

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

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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:

IRSSs 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)

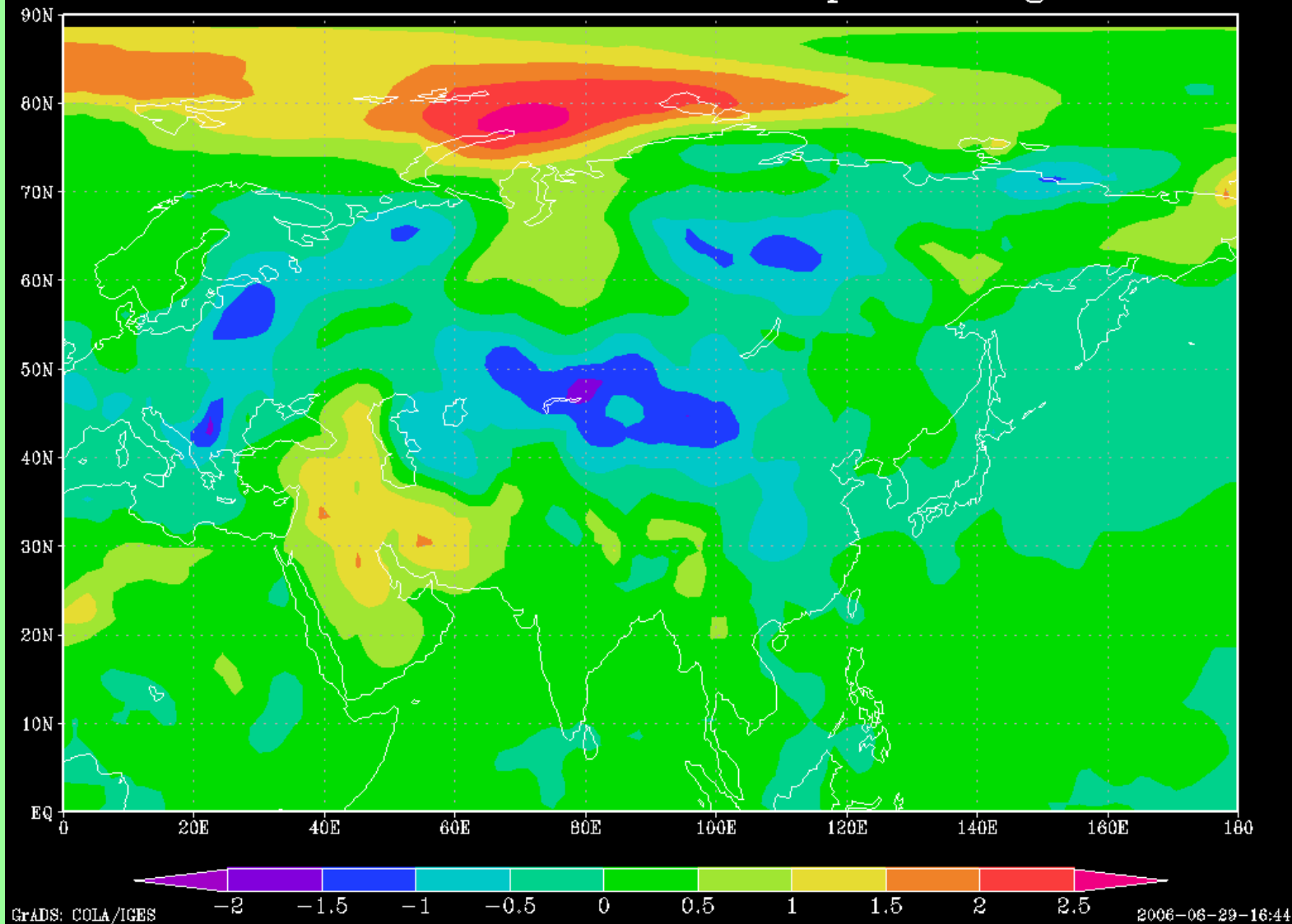
2002: Will Steffen (IGBP) had suggested to develop with assistance of SB RAS one of Integrated Regional Studies in Siberia

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 the winter temperature grows

