

Global Environmental Policy

Polar Environment and Global Warming
(changed)

International Research Project, INSROP

INSROP GIS

Experimental Voyage

May 27, 2003

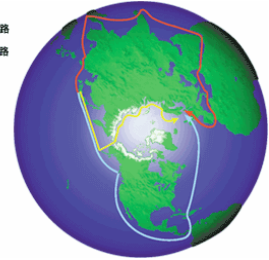
Hajime Yamaguchi

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INSROP

International Northern Sea Route Programme

スエズ運河経由航路
パナマ運河経由航路
北極海経由航路



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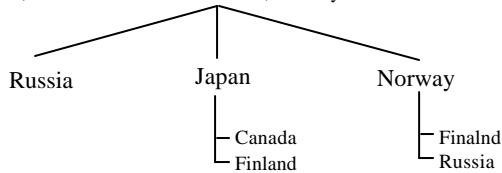
INSROP

Organized by

CNIMF, Central Marine Research & Design Institute, Russia

SOF, Ship & Ocean Foundation, Japan

FNI, The Fridtof Nansen Institute, Norway



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INSROP

1st Phase: 3 years, 1993-1995

Evaluation Phase: 1 year, 1996

2nd Phase: 2 years, 1997-1998

Final Presentation: 1999

Budget: 2-3,000,000 US\$ / year

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INSROP

4 Sub-Programmes

1. Natural Conditions and Ice Navigation
2. Environmental Factors
3. Trade and Commercial Shipping Aspects
4. Political, Legal and Strategic Factors

Each sub-programmes manages 10-20 projects every year.

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INSROP Outputs

- 166 research project reports
- 3 books (2 English, 1 Japanese)
- 3 international conferences
- INSROP GIS

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Major Roles

- Russia:
CNIIMF, Icebreaker and navigation data
AARI, Ice conditions and other environmental data
- Norway:
GIS
Environmental impact assessment
Political and Economical demands
- Japan:
Extensive tank tests for optimal ship design
Experimental voyage
Navigation simulation and economic assessment
Inputs from Canada and Finland

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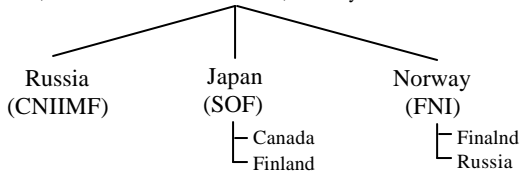
Many Negotiations

- Complicated structure of Russian Society
> CNIIMF as agency
SOF members = office workers and not many
Volunteer works of researchers
- Tell clearly what we need, and what we want to and can do with it.
- Find characters to whom we are asking something.
- Realize team working ASAP.
- Internet communication as well as normal communications.

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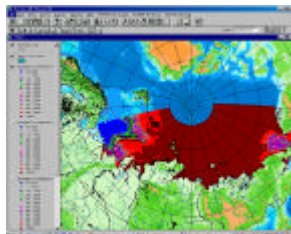
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INSROP GIS for Sustainable Development

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GIS, Geographic Information System

- Digital map displayed on a PC screen
+
Database



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GIS data

- GIS data compositions
 - map data : point (e.g. city and data point), line (e.g. river), polygon (e.g. country border), etc. to express the position and shape of the attribute
 - attribute data : any data related to the map data
e.g. population, address, area, name...
 - +
 - meta data : to describe the whole data set

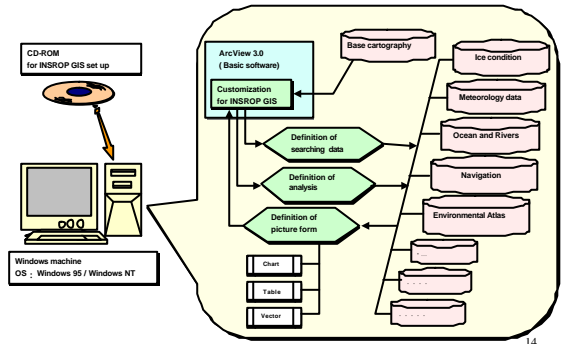
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GIS

helps us to view and analyze the any spatial information and to make decision on a particular plan.

