APN CAPaBLE

- Making a Difference –

Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries

Capacity building to study interrelations between atmospheric composition, anthropogenic load and climate change in Northern Asia

Final Report for APN CAPaBLE Project:
CBA2007-08NSY

Collaborating Institutions: SCERT (http://scert.ru), FRCGC (http://www.jamstec.go.jp/frcgc/) with participation of KazGeoCosmos and NIGMI RUz

Project Title

Capacity Building to Study Interrelations between Atmospheric Composition, Anthropogenic Load and Climate Change in Northern Asia

CBA2007-08NSY

Final Report submitted to APN

www.apn-gcr.org

Overview of project work and outcomes

Non-technical summary

The project was aimed at engagement of regional research community, especially young scientists, into professional activity in area of experimental and theoretical studies of atmospheric composition, air quality and their interrelations with anthropogenic load and climate change in Northern Asia. As initial step to this end, international workshop on Atmospheric Composition and Air Quality was organized in Tomsk, July 20-22. To support this activity continuously, we launched a dedicated web site as an information system aimed at education/training of young scientists in this domain and to integrate into it thematic educational resources, specially prepared on the base of Workshop materials, including tutorials on selected topics of basics and applications of Atmospheric Chemistry and Physics of Climate thus transforming during the project execution the web site into a powerful instrument for young scientists' training and a platform for dissemination of environmental information to local population and decision makers.

Objectives

The present project is aimed to:

- **involvement of regional research community, especially young scientists, into professional activity in area of experimental and theoretical studies of atmospheric composition, air quality and their interrelations with anthropogenic load and climate change in Northern Asia**

Specific objectives are:

- **To organize international workshop with enlarged participation of young scientists from the targeted region devoted to different aspects of Northern Asia atmospheric composition study in their interrelations with climate change and industrial load;**
- **To launch and support dedicated web site as an information system aimed at support of young scientists' education/training in this domain as well as a powerful dissemination instrument to attract attention of local and regional population and decision/policy makers to these important for regional well being issues;**
- **To prepare, on the base of Workshop materials, tutorials on selected topics of basics and applications of Atmospheric Chemistry and Physics of Climate;**
- **To integrate the prepared educational resources into the web site thus transforming it into a powerful instrument for young scientists' training and a platform for dissemination of environmental information to local population and decision makers.**

Amount received and number years supported

The Grant awarded to this project was:

- **US$ 38000 for Year1, 2007-2008:**

Work undertaken

To provide young scientists and community in large from the targeted region with understanding interrelations of different aspects of Northern Asia atmospheric composition study with climate change and industrial load, the Workshop was hold within framework of an educational event CITES 2007 (Tomsk, 14-25 July 2007). This biannual (http://www.scert.ru/en/conferences/) full format 11-days international event comprises Young Scientist School and Conference on Computational Information Technologies for Environmental Sciences (CITES). Sixty young participants from NIS, Asian and European countries were selected on competitive basis to participate firstly in the 6-day school. Its main research themes were Transport and Transformation of Pollution in Geophysical Media (lecture course organized and supervised by Valentin Dymnikov and RAS

Corresponding member Vasily Lykosov, Institute for Numerical Mathematics, Moscow), and Design and Development of Web-based Information-Computational Systems for Environmental Science (lecture course organized and supervised by Professor Evgeny Gordov, SCERT and Dr. Alexander Fazliev, Institute of Atmospheric Optics SB RAS). Relevant training sessions devoted to practical aspects of pollution transport and transformations as well as development of thematic web services were organized and supervised by Alexander Fazliev with assistance of Training Sessions Tutors.

After school the attendees took part in the CITES conference whose audience was enlarged by a number of prominent scientists and decision-makers from NIS, Asian and European leading environmentally oriented research organizations.

The Conference was run as a set of consequent Workshops devoted to different aspects of its theme. It has been started by the Practical Session on Tom river water quality combined with a boat trip. Then APN Workshop on Atmospheric Composition and Air Quality chaired by Profs. Akimoto (Japan) and Gordov (Russia) was run with three following Sessions: Atmospheric Composition and Air Quality Measurements (organized by Prof. Akimoto), Atmospheric Composition and Air Quality Modeling (organizer Profs. Baklanov (Denmark) and Penenko (Russia)) and Environmental Data Resources and Information Systems (organized by Prof. Gordov, Dr. Fazliev, Prof. Zakarin (Kazakhstan) and Dr. Tolkacheva (Uzbekistan)).The Workshops on Climate Change Assessment and Modeling included Sessions on Physics of Climate and on Northern Regional Climate Change Assessment. The Workshop on Siberia Integrated Regional Study (SIRS) comprised Sessions on Development of SIRS information-computational infrastructure, and Siberia Environment Dynamics in context of global and Northern Eurasia changes. The Workshop on Man-made Environmental Risks in Siberia was based on focus group studies performed within the Enviro-RISKS FP6 Project. During the CITES 2007 conference participants presented their papers and, after several lectures on «hot topics» of environmental sciences, delivered by key NIS, Asian, European and US specialists in the area, got better understanding of the current trends.

In course of the APN Workshop three one-hour Invited lectures were presented: Tropospheric ozone and its impact on climate and environment (Akimoto H.), Laser gas analysis of the atmosphere: history of development and prospects (Zuev V.V.) and Thermally driven mesoscale circulation over urbanized areas (Kurbatsky A.F., Kurbatskaya L.I.). Also 11 half-hour Invited and six 15-minute Contributed papers on basic and applied thematic problems were reported. Young scientists presented 47 poster papers. To give the project vision, the CAPaBLE project Open initial meeting was also included into the Conference Program. It should be added that the CITES event Program is available at the site and presentations of all reported papers will be accessible there soon.

Statistics of the whole CITES event looks like following: 128 participants from 49 research organization of different countries, among those 2 APN countries (Japan and Russia), 2 APN targeted countries (Kazakhstan and Uzbekistan) and 6 European countries. Geographic distribution of Russian participants spread from Vladivostok to Saint-Petersburg. From 60 young scientists 16 were supported by the APN grant. Unfortunately 2 Chinese young scientists selected for such support were unable to get their passports in time and could not participate in the event. Also 13 Lecturers were supported on the base of APN funding.

It should be noted that 15 Russian young scientists were supported by the Russian Ministry of Education and Science and organization of the whole event as well as funding of participation of young scientists and elder researchers from Russia and other NIS countries, was supported by the EC FP6 projects ENVIROMIS-2 (http://enviromis.scert.ru) and Enviro-RISKS (http://risks.scert.ru). It is seen that the APN support allowed us to involve into this activity a new group of young scientists and Lecturers from APN region countries. The CITES event and APN Workshop promoted the generation and transfer of new findings and methodologies in area of atmospheric composition, air quality and climate change; it also helped promising young scientists in the region in the career development and their

involvement to APN and the community of global change scientists represented at the CITES event. The young scientists will become a part of an overall network of scientists interested in different aspects of global change in the Northern Asia region.

Co-ordination Meeting "Thematic educational resources providing necessary foundation to study interrelations between atmospheric composition, anthropogenic load and Climate Change in Northern Asia and their IT-based implementation/usage".of the project was organized on February 7–8, 2008 at Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan. The objectives of this meeting were:
To discuss thematic educational resources prepared by the Project participants devoted to thematic basic and applied topics; and
To elaborate an approach for effective usage of the prepared educational resources on the base of IT tools implemented at the project web site.
During this meeting thematic educational resources prepared by the Project participants devoted to basic and applied topics of the project theme were discussed. Among those are "Atmospheric Composition" (Prof. H. Akimoto, Drs. H. Irie, Y. Kanaya and M. Takigawa, Frontier Research Center for Global Change, Yokohama, Japan), "Anthropogenic Load" (Dr. L. Shardakova, Research Hydrometeorological Institute of the Republic of Uzbekistan, Tashkent), "Climate Change in Northern Asia" (Prof. V. Lykosov, RAS Institute for Numerical Mathematics, Moscow, Russia, and Prof. E. Gordov, Siberian Center for Environmental Research and Training, Tomsk, Russia, and "Web and GIS based information systems for Environmental Sciences" (Prof. E. Gordov, Prof. E. Zakarin and Dr. Sci. B. Mirkarimova, KazGeoCosmos, Almaty, Kazakhstan). The approach for effective usage of the prepared educational resources on the base of IT tools implemented at the project web site was elaborated on the base of suggestions presented by Dr. A. Titov (Siberian Center for Environmental Research and Training, Tomsk, Russia) in his paper "IT tools implemented at the project site and their possible usage for education".

Project web-site has been designed and launched as information-computational system (http://project.enviromis.scert.ru/apn/) where complete information on project running is available. Thematic educational resources prepared by the Co-ordination Meeting participants were integrated into the site (http://project.enviromis.scert.ru/apn/Thematic_Educational_Resources/) and Thematic educational tools were developed and made accessible there (http://project.enviromis.scert.ru/apn/tools/). These tools allows user to determine atmosphere pollution level above a city on the base of previously run atmospheric photochemistry model for Tomsk city as well as to calculated climate change characteristics for Northern Eurasia on the base of gathered archives of meteorological and climatic data. Currently the archive comprises the two NCAR Reanalysis data sets and delivered in course of the project carrying out European Reanalysis ERA-40. It nearest future the Japanese Reanalysis JRA-25 will be added to it.

Results

Overall result of the activity is in enhancing of understanding of interrelations between Atmospheric Composition and Climate Change in the targeted region and in involvement of young scientists into relevant research activity.

It was done due to a coherent set of activities undertaken, which are:

- International Conference and Young Scientists School on Computational Information Technologies for Environmental Sciences: "CITES-2007" was organized in Tomsk, Russia, on 14-25 July, 2007.
- In the frameworks of CITES-2007 event the Initial Meeting and the APN Workshop on Atmospheric Composition and Air Quality was held on July 21-22, 2007;
- Program and Abstract book of International Conference and Young Scientists

School on Computational Information Technologies for Environmental Sciences: "CITES-2007" (Tomsk, Russia, 14-25 July, 2007) were published before the event thus providing dissemination of results.
- Selected papers presented at the APN Workshop on Atmospheric Composition and Air Quality and other Workshops within CITES-2007 conference were prepared for publication in the special issue of peer reviewed Journal of Computational Technologies (http://www.ict.nsc.ru/jct). It will be published in June 2008.
All materials of CITES-2007 are available at http://www.scert.ru/en/conferences/cites07/matherials/.
- bilingual (English and Russian) project web site as a thematic information-computational system and a dissemination tool was launched (http://project.enviromis.scert.ru/apn/) were information on the project running and developed educational resources are accessible.
- Co-ordination Meeting was organized on February 7–8, 2008 at Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan.
- Presentations made at co-ordination Meeting on February 7–8, 2008 at Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan were put on project site (http://project.enviromis.scert.ru/apn/Project_milestones/)
- Thematic educational materials and tasks were prepared and put on the project site http://project.enviromis.scert.ru/apn/Thematic_Educational_Resources/) and IT tools aimed at education and training in the targeted domain were integrated into the site (http://project.enviromis.scert.ru/apn/tools/).

Relevance to the APN CAPaBLE Programme and its Objectives

The output of the project contributes directly to the APN Science Agenda, enhancing regional young scientists' involvement into this important domain and assisting in their career development. The central project theme, which is atmosphere composition and quality in relationships with climate change, is closely linked to the announced by APN topics, namely - "Climate Change & Variability" and "Human Dimensions". This is also central theme of the educational web site developed in course of the project. This project is also in line with developed by the Russian National Committee for IGBP Siberia Integrated Regional Study (SIRS), which is also one the Northern Eurasia Earth Science Partnership Initiative regional Megaprojects.

Self evaluation

The project objectives are achieved as planned

Potential for further work

Cooperation between Japanese and Russian researchers established during the project carrying out appeared to be quite fruitful. That is why at the Co-ordination Meeting in Yokohama it was decided that it should be continued. Currently the both sides are searching funding opportunities for further joint work in area of interrelations between atmospheric composition and Global Change with special emphasis on climate change dynamics in Northern Eurasia.

Publications

1. **CD with CITES-2007 proceedings**
2. **Project web-site http://project.enviromis.scert.ru/apn/**
3. **Project Thematic educational resources http://project.enviromis.scert.ru/apn/Thematic_Educational_Resources/**
4. **Project Thematic Educational IT tools http://project.enviromis.scert.ru/apn/tools/**
5. **Special issue of Journal of Computational Technologies (http://www.ict.nsc.ru/jct)**

Acknowledgments

APN support of this project is warmly acknowledged. Also partial support of activities undertaken in course of the project carrying out by EC FP6 Enviro-RISKS (INCO-CT-2005-013427) and ENVIROMIS-2 (INCO-CT-2006-031303) projects and RF Ministry of Education and Science project (2007-9-1.7-00-01-023**) is acknowledged as well.**

Technical Report

Preface

The project is aimed at involvement of regional research community, especially young scientists, into professional activity in area of experimental and theoretical studies of atmospheric composition, air quality and their interrelations with anthropogenic load and climate change in Northern Asia. To reach it a dedicated international workshop with enlarged participation of young scientists from the targeted region was organized (Tomsk, Russia, July 2007). Also a dedicated web site as an information system aimed at support of young scientists' education/training in this domain was launched and supported in operation. Relevant materials were prepared by the project participants and experts from APN targeted Central Asia states. The project outputs are enhancing regional young scientists' involvement into this important domain and assisting in their career development, it contributes into capacity building activities and it makes an input into sustainable development in the region via its dissemination activity.

Table of Contents

1. Introduction

Nowadays climate change is an obvious fact. There are many international and national programs that study this phenomenon. For instance, "Climate Change & Variability" and "Human Dimensions" topics were announced y APN; researches under World Climate Research Programme (WCRP) determine to what extent interrelations between regional atmosphere composition and climate should be taken into account in climate modeling efforts as well as try to understand to what extent human activities affect climate in the surveyed area; activities of the Earth system Science Partnership (ESSP) describe and understand the links between regional and processes that regulate the total Earth System. Nevertheless, still there are research and generation gaps and crucial questions in this area. It is necessary to involve regional research community, especially young scientists, into professional activity in area of experimental and theoretical studies of atmospheric composition, air quality and their interrelations with anthropogenic load and climate change in Northern Asia. It is also necessary to facilitate establishing regular channels between regional decision and policy makers and research community for requesting and receiving science and technology advice in area of environmental problems arising under global climate change and caused it processes in order to provide sustainable development in the targeted region and to facilitate sharing knowledge, experiences and best practices via the dedicated web site. All the above mentioned made the grounds for the current project and form its objectives.

The main objective of the project is involvement of regional research community, especially young scientists, into professional activity in area of experimental and theoretical studies of atmospheric composition, air quality and their interrelations with anthropogenic load and climate change in Northern Asia
Project specific objectives are:
To organize international workshop with enlarged participation of young scientists from the targeted region devoted to different aspects of Northern Asia atmospheric composition study in their interrelations with climate change and industrial load;
To launch and support dedicated web site as an information system aimed at support of young scientists' education/training in this domain as well as a powerful dissemination instrument to attract attention of local and regional population and decision/policy makers to these important for regional well being issues;
To prepare, on the base of Workshop materials, tutorials on selected topics of basics and applications of Atmospheric Chemistry and Physics of Climate; and
To integrate the prepared educational resources into the web site thus transforming it into a powerful instrument for young scientists' training and a platform for dissemination of environmental information to local population and decision makers.

General description of the approach adopted to carry out the project is described in the next section. In subsequent sections the project results and outcomes are presented in more details. It is shown that the project outputs are enhancing regional young scientists' involvement into this important domain and assisting in their career development, it contributes into capacity building activities and it makes an input into sustainable development in the region via its long term dissemination activity based on usage of stably supported in operation project web site.

2. Methodology

Explain how you carried out the project, which should follow logically from the aims. Depending on the kind of data, this section may contain subsections on experimental details, materials used, data collection/sources, analytical or statistical techniques employed, study field areas, etc. Provide sufficient detail for a technical/scientific audience to appreciate what you did. Include flowcharts, maps or tables if they aid clarity or brevity.

