.Add( "mediumvioletred", { 199, 21, 133 } )
RGB_Dictionary.Add( "midnight blue", { 25, 25, 112 } )
RGB_Dictionary.Add( "midnightblue", { 25, 25, 112 } )
RGB_Dictionary.Add( "mint cream", { 245, 255, 250 } )
RGB_Dictionary.Add( "mintcream", { 245, 255, 250 } )
RGB_Dictionary.Add( "misty rose", { 255, 228, 225 } )
RGB_Dictionary.Add( "mistyrose", { 255, 228, 225 } )
RGB_Dictionary.Add( "mistyrose1", { 255, 228, 225 } )
RGB_Dictionary.Add( "mistyrose2", { 238, 213, 210 } )
RGB_Dictionary.Add( "mistyrose3", { 205, 183, 181 } )
RGB_Dictionary.Add( "mistyrose4", { 139, 125, 123 } )
RGB_Dictionary.Add( "moccasin", { 255, 228, 181 } )
RGB_Dictionary.Add( "navajo white", { 255, 222, 173 } )
RGB_Dictionary.Add( "navajowhite", { 255, 222, 173 } )
RGB_Dictionary.Add( "navajowhite1", { 255, 222, 173 } )
RGB_Dictionary.Add( "navajowhite2", { 238, 207, 161 } )
RGB_Dictionary.Add( "navajowhite3", { 205, 179, 139 } )
RGB_Dictionary.Add( "navajowhite4", { 139, 121, 94 } )
RGB_Dictionary.Add( "navy blue", { 0, 0, 128 } )
RGB_Dictionary.Add( "navy", { 0, 0, 128 } )
RGB_Dictionary.Add( "navyblue", { 0, 0, 128 } )
```

```
RGB_Dictionary.Add( "old lace", { 253, 245, 230 } )
RGB_Dictionary.Add( "oldlace", { 253, 245, 230 } )
RGB_Dictionary.Add( "olive drab", { 107, 142, 35 } )
RGB_Dictionary.Add( "olivedrab", { 107, 142, 35 } )
RGB_Dictionary.Add( "olivedrab1", { 192, 255, 62 } )
RGB_Dictionary.Add( "olivedrab2", { 179, 238, 58 } )
RGB_Dictionary.Add( "olivedrab3", { 154, 205, 50 } )
RGB_Dictionary.Add( "olivedrab4", { 105, 139, 34 } )
RGB_Dictionary.Add( "orange red", { 255, 69, 0 } )
RGB_Dictionary.Add( "orange", { 255, 165, 0 } )
RGB_Dictionary.Add( "orange1", { 255, 165, 0 } )
RGB_Dictionary.Add( "orange2", { 238, 154, 0 } )
RGB_Dictionary.Add( "orange3", { 205, 133, 0 } )
RGB_Dictionary.Add( "orange4", { 139, 90, 0 } )
RGB_Dictionary.Add( "orangered", { 255, 69, 0 } )
RGB_Dictionary.Add( "orangered1", { 255, 69, 0 } )
RGB_Dictionary.Add( "orangered2", { 238, 64, 0 } )
RGB_Dictionary.Add( "orangered3", { 205, 55, 0 } )
RGB_Dictionary.Add( "orangered4", { 139, 37, 0 } )
RGB_Dictionary.Add( "orchid", { 218, 112, 214 } )
RGB_Dictionary.Add( "orchid1", { 255, 131, 250 } )
RGB_Dictionary.Add( "orchid2", { 238, 122, 233 } )
RGB_Dictionary.Add( "orchid3", { 205, 105, 201 } )
RGB_Dictionary.Add( "orchid4", { 139, 71, 137 } )
RGB_Dictionary.Add( "pale goldenrod", { 238, 232, 170 } )
RGB_Dictionary.Add( "pale green", { 152, 251, 152 } )
RGB_Dictionary.Add( "pale turquoise", { 175, 238, 238 } )
RGB_Dictionary.Add( "pale violet red", { 219, 112, 147 } )
RGB_Dictionary.Add( "palegoldenrod", { 238, 232, 170 } )
RGB_Dictionary.Add( "palegreen", { 152, 251, 152 } )
RGB_Dictionary.Add( "palegreen1", { 154, 255, 154 } )
RGB_Dictionary.Add( "palegreen2", { 144, 238, 144 } )
RGB_Dictionary.Add( "palegreen3", { 124, 205, 124 } )