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INSROP GIS



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INSROP GIS Demonstration

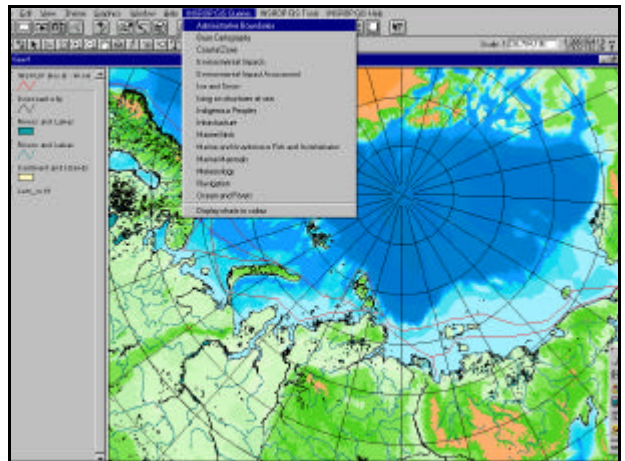
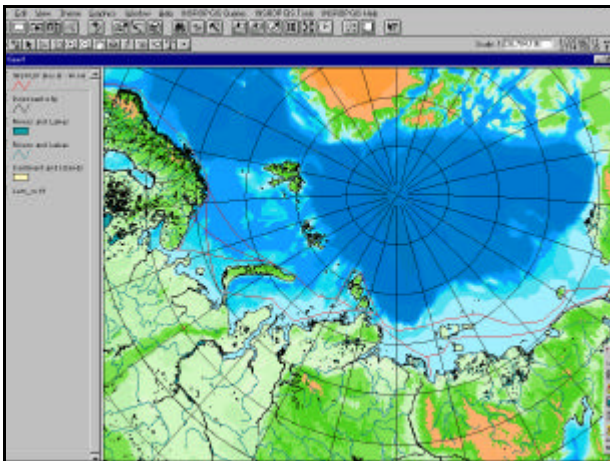
1. Color Map
2. Example of Data Analysis
3. Display of Oil Spill Simulation
4. Data Analysis along the Navigation Route
5. Simple Environmental Impact Assessment

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1 .Color(Bi tMap)

