Siberia Environment Integrated Regional Study as a ground for International Scientific Cooperation

E.P. Gordov, G.Begni, M.V. Kabanov, V.N. Lykosov, A. Shvidenko and E.A. Vaganov

Siberian Branch of Russian National committee on IGBP

Outlines

- **ESSP and IGBP Integrated Regional Study approach**
- **Siberia Integrated Regional Study**
- **Background**
- **The state of the art**
- **Possible future**
- **Conclusions**

ESSP Integrated Regional Studies (IRS)

- **Based on the concept of the region as a holistic entity in the context of the Earth System;**
- **Contribute sound scientific understanding in support of sustainable development in the region;**
- **Contribute to a quantitative and qualitative understanding of regional-global linkages and the consequences of changes in these linkages.**

Overall Approach

Each IRS be developed and led by scientists in the region concerned.
Each IRS should address the same overall questions:

- **What will the region be like in 50 years (2050)?**
- **What will be the consequences of these projected changes (scenarios) for the welfare of the region?**
- **What are the consequences for the Earth System?**

‘Region' in an **IRS** refers to a large geographical area according to the following:

IRSs must:

(i) transcend disciplinary boundaries across natural and social sciences, address all relevant aspects of marine, terrestrial, atmospheric, social, economic, cultural, historical etc. components of the Earth System;

(ii) reflect the particular socio-economic and biophysical characteristics of the region ; and

(iii) address regional research as an integrative Earth System science from planning to the synthesis and completion stages of such studies.

Example Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)

- 80 research groups - 600 scientists
- How does Amazonia function as a regional entity (e.g., natural cycles of water, energy, aerosols, carbon, nutrient and trace-gases)?
- How will changes in land use and climate affect the biological, chemical and physical functioning of Amazonia, including its sustainability and influence on global climate?

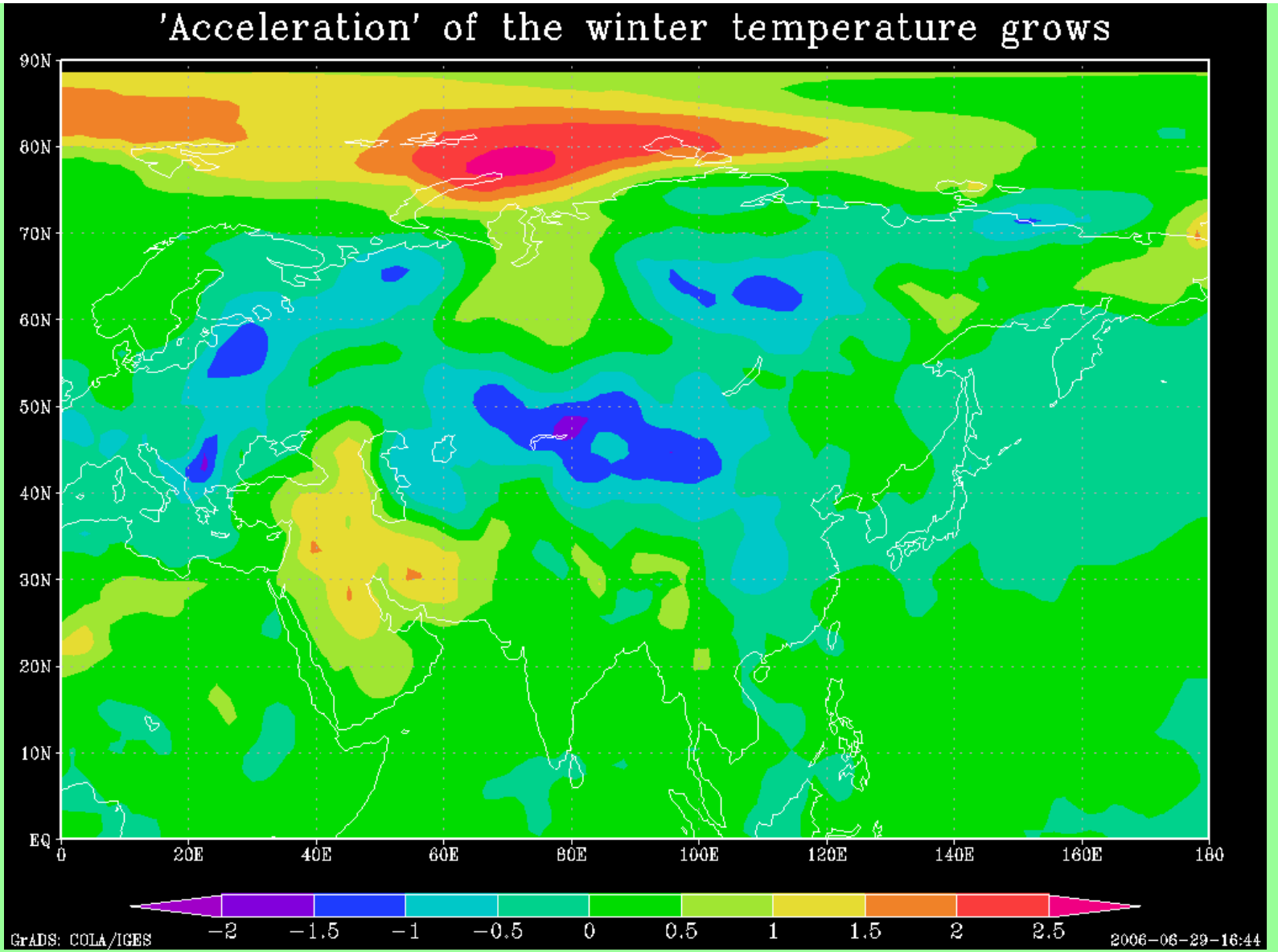
Siberia Integrated Regional Study (SIRS)

2002: Will Steffen (IGBP) had suggested to develop with assistance of SB RAS one of Integrated Regional Studies in Siberia