Project methodology is based on the gained by SCERT experience in organization of international scientific and educational/training meetings aimed at involvement of young scientist to continue their professional career in area global change basic science and application. History and general features of this approach are described in recent paper [1]. Strong professional basis of Partners and experts involved as well as their high professional level in the suggested thematic forms methodological foundation for selection of papers and lectures for the organized in course of the project carrying our CITES event. Also it guaranteed relevant level of the prepared thematic educational materials. Development of the dedicated web site is based on specially designed middleware adjusted to support scientific web sites. In particular, development of IT thematic educational tools is based of specific interrelations between Earth Sciences and Information technologies [2]. Such approach guarantees the generation and transfer of new findings and methodologies in area of atmospheric composition, air quality and climate change; it helps to attract promising young scientists from the region to their involvement into research activity in this important for sustainable development of the region domain.

The first planned project Workshop on Atmospheric Composition and Air Quality **was hold within framework of an educational event CITES 2007 (Tomsk, 14-25 July 2007). This biannual (http://www.scert.ru/en/conferences/) full format 11-days international event comprises Young Scientist School and Conference on Computational Information Technologies for Environmental Sciences (CITES). Sixty young participants from NIS, Asian and European countries were selected on competitive basis to participate firstly in the 6-day school. Its main research themes were Transport and Transformation of Pollution in Geophysical Media (lecture course organized and supervised by Valentin Dymnikov and RAS Corresponding member Vasily Lykosov, Institute for Numerical Mathematics, Moscow), and Design and Development of Web-based Information-Computational Systems for Environmental Science (lecture course organized and supervised by Professor Evgeny Gordov, SCERT and Dr. Alexander Fazliev, Institute of Atmospheric Optics SB RAS). Relevant training sessions devoted to practical aspects of pollution transport and transformations as well as development of thematic web services were organized and supervised by Alexander Fazliev with assistance of Training Sessions Tutors. The School scientific program was devoted mainly to two modern and quickly developing branches of informational computational technologies for environmental sciences: Admixture Transport and Transformation in Geophysical Media and Design and Development of Web-based Information-Computational Systems for Environmental Sciences. During the first day four 1,5 hours general introductory lectures were presented by leading Russian Academy of Sciences researchers:**

Academician V.P. Dymnikov (RAS Institute for Numerical Mathematics) "Computational aspects of active and passive admixtures transport and transformation in atmosphere ";

RAS Corresponding member A.S. Kholodov (Moscow Physico-Tecnical Institute) "Numerical methods of transport equation solving";

Professor V.I. Klyatskin (RAS Institute of Atmospheric Physics) "Admixture transport in stochastic media";

RAS Corresponding member Vl.V. Voevodin (MSU) "Supercomputer technologies for

complex problems solving";
During mornings of the next 5 days lecture courses on each theme were delivered (additional lectures on the both themes were delivered during the Conference). The first lecture course was organized and supervised by Valentin Dymnikov and RAS Corresponding member Vasily Lykosov (Institute for Numerical Mathematics). The second lecture course was organized and supervised by Professor Evgeny Gordov (SCERT) and Dr. Alexander Fazliev (SB RAS Institute of Atmospheric Optics) and was devoted to organization of information processes and information resources forming in Environmental Sciences. All in all 17 lectures were performed during the School. The Training Sessions were run in specially equipped computer classes during the same dates in afternoon time. The groups of 3-4 persons with assistance of tutors were given an opportunity to perform the allocated tasks on the basis of information and computational resources of the Siberian Center for Environment Research and Training and Tomsk University of Control Systems and Radioelectronics. After finishing training course each group delivered a 15-minutes presentation on the results of their work to all school attendants.

After school the attendees took part in the CITES conference whose audience was enlarged by a number of prominent scientists and decision-makers from NIS, Asian and European leading environmentally oriented research organizations. The Conference was run as a set of consequent Workshops devoted to different aspects of its theme. It has been started by the Practical Session on Tom river water quality combined with a boat trip. Then APN Workshop on Atmospheric Composition and Air Quality chaired by Profs. Akimoto (Japan) and Gordov (Russia) was run with three following Sessions: Atmospheric Composition and Air Quality Measurements (organized by Prof. Akimoto), Atmospheric Composition and Air Quality Modeling (organizer Profs. Baklanov (Denmark) and Penenko (Russia)) and Environmental Data Resources and Information Systems (organized by Prof. Gordov, Dr. Fazliev, Prof. Zakarin (Kazakhstan) and Dr. Tolkacheva (Uzbekistan)). In course of the APN Workshop three one-hour Invited lectures were presented: Tropospheric ozone and its impact on climate and environment (Akimoto H.), Laser gas analysis of the atmosphere: history of development and prospects (Zuev V.V.) and Thermally driven mesoscale circulation over urbanized areas (Kurbatsky A.F., Kurbatskaya L.I.). Also 11 half-hour Invited and six 15-minute Contributed papers on basic and applied thematic problems were reported. Young scientists presented 47 poster papers. To give the project vision, the CAPaBLE project Open initial meeting was also included into the Conference Program.

Major findings reported at the Workshop comprise the following. In his invited lecture Professor H. Akimoto described tropospheric ozone and its impact on climate and environment with special emphasis to Asia. Really, tropospheric ozone is a greenhouse gas whose radiative forcing from preindustrial era to present is next to methane in a global average, and is almost equivalent to CO2 in particular areas. The spatial and temporal distribution of tropospheric ozone is very un-uniform due to its rather short atmospheric lifetime. It is of particular concern how such uneven heating affect on climate change being different from even heating by long-lived greenhouse gases such as CO2. Also, ozone is a toxic gas to human health and vegetation such as agriculture and forest trees. Concentration of tropospheric ozone in the northern hemisphere now exceeds the critical levels for human health and ecosystem health not only in urban area but also more regionally including rural areas in Europe, Asia and North America. From this point, regional transboundary transport within each continent and inter-continental transport of ozone from one continent to another is of particular concern. It is now well recognized that both regional long-range transport and intercontinental transport contribute to exceedance of air quality standards of ozone in various part of the world. In particular analysis shows that due to intercontinental transport at Northern Mid-latitudes European pollution can affect East Asia.

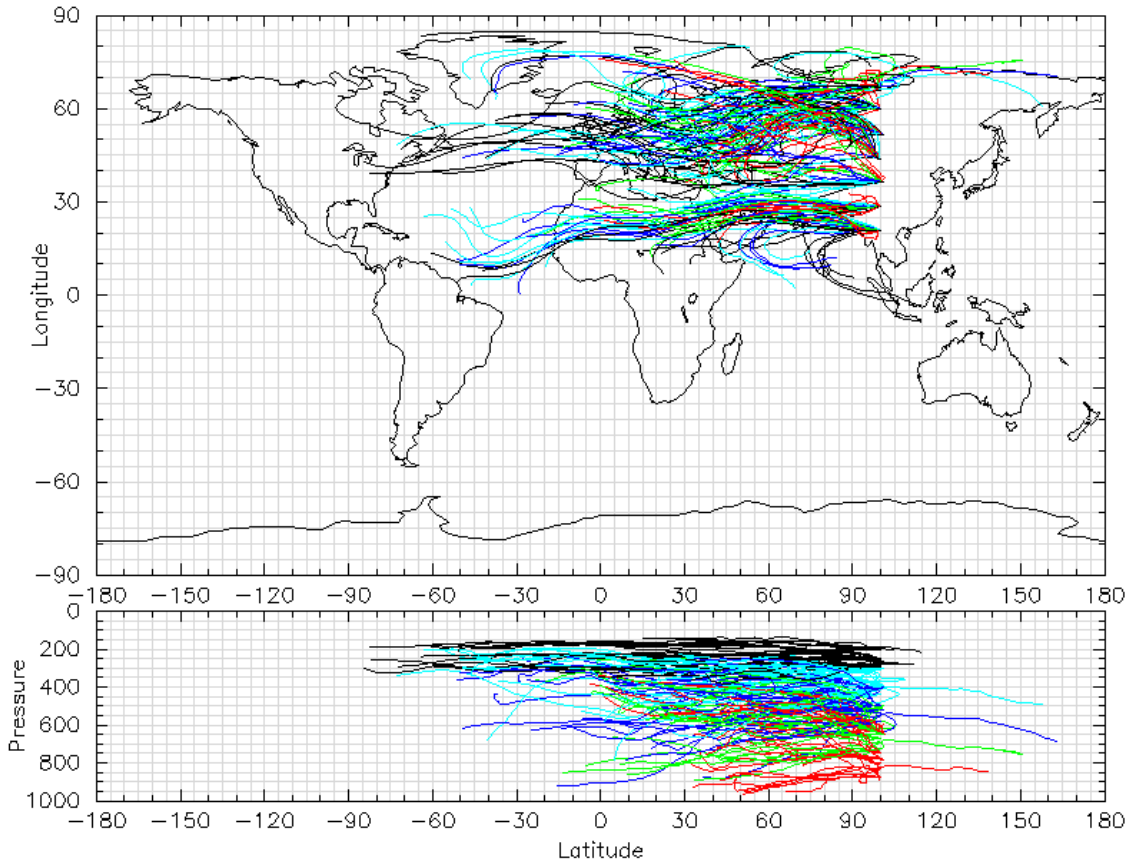


Fig.1 Air mass trajectories.

It was shown on the base of observations that contribution of continental pollution to Japan is rather important and should be taken into account. Also influence of the ozone distribution on temperature rising was determined.

Also calculation of tropospheric ozone distribution performed with WRF/Chem and CHASER (chemical atmospheric general circulation model for study of atmospheric environment and radiative forcing) models was presented by Dr. Takigawa M. The gaseous and aerosol chemistry module is implemented in the CHASER model in an on–line treatment. CHASER is based on CCSR/FRCGC/NIES AGCM 5.7b, and the meteorology and radiation can be calculated in CHASER itself. The radiative feedback through the distribution of chemical species is taken into account in CHASER. Daily forecasts have been available on a web page since 1 January 2002. A regional–scale chemical weather forecasting system based on WRF/Chem. The lateral boundary for the chemical species is taken from the 3–hourly output of CHASER. The model–calculated surface ozone by using this model system was compared with the ground–based observations and good agreement was shown. Dr. Raputa V.F. presented results of field, chemico-analytical and numerical investigations of snow cover contamination by torch emission of Priobskoye and Prirazlomnoye oil fields in Khanty-Mansiysk Autonomous Region, which are constant and the most powered in this territory. It was shown the essential increase (1.5 – 2 times) in aerosol deposition and in particle size in winter 2005 – 2006 as compared to 2004 –2005 years. Professor Baklanov A. presented description of Integrated systems with on-line and off-line coupling of meteorological and atmospheric chemical transport models. In particular, usage of DMI-ENVIRO-HIRLAM led to important conclusions that feedbacks through the first indirect effect lead to modifications of the order 7 % in dry and wet deposition patterns over major polluted areas in Europe.

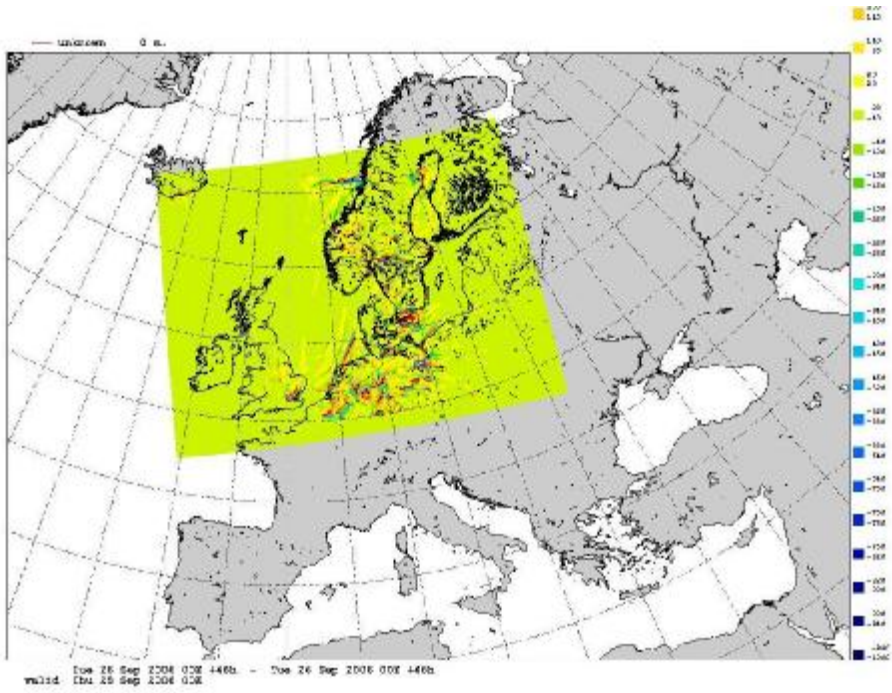


Fig.2 Difference (ref - perturbation) in accumulated dry deposition [ng/m2]

Role of ecological indicators and GIS-technologies in the complex assessment of ecological conditions of the industrial agglomerations was revealed by Tolkacheva G.A. on the base of analysis performed in Central Asia.

The next CITES-2007 event, which is Workshop on Climate Change Assessment and Modeling also directly related to the project central theme. It included Sessions on Physics of Climate and on Northern Regional Climate Change Assessment. Regional aspects of climate change were presented by Professor Lykosov V.N. A special attention is paid to the problem of "regionalization" of the model results with the aim to analyze specifics of changes in the climate and heir impact on the regional environment (e.g., in Siberia). In particular, some dangerous evidences of regional features of climate, such as, for example, catastrophic floods, extreme frosts and droughts, degradation of the permafrost active layer, were considered. Also, some possible approaches for the development of regional integrated models of assessing the environment vulnerability due to global climate change were discussed.

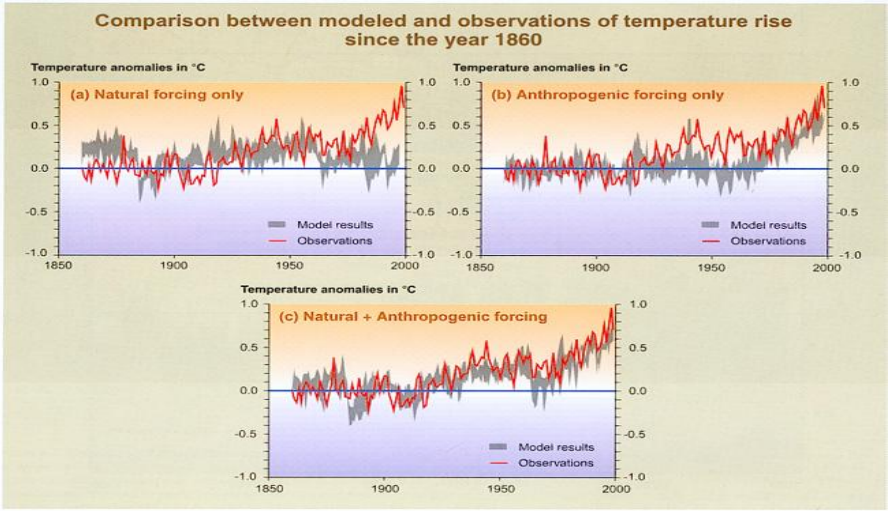


Fig.3 Comparison of observed changes in global-average surface air temperature

over the 20-th century with that from an ensemble of climate model simulations (http://www.grida.no/climate/ipcc_tar/vol4/english/022.htm)

The Workshop on Siberia Integrated Regional Study (SIRS) comprised Sessions on Development of SIRS information-computational infrastructure, and Siberia Environment Dynamics in context of global and Northern Eurasia changes. Siberia Integrated Regional Study (SIRS, http://sirs.scert.ru/en/) is a Northern Eurasia Earth Science Partnership Initiative (NEESPI) megaproject coordinating national and international activity in the region in line with Earth System Science Program (ESSP) approach aimed at investigation of environmental changes in Siberia in their interrelations with Climate Warming and Global Change. Siberia is the region where the most pronounced consequences of climate changes already happen and will happen as follows from observations and projections of various models. Variability of climatic characteristics in space and time has been evidenced through in situ and remote sensing measurements and were forecasted by advanced climatic models. These effects create the possibility for large and significant biological, climatic and socioeconomically coupled land use changes throughout this region. Science issues for the Siberia region are growing in global importance not only in relation to climate change (e.g. snow and ice dynamics) and carbon, but also with respect to aquatic, arid, and agricultural systems, snow and ice dynamics. The International Geosphere Biosphere Program (IGBP) reported recently that the Northern Eurasia is one of the critical "Switch and Choke" points in the Earth System, which may function as a generator of small changes in regional systems potentially leading to profound changes in the ways in which the Earth System operates. The Siberia region requires a new research paradigm. An overarching vision of regional aspects and its various connections to global aspects is now needed in line with the defined by the Earth System Science Partnership Integrated Regional Studies (IRS) approach, which could lead to Siberia IRS (SIRS) program. This requires bringing together scientists from several disciplines and sub-regions into a much wider approach and setting up the relevant structures (institutions, regional and trans-regional and international networks, funding) to lead such integrative studies. SIRS is developed in cooperation of Russian Academy of Science (Siberian Branch) specialists with their European and American partners/counterparts and is aimed at coordination of multidisciplinary and "distributed" teams of specialists carrying out different scale projects on Siberia environment dynamics. Currently SIRS is supervised by the Russian National Committee for IGBP and managed by its Siberian Branch. At the Session reported were recent results of investigations of the two major Siberian ecosystems dynamics, which are boreal forests and wetlands, with special emphasis on their role in the carbon cycle as well as results of climatic modeling for the region under study. Among those are:

• First achievements of the Zotino Tall Tower Observation Facility (a climatic research station in the Siberian taiga, established and operated by the Max-Planck-Institute for Biogeochemistry in Jena and the SB RAS Sukachev Institute of Forest, ZOTTO) operation, which should determine boreal forests role in the global carbon cycle more precisely;

• New quantitative estimations of wetlands contribution in carbon sequestration are gained from analysis of ground observations performed at the Great Vasyugan. It is found that carbon balance between CO2 emission from peat surface and accumulation by phytomass and peat is still negative for all observation sites. Moreover, it is shown that for IPCC scenarios balance on CO2 will be kept until 2080, even though bog ecosystem has limited potential on CO2 accumulation.