- Base Map
- Query Menu to Extract the Data

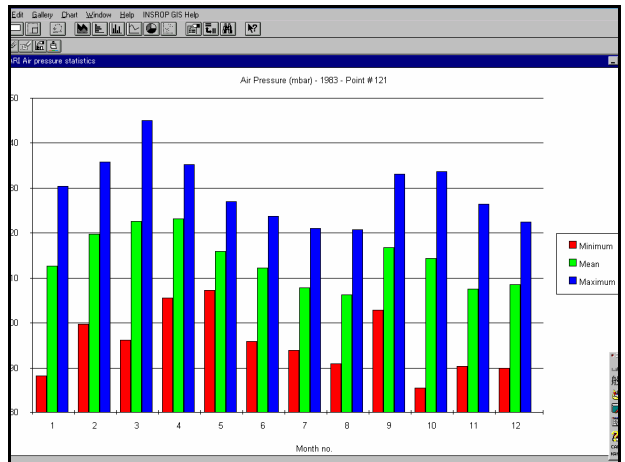
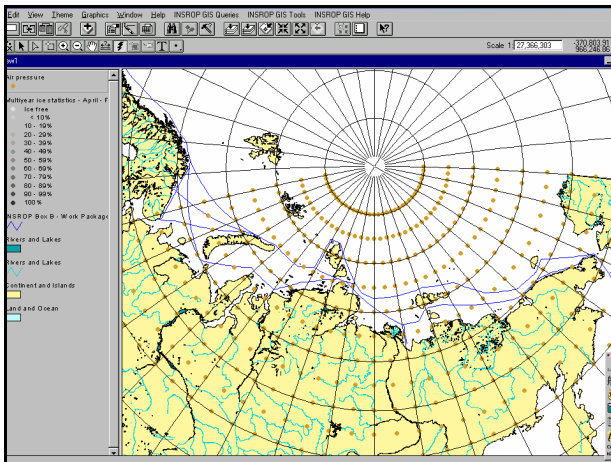
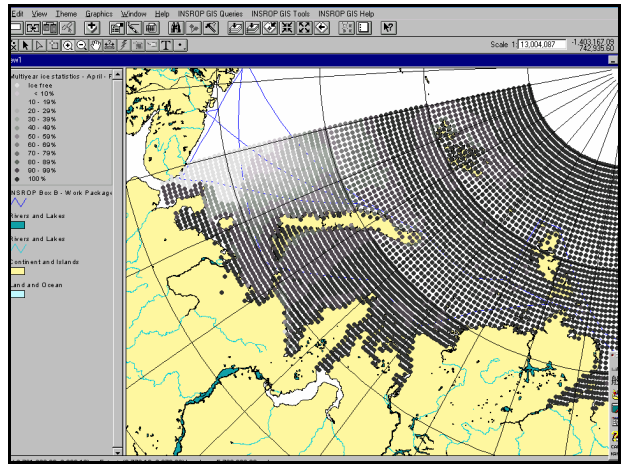
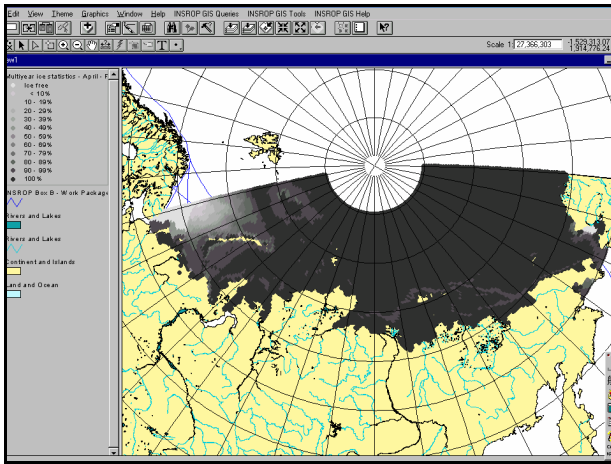
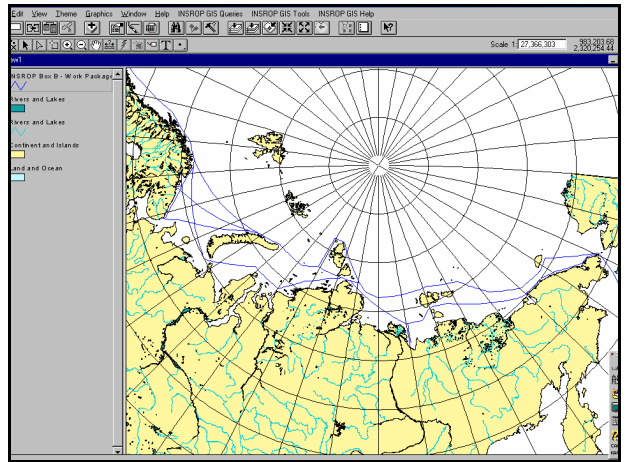
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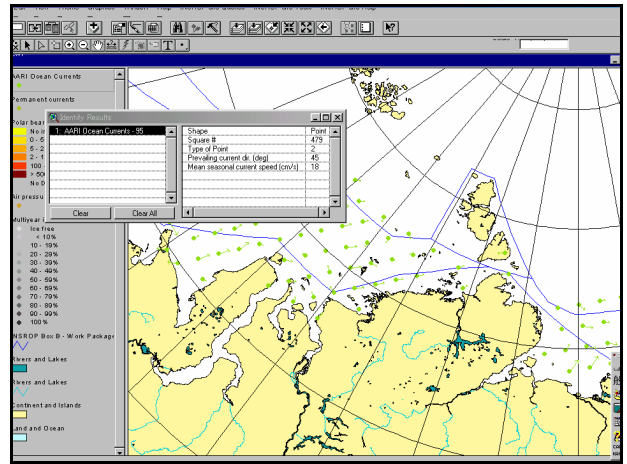
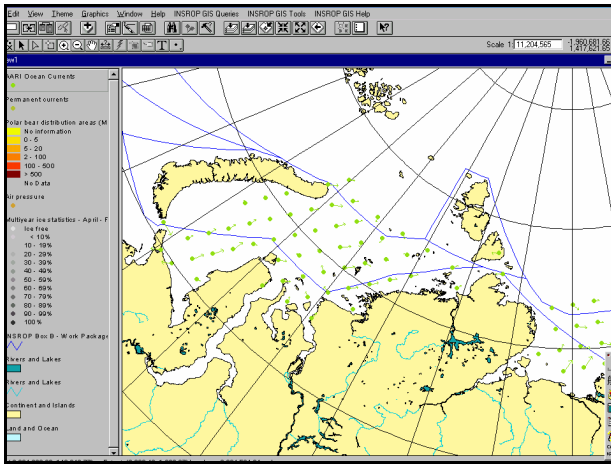
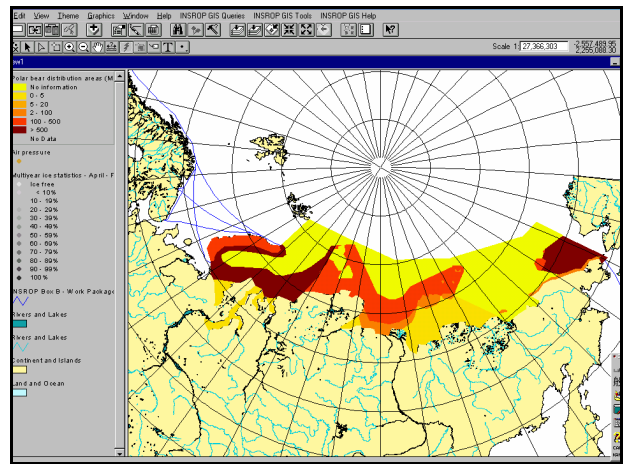
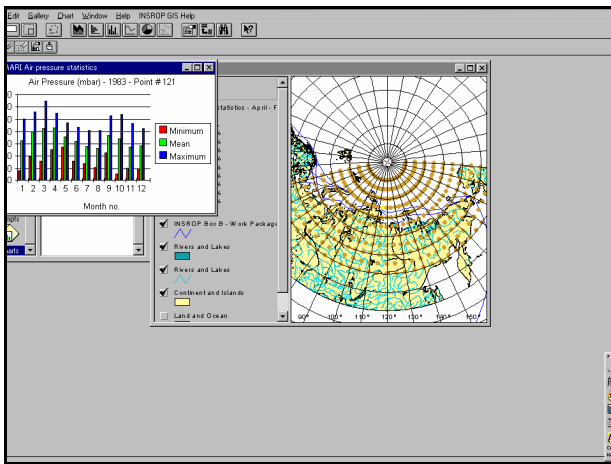