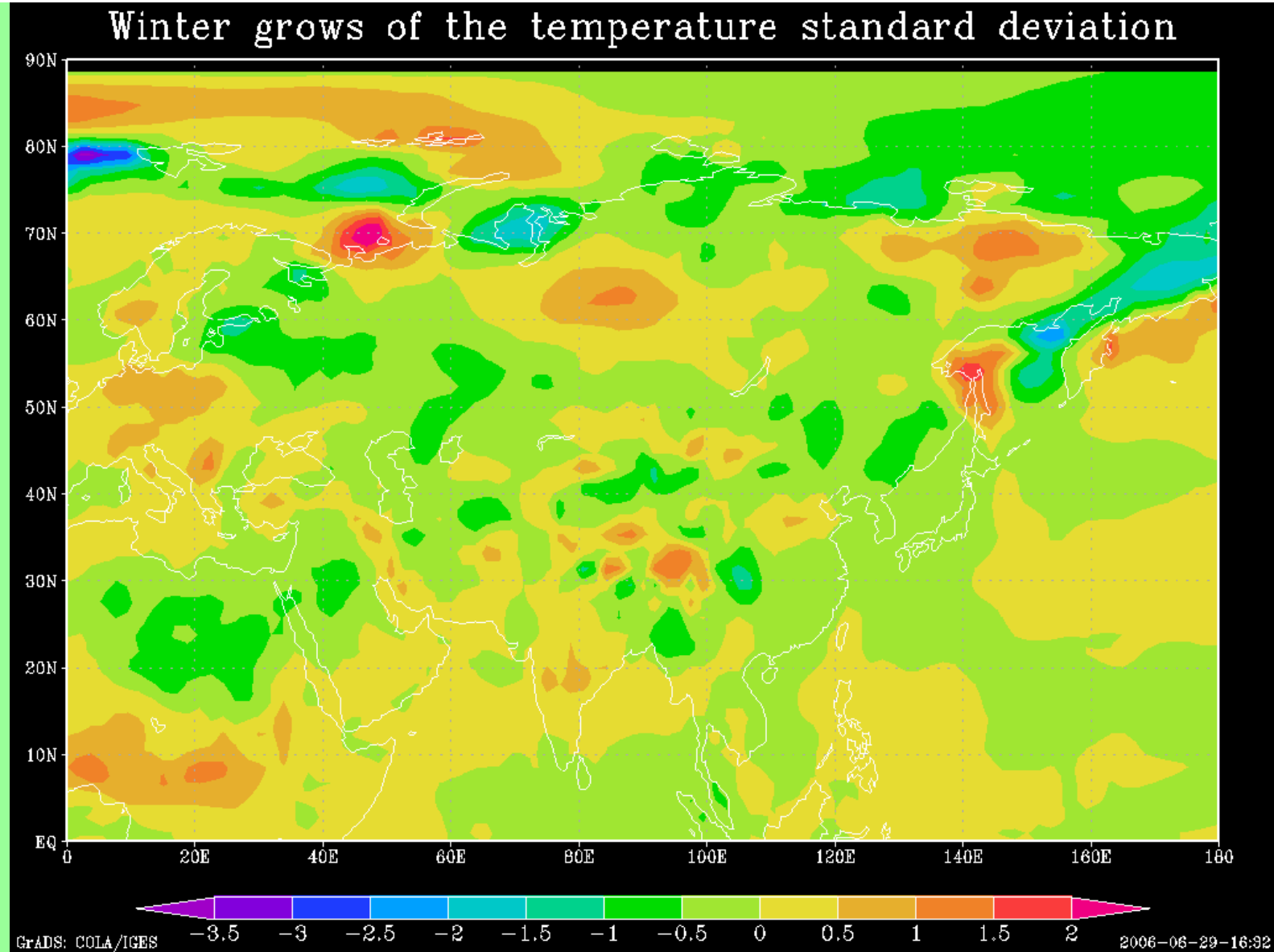


“Acceleration” of winter warming (2 m temperature) in Northern Eurasia in the end of XX century (Gordov, Okladnikov, unpublished)

Tomsk, 1-8 July 2006

ENVIROMIS-2006

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(Gordov, Okladnikov, unpublished)

Tomsk, 1-8 July 2006

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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