RGB_Dictionary.Add( "palegreen4", { 84, 139, 84 } )
RGB_Dictionary.Add( "paleturquoise", { 175, 238, 238 } )
RGB_Dictionary.Add( "paleturquoise1", { 187, 255, 255 } )
RGB_Dictionary.Add( "paleturquoise2", { 174, 238, 238 } )
RGB_Dictionary.Add( "paleturquoise3", { 150, 205, 205 } )
RGB_Dictionary.Add( "paleturquoise4", { 102, 139, 139 } )
RGB_Dictionary.Add( "palevioletred", { 219, 112, 147 } )
RGB_Dictionary.Add( "palevioletred1", { 255, 130, 171 } )
RGB_Dictionary.Add( "palevioletred2", { 238, 121, 159 } )
RGB_Dictionary.Add( "palevioletred3", { 205, 104, 137 } )
RGB_Dictionary.Add( "palevioletred4", { 139, 71, 93 } )
RGB_Dictionary.Add( "papaya whip", { 255, 239, 213 } )
RGB_Dictionary.Add( "papayawhip", { 255, 239, 213 } )
RGB_Dictionary.Add( "peach puff", { 255, 218, 185 } )
RGB_Dictionary.Add( "peachpuff", { 255, 218, 185 } )
RGB_Dictionary.Add( "peachpuff1", { 255, 218, 185 } )
RGB_Dictionary.Add( "peachpuff2", { 238, 203, 173 } )
RGB_Dictionary.Add( "peachpuff3", { 205, 175, 149 } )
RGB_Dictionary.Add( "peachpuff4", { 139, 119, 101 } )
RGB_Dictionary.Add( "peru", { 205, 133, 63 } )
RGB_Dictionary.Add( "pink", { 255, 192, 203 } )
RGB_Dictionary.Add( "pink1", { 255, 181, 197 } )
```

```
RGB_Dictionary.Add( "pink2", { 238, 169, 184 } )
RGB_Dictionary.Add( "pink3", { 205, 145, 158 } )
RGB_Dictionary.Add( "pink4", { 139, 99, 108 } )
RGB_Dictionary.Add( "plum", { 221, 160, 221 } )
RGB_Dictionary.Add( "plum1", { 255, 187, 255 } )
RGB_Dictionary.Add( "plum2", { 238, 174, 238 } )
RGB_Dictionary.Add( "plum3", { 205, 150, 205 } )
RGB_Dictionary.Add( "plum4", { 139, 102, 139 } )
RGB_Dictionary.Add( "powder blue", { 176, 224, 230 } )
RGB_Dictionary.Add( "powderblue", { 176, 224, 230 } )
RGB_Dictionary.Add( "purple", { 160, 32, 240 } )
RGB_Dictionary.Add( "purple1", { 155, 48, 255 } )
RGB_Dictionary.Add( "purple2", { 145, 44, 238 } )
RGB_Dictionary.Add( "purple3", { 125, 38, 205 } )
RGB_Dictionary.Add( "purple4", { 85, 26, 139 } )
RGB_Dictionary.Add( "red", { 255, 0, 0 } )
RGB_Dictionary.Add( "red1", { 255, 0, 0 } )
RGB_Dictionary.Add( "red2", { 238, 0, 0 } )
RGB_Dictionary.Add( "red3", { 205, 0, 0 } )
RGB_Dictionary.Add( "red4", { 139, 0, 0 } )
RGB_Dictionary.Add( "rosy brown", { 188, 143, 143 } )
RGB_Dictionary.Add( "rosybrown", { 188, 143, 143 } )
RGB_Dictionary.Add( "rosybrown1", { 255, 193, 193 } )
RGB_Dictionary.Add( "rosybrown2", { 238, 180, 180 } )
RGB_Dictionary.Add( "rosybrown3", { 205, 155, 155 } )
RGB_Dictionary.Add( "rosybrown4", { 139, 105, 105 } )
RGB_Dictionary.Add( "royal blue", { 65, 105, 225 } )
RGB_Dictionary.Add( "royalblue", { 65, 105, 225 } )
RGB_Dictionary.Add( "royalblue1", { 72, 118, 255 } )
RGB_Dictionary.Add( "royalblue2", { 67, 110, 238 } )
RGB_Dictionary.Add( "royalblue3", { 58, 95, 205 } )
RGB_Dictionary.Add( "royalblue4", { 39, 64, 139 } )