2. Examples of Data View and Analysis

- Ice Concentration
- Air Pressure and Its Time Variation
- Polar Bear Distribution
- Sea Surface Current Distribution

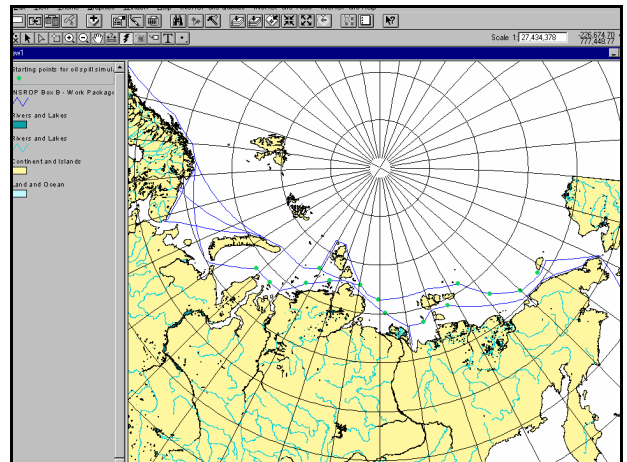
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Oil Spill Simulation

- Wind and current data in the INSROP GIS.
- 3,500 ton spilled oil to be assumed.
- Probability of oil presence due to statistical variation of wind and current.



EIA

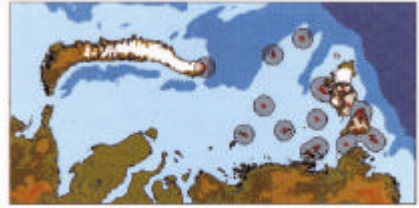
Environmental Impact Assessment (Effects on Biological System)

Effects of increased NSR navigation on
Ivory Gulls in Kara Sea
(quantification of simplified equation)

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EIA for Normal NSR Operation

1st step: display the spatial distribution of Ivory Gull colonies



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EIA

2nd step: typical sailing routes in Kara Sea



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EIA

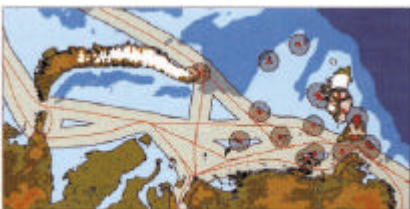
3rd step: spatial range of a given impact factor represented by an influence zone along the sailing segments