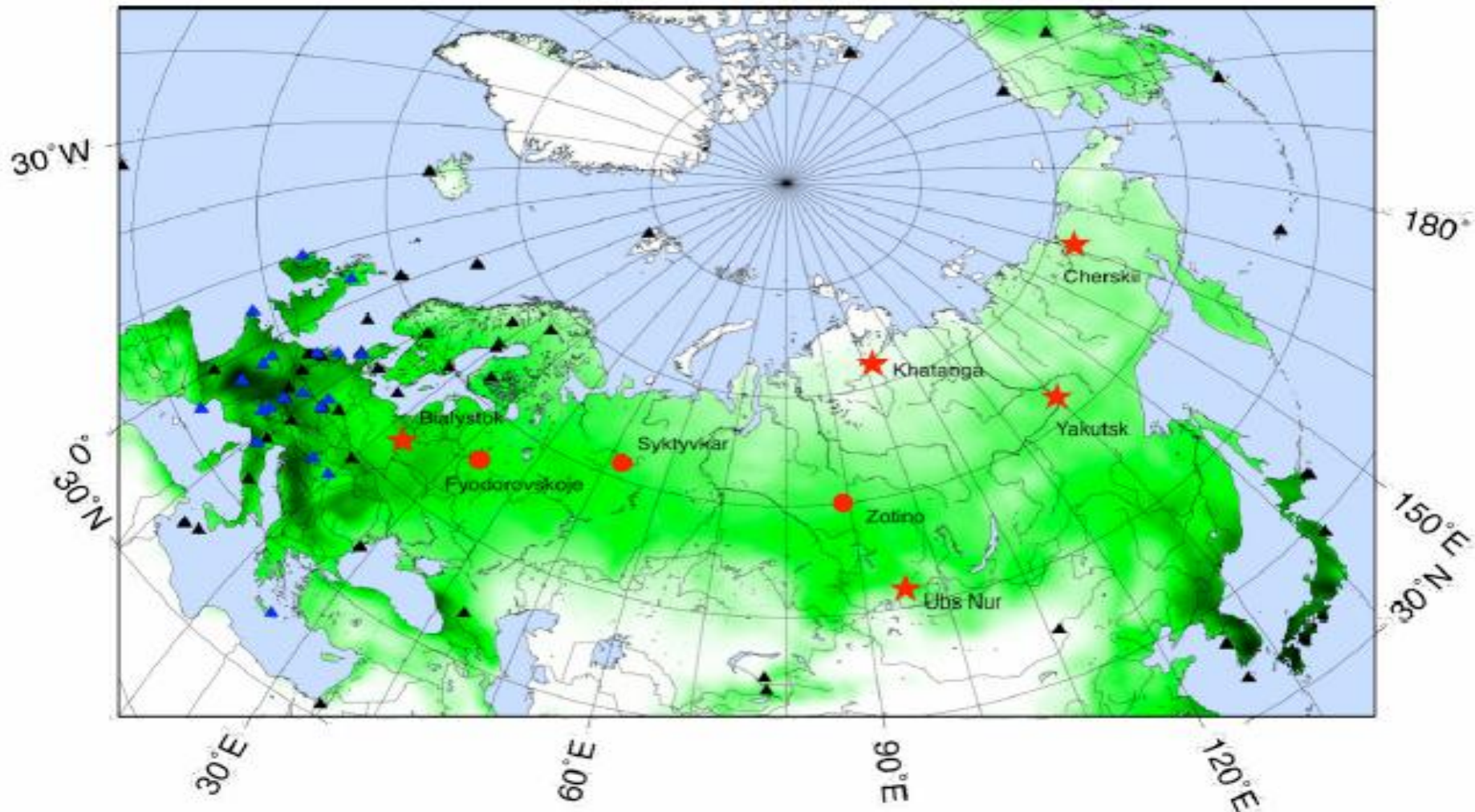
Project Manager: Reiner Zimmermann

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



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- ▶ Ecosystem Models

A. Kaspar
Admin

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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