RGB_Dictionary.Add( "saddle brown", { 139, 69, 19 } )
RGB_Dictionary.Add( "saddlebrown", { 139, 69, 19 } )
RGB_Dictionary.Add( "salmon", { 250, 128, 114 } )
RGB_Dictionary.Add( "salmon1", { 255, 140, 105 } )
RGB_Dictionary.Add( "salmon2", { 238, 130, 98 } )
RGB_Dictionary.Add( "salmon3", { 205, 112, 84 } )
RGB_Dictionary.Add( "salmon4", { 139, 76, 57 } )
RGB_Dictionary.Add( "sandy brown", { 244, 164, 96 } )
RGB_Dictionary.Add( "sandybrown", { 244, 164, 96 } )
RGB_Dictionary.Add( "sea green", { 46, 139, 87 } )
RGB_Dictionary.Add( "seagreen", { 46, 139, 87 } )
RGB_Dictionary.Add( "seagreen1", { 84, 255, 159 } )
RGB_Dictionary.Add( "seagreen2", { 78, 238, 148 } )
RGB_Dictionary.Add( "seagreen3", { 67, 205, 128 } )
RGB_Dictionary.Add( "seagreen4", { 46, 139, 87 } )
RGB_Dictionary.Add( "seashell", { 255, 245, 238 } )
RGB_Dictionary.Add( "seashell1", { 255, 245, 238 } )
RGB_Dictionary.Add( "seashell2", { 238, 229, 222 } )
RGB_Dictionary.Add( "seashell3", { 205, 197, 191 } )
RGB_Dictionary.Add( "seashell4", { 139, 134, 130 } )
RGB_Dictionary.Add( "sienna", { 160, 82, 45 } )
RGB_Dictionary.Add( "sienna1", { 255, 130, 71 } )
RGB_Dictionary.Add( "sienna2", { 238, 121, 66 } )
```

```
RGB_Dictionary.Add( "sienna3", { 205, 104, 57 } )
RGB_Dictionary.Add( "sienna4", { 139, 71, 38 } )
RGB_Dictionary.Add( "sky blue", { 135, 206, 235 } )
RGB_Dictionary.Add( "skyblue", { 135, 206, 235 } )
RGB_Dictionary.Add( "skyblue1", { 135, 206, 255 } )
RGB_Dictionary.Add( "skyblue2", { 126, 192, 238 } )
RGB_Dictionary.Add( "skyblue3", { 108, 166, 205 } )
RGB_Dictionary.Add( "skyblue4", { 74, 112, 139 } )
RGB_Dictionary.Add( "slate blue", { 106, 90, 205 } )
RGB_Dictionary.Add( "slate gray", { 112, 128, 144 } )
RGB_Dictionary.Add( "slate grey", { 112, 128, 144 } )
RGB_Dictionary.Add( "slateblue", { 106, 90, 205 } )
RGB_Dictionary.Add( "slateblue1", { 131, 111, 255 } )
RGB_Dictionary.Add( "slateblue2", { 122, 103, 238 } )
RGB_Dictionary.Add( "slateblue3", { 105, 89, 205 } )
RGB_Dictionary.Add( "slateblue4", { 71, 60, 139 } )
RGB_Dictionary.Add( "slategray", { 112, 128, 144 } )
RGB_Dictionary.Add( "slategray1", { 198, 226, 255 } )
RGB_Dictionary.Add( "slategray2", { 185, 211, 238 } )
RGB_Dictionary.Add( "slategray3", { 159, 182, 205 } )
RGB_Dictionary.Add( "slategray4", { 108, 123, 139 } )
RGB_Dictionary.Add( "slategrey", { 112, 128, 144 } )
RGB_Dictionary.Add( "snow", { 255, 250, 250 } )
RGB_Dictionary.Add( "snow1", { 255, 250, 250 } )
RGB_Dictionary.Add( "snow2", { 238, 233, 233 } )
RGB_Dictionary.Add( "snow3", { 205, 201, 201 } )
RGB_Dictionary.Add( "snow4", { 139, 137, 137 } )
RGB_Dictionary.Add( "spring green", { 0, 255, 127 } )
RGB_Dictionary.Add( "springgreen", { 0, 255, 127 } )
RGB_Dictionary.Add( "springgreen1", { 0, 255, 127 } )
RGB_Dictionary.Add( "springgreen2", { 0, 238, 118 } )