The first session of the SIRS Workshop was devoted to Development of SIRS Information-Computational Infrastructure. **To understand dynamics of regional environment properly and perform its assessment on the base of monitoring and modeling an information-computational infrastructure is required. Management of multidisciplinary environmental data coming from large regions requires new data management structures and approaches. The infrastructure developed in**

cooperation of Russian Academy of Science (Siberian Branch) specialists with their European and American partners/counterparts is aimed at support of multidisciplinary and "distributed" teams of specialists performing cooperative work with tools for exchange and sharing of data, models and knowledge optimizing the usage of information-computational resources, services and applications.
Recently developed key elements of the SIRS infrastructure are described in details. Among those are the Climate site of the environmental web portal ATMOS (http://climate.atmos.iao.ru) providing an access to climatic and mesoscale meteorological models and the Climate site of the Enviro-RISKS web portal (http://climate.risks.scert.ru/), providing an access to interactive web-system for regional climate assessment on the base of standard meteorological data archives. At the Session Pr. E. Gordov presented a state-of-art of SIRS. He explained that Distributed Focus Research Centers to support NEESPI (as presented by Pr. P. Groisman during the Helsinki NEESPI Summit) are under development in Krasnoyarsk and Tomsk. This coordination activity includes training and educational activities led by SCERT, So, the SIRS activity as a NEESPI mega-project was definitely consolidated by the Helsinki NEESPI Summit. Pr. E. Gordov also presented the state of development of information-computational SIRS infrastructure, as it results from SB-RAS and EC projects (ENVIROMIS-2 and ENVIRO-RISKS). These developments allow properly manage the huge amount of heterogeneous data needed to monitor and model the environment and its dynamics on large regions, and share them with research teams worldwide. This includes among others thematic websites (climate and musicale meteorology, regional climate assessments), an expert analytical system, electronic databases and libraries. This quite complex system has been designed to provide all necessary inputs and storage capacities to the SIRS interdisciplinary research efforts. Dr. G. Begni *et al*. presented the important efforts made by France, both in national, bilateral and multilateral frameworks, to bring a contribution of its own to the global Earth Observation Systems from Space, at various time and spatial scales and a wide range of disciplines. This contribution may bring unique raw and processed information (including products to be endorsed by the GMES European Initiative) to the NEESPI and SIRS interdisciplinary programs as well as scientific cooperation opportunities, opening wide innovative perspectives both to SIRS and the French Space community.

At the second Session (Siberia Environmental Dynamics in context of global and Northern Eurasia Changes) Pr. M. Heimann presented an invited report about monitoring biogeochemically driven atmospheric greenhouse gases over Siberia. He insisted on the fact that the boreal and arctic zone of Eurasia with its large amounts of carbon stored in forests and soils, as well as in wetlands and the underlying permafrost was indeed a hotspot in the Earth System. There is a severe trend to temperature increase here while precipitation regime is quite variable, which can lead to a severe vegetation stress. The carbon cycle presents several feedbacks between reservoirs. Warming may lead to an expansion of the growing season and hence to a larger carbon uptake by photosynthesis, which could be counterbalanced by soil respiration and increases in CO2 releases. Warming can liberate a fraction of CO2 and CH4 stored in permafrost and wetlands. Changes in hydrological regime may significantly affect fire frequency and wetland extent with additional consequences on carbon cycle. In order to have a proper quantification of regional carbon fluxes, both 'bottom-up' and 'top-down' approaches can be used. In the present state-of-art, they lead to incompatible results. For instance, results got from methods using TCOS sites lead to 1.3 PgC/yr, which is too large. A multiple constraint approach provides the most reliable greenhouse gas budget estimate. It must be based on (1) in situ flux measurements in key ecosystems, (2) inventory databases of carbon stored in forest biomass, (3) high precision atmospheric concentration measurements and (4) remote sensing of surface properties and atmospheric composition from space. All these measurements have to be included into a proper modelling framework. A key device for regional fluxes measurements is the ZOTTO observatory tower in Central Siberia, a quite significant investment

established in cooperation between the Max-Planck Society (Germany) and the V.I. Sucharev Institute for Forests, Krasnoyarsk. First results are more than encouraging. ZOTTO is planned to be an international observatory beyond 2010. Nevertheless, expanding the current sparse network of biogeochemical measurement stations over Eurasia, calibrating and maintaining it on the long run remains challenging.

Fig.4 – The ZOTTO Observatory Tower

Pr. A, Shvidenko *et al.* presented an invited lecture about 'Global Change in Siberia: Realities and Expectations'. He first explained that the two major drivers of regional global change are (1) climate change with heterogeneous but on average clearly negative impacts (increase in aridity, weather instability, frequency of extreme events) and (2) man made changes. Siberia is a hotspot for warming (about 8 degrees per 100 years near the Baikal Lake) with a general trend to increased dryness. These climatic variations occur along specific sub-regional and local features (e.g. along large rivers) Temperature and precipitations are the main drivers. Some climate change impacts on terrestrial ecosystems are positive: potential increase of productivity and expansion of agricultural lands. Others are negative, among which: loss of fertility; permafrost degradation; change in water cycle, bringing sea level increase, increase in salinity of coastal zones, coastal erosion, shrinking ice cover of Arctic Sea. Vegetation shift will result in substantial decrease of forested areas, increase of desertified steppes, negative impacts on biodiversity. The region will face an acceleration of catastrophic events: changes in fire regime (23 million hectares burnt in 2003), degradation of exocryogenic landscapes (salinity, increase of alkalinity, water and wind thermokarst erosion), decrease of arable lands, surplus of land salinity, undergoing of pasture lands (some 50%), high concentration of salt in upper larger dried Atlas, which cannot lead to forest regeneration. The region is facing a dangerous acceleration of global biogeochemical cycles, due to huge amount of carbon in organic soils, permafrost and carbon hydrates. Natural and man induced disturbances can exceed -20% in NPP. The SIBERIA-II project (Centre of Siberia) led to multi-sensor approaches for greenhouse gases accounting in Siberia. The vegetation of the region under study was proven to act as a carbon sink, estimated to 99.8 TgC/year. Climate change has also significant impacts of human health though extreme climatic phenomena

increase in danger of infectious diseases, etc. There are also destructive anthropogenic impacts on environment: level of pollution in regions of extraction of gas and oil exceeding by far the tolerable limits, pollution of rivers, parasitic contamination of fishes and humans. Oil and gas extraction impacts in Western Siberia destroyed 15% of tundra surface and 30% of total natural areas. All these features evidence the needs of adaptation and mitigation measures. At the same time, current knowledge of specifics and consequences of global change is limited. Levels of uncertainties of estimates and predictions are high and often unknown. Many scientifically complex but vital questions, need to be addressed. SIRS is expected to lead a proper coordination and system combination of these necessary multidisciplinary research activities.

Pr. Krutikov *et al.* presented the 'dynamics of the Great Vasyugan Bog'. The surface of this bog is about 53,000 km2. It dates from 6 to 10,000 years, but it increased by 25% some 500 years ago. There is a trend to annual bogging of the Siberian plain. The bog includes some 800,000 small lakes. The depth is between 4 to 12 meters. The main items to be monitored are physical, biological and chemical processes taking place in that natural system. Key sites were mapped with an 18 bit legend using satellite and in situ data. A specific attention was paid to the spatial structure of forest/marsh natural system. Dynamics of natural processes was analyzed by multi-component analysis of stratification sections of peat deposit (including cryogenic stopping) by their biochemical characteristics and microelement composition combined with radiocarbon dating of layers. Another line of research is the study of spatiotemporal structure of emission of the main gas components from natural forest-bog complex such as CO2 and CH4, as well as thermal influence of the bog. It was shown that significant local warming around the Great Vasyugan Bog keep up to a 10 km altitude. Odd phenomena in CO2 and CH4 seasonal regimes were evidenced. The carbon exchanges critically depend on intricate species and ecosystem, but the bog as a whole exhibits a positive carbon balance. Great degradation in bog formation process has been evidenced. The primary factor is global change. Paleoclimatic studies with similar objects in Europe and North America exhibit comparable behaviour under past climate changes. This implies geo-information technologies to reconstruct paleoclimates in Holocene. A standardized database was built by IMCES,

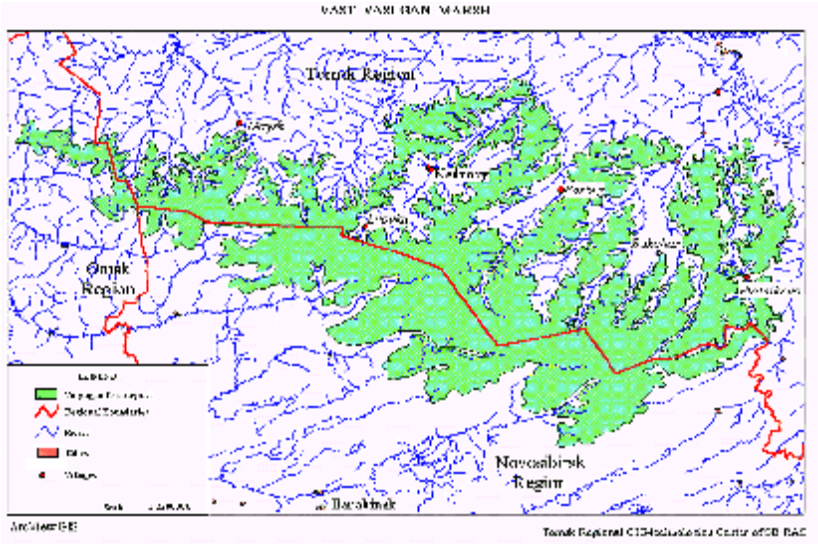


Fig.5 A GIS map of the Great Vasyugan Bog - © IMCES

The Workshop on Man-made Environmental Risks in Siberia was based on focus group studies performed within the Enviro-RISKS FP6 Project. The FP6 Project "Man-induced Environmental Risks: Monitoring, Management and Remediation of Man-made Changes in Siberia" (Enviro-RISKS) strategic objective is to facilitate elaboration of solid scientific background and understanding of man-made associated environmental risks, their influence on all aspects of regional

environment and optimal ways for it remediation by means of coordinated initiatives of a range of relevant RTD projects as well as to achieve their improved integration thus giving the projects additional synergy in current activities and potential for practical applications. List of Partners includes 3 leading European research organizations, 6 leading Russian research organizations (5 - located in Siberia) and 1 organization from Kazakhstan. Additionally several Russian and European research organizations joined to the Project as Associated Partners. Scientific background and foundation for the project performance is formed by a number of different levels RTD projects carried out by Partners and devoted to near all aspects of the theme. The set comprise coordinated/performed by partners EC funded thematic international projects, Russian national projects and other projects performed by NIS partners. Among main activities, aimed at realization of the Enviro-RISKS objective, are development and support of the Project web portal and environmental information distributed database and search for synergy between the different projects on Siberian environment and elaboration of recommendation for new Projects. Also within the project tasks is facilitation to development of Siberia Integrated Regional Study (SIRS, http://sirs.scert.ru/), which currently is one of the NEESPI regional megaprojects and educational activity aimed at preparation of young scientists ready to join the professional community. Siberia environment has been subjected to serious man-made transformations during last 50 years, whose negative consequences might be amplified by regional manifestations of global change. Say caused by deforestation (cutting and forest fires) variations in Siberian rivers runoffs and wetland regimes might interfere with change of atmospheric circulation in the region, which varies forest fires frequency, flambeau lights and losses of gas and petroleum during their transportation vary regional atmosphere composition and its radiation properties, etc. These regional problems are typical for number of NIS and for near all Northern countries. To elaborate solid scientific background and understanding of man-made associated environmental risks, their influence on all aspects of regional environment and optimal ways for it remediation, which is required to get practical results in enhancing of environment and diminish environmental risks, major Thematic Focuses were selected and relevant Working Groups established. Three Thematic Focuses/Groups consider major risks inherent to Siberia environment. These groups (with their leaders) are the following:

1. Atmospheric Pollution and Risks (Alexander Baklanov and Vladimir Penenko),
2. Climate/Global Change and Risks (Martin Heimann and Vasily Lykosov), and
3. Terrestrial Ecosystems and Hydrology and Risks (Michael Kabanov and Anatoly Shvidenko).

The forth Focus has a generic nature and is devoted to:

1. Information Systems, Integration and Synthesis (Evgeny Gordov and Edige Zakarin).

The working groups also form a basis for organization of the thematic Expert Groups, which are elaborating practical recommendations for coordination of new projects on Siberia environment initiated by Partners. Results reported at the Workshop were based on Focus groups findings (Reports summarizing Focus groups findings soon will be published as a DMI Report). Among major results reported are:

- **Performed by DMI with Partners long-term simulation of atmospheric transport and deposition patterns from sources of continuous anthropogenic sulphates and radionuclides emissions located in the Siberian, Kazakhstan, Ural, and other geographical regions (Atmospheric Pollution and Risks);**
- **Analysis of climatic projections for the region performed on the basis of CMIP Program numerical experiments (Climate/Global Change and Risks);**
- **Determination of major risks for ecosystems and hydrology caused by regional manifestations of Global change (Terrestrial Ecosystems and Hydrology and Risks); and**
- **Development and launching the bilingual (Russian and English) Enviro-RISKS Project web-portal (http://risks.scert.ru/), which is 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 (Information Systems, Integration and Synthesis).

During the CITES 2007 conference participants presented their papers and, after several lectures on «hot topics» of environmental sciences, delivered by key NIS, Asian, European and US specialists in the area, got better understanding of the current trends.
It should be added that the CITES event Program is available at the site (http://www.scert.ru//conferences/cites/2007/Conference_Program2.pdf) and presentations of all reported papers are presented at the site as well (http://www.scert.ru/conferences/cites/2007/presentation/ConferenceEng.html).

As the next project stage a bilingual (English and Russian) project web site (http://project.enviromis.scert.ru/apn/was launched and supported in operation) as an information system aimed at support of young scientists' education/training in this domain thus involving continuously regional research community, especially young scientists into professional activity as well as attracting attention of local and regional population and decision/policy makers to these important for well being issues. The site is a part of the thematic environmental web portal supporting the ENVIROMIS Network (http://enviromis.scert.ru), which gives its users additional opportunities to get new knowledge. The portal engine is employing special software developed to support scientific portals and sites [GLF ATMOS].

Fig.6 Start page of the project site

The left hand side menu allows one to navigate and select subject of interest from Project participants, Project milestones, Project deliverables, Thematic educational tools and Thematic educational IT tools.

Co-ordination Meeting "Thematic educational resources providing necessary foundation to study interrelations between atmospheric composition, anthropogenic load and Climate Change in Northern Asia and their IT-based implementation/usage".of the project was organized on February 7–8, 2008 at Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan. The objectives of this meeting were:
To discuss thematic educational resources prepared by the Project participants devoted to thematic basic and applied topics; and
To elaborate an approach for effective usage of the prepared educational resources on the base of IT tools implemented at the project web site.