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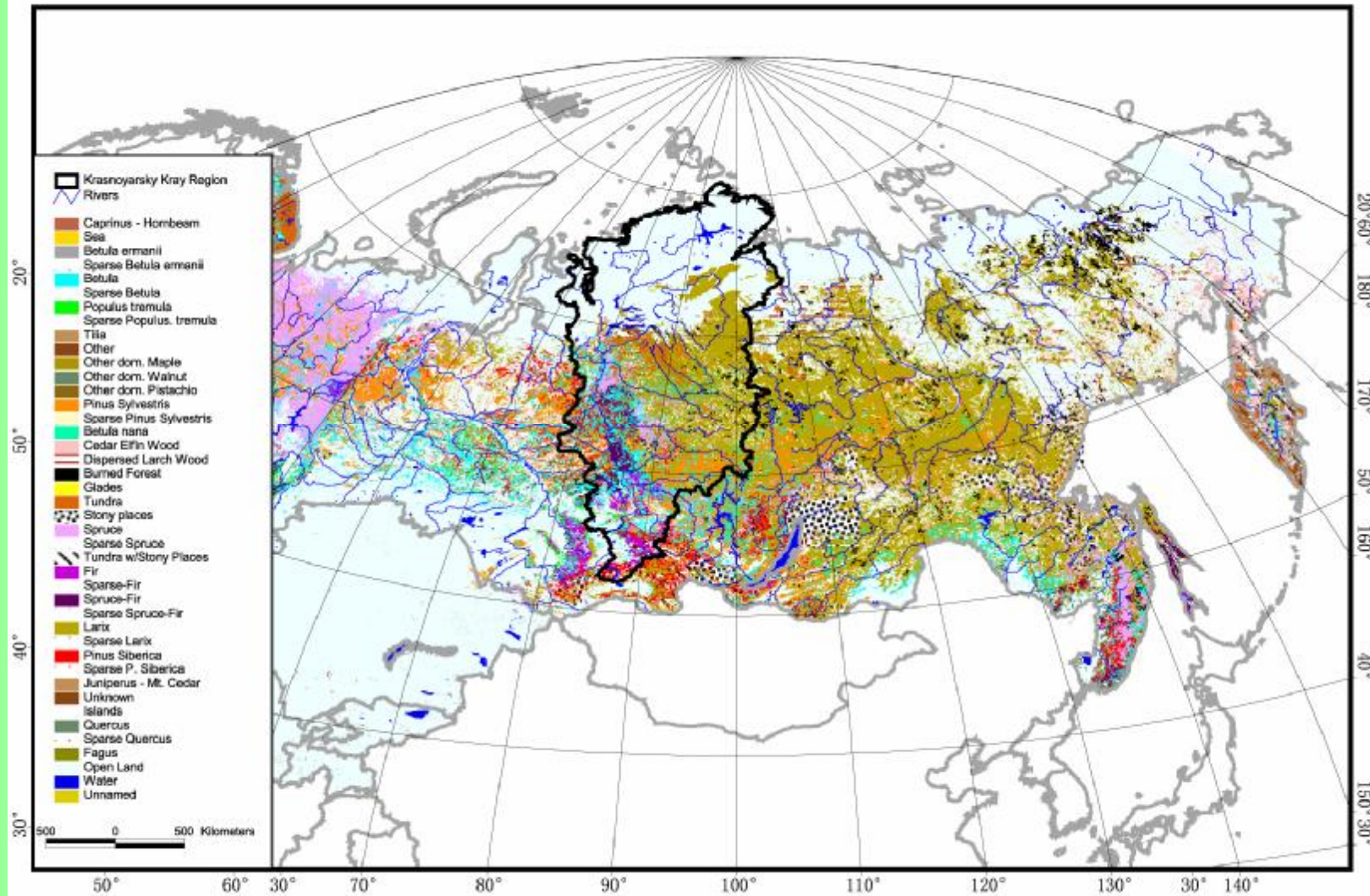
Consortium:



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IIASA Forestry Project

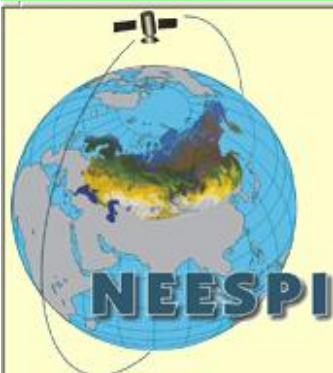
FORESTS OF THE RUSSIAN FEDERATION



Tomsk, 1-8 July 2006

ENVIROMIS-2006

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Northern Eurasia Earth Science Partnership Initiative



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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.

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ATMOS : bilingual Scientific WWW Portal for Atmospheric Environment

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

Атмосфера и окружающая среда Guest |

Измерения	Аэрозоль	Радиация	Спектроскопия	Химия	Климат	О проекте
-----------	----------	----------	---------------	-------	--------	-----------

Rus | Eng |

ATMOS: научный портал для атмосферных наук Новости

Портал представляет собой интегрированный набор множества распределенных, но координируемых предметных сайтов, содержащих типовую информацию с исследовательскими базами данных, моделями и аналитическим инструментарием для прямого использования и визуализации. Каждый предметный сайт является отображением информационной системы средствами Интернет-технологий. Портал разделен на две группы сайтов. Полная **функциональность портала** обеспечивается только для **зарегистрированных** пользователей. Справку о каждой текущей странице можно найти в .