RGB_Dictionary.Add( "springgreen3", { 0, 205, 102 } )
RGB_Dictionary.Add( "springgreen4", { 0, 139, 69 } )
RGB_Dictionary.Add( "steel blue", { 70, 130, 180 } )
RGB_Dictionary.Add( "steelblue", { 70, 130, 180 } )
RGB_Dictionary.Add( "steelblue1", { 99, 184, 255 } )
RGB_Dictionary.Add( "steelblue2", { 92, 172, 238 } )
RGB_Dictionary.Add( "steelblue3", { 79, 148, 205 } )
RGB_Dictionary.Add( "steelblue4", { 54, 100, 139 } )
RGB_Dictionary.Add( "tan", { 210, 180, 140 } )
RGB_Dictionary.Add( "tan1", { 255, 165, 79 } )
RGB_Dictionary.Add( "tan2", { 238, 154, 73 } )
RGB_Dictionary.Add( "tan3", { 205, 133, 63 } )
RGB_Dictionary.Add( "tan4", { 139, 90, 43 } )
RGB_Dictionary.Add( "thistle", { 216, 191, 216 } )
RGB_Dictionary.Add( "thistle1", { 255, 225, 255 } )
RGB_Dictionary.Add( "thistle2", { 238, 210, 238 } )
RGB_Dictionary.Add( "thistle3", { 205, 181, 205 } )
RGB_Dictionary.Add( "thistle4", { 139, 123, 139 } )
RGB_Dictionary.Add( "tomato", { 255, 99, 71 } )
RGB_Dictionary.Add( "tomato1", { 255, 99, 71 } )
RGB_Dictionary.Add( "tomato2", { 238, 92, 66 } )
RGB_Dictionary.Add( "tomato3", { 205, 79, 57 } )
RGB_Dictionary.Add( "tomato4", { 139, 54, 38 } )
RGB_Dictionary.Add( "turquoise", { 64, 224, 208 } )
```

```
RGB_Dictionary.Add( "turquoise1", { 0, 245, 255 } )
RGB_Dictionary.Add( "turquoise2", { 0, 229, 238 } )
RGB_Dictionary.Add( "turquoise3", { 0, 197, 205 } )
RGB_Dictionary.Add( "turquoise4", { 0, 134, 139 } )
RGB_Dictionary.Add( "violet red", { 208, 32, 144 } )
RGB_Dictionary.Add( "violet", { 238, 130, 238 } )
RGB_Dictionary.Add( "violetred", { 208, 32, 144 } )
RGB_Dictionary.Add( "violetred1", { 255, 62, 150 } )
RGB_Dictionary.Add( "violetred2", { 238, 58, 140 } )
RGB_Dictionary.Add( "violetred3", { 205, 50, 120 } )
RGB_Dictionary.Add( "violetred4", { 139, 34, 82 } )
RGB_Dictionary.Add( "wheat", { 245, 222, 179 } )
RGB_Dictionary.Add( "wheat1", { 255, 231, 186 } )
RGB_Dictionary.Add( "wheat2", { 238, 216, 174 } )
RGB_Dictionary.Add( "wheat3", { 205, 186, 150 } )
RGB_Dictionary.Add( "wheat4", { 139, 126, 102 } )
RGB_Dictionary.Add( "white smoke", { 245, 245, 245 } )
RGB_Dictionary.Add( "white", { 255, 255, 255 } )
RGB_Dictionary.Add( "whitesmoke", { 245, 245, 245 } )
RGB_Dictionary.Add( "yellow green", { 154, 205, 50 } )
RGB_Dictionary.Add( "yellow", { 255, 255, 0 } )
RGB_Dictionary.Add( "yellow1", { 255, 255, 0 } )
RGB_Dictionary.Add( "yellow2", { 238, 238, 0 } )
RGB_Dictionary.Add( "yellow3", { 205, 205, 0 } )
RGB_Dictionary.Add( "yellow4", { 139, 139, 0 } )
RGB_Dictionary.Add( "yellowgreen", { 154, 205, 50 } )
return( RGB_Dictionary )
```

APPENDIX D: REVIEW with comments from the Authors

Comments based on review of INSROP discussion paper

by David Henry and Igor Lysenko, January 1999,

and authors' response to the revievers' comments written in italics.