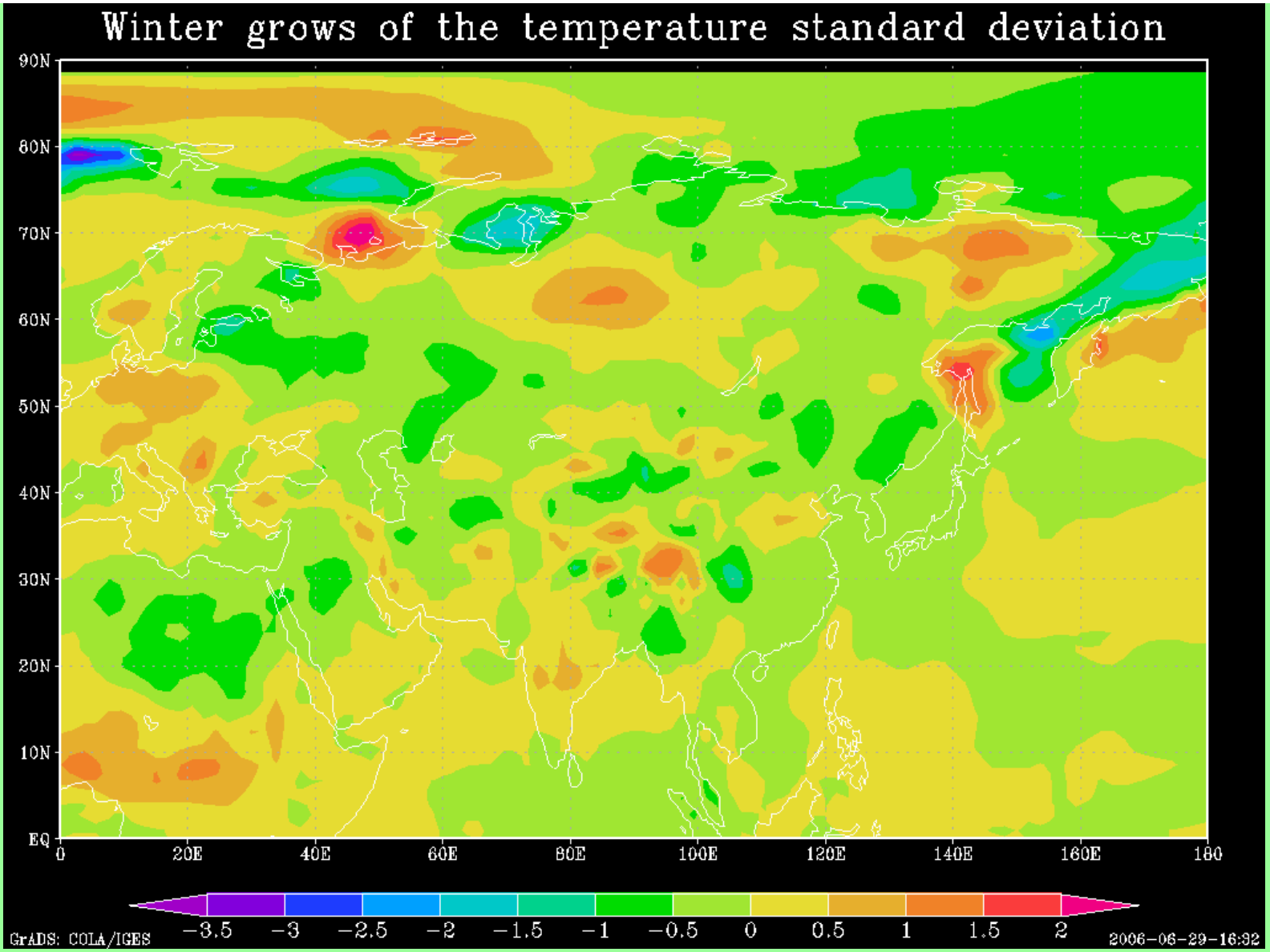
Why Siberia:

- **Drastic regional climate variations;**
- **Role in carbon cycle (forestry, bogs, peat);**
- **Permafrost;**
- **Siberia-global system linkages; and**
- **SB RAS research infrastructure**

2003 – beginning of specific activity!



“Acceleration” of winter warming (2 m temperature) in Northern Eurasia in the end of XX century (Gordov, Okladnikov, unpublished)



Grows of near surface temperature fluctuation in Eurasia in the end of XX century (Gordov, Okladnikov, unpublished)

SIRS Components

Scientific;

•Infrastructural;

•Organizational;

•Educational (capacity building)

SIRS Stages

Background (till 2003)

The state of the art (2003 – 2005)

Possible future

SIRS Background (till 2003):

- **Scientific – a number of uncorrelated national and international level projects devoted to different aspects of Siberia environment**
  SB RAS, RFBR, INTAS, ISTC, FP5 EC, NASA,…

- **Infrastructural - nonspecific;**

- **Organizational – none, leaving apart the SB RAS SIBIR' Program**

- **Educational (capacity building) - nonspecific**

SIRS the state of the art (2003 – 2005)

- **Scientific**

SB RAS, EC, INTAS, NIES and NASA projects on Siberia in line with SIRS objectives, beginning of clusterization

SB RAS Integrated projects (2003-2005):

Siberian Geosphere – Biosphere Program: integrated regional study of contemporary natural and climatic changes (SGBP);

Comprehensive monitoring of the Great Vasyugan Bog: investigation of the current conditions and processes of evolution;

Ecological problems of Siberian cities;