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EIA

4th step: potential conflict area given as overlap between the Ivory colony distribution and the influence zone for the impact factor



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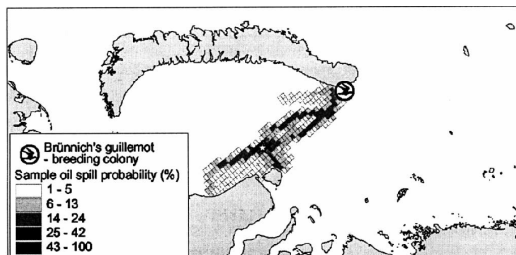
EIA

5th step: identification of sensitive/high risk areas



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EIA for Accidental Event



Results of Oil Spill Simulation and Guillemot Colony Position

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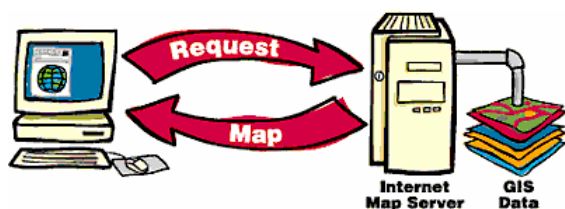
Why GIS for EIA?

- EIA can be done without GIS.
- But GIS speed-ups the EIA process, possibly realizing the PDCA (Plan-Do-Check Action) environment management system.

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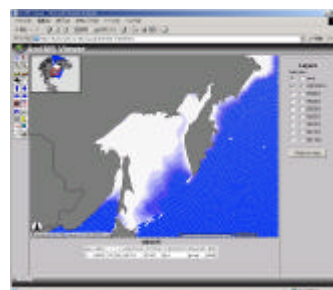
Communication with the Outside Society

IMS, Internet Map Server



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IMS Interface



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INSROP

↑ Data Survey/Construction and Future Prospects.

Experimental Voyage through the Northern Sea Route: August, 1995

• Acquisition of Actual NSR Data

• Acquisition of Ship Performance Data in Actual Sea Ice

JANSROP

Extensive Model Tests in Ice Tanks

• Relation between Ship Hull Form and Performance

• Components of Force Acting on the Ship

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Experimental Voyage through the Northern Sea Route: August, 1995

7 Tasks

- Monitoring the test voyage
 - Ice conditions along the route
 - Ship's progress
 - Evaluation of the transit voyage
- Evaluation of satellite ice information
 - Verification of satellite ice image by field data
 - Effectiveness of satellite ice image for navigation
- Performance measurement of SA-15 cargo ship
 - Daily logging of the voyage
 - Ship performance measurement

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Experimental Voyage through the Northern Sea Route: August, 1995

7 Tasks

- Technical issues of SA-15 cargo ships
- Operational problems of the NSR and future prospect
- Observation of natural environment
- Video documentation of the voyage

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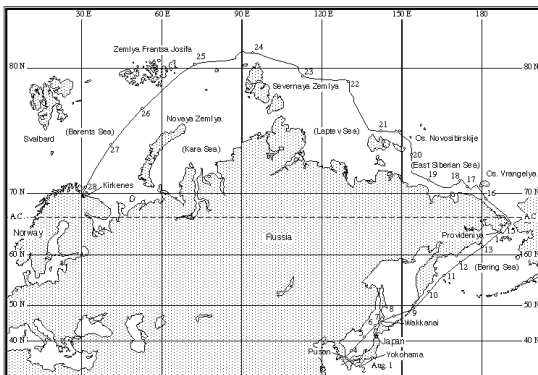
People on board

- 32 Crew
All Russian, A few persons can speak English.
- 18 Members of Scientific Team including 2 professional video crew, 1 director and 1 cameraman.
18 Japanese, 2 Russian and 1 Canadian.

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Travel with Troubles in the Beginning

NSR Sea Trial (August, 1995, on board m/v Kandakaksha)



Experimental Voyage through the Northern Sea Route: August, 1995

Projection of 35 min. video which recorded the onboard activities of the mission team consisting of 18 members from Japan, Russia and Canada.

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Homework

Select 1 from the following 2 tasks:

1. Investigate and discuss the feasibilities of the development of Russian polar regions including Okhotsk area from technological, economical, social and environmental aspects.
2. Survey the use of GIS for environmental issues and discuss the future prospect.

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