INSROP discussion paper
Project I.3.2
20 November 1998
INSROP GIS v3.0a
User's guide and system documentation
Stig Magnar Loevaas,
Odd Willy Brude

Our comments concern the above paper and the associated CD-ROM that provides the INSROP_GIS ArcView functionality and data sets. This paper we will refer to as the **User Guide.** If you would like to discuss any of the comments below, please do not hesitate to contact us.

As a general comment we would like to commend the author's on what is a substantial piece of work. The system produced and the data sets catalogued in the accompanying database form an impressive tool and source of information. This should be noted up front and is in no way to be lessened by the brief comments we provide here. In review these comments are meant to provide constructive ideas on how to improve the system and to point out observations from the point of view of a potential user of the system.

Also, having definitely short time/resources for investigation of complicated and high technological product we are certainly capable of making mistakes and we apologise in advance for any misunderstanding' s from our perspective.

User Guide

Firstly a few general comments. Clarity and usability could be improved if either you could separate out the user guide from the system documentation, or rearrange the structure of this report to clearly show a divide between the two. Please note that you are addressing two separate audiences who would benefit immensely from not being entwined with each other. You mention at some point in the document, that this tool is targeted at decision-makers. Current status of it's readiness would certainly mean that it have to be used by someone with a good degree of knowledge of GIS.

> ***Authors' reply:*** *The system is meant to be used by decision-makers capable of using ArcView, and our experience is that it only requires a little initial guidance to be able to use ArcView to look at prepared data sets. However, another major user group is likely to be researchers that have been working within INSROP. Some will use the system as it is, some will also add data, and some may want to use existing scripts as a basis for creating scripts for treating these new data. We have anyway restructured the document to improve readability and make it more logical for a new user.*

It would be rather useful for thematic specialists and decision makers if you could find a way to package the data sets without the system documentation. All the technical details/dataset

documentation could find it's place just as a supplementary file on disk. There are probably many users, who are experienced with GIS that would just like to get their hands on the data.

It would improve user navigation if you could list the contents of each chapter at the beginning of the corresponding chapter.

> ***Authors' reply:*** *Given the number of sections and sub-sections in some chapters, we only include a Table of Contents in the beginning of the document*

It is a little disappointing that you did not include information about the data sets within the user guide. Probably this information is to be included in the other document. However, we believe it would be more useful to combine this information into the user guide and make that a separate document from the system documentation.

> ***Authors reply:*** *This would make the document too voluminous. There is not much extra text for programmers in the document. The main difference is between users that only want to use the data that comes with the system, and users that want to add/integrate their own data into the database.*

The text needs general English editing. There are many small grammatical errors that should be rectified.

Specific Section Comments

1. Introduction

This section number is the same as for "background". They both have section #1 in the Table of Contents.

> ***Authors' reply:*** *Corrected*

Fourth paragraph first sentence, the sentence needs to be rewritten in order to clarify.

> ***Authors' reply:*** *Rewritten to be more direct and by avoiding use of the term 'hyper media'*

1.2. What is ArcView?
Add ESRI's web address to provide access to other international vendors.

> ***Authors' reply:*** *OK*

1.4. The INSROP GIS development strategy.
In numbered list, we suggest adding an extra point to explain the need to integrate new data with existing data.

> ***Authors' reply:*** *We don't feel that this helps clarify the message we were trying to deliver in these section.*

This section explains how ArcView has broken barriers to its use. It may be worthwhile to explain what the previous alternative was so that users can appreciate the improvement it has brought.

Authors' reply: *The basic idea of this section is to provide brief background on why INSROP GIS has been developed the way it has (e.g. based on commercial software), and explain some advantages of a computer-based information system compared to a paper-based atlas. We did not want to extend this section to include e.g. data management issues.*

The following sentence is integrated into the section: Prior to this most available GISs were UNIX-based, costly and required skilled users, or had very limited functionality.