During this meeting thematic educational resources prepared by the Project participants devoted to basic and applied topics of the project theme were discussed. Among those are "Atmospheric Composition" (Prof. H. Akimoto, Drs. H. Irie, Y. Kanaya and M. Takigawa, Frontier Research Center for Global Change, Yokohama, Japan), "Anthropogenic Load" (Dr. L. Shardakova, Research Hydrometeorological Institute of the Republic of Uzbekistan, Tashkent), "Climate Change in Northern Asia" (Prof. V. Lykosov, RAS Institute for Numerical Mathematics, Moscow, Russia, and Prof. E. Gordov, Siberian Center for Environmental Research and Training, Tomsk, Russia, and "Web and GIS based information systems for Environmental Sciences" (Prof. E. Gordov, Prof. E. Zakarin and Dr. Sci. B. Mirkarimova, KazGeoCosmos, Almaty, Kazakhstan). The approach for effective usage of the prepared educational resources on the base of IT tools implemented at the project web site was elaborated on the base of suggestions presented by Dr. A. Titov (Siberian Center for Environmental Research and Training, Tomsk, Russia) in his paper "IT tools implemented at the project site and their possible usage for education".

Most important issues of Atmospheric Composition and its interrelations with Global Change highlighted at the Project intermediate Co-ordination Meeting are the following. In particular, Dr. Irie reported about Remote Sensing for Air Quality Measurement, which included satellite measurements of the tropospheric NO_2 and the recent development of a ground-based remote sensing technique based on the Multi-Axis Differential Optical Absorption Spectroscopy (MAX-DOAS), which would overcome some shortcomings in satellite observations [3].

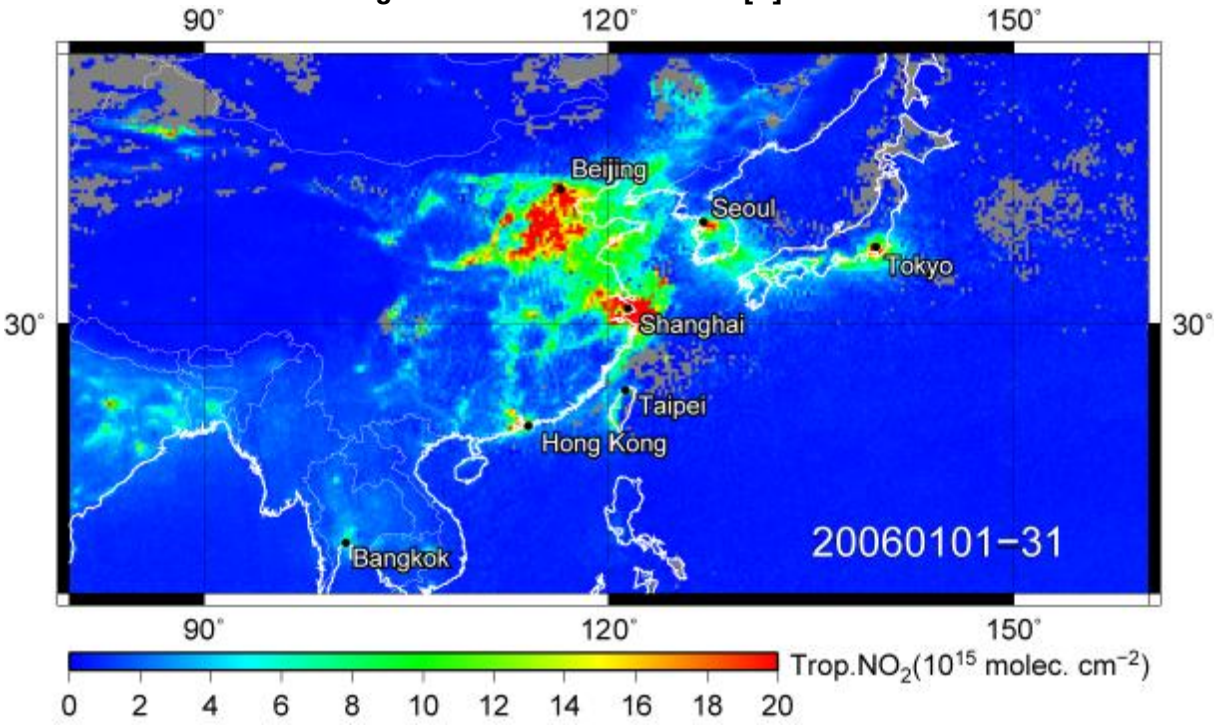


Fig. 7 Monthly mean tropospheric NO_2 columns measured by a satellite instrument, OMI (Ozone Monitoring Instrument), in January 2006. Data with a cloud fraction less than 0.1 were plotted on a 0.25^O (in latitude) × 0.25^O (in longitude) grid. Values exceeding 20×10^{15} molecules cm^{-2} are shown in red. The OMI NO_2 data was obtained from the NASA Goddard Earth Sciences Data and Information Services Center (GES-DISC) at http://disc.gsfc.nasa.gov. Similar data are also available at http://www.temis.nl/airpollution.

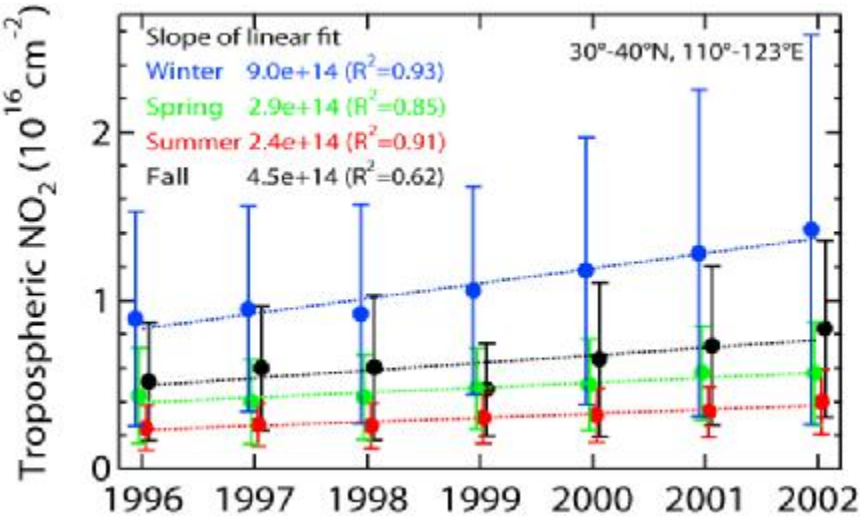


Fig. 8 Time series of the mean tropospheric NO_2 columns measured by a satellite instrument GOME over industrial areas of China (30°-40°N and 110°-123°E) for winter (December-February) (blue), spring (March-May) (green), summer (June-August) (red), and fall (September-November) (black). Error bars represent standard deviations of GOME NO_2 data over the region. The lines are the linear least-square fits to the data.

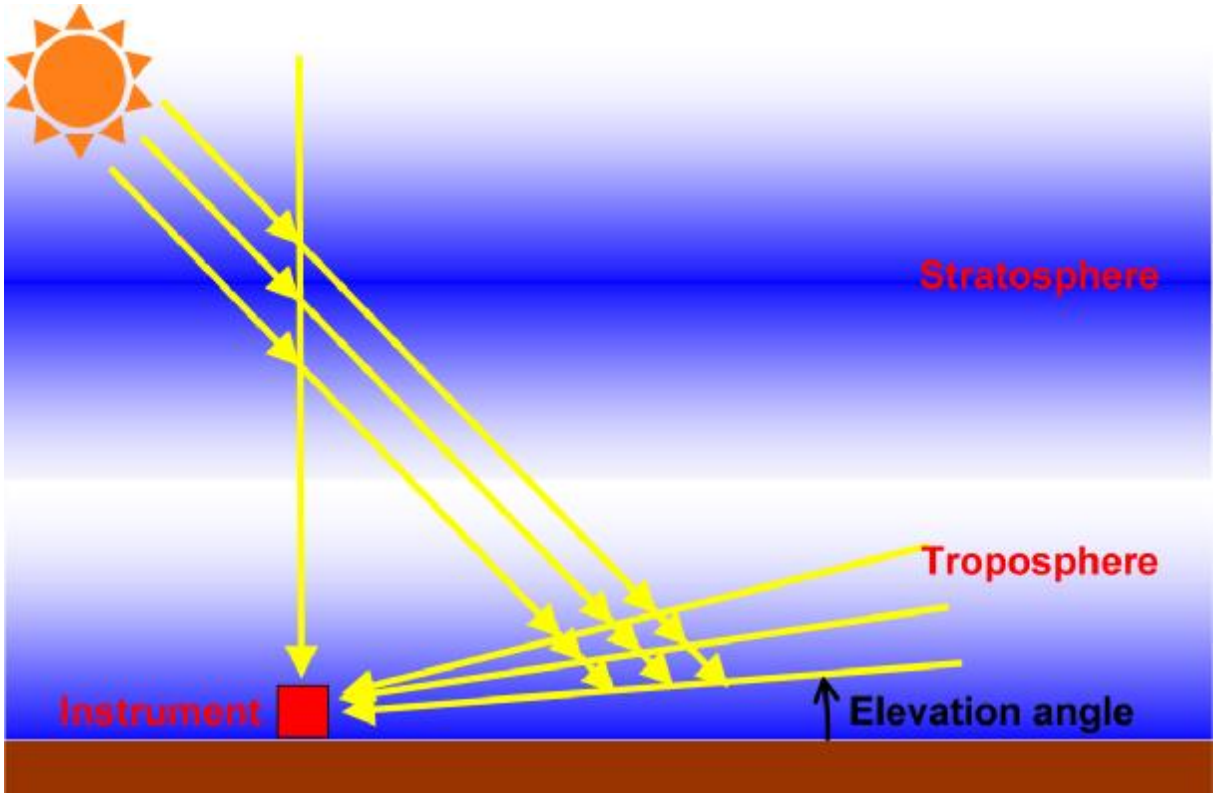


Fig. 9 Schematic of a MAX-DOAS measurement geometry.

Dr. Takigawa described the state of the art of Atmospheric Photochemistry – air-quality modelling [4].

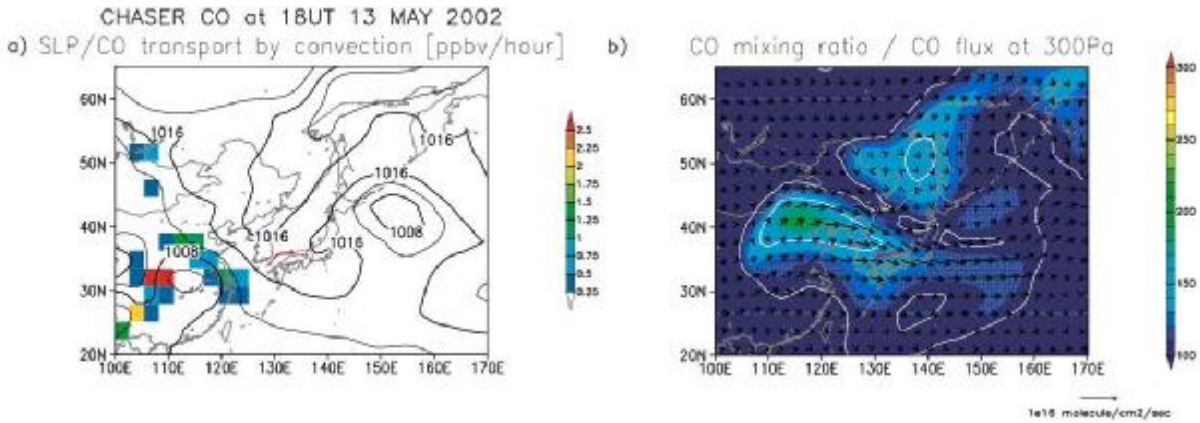


Fig. 10 : a) Sea level pressure (contours, units of hPa), and CO tendency by convective transport at 300 hPa at 18:00 UTC on 13 May 2002 (color tones, units of ppbv/hour), b) CO mixing ratio and horizontal CO flux at 300 hPa at 18:00 UTC on 13 May 2002. The contour interval is 50 ppbv. The unit length is shown below the figure. Red lines denote the track of flight 10 of PEACE-B on 14 May 2002, and the leg from 06:48 UTC to 07:22 UTC is shown with the bold line.

Thematic educational resources on Web based information systems for Environmental Sciences and their usage in Siberia Integrated Regional Study [5] were presented by Prof. E. Gordov. In particular they include developed and launched web portals, providing distributed collaborative information-computational environment to organizations/researchers participating in execution of EC FP6 projects "Environmental Observations, Modeling and Information Systems " (http://enviromis.scert.ru/) and "Enviro–RISKS - Man-induced Environmental Risks: Monitoring, Management and Remediation of Man-made Changes in Siberia" [6] (http://risks.scert.ru/).

Fig.11 Start page of the ENVIROMIS web portal

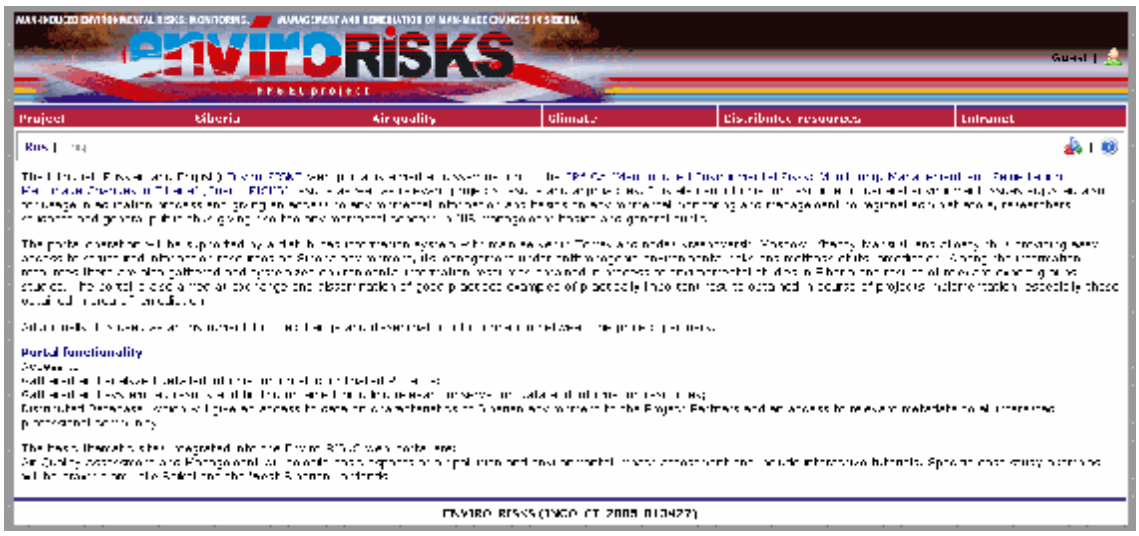


Fig.12 Start page of the Enviro-RISKS web portal

The portals are also powerful instruments for dissemination of the projects results and open a free access to collections of regional environmental data and education resources. These bilingual (Russian and English) resources are aimed at dissemination of information on general environment issues adjusted also for usage in education process and giving an access to regional environmental data and instruments to process them on-line. They are organized as a set of interrelated scientific sites, which are opened for external access. The Portal engines employs ATMOS portal software. They open easy access to structured information resources on Siberia environment and to results of project expert groups studies devoted to regional environment management under anthropogenic environmental risks. A built-in Intranet is used as an instrument for project management as well as for exchange and dissemination of information between the project partners. The portals give also an access to gathered and analyzed detailed information on all coordinated projects, gathered and systemized results and findings obtained including relevant observation data and information resources, distributed database, which will provide an access to data on characteristics of Siberian environment to the project partners and an access to relevant metadata to all interested professional community.

Perspective and important for future application approach was suggested by Dr. Titov to be used to develop thematic educational information-computational system. It is based on results of development at SCERT the working model of the distributed software system for collection, management, storage, retrieval and possible processing and visualization of environmental datasets containing results of meteorological and air pollution observations, field campaigns and mathematical climate modeling produced by different models. Specially designed metadata standard for machine-readable description of datasets related to meteorology, climate and atmospheric pollution transport domains is introduced as one of the key system components. The Resource Description Framework (RDF) technology means have been chosen for metadata description model realization (http://www.w3.org/RDF/) in the form of RDF Schema. The final version of the RDF Schema is implemented on the base of existing widely used standards, such as Dublin Core Metadata Element Set (http://dublincore.org/), Ecological Metadata Language (http://knb.ecoinformatics.org/software/eml/) and others. As a whole the system is available as a Web server (http://climate.risks.scert.ru/metadatabase/) based on the web-portal ATMOS engine [7] and implementing dataset management functionality including SeRQL based semantic search as well as statistical processing and visualization of selected data archives. The core of the system is Apache web server in conjunction with

Tomcat Java Servlet Container (http://jakarta.apache.org/tomcat/). Sesame Server, (http://www.openrdf.org/), used as a database for RDF and RDF Schema, is run within Tomcat framework and provides necessary environment for handling RDF metadata.