Aerosols of Siberia-2,…

Scale: 16-20 research institutions in each project

Terrestrial Carbon Observing System - Siberia

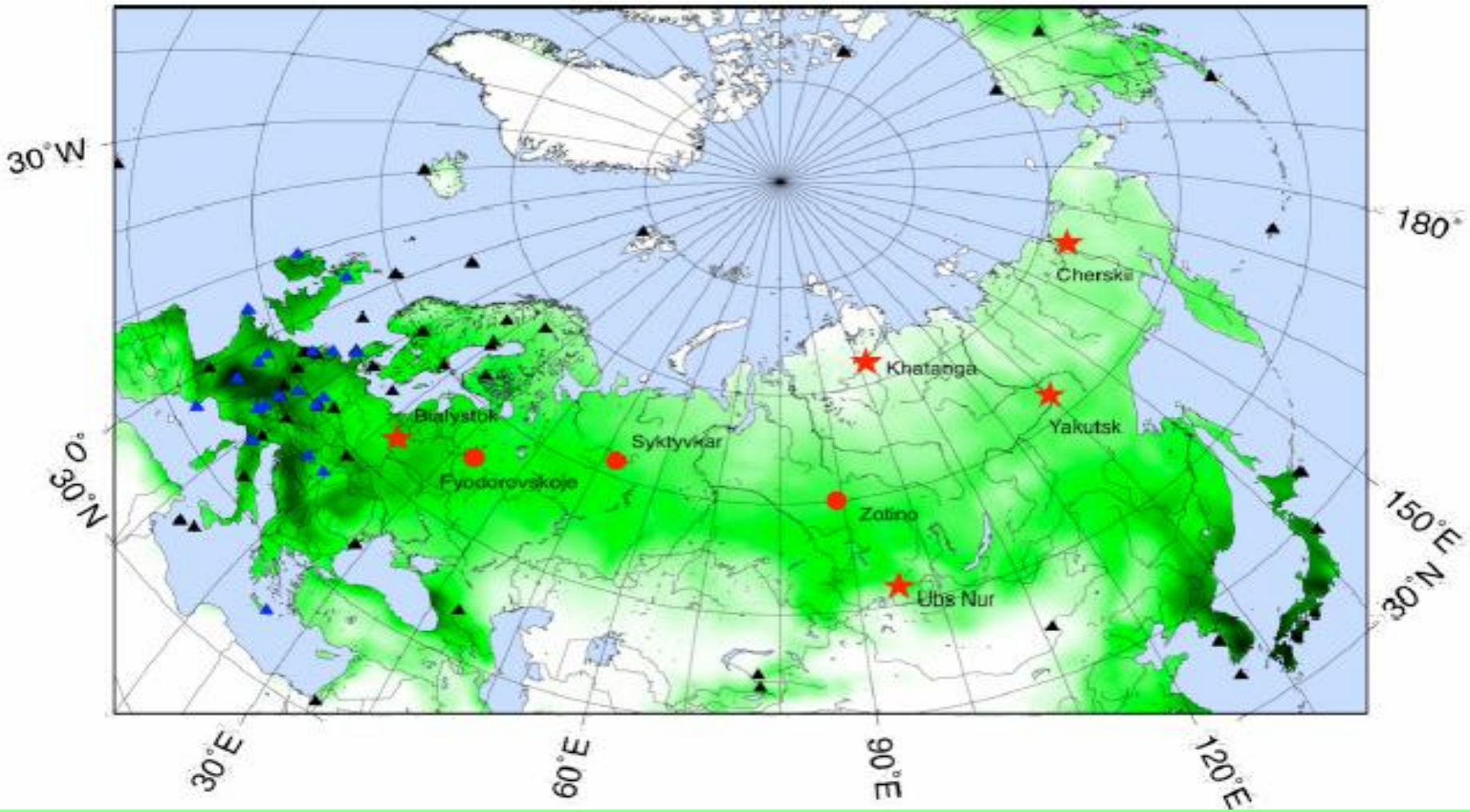
2002-2004

(FP5, EVK2-CT 2001-00131)

Coordinator: Martin Heimann
Project Manager: Reiner Zimmermann

Max-Planck-Institut für Biogeochemie, Jena, Germany
martin.heimann@bgc-jena.mpg.de

TCOS-Siberia Study Sites



Tall Tower in Siberia

- Funding by German Max-Planck-Society:
  - 3.0 MEuro/5yr,
  (Installation: ~1 MEuro, running costs: ~ 400k Euro/yr)
- Funding administration through ISTC
- Principal Partners:
  - Max-Planck-Institute for Biogeochemistry, Jena
  - Max-Planck-Institute for Chemistry, Mainz
  - Institute for Tropospheric Research, Leipzig
  - Institute of Forest, Krasnojarsk
- Status: Construction in 2004/5, Operational on September 1, 2005
- Beyond 2010: to become an international observatory with a life time of more than 30 yr

SIBERIA - II

Multi-Sensor Concepts for Greenhouse Gas Accounting of Northern Eurasia

Main
- Home
- News
- Contact
- Links

Background
- Abstract
- Summary
- Project Area
- Work Plan
- The Consortium
- Consortium Structure

Publications
- Kick-Off
- Scientific Publications
- Brochure (2 MB-pdf)
- Press Releases

Data
- Project Data

Ecosystem Models
- Ecosystem Models

A.Kaspar
Admin

1185

Home

Siberia-II is a shared-cost action financed through the 5th Framework Program of the European Commission, Generic Activity 7.2: Development of generic Earth Observation Technologies.

Project information: the SIBERIA-II brochure (2 MB pdf)

Coordination:

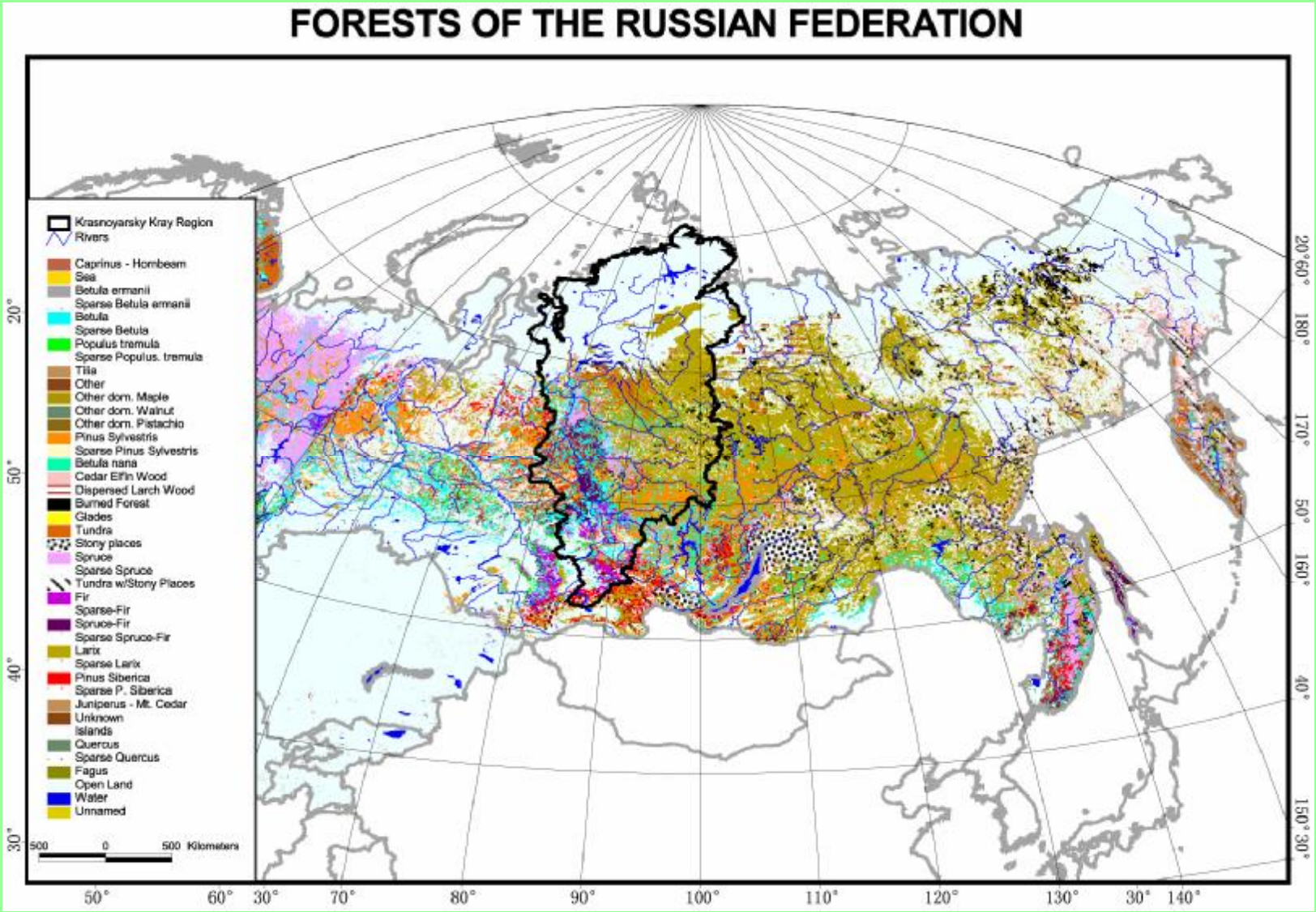
Prof. Dr. Chr. Schmullius

Lehrstuhl für Geoinformatik
Abteilung Fernerkundung
Institut für Geographie
Friedrich-Schiller-Universität
07743 Jena

Tel.:03641/948877, 948878
Fax.:03641/948852
email: c9scch@uni-jena.de

Consortium:

IIASA Forestry Project



NEESPI

Home

NEESPI News

Science

Organization

Meetings

International

Opportunities for Participation

Northern Eurasia Earth Science Partnership Initiative

NEESPI Goals | Scientific Rationale | Background | Science Plan Overview

roduction | S.P. Overview in Russi

URGENT MESSAGE. Deadline extended to May 12, 2006

****

- November 9-12, 2006 An Earth System Science Partnership Global Environmental Change Open Science Conference: "Global Environmental Change: Regional Challenges." Beijing, China. More Details

SIRS the state of the art (2003 – 2005)

•Infrastructure

Development of informational-computational infrastructure of integrated regional study of Siberia environment

To understand dynamic of regional natural and climatic system and perform regional environment assessment on the base of environmental monitoring and a set of developed models an information-computational infrastructure is required.

Key element:: The web portal ATMOS on Atmospheric Sciences is quite effective example of modern Information Technologies and Environmental Sciences integration.

Development of Web portal ATMOS and its localization in different Siberia regions might give an element for informational-computational infrastructure of integrated regional study of Siberia environment.

Development of informational-computational infrastructure of integrated regional study of Siberia environment

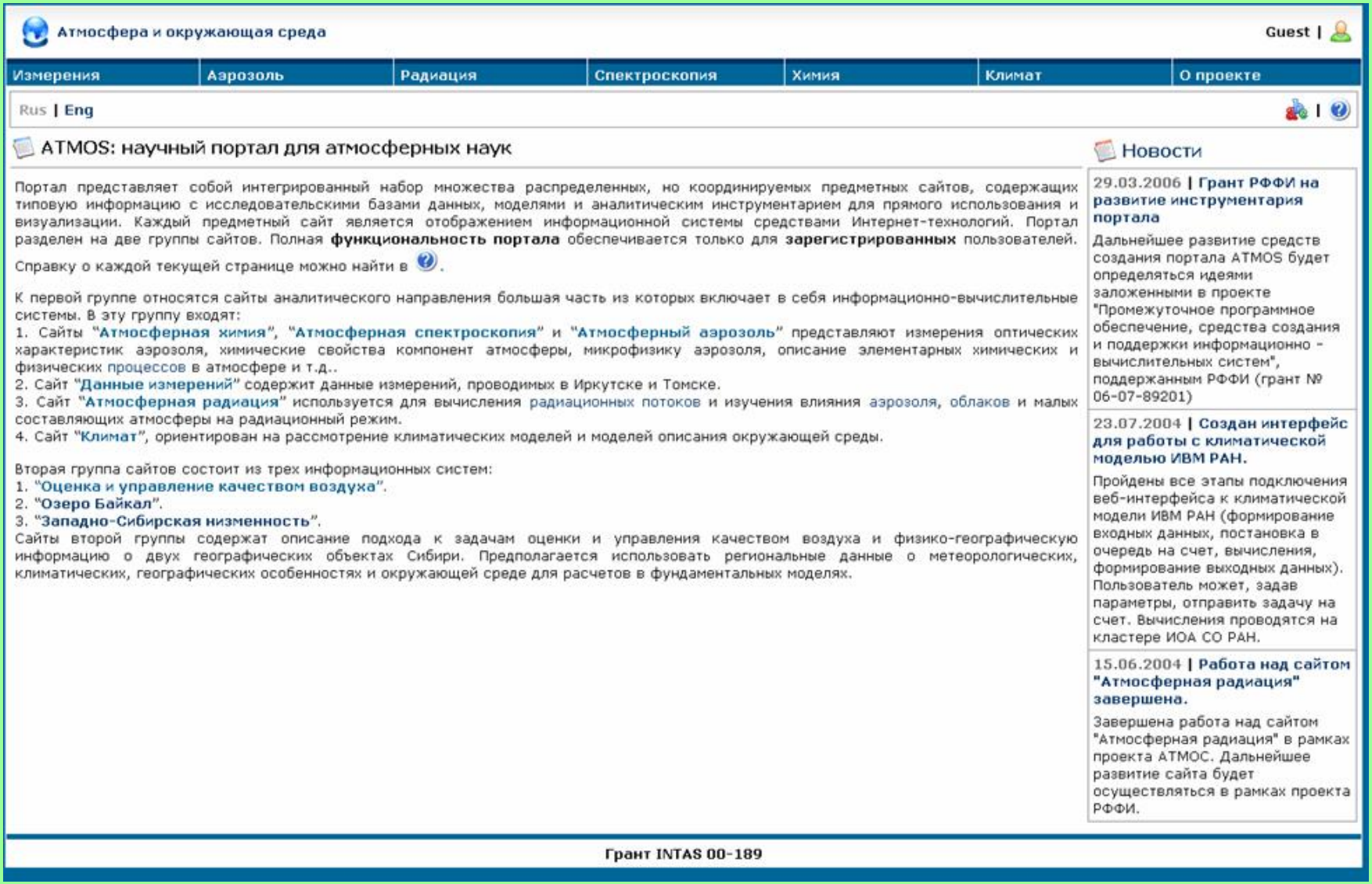
To understand dynamic of regional natural and climatic system and perform regional environment assessment on the base of environmental monitoring and a set of developed models an information-computational infrastructure is required.

The portal ATMOS is quite effective example of modern Information Technologies and Environmental Sciences integration.

Development of Web portal ATMOS and its localization in different Siberia regions might give an element for informational-computational infrastructure of integrated regional study of Siberia environment.