2. Installation of INSROP GIS

Authors' reply: *INSROP GIS is now developed as an ArcView Extension, which means that the 'default.apr' file should no longer be used. The chapter is rewritten to reflect this change.*

2.2. Set INSROP GIS system environment variables.

While using current solution for INSROP GIS initialisation, when setting environment variables in Windows NT 4.0, you might want to instruct user to either "apply" the variable's set or provide information on whether the system should be rebooted.

Authors' reply: *OK*

But overall strategy chosen for the INSROP GIS initialisation can't be considered as appropriate if the product is addressed for specialists other than computer technicians. Thematic specialists have very another interests than the system reconfiguration which might easily cost the entire ARCVIEW reinstallation. And AVENUE programming options do allow to escape any kind of this troubles making all necessary reconfiguration procedures temporary and "invisible" for user.

Authors' reply: *These environment variables does not affect ArcView at all. They are used to enable the user to store the INSROP GIS software and data where he/she wants and let the system know where this is.*

It looks like I.GIS needs more punctual programming and very thorough testing to be ready for publishing.

2.3.2. Put INSROP GIS into the Windows startup menu.
This paragraph is not clear and we found it impossible to follow the instructions.

Authors' reply: *Rewritten*

2.4. Modifying the stardard ArcView startup file.
This section is very unclear. We could not understand anything.

Authors' reply: *Rewritten*

3. The INSROP GIS software.
This whole section may be overkill. It sounds like an ArcView user manual.

Authors' reply: *This section is meant to inform also non-ArcView users of the main capabilities of a system based on ArcView.*

3.3. INSROP GIS layout templates.
We could not access these templates as you describe in your documentation.

> ***Authors' reply:*** *This is due to the Reviewer not understanding Section 2.4. We have however rewritten the section and added two other possibilities to enable use of the INSROP GIS templates.*

4.1. Directory structure.
First paragraph: you mention three basic INSROP GIS subdirectories and you list four in the paragraph.

> ***Authors' reply:*** *Missing update*

4.2. INSROP GIS interface.
First paragraph: Why do you reference figure 5.1?

> ***Authors' reply:*** *Because this figure, as described in the text, shows the standard INSROP GIS interface just after INSROP GIS is loaded.*

This section sounds again like a standard ArcView user manual.

For all subsections under 4.2, We think it would be more advantageous to describe the icons adjacent to the figure instead of after the table.

> ***Authors' reply:*** *OK*

The need to include the "triggered AVENUE script" column seems unnecessary for a user guide, although important as part of the system documentation. See comment above concerning the inappropriate mix of the user guide with the system documentation.

> ***Authors' reply:*** *We were also doubtful about this when preparing the document. The column has now been removed*

4.2.2. Views window.
dBase files are all generally "read only" and therefore cannot be written to. This is particularly noticeable when trying to use the query functionality.

> ***Authors' reply:*** *All files on or copied from a CD are read-only. There are only a few queries or menu choices that require modifications in the dBase files, and before using these the database must be copied to a harddisk and in the properties of the files the checkmark ahead of read-only must be taken away*

4.3.1. Database topics definition file.
The indigenous data sets are mentioned in this definition file, but were not available on the CDROM.

> ***Authors' reply:*** *The Sub-Programme II data sets were not complete at the time the CD was prepared. They are included now.*

4.3.4. Data set member attributes definition files.
Here, and in several sections of the guide, a section reference has been lost. This needs to checked thoroughly throughout the document.

Authors' reply: Checked and corrected

The last paragraph would be better placed at the beginning of the section. The purpose description would be useful to the user before the system documentation. This also applies to section 4.3.5.

Authors' reply: OK

4.4. INSROP GIS projects library.
You mention that there will be some projects in the INSROP project directory. This directory was empty on the CDROM we have.

Authors' reply: As all special functionality that we earlier planned to include in special projects is now implemented as INSROP GIS Queries, the need for prepared projects is lessened. Therefore it was empty. The PROJECTS folder is more intended as a depository for projects any user may prepare. This of course requires a PROJECTS folder located on a harddisk.