After preparation of thematic educational resources they were integrated into the project web site and made accessible via http://project.enviromis.scert.ru/apn/Thematic_Educational_Resources/.

Fig.13 The start page of the Thematic educational resources prepared by the project participants and experts

The developed and launched Thematic educational IT tools consist of two modules. The first one is the Web-system for air quality assessment of the city area based on the mathematical modeling data. The system employs results of meteorological and photochemical modelling. Pollution transport mathematical model represents the model of turbulent diffusion, including the transport equations with the description of advection, turbulent diffusion and chemical reactions, which is applied to calculate the air pollutant concentrations taking into account the chemical changes [8,9]. Mainly the work was devoted to creation of the web-system (http://air.risks.scert.ru/tomsk-mkg/) for effective air chemical composition assessment and analysis in the conditions of industrial city area and its suburbia. At present detailed pollutant concentration fields were obtained as an output of the pollution transport mathematical model described earlier for selected periods from 2000 to 2006. Dynamic and thermal characteristics of the atmospheric boundary layer are calculated on the basis of simplified mesoscale model of urban ABL developed at the Tomsk State University and Institute of Atmospheric Optics RAS. The problem was solved numerically in the investigated domain that covers an urbanized territory with numerous high-rise point sources, as well as linear, point and area emission sources situated on the underlying surface. Predictions were performed with the use of finite volume method and new explicit-implicit calculation scheme of solving three-dimensional prognostic transport equations at Skif-Cyberia multiprocessor systems of Tomsk State University. Then the dataset obtained as an output of pollution transport and transformation mathematical model was put onto the powerful server and provided with basic software toolset accessible via unified web-interface for data processing and visualization and subsequent analysis. Web-portal ATMOS software [7], specially designed for rapid development of scientific applications, has been used as a base for web-system development. Graphic user interface of the system is planned to realize using DHTML technology for it allows to provide more friendly user interface than standard HTML [10]. PHP scripting language is used for implementation of relevant program modules within the framework of ATMOS web-portal. The system being developed comprises three

following parts:

- **Generated by the model data archives containing detailed fields of the pollutant concentrations for selected for each season periods in 2000-2006 interval**
- **Graphic user interface**
- **A set of PHP-scenarios to perform data processing and conversion with the following visualization**

It should be noted that raw data archives obtained as a result of numerical modelling are incompatible with the data used by the system for a number of technical reasons, so that first they were structured and converted into the standard binary format used by GrADS software package for the following online visualization.
Graphic user interface is developed based on the web-portal ATMOS engine and represents dynamic HTML form to enter calculation and visualization parameters (Fig.14).

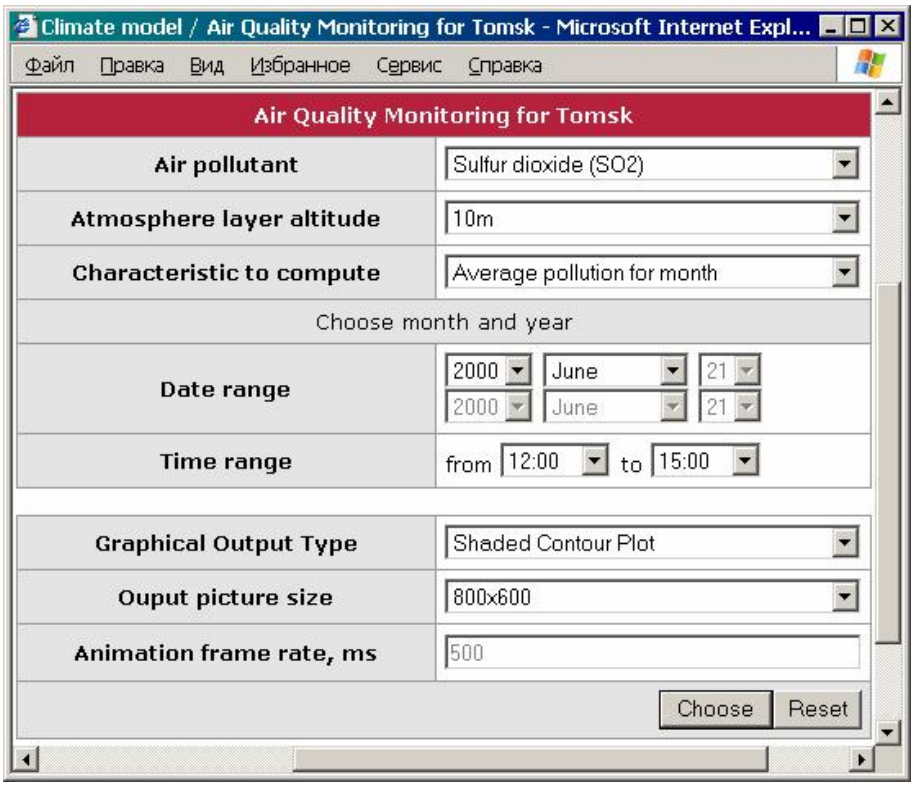


Fig.14 Dynamic HTML form for entering calculation parameters

The form allows setting the following parameters:

- **"Air pollutant" with such values as airborne particulate matter, sulfur dioxide, nitrogen dioxide, carbon oxide and ozone)**
- **"Atmospheric layer altitude" ranging from 10 to180 meters**
- **"Characteristic to compute". At present it is possible to calculate such characteristics as average pollution for month and season for chosen time of the day and their dynamics within the selected time interval as well as hourly dynamics for the selected day**
- **Date range, time range, graphical output type and picture size. There's also a possibility to choose animation frame rate to see dynamics of the pollutant concentration.**

"Date range" fields allow to set the time interval of interest. It should be noted that

contents of the fields is generated dynamically according to the model data currently available for processing. It is an important issue from the point of view of effective access to relevant information because model computational process is very heavyweight so that output data can be received in relatively small blocks. It is also possible to set "Graphical output type" and animation frame rate. After the form is filled in and calculations are carried out web-application will render the results on the screen.

Below several examples demonstrating present capabilities of the web-system are to be found. Fig.15 shows average nitrogen dioxide pollution of the Tomsk city area for September, 2006 from 6.00 pm till 9.00 pm.

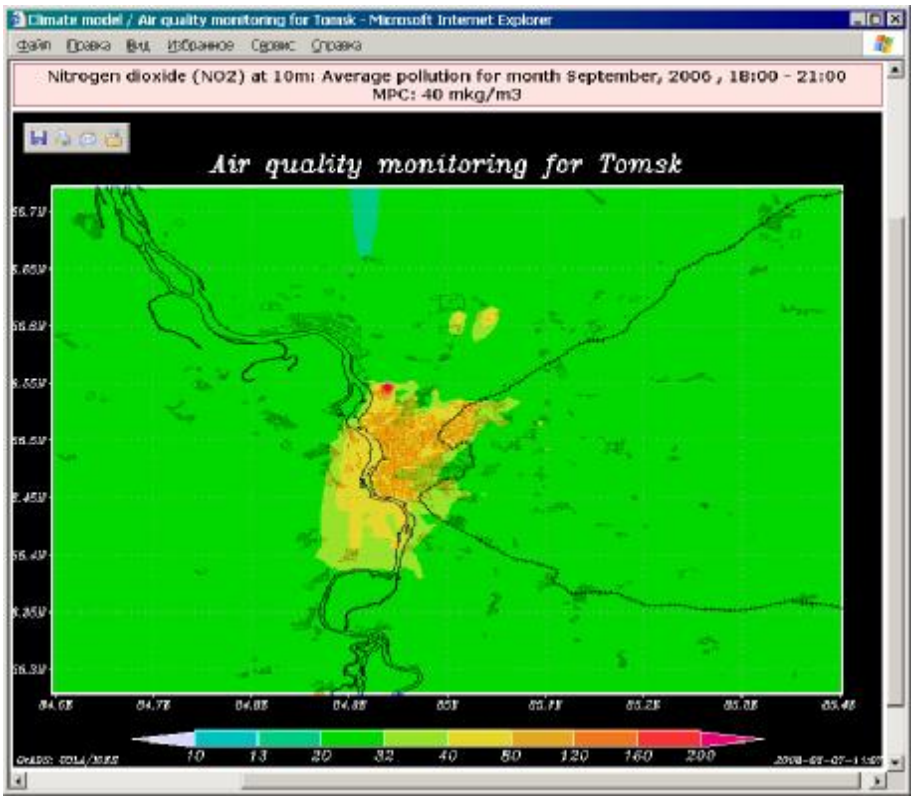


Fig.15 Average NO_2 pollution at 10m for September, 2006, 18.00 – 19.00.

It should be noted that the scale displayed on the graphics generated by the system is normalized according to the corresponding maximum permissible concentration value residing in the middle of the scale that makes the picture easy for interpretation.

The functional capability of the system of calculating monthly and seasonal averages for a number of years and representing them in animation mode would be useful for analysing pollutant concentration dynamics. Fig.16 that follows below shows an example of visualization of average seasonal SO_2 pollution for 6 years.

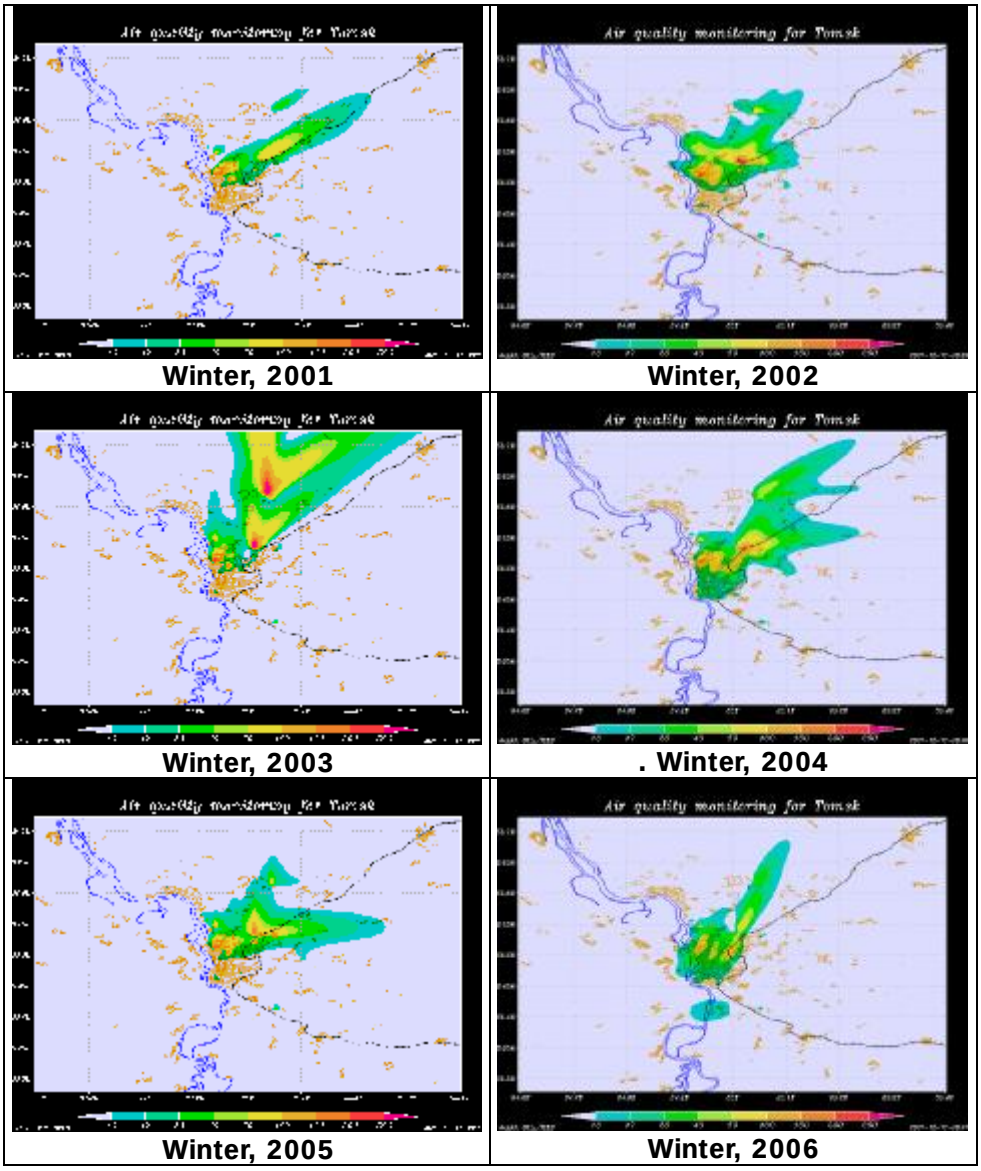


Fig.16 Dynamics of the average SO2 pollution for winter season at 10m, 12.00 – 15.00.

The system is aimed at educational purposes mainly. It also might be used by regional ecologists and decision makers and provides them with images of pollutant concentrations fields at different altitudes for the industrial city area. It allows one to determine characteristics of pollution distribution above the territory and their dynamics under different weather conditions, to estimate input of selected pollution sources (industry enterprises, transport, etc.) into pollution fields, as well as to estimate consequences of possible accidents leading to additional pollutants blowouts. Also it might be used to understand degree of anthropogenic influence on regional environment and climate. It should be added that the system has generic character and being provided with characteristics of industrial and transport pollution sources, local meteorology data, surface properties and generated by the pollution transport and transformation mathematical model datasets it can be easily adjusted for conditions of an arbitrary city.

The next educational IT tool developed and launched is web-system for regional climate change assessment on the base of standard meteorological data archives (http://climate.risks.scert.ru/). The system is a specialized web-application aimed at mathematical and statistical processing of huge arrays of meteorological and climatic data as well as on the visualization of results. The data of the first and

second NCAR/NCEP Reanalysis editions are currently used for processing and analysis. Grid Analysis and Display System (GrADS, http://www.iges.org/grads/) and Interactive Data Language (IDL, http://www.ittvis.com/idl/) are employed for visualization of the results obtained.

The system consists of graphic user interface, set of software modules written on script languages of GRADS or IDL and structured meteorological data sets. The graphic user interface is a dynamic web form to choose parameters for calculation and visualization and designed using HTML, PHP and JavaScript languages (Fig.17).

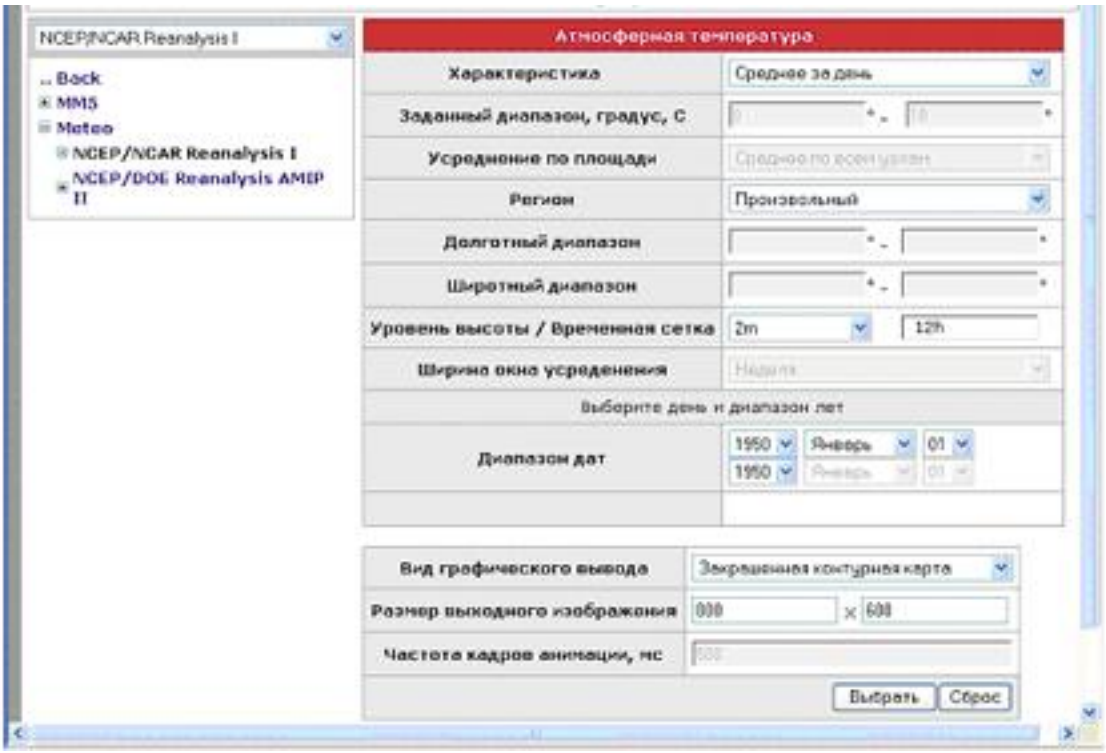


Fig.17 Graphic user interface of the system for selection of required calculations and visualization characteristics

Set of software modules consists of independent modules implementing analytical algorithms required for meteorological data processing, switched on with assistance of PHP and executed by GRADS/IDL system, which generates a graphical file containing the results of calculations performed. The latter along with corresponding metadata is passed to the system kernel for subsequent visualization at the web site page. The structured meteorological data are stored at the specialized server and available only for processing by the system so that user can not access data files directly while can freely get results of their analysis. The screen shot below (Fig.18) shows a window of a result graphical output.