К первой группе относятся сайты аналитического направления большая часть из которых включает в себя информационно-вычислительные системы. В эту группу входят:

1. Сайты **"Атмосферная химия"**, **"Атмосферная спектроскопия"** и **"Атмосферный аэрозоль"** представляют измерения оптических характеристик аэрозоля, химические свойства компонент атмосферы, микрофизику аэрозоля, описание элементарных химических и физических процессов в атмосфере и т.д..
2. Сайт **"Данные измерений"** содержит данные измерений, проводимых в Иркутске и Томске.
3. Сайт **"Атмосферная радиация"** используется для вычисления радиационных потоков и изучения влияния аэрозоля, облаков и малых составляющих атмосферы на радиационный режим.
4. Сайт **"Климат"**, ориентирован на рассмотрение климатических моделей и моделей описания окружающей среды.

Вторая группа сайтов состоит из трех информационных систем:

1. **"Оценка и управление качеством воздуха"**.
2. **"Озеро Байкал"**.
3. **"Западно-Сибирская изменчивость"**.

Сайты второй группы содержат описание подхода к задачам оценки и управления качеством воздуха и физико-географическую информацию о двух географических объектах Сибири. Предполагается использовать региональные данные о метеорологических, климатических, географических особенностях и окружающей среде для расчетов в фундаментальных моделях.

29.03.2006 | Грант РФФИ на развитие инструментария портала
Дальнейшее развитие средств создания портала ATMOS будет определяться идеями заложенными в проекте "Промежуточное программное обеспечение, средства создания и поддержки информационно - вычислительных систем", поддержанным РФФИ (грант № 06-07-89201)

23.07.2004 | Создан интерфейс для работы с климатической моделью ИВМ РАН.
Пройдены все этапы подключения веб-интерфейса к климатической модели ИВМ РАН (формирование входных данных, постановка в очередь на счет, вычисления, формирование выходных данных). Пользователь может, задав параметры, отправить задачу на счет. Вычисления проводятся на кластере ИОА СО РАН.

15.06.2004 | Работа над сайтом "Атмосферная радиация" завершена.
Завершена работа над сайтом "Атмосферная радиация" в рамках проекта ATMOS. Дальнейшее развитие сайта будет осуществляться в рамках проекта РФФИ.

Грант INTAS 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/>



на главную english www.scert.ru sgbp.scert.ru intranet.scert.ru

Environmental observations, modeling & informational systems

ENVIROMIS

Environmental Observations, Modelling and Information Systems Special Support Act...

Мероприятия Информационные ресурсы Цели и результаты Проекты Шестая рамочная программа

Environmental Observations, Modelling and Information Systems Special Support Action

Основные цели проекта:

- ♦ Организация, на основе современных информационных технологий, взаимодействия между институтами России и СНГ, работающими в области наук об окружающей среде (ENVIROMIS Network);
- ♦ Способствование широкому распространению, передаче и использованию результатов, полученных этими институтами через специально разработанный веб сайт;
- ♦ Подготовка новых инициатив научного сообщества СНГ для 6 Рамочной программы ЕС путем организации упорядоченного набора тематических школ для молодых ученых и международных конференций.

Для достижения этих целей используется три инструмента:

Кооперация профильных организаций Беларуси, Казахстана, России, Украины и Узбекистана в выполнении исследований и в использовании полученных результатов; Разработка и поддержка специальной информационно-вычислительной системы, открывающей студентам, специалистам и интересующемуся населению в Интернете доступ к тематическим и общим информационным ресурсам в области наук об окружающей среде и их приложений; и

Организация междисциплинарных (ENVIROMIS) и тематических (CITES) конференций и совмещенных с ними Школ молодых ученых для повышения уровня профессионализма в области информационно-вычислительных технологий для наук об окружающей среде.

Проект координируется и выполняется Сибирским центром климато-экологических исследований и образования под руководством проф. Е.П. Гордова. Кроме этого, в проекте участвуют представители ведущих научных организаций России и СНГ. В частности, это Институт мониторинга природных и экологических систем СО РАН,