ATMOS : bilingual Scientific WWW Portal for Atmospheric Environment

http://atmos.iao.ru, http://atmos.scert.ru, INTAS grant 00-189



FP6 INCO Projects Environmental Observations, Modelling and Information Systems Special Support Action: ENVIROMIS and ENVIROMIS-2

Objectives:

•Networking of relevant profile organization in Russia and NIS
•Continuous distant information dissemination via specially developed information-computational system open to access in Internet;
•Organization of workshops and training courses as separate events and as events collocated with National /International conferences on Environment Sciences taking place in Russia and in NIS.

Being based on modern information and computational technologies SSA indirectly facilitates cooperation and exchanges in other areas as well.

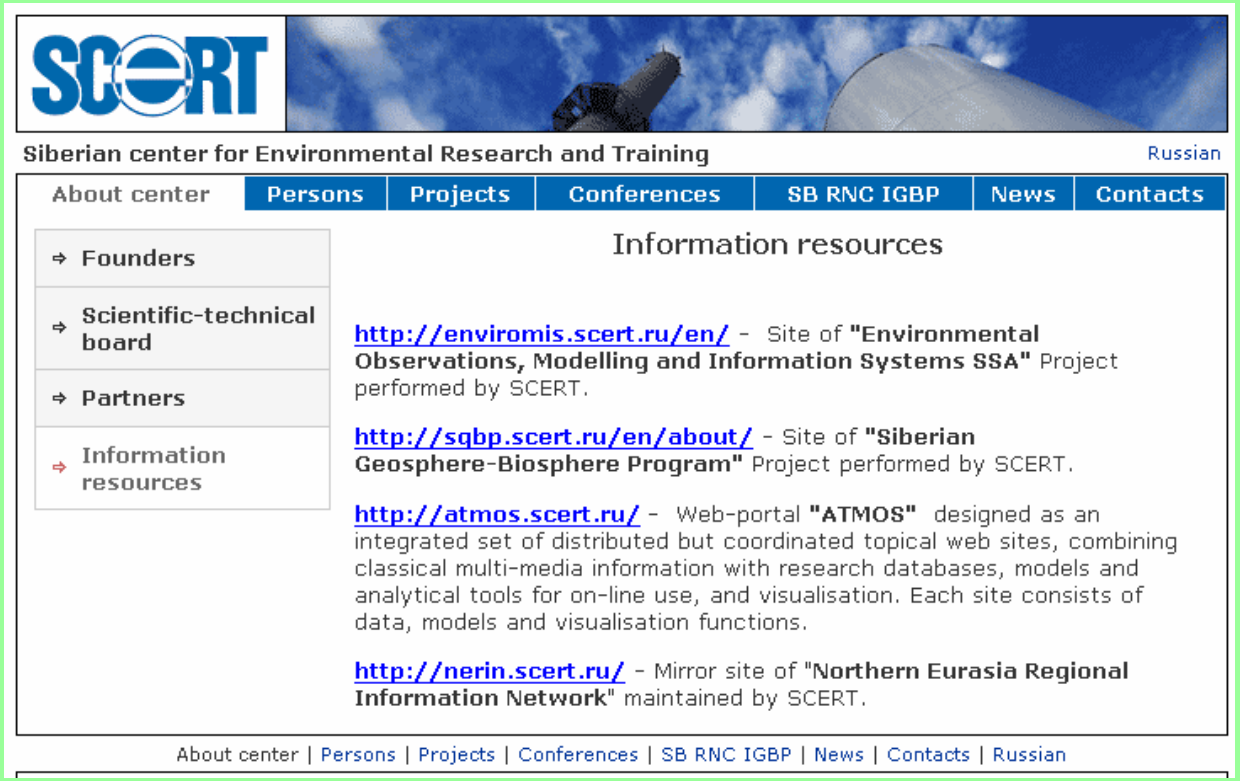
Consortium: SCERT with assistance of several leading NIS research and educational organizations.

Bilingual Project site http://enviromis.scert.ru/

GOFC-GOLD Northern Eurasia Regional Information Network (NERIN)

Russian language mirror (http://nerin.scert.ru/) of the NERIN DB at

http://www.fao.org/gtos/gofc-gold/net-NERIN.html



NERIN start page in Russian

SIRS the state of the art (2003 – 2005)

•Organizational

Creation of Siberian Branch of Russian National Committee for IGBP– first practical action of SB RAS in development of SIRS.

Lines of activity:
Biological – ac. E.A. Vaganov (biosphere research coordination);

Climatic and Ecological – RAS corr. member M.V. Kabanov (research of modern natural and climatic changes);

Paleoclimatic – ac. M.I. Kuz'min (paleoclimate study);

Permafrost – ac. V.P. Mel'nikov (cryolyosphere study);

Informational infrastructure – prof. E.P. Gordov (informational support for environmental research, data storage and access)

According SB of the Russian National IGBP Committee on the initial stage SIRS will be centred along the three following activities:

Study of greenhouse gases and aerosol exchange between biota and atmosphere

Regional climate change impact monitoring and modelling

Development of information-computational infrastructure of SIRS

Approach: clustering relevant projects

FP6 INCO Co-ordination activities

Man-induced Environmental Risks: Monitoring, Management and Remediation of Man-made Changes in Siberia: Enviro–RISKS (2005-2008)