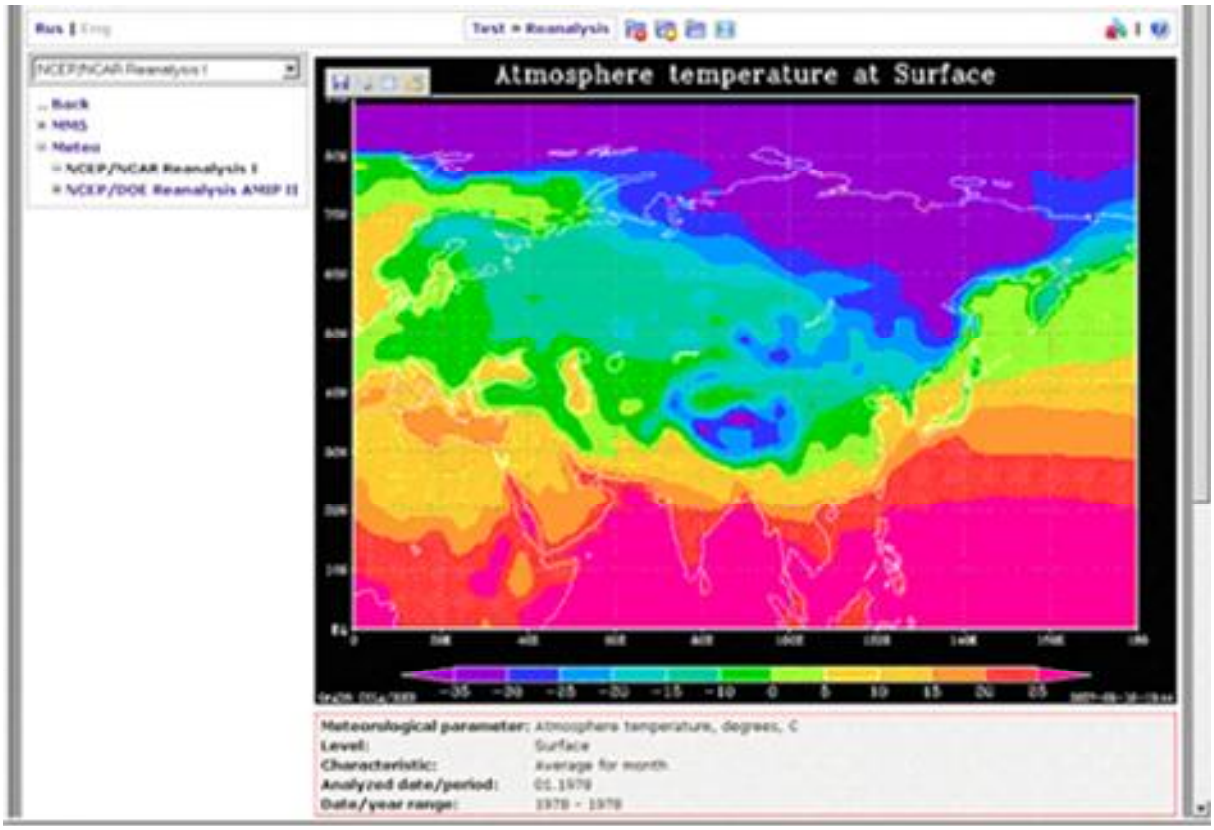


Fig.18 Surface temperature in January, 1978 for chosen geographical domain (40-90 degrees of the Northern latitude and 0-180 degrees of the Eastern longitude)

At present the following climatic characteristics have been chosen for subsequent analysis: temperature, pressure, air and soil humidity, precipitation level and geopotential height. Due to the middleware used the system structure is rather flexible and this set can be easily expanded by adding new features to the interface as well as to the executable software. Currently system allows performing for chosen spatial and time ranges the following mathematical and statistical operations, key for the climate assessment: calculation of maximum, minimum, average, variance and standard deviation values, number of days with the value of the chosen meteorological parameter within given range, as well as time smoothing of parameter values using moving averaging window. It is also possible to calculate correlation coefficient for an arbitrary pair of parameters, linear regression coefficients between some pair of characteristics and to determine first (last) cold (warm) period (such as day, week, and month) of the year. The user interface allows one to choose geographic domain, time interval, characteristic of interest and visualization parameters. For example, a pulldown menu “Region” includes the following options: Siberia, Europe, Asia, Eurasia, the whole Earth and that is defined by user. The last option choice leads to appearance of "Longitudinal range” and “Latitudinal range” fields in which user should enter coordinates of the geographical domain of interest. User can also choose type of statistical characteristic, interval for averaging, altitude level, and so on. While calculating averages with moving window, which width can be specified as week, month, three months, half of the year and year, one gets the smoothed sequence of spatial distributions for the characteristic of interest. This set is represented as an animation, which can be viewed either in automatic or in controlled regime. Below several shots from such sequence are shown including the control bar specifying the viewing mode.

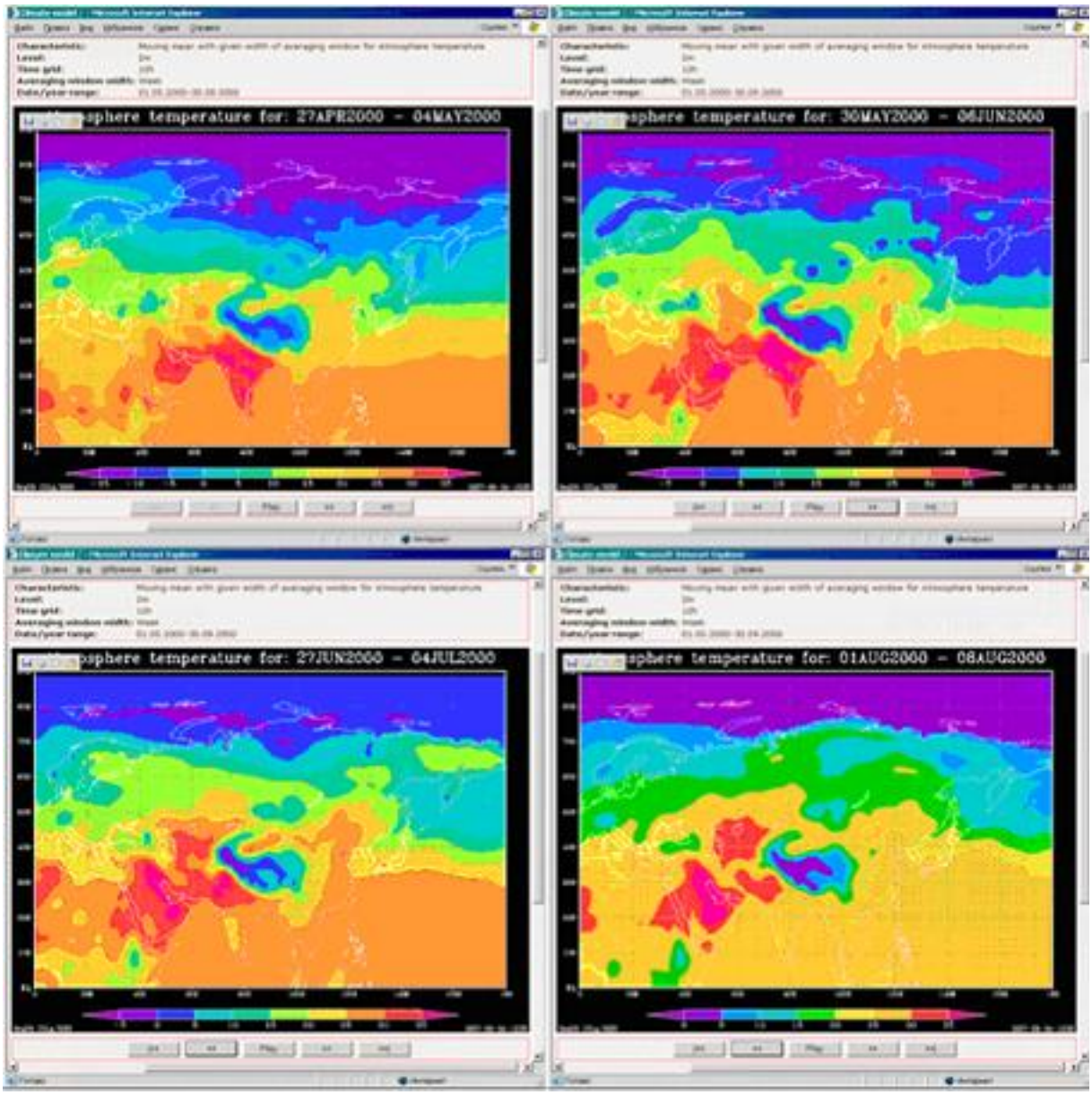
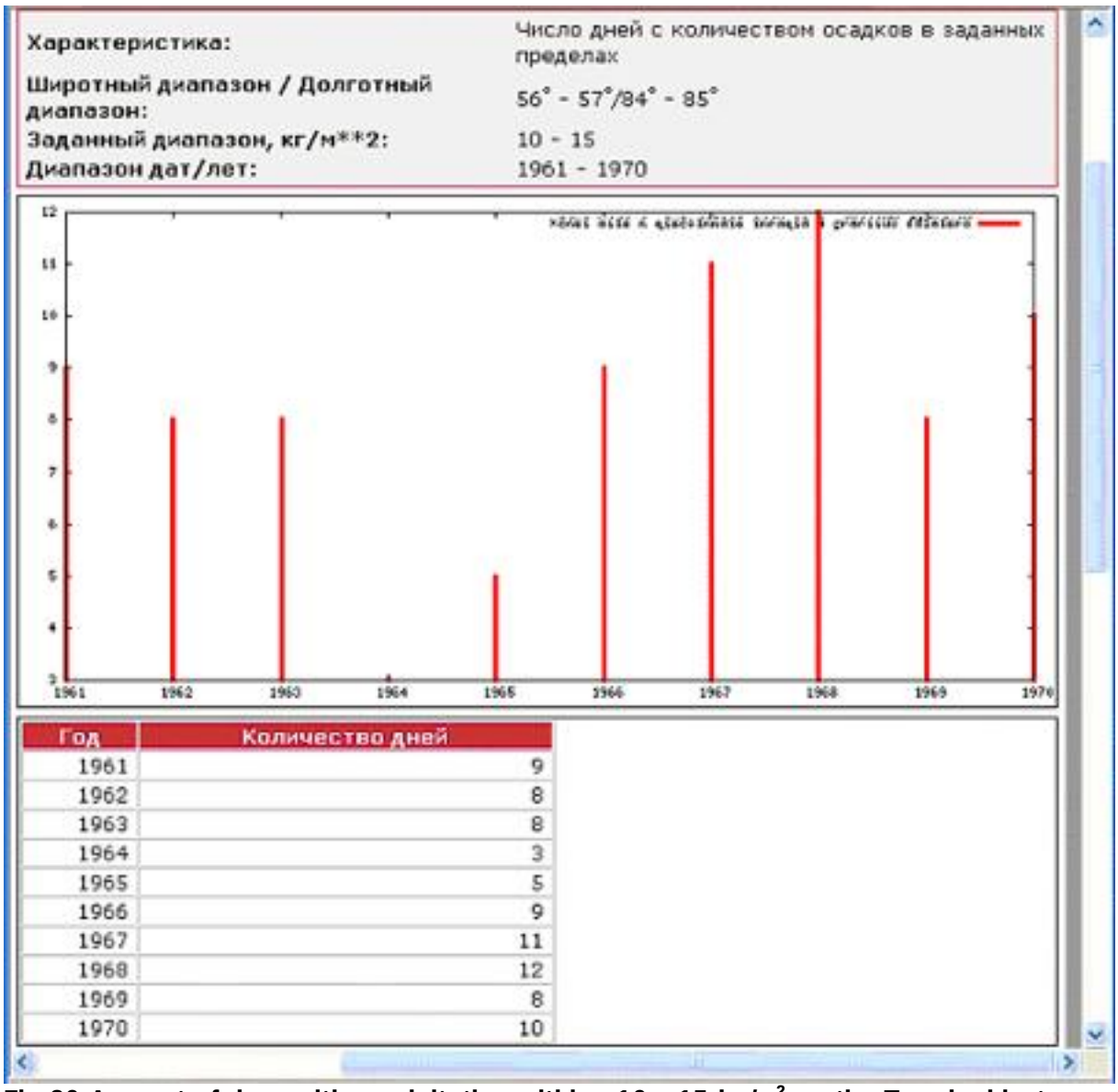


Fig.19 Results of averaging with moving window

The system allows to perform different mathematical and statistical operation, including calculations of mean values, standard deviations, determination of the first (last) warm (cold) day (week, month) of the selected year, amount of days with precipitation from the given interval (see Fig.20 below), etc.



Год	Количество дней
1961	9
1962	8
1963	8
1964	3
1965	5
1966	9
1967	11
1968	12
1969	8
1970	10

Fig.20 Amount of days with precipitation within 10 - 15 kg/м^2 on the Tomsk oblast territory during 1961 – 1970.

Comparison of characteristics retrieved from different data sets is also possible. For example, difference between atmospheric pressure in Eurasia during Spring of 2001 looks like following:

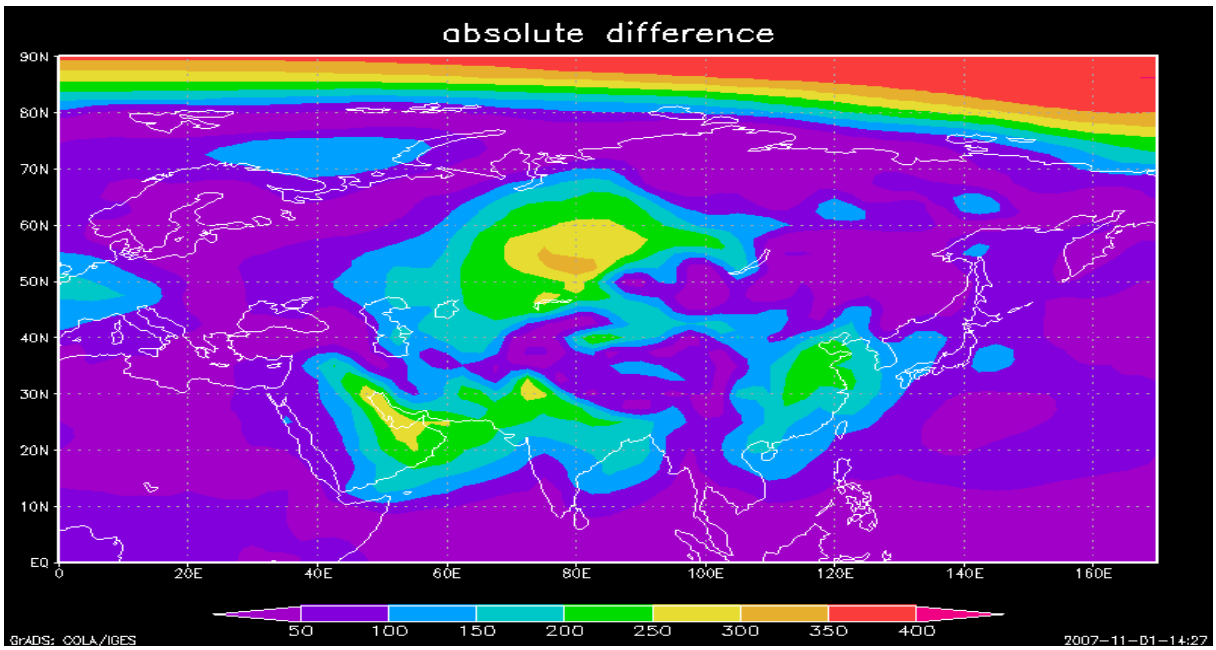


Fig. 21. Absolute difference between pressure $Abs\_dif = |b - a|$, where *a* and *b* are relevant mean pressure calculated for Spring 2001.