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>



The screenshot shows the SCERT website interface. At the top left is the SCERT logo. To its right is a banner image of a satellite dish against a blue sky with clouds. Below the banner, the text "Siberian center for Environmental Research and Training" is displayed, with a "Russian" link on the right. A horizontal navigation menu contains the following items: "About center", "Persons", "Projects", "Conferences", "SB RNC IGBP", "News", and "Contacts". On the left side, there is a vertical menu with four items: "Founders", "Scientific-technical board", "Partners", and "Information resources". The main content area is titled "Information resources" and contains three entries, each with a URL and a brief description: 1. <http://enviromis.scert.ru/en/> - Site of "Environmental Observations, Modelling and Information Systems SSA" Project performed by SCERT. 2. <http://sqbp.scert.ru/en/about/> - Site of "Siberian Geosphere-Biosphere Program" Project performed by SCERT. 3. <http://atmos.scert.ru/> - Web-portal "ATMOS" designed as an integrated set of distributed but coordinated topical web sites, combining classical multi-media information with research databases, models and analytical tools for on-line use, and visualisation. Each site consists of data, models and visualisation functions. At the bottom of the page, there is a footer with the same navigation menu items as the top: "About center | Persons | Projects | Conferences | SB RNC IGBP | News | Contacts | Russian".

NERIN - Региональная Информационная Сеть по Северной Евразии

Северная Евразия - крупнейший массив суши, расположенный вне тропиков, и обладающий самыми большими запасами органического углерода, а также являющийся областью активного изменения землепользования. Данный регион также является основным источником неопределенности во многих крупномасштабных оценках, включая оценки поверхности земли, запасов и потоков углерода.



Основная цель NERIN - это содействие и координация производству и обеспечению наблюдений за Системой Земля для широкого круга сообществ пользователей в Северной Евразии.

Она тесно связана с Инициативой Партнерства по наукам о Земле в Северной Евразии ([NEESP](#)), которая является программой научных исследований Системы Земля, поддержанной в регионе на международном уровне. NERIN также сотрудничает с агентствами по земле- и лесопользованию для обеспечения непрерывных высококачественных наблюдений для практических приложений, а также приложений управления.

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



The bilingual (Russian and English) Enviro-RISKS web-portal is aimed at dissemination of the FP6 CA "Man-induced Environmental Risks: Monitoring, Management and Remediation of Man-made Changes in Siberia" (Enviro-RISKS) results as well as relevant projects results and approaches. It is also an information resource on general environment issues adjusted also for usage in education process and giving an access to environmental information and basics on environmental monitoring and management to regional administrators, researchers, students and general public thus giving rise the environmental concern in NIS management bodies and general public;

The portal operation will be supported by a distributed information system with main server in Tomsk and nodes Krasnoyarsk, Moscow, Khanty-Mansiisk and Almaty thus providing easy access to structured information resources on Siberia environment, its management under anthropogenic environmental risks and methods of its remediation. Among the information resources there are also gathered and systemized environmental information resources obtained in process of environmental studies in Siberia and results of relevant expert groups studies. The portal is also aimed at exchange and dissemination of good practices examples of practically important results obtained in course of projects implementation, especially those obtained in area of remediation.

Additionally it is used as an instrument for exchange and dissemination of information between the project partners.

Portal functionality

Access to:

- Gathered and analyzed detailed information on all coordinated Projects;
- Gathered and systemized results and finding obtained including relevant observation data and information resources;
- Distributed Database, which will give an access to data on characteristics of Siberian environment to the Project Partners and an access to relevant metadata to all interested professional community.

The basic thematic sites integrated into the Enviro-RISKS web-portal are:

Air Quality Assessment and Management will compile basic aspects of air pollution and environmental impact assessment and include interactive tutorials. Specific case study examples will be drawn from Lake Baikal and the West Siberian Lowlands.

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

ENVIF



The poster features a central graphic of a sun with a globe in its center, overlaid with the stylized red text 'CITES 2005'. The background is a light gray grid with binary code (0s and 1s) scattered throughout. At the top and bottom, there are blue horizontal bars containing the text 'Novosibirsk, Russia, March 13-23, 2005' and 'Новосибирск, Россия, 13-23 марта 2005 года' respectively. The main title is in bold black and red fonts, followed by the subtitle 'and Young Scientists School on Computational Information Technologies for Environmental Sciences'. At the bottom, the Russian title 'Международная конференция и школа молодых ученых' is written in bold black and red, followed by the subtitle 'по вычислительно-информационным технологиям для наук об окружающей среде'.