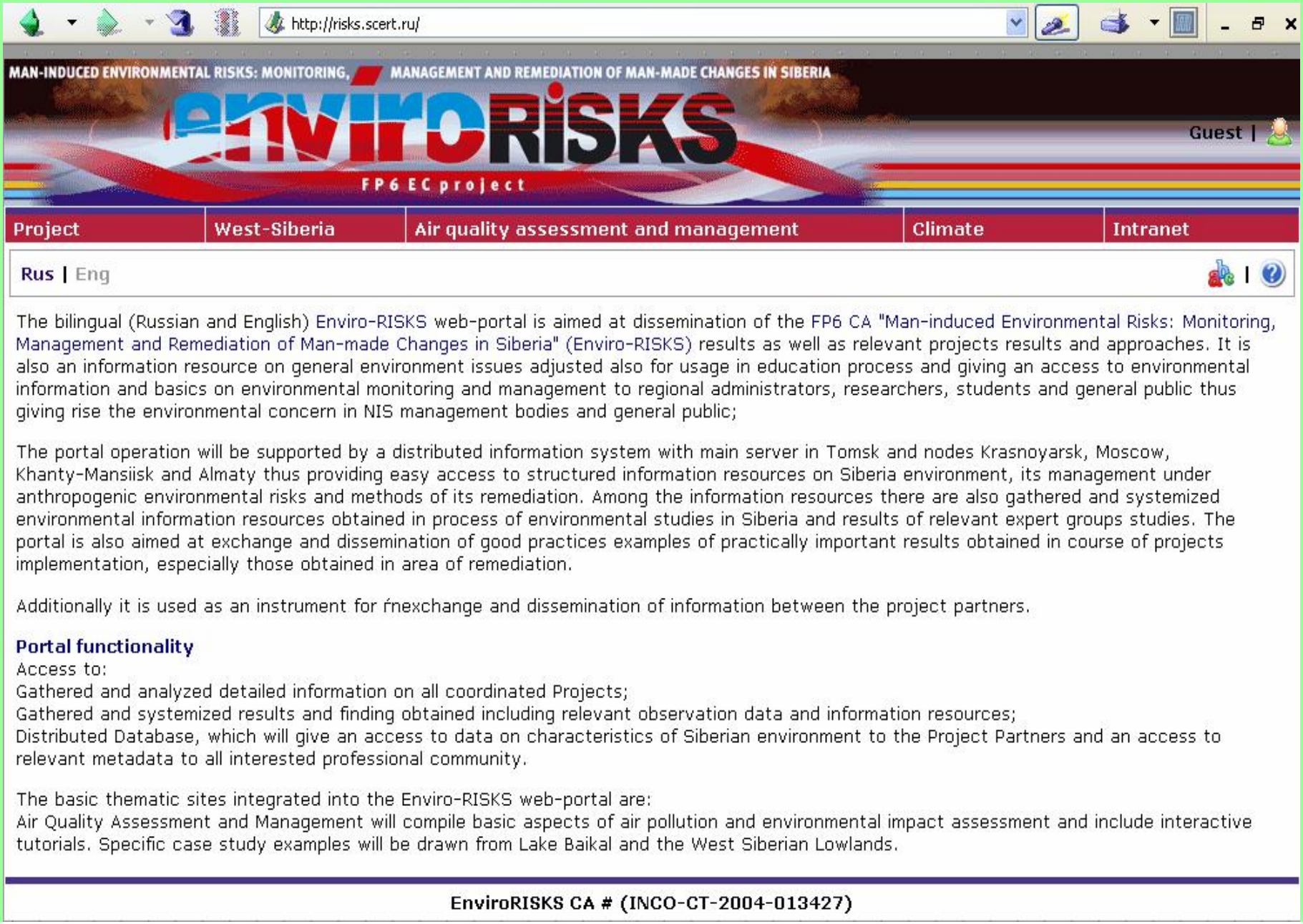
Basic approach: coordination of performed projects devoted to Siberia environment

Danish Meteorological Institute co-ordinates Project,
Siberian Center for Environment Research and Training assists
Partners
Max-Planck-Institute for Biogeochemistry, Jena
The International Institute for Applied Systems Analysis
Institute for Numerical Mathematics of RAS
Institute of Forest SB RAS
KazGeoCosmos
Ugra Research Institute of Information Technologies
Institute of Monitoring of Climatic and Ecological Systems SB RAS
Institute of Computational Mathematics and Mathematical Geophysics SB
Observer
MEDIAS-France

Thematic Focuses and Groups:

- **Atmospheric Pollution and Risks**: *AR-NARP, EmergPrep, FUMAPEX, GEMS (DMI), Cities of Siberia, Forecast Methods, Risk (ICMMG), Dust, Hydrocarbons (KazGeoCosmos), Tomsk (SCERT) –* ***Penenko, Baklanov***
- **Climate/Global Change**: *TCOS-Siberia (MPI-BGC), AMIP/CMIP (INM), SGBR (SCERT, IMCES), EACR (ICMMG), CARBO-North (DMI), -* ***Lykosov, Heimann***
- **Terrestrial Ecosystems and Hydrology**: *Siberia-2 (IIASA), Siberian Taiga (IF), Yugra: Space Monitoring, Water Quality, Land Remediation (URIIT), Great Vasyugan Bog (IMCES), GIS/RS -Agro, Water Oil Poll (KazGeoCosmos) –* ***Kabanov, Shvidenko***
- **Info-Systems, Integration and Synthesis**: *ENVIROMIS, ISIREMM (SCERT), GIS (KazGeoCosmos),* ***Gordov, Zakarin***

Enviro-RISKS web portal



SIRS the state of the art (2003 – 2005)

•**Educational/capacity building** (http://scert.ru/en/conferences/)

IRS specifics:
Multidisciplinarity;
Necessity of information-computational infrastructure;
Results should be delivered to regional decision makers

Capacity building program:
ENVIROMIS Multidisciplinary Conference with elements of YSS (Invited lectures embedded as well as thematic Workshops);

CITES (Computational and Information Technologies for Environmental Sciences) YSS and Conference (Lecture courses, Training sessions as well as Invited lectures)

70-80/ year NIS YS are selected and supported (thanks INTAS and INCO EC)

International School and Conference on Computational Information Technologies for Environmental Sciences (CITES), Novosibirsk, March 13-23 2005

Working Group on Siberia Integrated Regional Study development, Novosibirsk, March 23 2005

FP6 INCO Programme ENVIROMIS SSA

INTAS Young Scientist School

Tomsk, 1-8 July 2006

ENVIR

International Conference with elements of Young scientist school “Environmental Observations, Modeling and Information Systems” (ENVIROMIS-2006), 1-8 July 2006, Akademgorodok, Tomsk, Russia