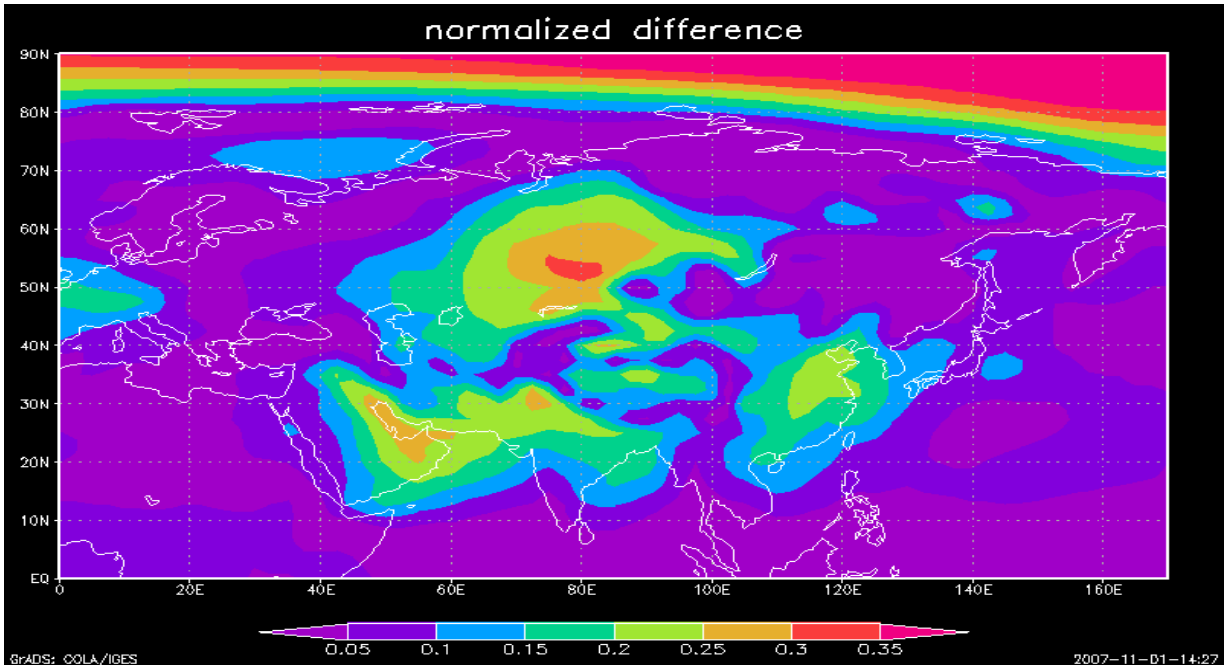


Fig. 22. Relative difference of pressure ($Norm\_dif = \left|\frac{b-a}{a}\right| \cdot 100\%$) for the same period.

Possibility to calculate time trends is also realized in the system. For example, Figs. 12 and 13 shows the calculated annual temperature 8 year trend ($Tr = \frac{\bar{y} - \bar{x}}{n}$, $\bar{x}$ is the mean for the first interval while $\bar{y}$ - for the second interval, *n* is the chosen interval)

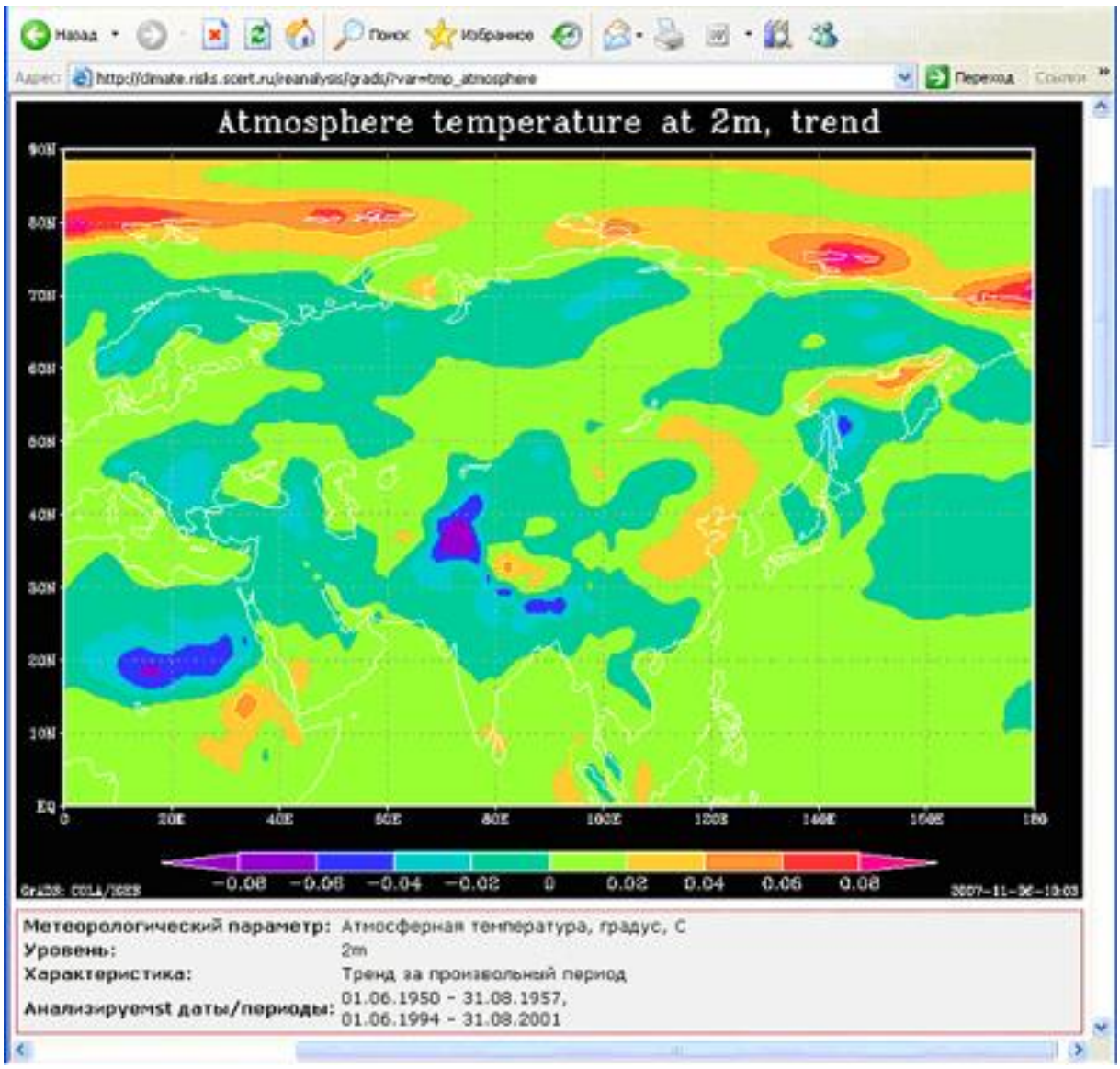


Fig.23 Trend for temperature calculated on the base NCEP/NCAR Reanalysis

As seen from the results obtained, there is no temperature increase over the most part of Eurasia for the period indicated.

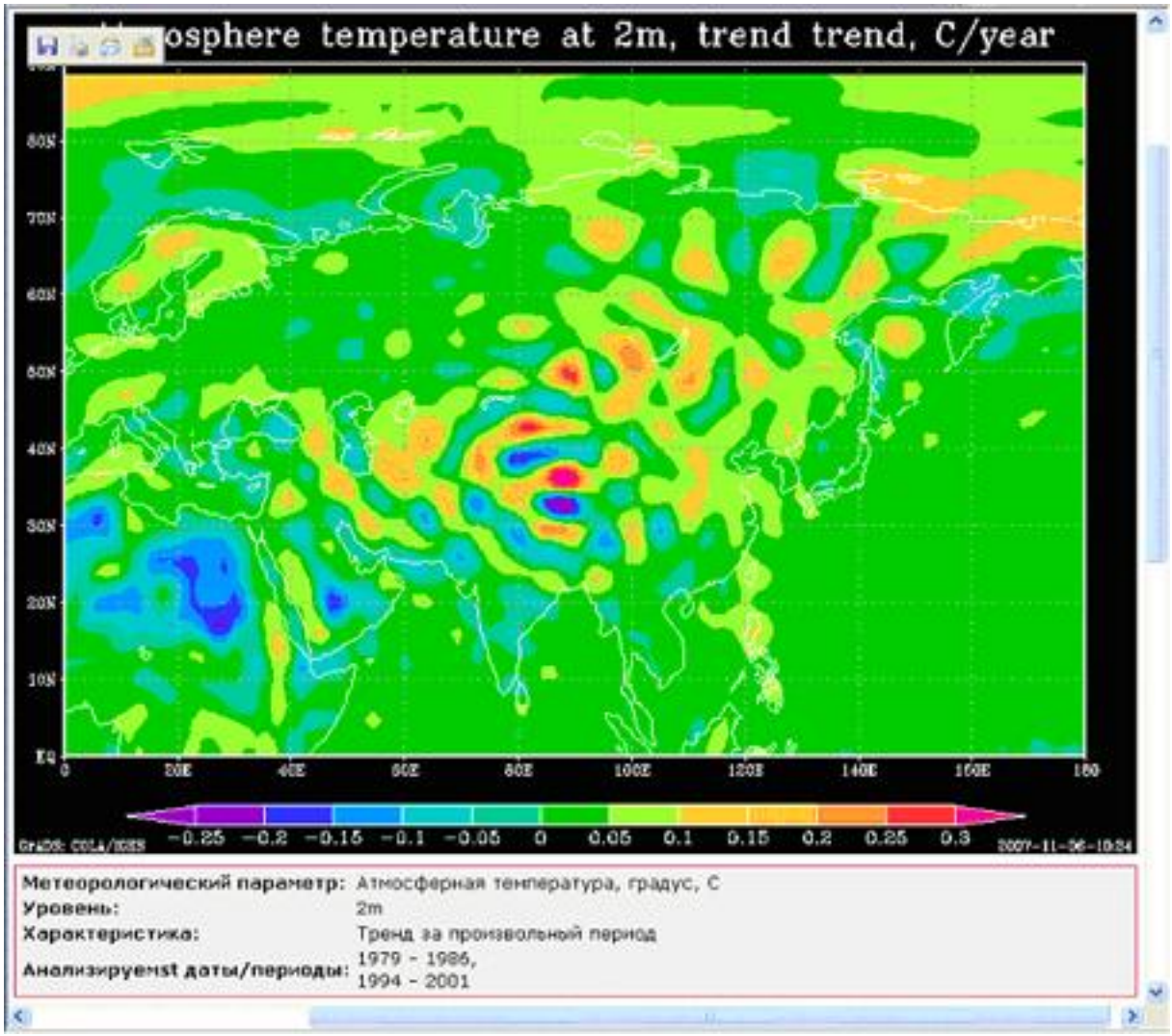


Fig.24 Trend for temperature calculated on the base NCEP/DOE AMIP II.Reanalysis

In spite of the fact that the system primary orientation is educational, it will be useful for regional meteorological and climatic investigations aimed at determination of trends of the processes being taken place. Also it will simplify the work with huge archives of the spatially distributed data. It should allow scientific researchers to concentrate on the solving of their particular tasks without being overloaded by routine work and to guarantee the reliability and compatibility of the results obtained.

Acknowledgments

The CITES-2007 event was organized by Siberian Center for Environmental Research and Training (SCERT) together with the Institute for Numerical Mathematics RAS (INM) and Institute of Monitoring of Climatic and Ecological Systems SB RAS (IMCES) with the support of the EC INCO Programme and Asia Pacific Network for Global Change. The event is organized under auspices of the Russian National Committee for IGBP and its Siberian Branch, SB RAS Joint Scientific Councils on Earth Sciences and on Mathematics and Informatics. The scientific educational action CITES-2007 was partially supported by the EC grants ENVIROMIS-2 (№ 031303) and Enviro-RISKS (№ 013427) and by the Asia Pacific Network for Global Change CAPaBLE project CBA2007-08NSY and a grant of Russian Ministry of Education and Science. This support allowed us to cover a part of participation expanses of the selected School attendees. All participants of the Workshop unanimously thanked sponsors for support of this important event.

References

1. **Gordov E.P., Kabanov M.V., Lykosov V.N. Information-computational technologies for environmental science: young scientists training. Computational technologies, Volume 11, Special issue, 2006 year, pp. 3-11.**

2. Gordov E.P., Lykosov V.N. ICT for Environmental Sciences: Synthesis of Science and Education. Computational technologies, Volume 13, Special issue, 2008 year, pp. 3-10.

3. Irie, H., et al. (2005), Evaluation of long-term tropospheric NO_2 data obtained by GOME over East Asia in 1996-2002, Geophys. Res. Lett., 32, L11810, doi:10.1029/2005GL022770; Irie, H., et al. (2008a), Validation of OMI tropospheric NO_2 column data using MAX-DOAS measurements deep inside the North China Plain in June 2006, to be submitted to Atmos. Chem. Phys.; Irie, H., et al. (2008b), Performance of MAX-DOAS measurements of aerosols at Tsukuba, Japan: a comparison with lidar and sky radiometer measurements, Atmos. Chem. Phys., 8, 341-350.

4. Sudo, K., M. Takahashi, J. Kurokawa, and H. Akimoto, CHASER: A global chemical model of the troposphere 1. Model description, J. Geophys. Res., 107, D21, doi:10.1029/2001JD001113, eid:4339, 2002.

5. Gordov E.P., Lykossov V.N. Development of information-computational infrastructure for integrated study of Siberia environment. Computational technologies, Volume 12, Special issue, 2007 year, pp. 19-31.

6 Baklanov A., Gordov E.P. Man-induced environmental risks: monitoring, management and remediation of man-made changes in Siberia. Computational technologies, Volume 11, Special issue, 2006 year, pp. 162-171.

7. E.P. Gordov, V.N. Lykosov, and A.Z. Fazliev. Web portal on environmental sciences "ATMOS". Advances in Geosciences. 2006. Vol. 8. p. 33 - 38.

8. Belikov, D.A., A.V. Starchenko, An Investigation of Secondary Pollutants Formation (Ozone) in the Atmosphere of Tomsk, Journal of Atmospheric and Oceanic Optics, 18 (05-06), 391-398, 2005.

9. Belikov D.A., Parallelization method achievement of numerical model of atmospheric diffusion for investigation of primary and secondary pollutants transport over urban territory, Thesis for the degree of Candidate of Physics-and-Mathematics Science, Tomsk State University, 2006.

10. Gordov, E.P., I.G. Okladnikov, and A.G. Titov, Development of elements of web-based information-computational system supporting regional environment processes investigations, Computational Technologies, 12(3), 20-28, 2007.