The note at the end of this section reminds us to congratulate on your attention to metadata throughout the INSROP GIS.

4.5.1. Core database.
The note at the end of this section fails to indicate that you have to select a .def file first.

Authors' reply: Rewritten

4.5.2. Metadata.
Having congratulated you on your attention to metadata, we would like to add clarification to this. It would have been much more useful to use internationally accepted metadata standards so that the data within INSROP GIS could be used with other metadata catalogues.

*Authors' reply: When designing INSROP GIS we planned to adopt an international standard. When implementing the database we decided to drop this idea since for most of the data sets received/prepared within INSROP we did not receive sufficient information to justify the work of preparing metadata in an international standard. We also wanted to use a metadata standard where as much as possible of the metadata could be generated automatically. However, the free-text part of the metadata (the *.dco-files) can include data organised in an international metadata standard.*

5.1. Starting INSROP GIS
When we start INSROP GIS, it never recognizes default.apr. Each time, you have to import the default.apr file. The path is correctly set and we do end up in the right directory for this file, but it will not load.

Authors' reply: Not required any more, but see Section 2.4 for further understanding.

5.3. Using projects from the INSROP GIS project library.
Again, no projects exist in presented version of the CDROM.

Authors' reply: OK

Section 4.4 of Brude et al., 1988 does not exist in presented copy of that document.

Authors' reply: *By an unfortunate mistake the Reviewer did not receive the most up-to-date version prepared by us, but Brude et al., 1999 is now completed.*

6.1 Using data from the INSROP GIS database
The last section of the first paragraph needs to be rewritten for clarification.

Authors' reply: *OK*

6.2.2 Importing ASCII point features
Last sentence could be included, with the omission of the word 'point', at the beginning of section 6.2.1.

Authors' reply: *OK*

6.4 Using and documenting your own data
You reference section 6.2 and 6.3 in this section, however, section 6.3 doesn't explain how to locate a shape file.

Authors' reply: *The previous Sections 6.2 and 6.3 describes how a user can create shapefiles from his/hers own data, and thereby extend the database.*

7.3.1 Display attribute
We would add ". with a legend" to the end of this sub-title.

Authors' reply: *OK*

7.4 INSROP GIS queries
This whole subsection could potentially be moved to the section that describes the specific data set queries.

Authors' reply: *As it is part of the INSROP GIS interface we find it natural to keep this information here.*

8 INSROP GIS queries
We have not checked every single query described in this section. Instead, we randomly selected a number of queries to test. As it was mentioned in general comments, we would have preferred to see descriptions of the data set included either in this section or in a separate section.

8.4.4 Air temperature
We tried to display the metadata ASCII file. This displayed OK, but the documentation included was too basic. The overall impression is that any user new to the data sets would need to have copies of all the relevant INSROP reports in order to understand the data.

We believe the metadata could be improved slightly in order to give the user a better understanding.

The metadata does not wrap-around in this window. This makes it very difficult to read.