Novosibirsk, Russia, March 13-23, 2005

**International
Conference**
and Young Scientists School
on Computational Information Technologies
for Environmental Sciences

CITES
2005

**Международная
конференция**
и школа молодых ученых
по вычислительно-информационным
технологиям для наук об окружающей среде

Новосибирск, Россия, 13-23 марта 2005 года

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

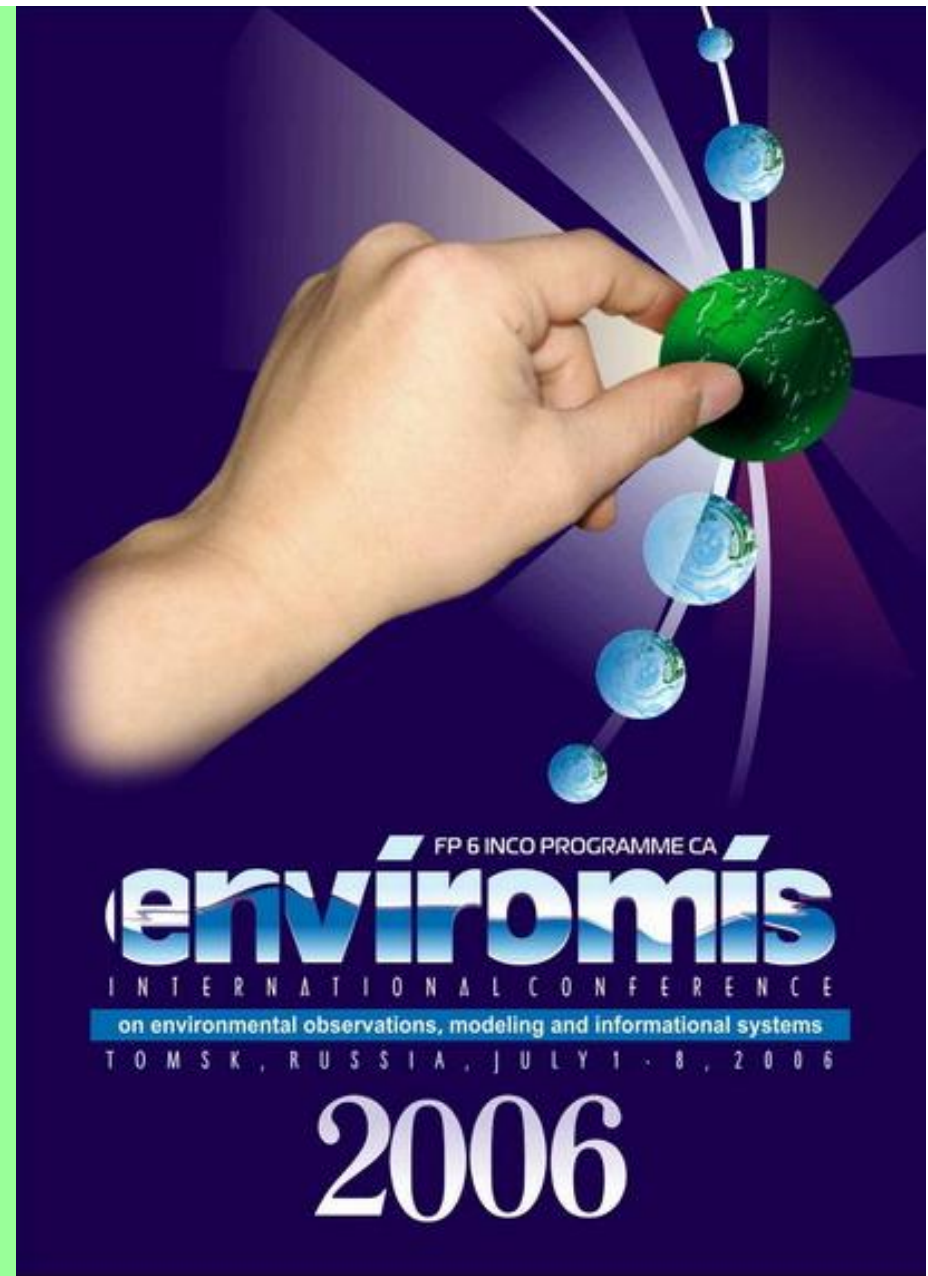
Workshop on Man-Made Environmental Risks: Control and Rehabilitation of Environment