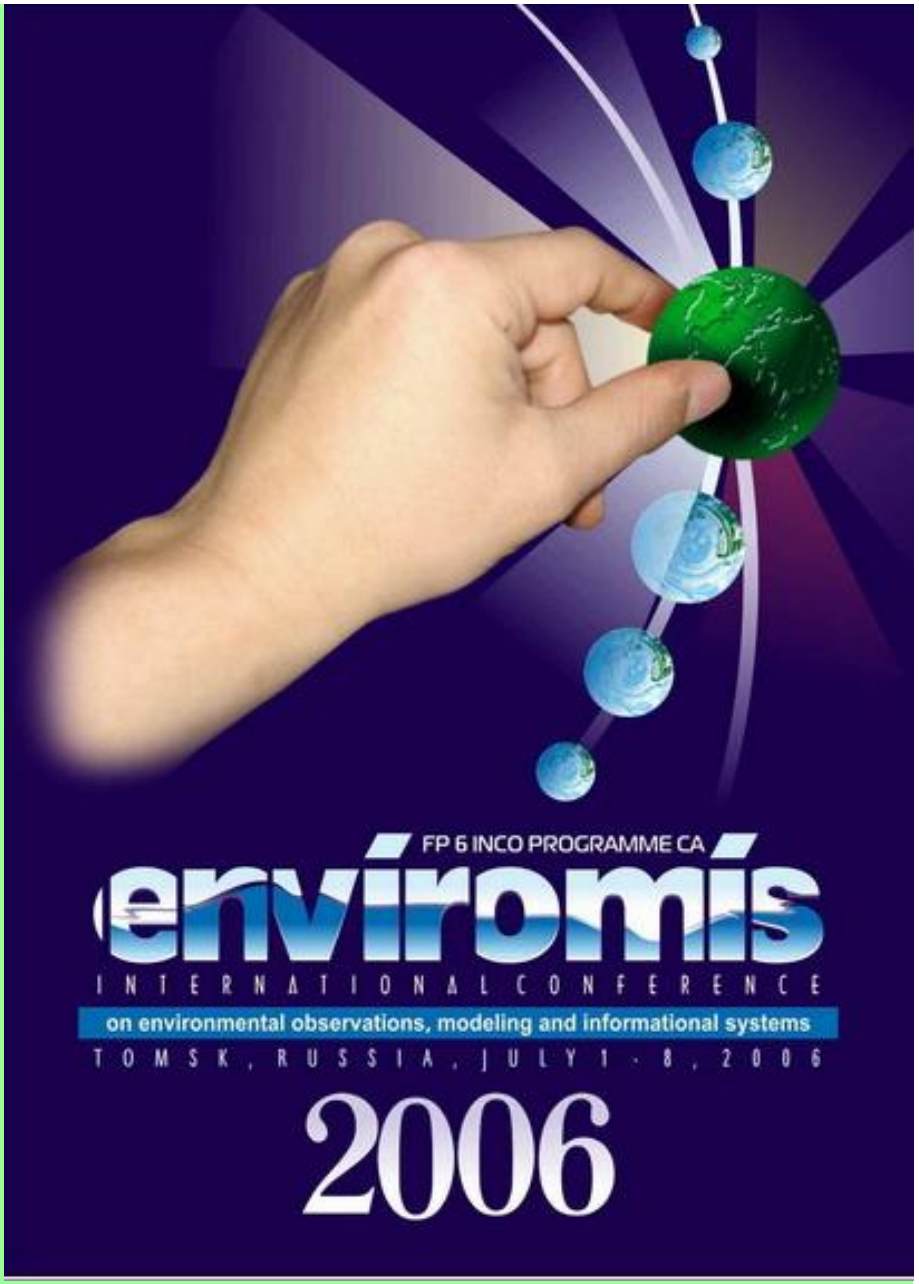
Workshop on Man-Made Environmental Risks: Control and Rehabilitation of Environment

Workshop on Development of Siberia Integrated Regional Study program

http://scert.ru/en/conferences/enviromis2006/

FP6 INCO Programme ENVIROMIS-2 SSA

FP6 INCO Programme Enviro-RISKS CA



SIRS possible future

- **Cluster of Projects coordinated by SIRS Scientific Council (projects' Co-ordinators):**
- **SB RAS Integrated projects (2006-2008)**
- **RAS Programs projects (2006-2008)**
- **NASA projects like NELDA (Northern Eurasia Landcover Dynamics Analysis, O. Krankina)**
- **Regional focus for EC FP6 CIRCLE (Climate Impact Research Coordination for a Larger Europe , M. Koenig) CA**
- **Participation in EC FP6 GMES GNU (Global Network of Users, H. Haubold) CA**

SIRS possible future

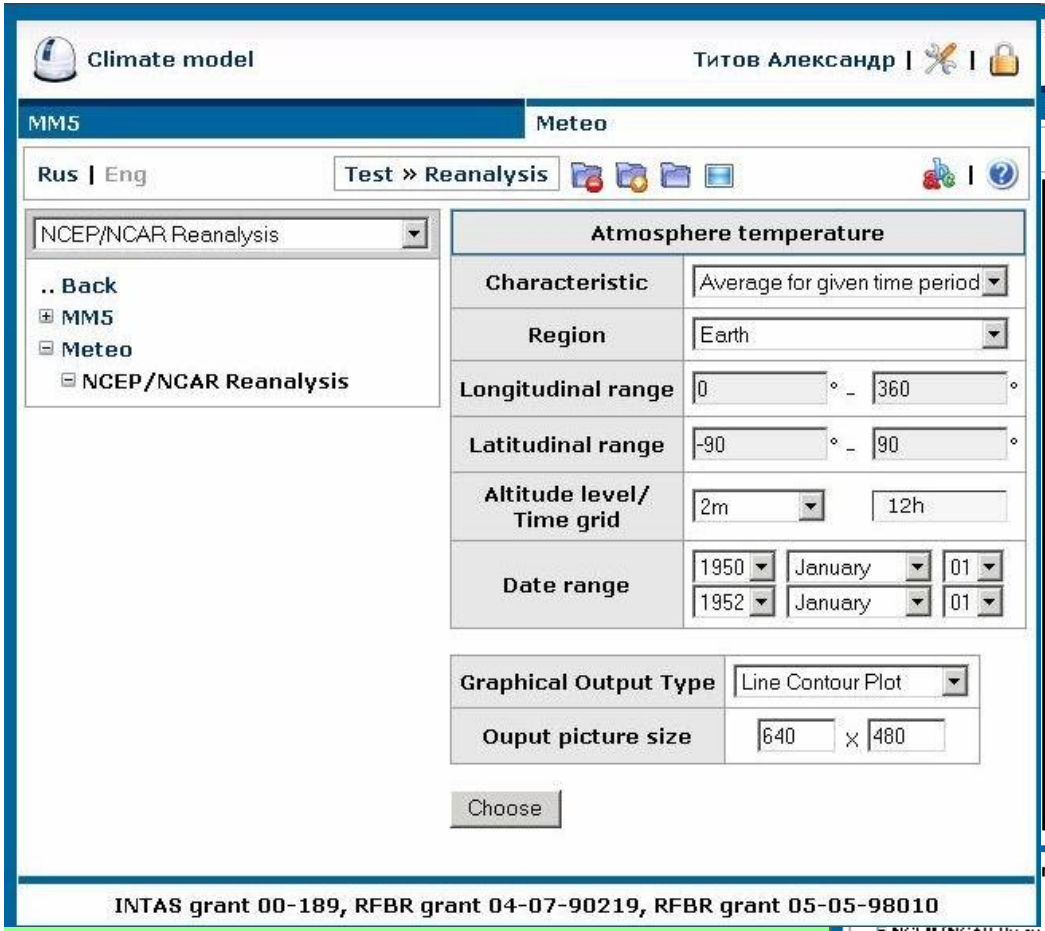
- **Recent INTAS – SB RAS Call projects**

Submitted:

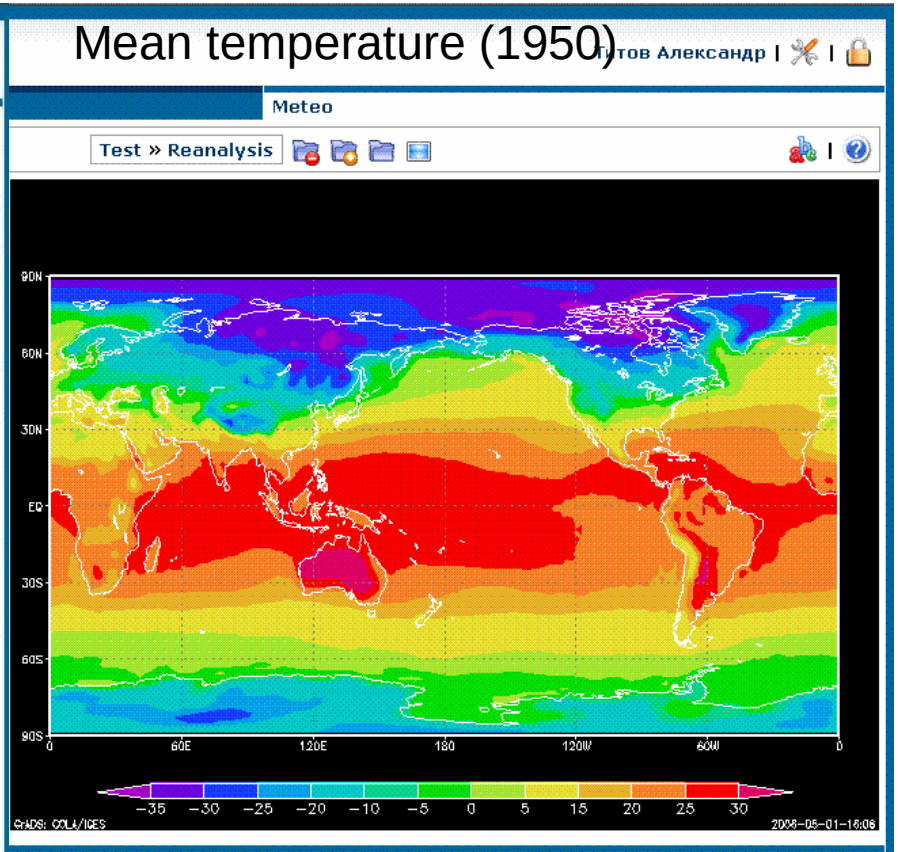
- **Modeling and Monitoring Siberia Climate Dynamics under Global Change (S. Zilitinkevich)**
- **Great Vasyugan Bog Dynamics and Attendant Regional Hydrological Processes under Global Climate Change (L. Bengtsson)**
- **Development of collaborative information-computational environment to support multidisciplinary research of Siberia regional environment (G. Begni)**
- **Open Calls of RFBR-CRDF, APN, etc**
- **FP7 SIRS Integrated Project and CA**

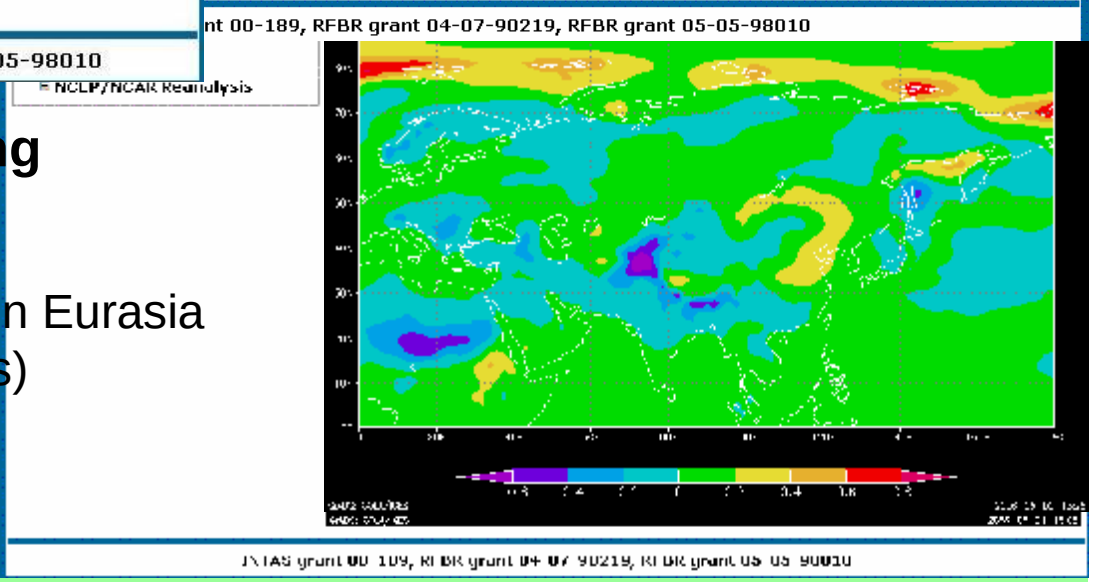
SIRS possible future

- **Developed informational-computational infrastructure open for all researchers**
- **GOFC-GOLD NERIN activity**
- **SB RAS Integrated Project 34 “Development of distributed information-computational system for investigation of ecological systems” (N.A. Kolchqnov, A.M. Fedotov and E.P. Gordov)**
- **SB RAS Integrated Project 86 “Development of tools for satellite ecological monitoring of Siberia and Far East on the basis of information and telecommunication methods and technologies” (V.V. Shaidurov)**



Mean temperature (1950)





Remote climatic data processing

Trends of mean temperatures in Eurasia (1951-2002, degree C/10 years)

Tomsk, 1-8 July 2006

SIRS possible future

•CITES 2007 International Conference and Young Scientists School, Tomsk, July 2007.
Major educational topics:
•Basics and application of pollution transport in atmosphere and
•Design of scientific sites for Earth System Science
SIRS targeted Forum

•ENVIROMIS 2008 International Conference with elements of Young Scientists School, Tomsk, July 2008.
SIRS Multidisciplinary Forum

•SCERT transformation into International Research and Educational Center supporting SIRS

SIRS possible future

- **Internationally recognized and funded research Program comprising a number of projects**

Results anticipated:

- **Understanding Regional-Global linkages**
- **Assessment of Global Change on regional level**
- **Mitigation of negative effects caused by climate change**
- **Solid scientific background for regional decision makers and authorities**

Conclusions/SIRS problems

- **Lack of coherent RAS/SB RAS funding for SIRS oriented projects**
- **Lack of internationally recognized scientific SIRS Program**
- **Harmonization of relationships with NEESPI**

THANKS!