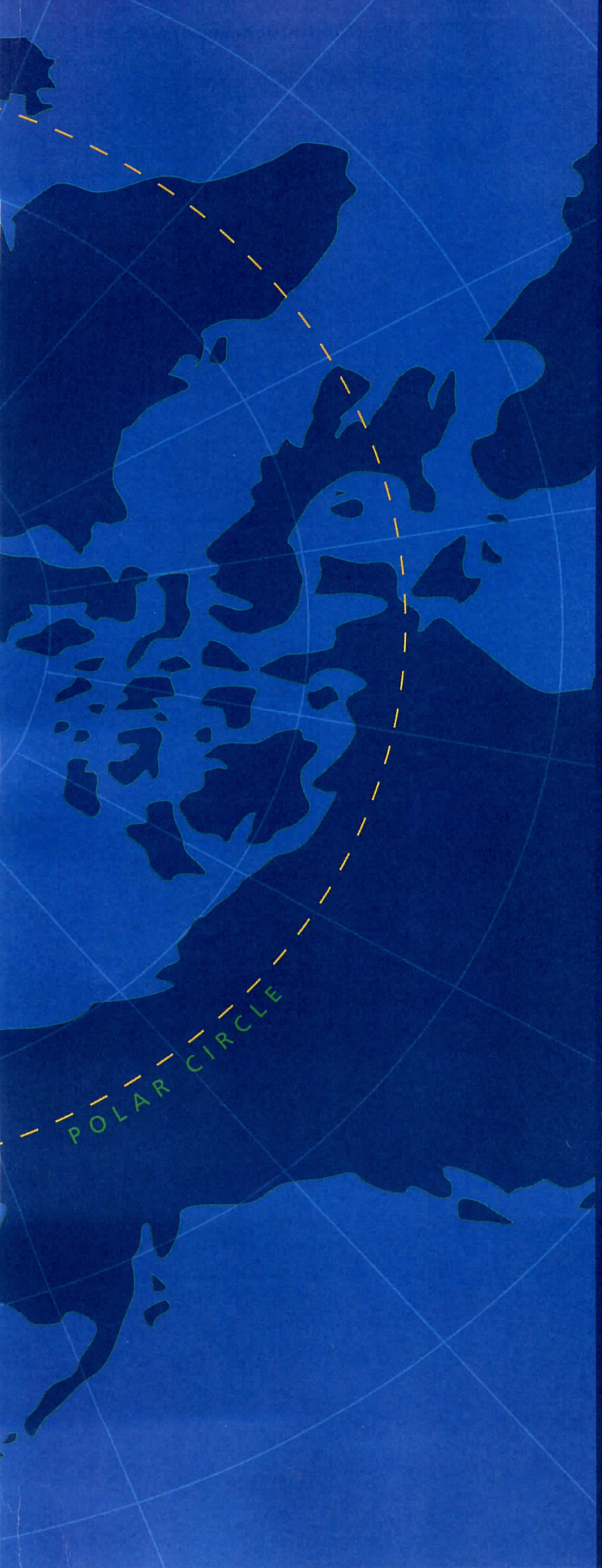
Authors' reply: *This is an ArcView limitation. The metadata files are also included in the INSROP GIS help files, and the ASCII files may be opened in a text editor, e.g. Notepad. However, using the ArcView text window is the simplest.*

8.7.1 Oil spill simulations
We tried this section, but we could not access metadata associated with the data sets. Is it the case that only some of the data sets have metadata?

> ***Authors' reply:*** *When the CD was sent for review a few data sets did not have metadata. Now all have.*

8.8.1 Baselines
What is a baseline - no description found and very strange object - we are really interested to know more about it for self-education purpose...

> ***Authors' reply:*** *A baseline is a country's "formal coast line" from where its economic zone, its terriotorial waters etc. is measured. In many places, the baseline coincides with the coastline itself (measured at the low tide line), but in places where the coastline is heavily indented, or where islands lie close to the coast, international law allows the baseline to be defined by straight lines between outer points (capes, bay entrance points, islands etc).*



The three main cooperating institutions of INSROP

Ship & Ocean Foundation (SOF), Tokyo, Japan.

SOF was established in 1975 as a non-profit organization to advance modernization and rationalization of Japan's shipbuilding and related industries, and to give assistance to non-profit organizations associated with these industries. SOF is provided with operation funds by the Sasakawa Foundation, the world's largest foundation operated with revenue from motorboat racing. An integral part of SOF, the Tsukuba Institute, carries out experimental research into ocean environment protection and ocean development.

Central Marine Research & Design Institute (CNIIMF), St. Petersburg, Russia.

CNIIMF was founded in 1929. The institute's research focus is applied and technological with four main goals: the improvment of merchant fleet efficiency; shipping safety; technical development of the merchant fleet; and design support for future fleet development. CNIIMF was a Russian state institution up to 1993, when it was converted into a stock-holding company.

The Fridtjof Nansen Institute (FNI), Lysaker, Norway.

FNI was founded in 1958 and is based at Polhøgda, the home of Fridtjof Nansen, famous Norwegian polar explorer, scientist, humanist and statesman. The institute spesializes in applied social science research, with special focus on international resource and environmental management. In addition to INSROP, the research is organized in six integrated programmes. Typical of FNI research is a multi-disciplinary approach, entailing extensive cooperation with other research institutions both at home and abroad. The INSROP Secretariat is located at FNI.