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)**

Climate model | Титов Александр |  | 

MM5 | Meteo

Rus | Eng | Test » Reanalysis    

NCEP/NCAR Reanalysis

.. Back
 + MM5
 + Meteo
 + NCEP/NCAR Reanalysis

Atmosphere temperature

Characteristic: Average for given time period

Region: Earth

Longitudinal range: 0° - 360°

Latitudinal range: -90° - 90°

Altitude level/ Time grid: 2m | 12h

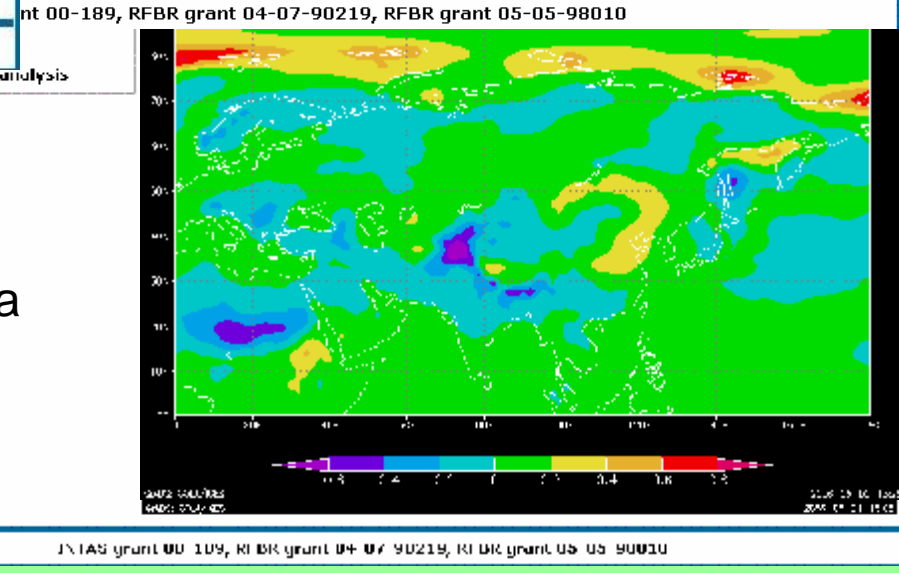
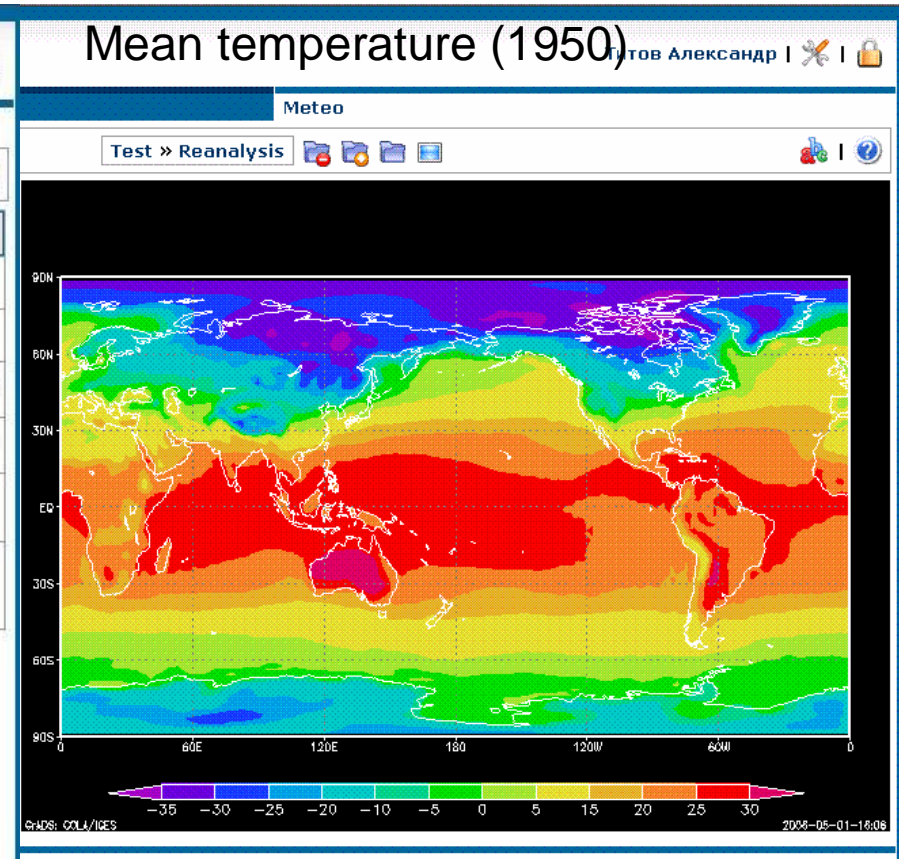
Date range: 1950 January 01 | 1952 January 01

Graphical Output Type: Line Contour Plot

Output picture size: 640 x 480

Choose

INTAS grant 00-189, RFBR grant 04-07-90219, RFBR grant 05-05-98010



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!