3. Results & Discussion

Statistics of the whole CITES event looks like following: 122 participants from 49 research organization of different countries, among those 2 APN countries (Japan and Russia), 2 APN targeted countries (Kazakhstan and Uzbekistan) and 6 European countries. Geographic distribution of Russian participants spread from Vladivostok to Saint-Petersburg. From 60 young scientists 16 were supported by the APN grant. Unfortunately 2 Chinese young scientists selected for such support were unable to get their passports in time and could not participate in the event. Also 13 Lecturers were supported on the base of APN funding.
It should be noted that 15 Russian young scientists were supported by the Russian Ministry of Education and Science and organization of the whole event as well as funding of participation of young scientists and elder researchers from Russia and other NIS countries, was supported by the EC FP6 projects ENVIROMIS-2 (http://enviromis.scert.ru) and Enviro-RISKS (http://risks.scert.ru). It is seen that the APN support allowed us to involve into this activity a new group of young scientists and Lecturers from APN region countries. The CITES event and APN Workshop promoted the generation and transfer of new findings and methodologies in area of atmospheric composition, air quality and climate change; it also helped promising young scientists in the region in the career development and their involvement to APN and the community of global change scientists represented at the CITES event. The young scientists will become a part of an overall network of scientists interested in different aspects of global change in the Northern Asia region. Selected papers presented at the APN Workshop on Atmospheric Composition and Air Quality and other Workshops within CITES-2007 event were prepared for publication in the special issue of peer reviewed Journal of Computational Technologies (http://www.ict.nsc.ru/jct). The special issue will be published in June 2008.

As the next project stage we launched and support in operation a bilingual (English and Russian) project web site (http://project.enviromis.scert.ru/apn/) as an information system aimed at support of young scientists' education/training in this domain thus involving continuously regional research community, especially young scientists into professional activity as well as attracting attention of local and regional population and decision/policy makers to these important for well being issues. The site is a part of the thematic environmental web portal supporting the ENVIROMIS Network (http://enviromis.scert.ru), which gives its users additional opportunities to get new knowledge. We elaborated relevant educational materials reviewed them and discussed during the project meeting in Japan, on February 7–8, 2008 at Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan. After this meeting these information resources were deployed at the web site thus transforming it into a powerful educational tool in area of air quality, atmospheric composition and climate change. Presentations made at co-ordination Meeting on February 7–8, 2008 at Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan were also put on project site (http://project.enviromis.scert.ru/apn/Thematic_Educational_Resources/).

The scale of the event organized in course of the project carrying out, level of prepared educational resources and reliable way for their presentation to young scientists by means of modern IT allow us to think that we reached the main aim of the project, which is involvement of regional research community, especially young scientists, into professional activity in area of experimental and theoretical studies of atmospheric composition, air quality and their interrelations with anthropogenic load and climate change in Northern Asia

4. Conclusions

To reach the main aim of the project on involvement of regional research community, especially young scientists, into professional activity in area of experimental and theoretical studies of atmospheric composition, air quality and their interrelations with anthropogenic load and climate change in Northern Asia, the following specific tasks were solved:

- **In the frameworks of CITES-2007 event the Initial Meeting and the APN Workshop on Atmospheric Composition and Air Quality was held on July 21-22, 2007; 128 participants from 49 research organization of different countries, among those 2 APN countries (Japan and Russia), 2 APN targeted countries (Kazakhstan and Uzbekistan) and 6 European countries. Geographic distribution of Russian participants spread from Vladivostok to Saint-Petersburg. From 60 young scientists 16 were supported by the APN grant. Selected papers presented at the APN Workshop on Atmospheric Composition and Air Quality and other Workshops within CITES-2007 conference were prepared for publication in the special issue of peer reviewed Journal of Computational Technologies (http://www.ict.nsc.ru/jct). The special issue will be published in March 2008. All materials of CITES-2007 are available at http://www.scert.ru/en/conferences/cites07/matherials/;**

- Bilingual (English and Russian) project web site as a thematic information system was launched (http://project.enviromis.scert.ru/apn/) were information on the project running is available.

- Thematic educational materials and tasks were prepared and put on the project site (http://project.enviromis.scert.ru/apn/Thematic_Educational_Resources/). Educational materials were reviewed and discussed during the project co-ordination meeting in Japan, on February 7–8, 2008 at Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan. Presentations made at co-ordination Meeting were also put on project site (http://project.enviromis.scert.ru/apn/Project_milestones/); and

- the project site was transformed into information-computational system (http://project.enviromis.scert.ru/apn/tools/) aimed at education and training in the targeted domain and a dissemination tool for prepared educational materials and the whole set of the project outcomes, including findings reported at the organized events.

As a whole the project outcomes should lead to better knowledge of Atmospheric Composition and Climate Change interrelations a nd their specific importance for Northern Asia. Also young scientists were informed about opened by National and International (including APN) opportunities for their RTD activity and to their more active involvement into international cooperation in this domain. Improvement of professional skill of NIS young researchers, better understanding of their region environmental situation should lead to better environment protection and health safety in the targeted regions and facilitate exchange of ideas and approaches both in basic and applied problem treatment as well as stimulate appearance of new cooperative efforts in the area of environmental sciences and applications. It should be added that enhanced professional skill of young and prominent scientists as well as appearance if informal links with their abroad colleagues will lead to the consolidation of cooperation in the field of environmental monitoring and environmental management information systems/components, dissemination of advanced research results for the implementation within NIS.
One of results achieved is filling a gap between basic science achievements and their practical applications in this domain. It also should lead to facilitation of

exchange of ideas and approaches both in basic and applied problem treatment, and stimulated appearance of new cooperative efforts in the area of environmental sciences and applications.

The output of the project contributes directly to the APN Science Agenda, enhancing regional young scientists' involvement into this important domain and assisting in their career development. The central project theme, which is atmosphere composition and quality in relationships with climate change, is closely linked to the announced by APN topics, namely - "Climate Change & Variability" and "Human Dimensions". This is also central theme of the educational web site developed in course of the project.

5 Future Directions

Cooperation between Japanese and Russian researchers established during the project carrying out appeared to be quite fruitful. That is why at the Co-ordination Meeting in Yokohama it was decided that it should be continued. Currently the both sides are searching funding opportunities for further joint work in area of interrelations between atmospheric composition and Global Change with special emphasis on climate change dynamics in Northern Eurasia. There are two directions for continuation of this cooperation. The first one is related with preparation of joint research project in area of Atmospheric Composition and Global Change, while the second one might consider as direct continuation of the reported project. It will be devoted to capacity building in the APN region and will involve a coherent set of thematic educational actions supported by development and support of relevant web based educational IT resources and specialized tools.

References

6. **CD with CITES-2007 proceedings**

7. **Project web-site http://project.enviromis.scert.ru/apn/**

8. **Project Thematic educational resources http://project.enviromis.scert.ru/apn/Thematic_Educational_Resources/**

9. **Project Thematic Educational IT tools http://project.enviromis.scert.ru/apn/tools/**

10. **Special issue of Journal of Computational Technologies (http://www.ict.nsc.ru/jct)**

Appendices

International Conference and Young Scientists School on Computational Information Technologies for Environmental Sciences: "CITES-2007" Tomsk, Russia, 14-25 July, 2007

Program of the CITES-2007 Young Scientists School
14 July, Saturday
8:00-9:00 Registration (Congress Center Rubin)
9:00-9:30 Opening
9:30-18:00 Lectures
1. Dymnikov V.P.
Computational aspects of active and passive admixtures transport and transformation in atmosphere
2. Kholodov A.S.
Numerical methods of transport equation solving
3. Voevodin Vl.V.
Supercomputer technologies for complex problems solving
4. Klyatskin V.I.
Admixture transport in stochastic media

15 July, Sunday
9:00-13:00 Lectures (IMCES Conference Hall)
1. Kholodov A.S.
Nonlinear monotonic schemes for transport equation solving
2. Smyshlyaev S.P.
Modeling of chemically interacting gases in atmosphere middle- and underlayer
3. Fazliev A.Z.
Presentation of declarative knowledge in information systems
15:00-19:00 Training sessions (TUSUR Computer classes)
Instructors Akhlyostin A.Yu., Bart A. A., Belikov D.A., Lavrent'ev N.A, Prevezentsev A. I., Titov A.G.

16 July, Monday
9:00-13:00 Lectures (IMCES Conference Hall)
1. Kuznetsov Yu.I.
Methods for solving rigid equations sets
2. Vyazilov E.D.
Formation of metadata and knowledge in Earth sciences
Fazliev A.Z.
Presentation of procedural knowledge in information systems
15:00-19:00 Training sessions (TUSUR Computer classes)
Instructors Akhlyostin A.Yu., Bart A. A., Belikov D.A., Lavrent'ev N.A, Prevezentsev A. I., Titov A.G.

17 July, Tuesday
9:00-13:00 Lectures (IMCES Conference Hall)
1. Tolstykh M.A.
Semi-Lagrange schemes for transport equation solving
2. Kostrykin S.V.
Pollution transport by vortex systems – theory, laboratory and computational modeling
3. Fazliev A.Z.
Workflows management systems
15:00-19:00 Training sessions (TUSUR Computer classes)
Instructors Akhlyostin A.Yu., Bart A. A., Belikov D.A., Lavrent'ev N.A, Prevezentsev A. I., Titov A.G.

18 July, Wednesday
9:00-13:00 Lectures (IMCES Conference Hall)
1. Aloyan A.E.
Modeling of admixture transport and transformation in atmosphere
2. Glazunov A.V.
Eddy models and pollution transport
2. Kudashev E.B.
Satellite remote sensing information resources and problems of their integration into international systems of Earth study from space
4. Gordov E.P.
Information-computational systems for city air quality monitoring and modeling
15:00-19:00 Training sessions (TUSUR Computer classes)
Instructors Akhlyostin A.Yu., Bart A. A., Belikov D.A., Lavrent'ev N.A, Prevezentsev A. I., Titov A.G.

19 July, Thursday
Preparation of Reports on the work performed
14:30 – 18:00 Participants Reports on performed work (IMCES Conference Hall)

Program of the CITES-2007 Conference
20 July, Friday
9:00 Practical Session and boat trip

July 21, Saturday
8:30-9:30 Registration (IMCES Conference Hall)
9:30 -10:00 Conference opening
1. APN Workshop on Atmospheric Composition and Air Quality Chairs Prof. H. Akimoto (Japan) and Prof.E. Gordov (Russia) (IMCES Conference Hall)
10:00-15:45 Session 1.1. Atmospheric Composition and Air Quality Measurements (Chair Hajime Akimoto)
Invited lectures
1. Akimoto H.
Tropospheric ozone and its impact on climate and environment
2. Zuev V.V.
Laser gas analysis of the atmosphere: history of development and prospects
Invited reports
1. Kanaya Yu.
Chemistry of tropospheric OH and HO_2 radicals: current understanding and questions
2. Raputa V.F.
Models of reconstruction regional pollution on the observed data
3. Takigawa M., Niwano M., Akimoto H., Takahashi M.
Model calculation of tropospheric ozone distribution
Oral report
1. Irie H.
Synergistic use of satellite and ground-based observations to understand air quality issues
16:15-18:00 Poster presentations (IMCES Conference Hall)
Session 1.1.
1. Burgaz A.A.
Structure of the fields of total columnar ozone and its connection with circulation processes of south hemisphere
2. Dementeva A.L., Zhamsueva G.S., Zayahanov A.S., Tsydypov V.V., Ayurzhanaev A.A.
Research of particularities of circulation and processes of air mass in East Gobi
3. Devyatova A., Saeva O.P.
Dust and aerosol pollution from stationary man-caused sources in Novosibirsk city
4. Goryaeva V.S., Tolkacheva G.A.

Role of atmospheric precipitations as ecological indicators in the monitoring of the environment conditions of the urbanized territories in the arid zones
5. Klejnowski K., Osrodka L., Krajny E., Wojtylak M., Kowalska M.
Analysis changes of concentrations particulate matter PM10 and PM2.5 fractions in Upper Silesian agglomeration (Poland) in 2001-2005 years in aspect new directive EU on ambient air quality and cleaner air for Europe
6. Lyapina E.E., Golovatskaya E.A.
Near surface concentration of mercury in Tomsk
7. Melnikova V.N., Shulgina T.M., Titov A.G.
Statistical analysis of meteorological data of NCEP/NCAR Reanalysis 1 and Reanalysis 2 for West Siberia
8. Panteeva N., Tolkacheva G., Rakhmatova N.
Comparative analysis of long-term variations of Total Column Ozone in Uzbekistan by using ground and satellite data (TOMS)
9. Rakhmatova N., Tolkacheva G., Panteeva N., Starovatov O.
Spatial-temporal variability of Total Column Ozone over Uzbekistan by using ground and satellite (TOMS) data
10. Raputa V.F., Smolyakov B.S., Shuvaeva O.V.
Assessment of volumes of torch burning attendant oil gas by surface monitoring data
11. Talovskaya A.V., Yazikov E.G.
Geochemical composition of dust aerosols within ground "Tomsky" in Tomsk region

18:00- 20:00 Open initial project meeting of APN CAPaBLE project CBA2007-08NSY "Capacity Building to Study Interrelations between Atmospheric Composition, Anthropogenic Load and Climate Change in Northern Asia" (SCERT Seminar Hall)

22 July, Sunday
9:00-15:00 Session 1.2. Atmospheric Composition and Air Quality Modeling (Chairs Alexander Baklanov and Vladimir Penenko)
Invited lecture
1. Kurbatsky A.F., Kurbatskaya L.I.
Thermally driven mesoscale circulation over urbanized areas
Invited reports
1. Starchenko A.V.
Parallel computation for weather research and environment protection
2. Baklanov A., Aloyan A., Mahura A., Luzan P.
Approaches to evaluation of source-receptor relationship for atmospheric pollutants: trajectory modelling, cluster, probability fields analyses, and adjoint equations
3. Aloyan A.E., Arutyunyan V.O., Yermakov A.N.
Modeling the dynamics and kinetics of gaseous pollutants and aerosols in the atmosphere: estimation of the environmental impact of forest fires
4. Penenko V.V.
Discrete-analytical approximations based on global and local adjoint problems for atmosphere, ocean and environment studies
Oral reports
1. Semenov V., Sorokovikova O., Fokin A.
Modeling of contaminant transport in a megapolis
2. Yudin M.S.
Orographic retardation of a cold atmospheric front near a lake
3. Lezhenin A.A., Shlychkov V.A., Mal'bakhov V.M.
Numerical model study of atmospheric pollutant transport over a rough terrain
4. Klimova E.G.
Data assimilation algorithms based on the dynamical-stochastic approach

15:00-17:45 Session 1.3. Environmental Data Resources and Information Systems (Chairs Evgeny Gordov, Alexander Fazliev, Edige Zakarin and Galina Tolkacheva)

Invited reports

1. Zakarin E.A., Balakay L.A., Dedova T.V., Mirkarimova B.M.
Risk mapping of adverse environmental impact on biota of North – West Caspian Sea region

2. Tolkacheva G.A., Kovalevskaya Yu.I., Aksenova L.A., Shardakmova L.Yu., Vidineeva E.M., Vereschagina N.G.
Role of ecological indicators and GIS-technologies in the complex assessment of ecological conditions of the industrial agglomerations

3. Serebriakov V.A.,.Vershinin A.V
Distributed interoperable processing in GIS

4. Lavrentiev N.A., Vrazhnov D.A., Starchenko A.V., Fazliev A.Z.
Global and regional models in the informational-computational system "Climate"

Oral reports

1. Semenov V., Arutunjan R., Sorokovikova O., Fokin A., Rubinshtein K., Ignatov R., Novikova I., Grizan E. , Astachova E.
Mesoscale model of atmospheric dispersion of contamination under temperature and topography inhomogeneity of landscape and its usage in DSS for nuclear accidents NOSTRADAMUS

17:45-19:30 Poster presentations

Session 1.2 (IMCES Conference Hall)

1. Balakay L., Tusseyeva N.
Analysis of distant carrying of pollutants from Kazakhstan territory

2. Baranovsky N.V.
Parallel computing technologies and mathematical modelling of natural fires spread

3. Belikov D.
Model of atmospheric chemistry for air pollution analysis in the city

4. Hamal K., Bun R.
Spatial modeling of greenhouse gas emissions in energy sector on regional level

5. Chernova A.V.
Study of admixture transportation in the atmosphere according to Lagrange approach

6. Dubickaya S.V., Fomin S.P
Atmospheric composition changes simulation after detonation of Solid Rocket Motors. The algorithms for solving the negative influence problem

7. Gritsan E.V.
Assessment on simulation of the different precipitation classes by a regional hydrodynamic model for application to analysis of atmospheric pollution transport over the East Asian region

8. Ignatov R.Y., Rubinstein K.G., Gritsan E.V., Novikova I.V.
Using a regional non-hydrostatic model for calculation of meteorological data for the purpose of radionuclide distribution and deposition forecasts over the Kola Peninsula region

9. Ivanova E.V., Kazakov A.L.
Test of the one-dimensional model as to reproduce the seasonal structure of the atmospheric boundary layer over water surface

10. Khamidullin I.R., Bayanov I.M.
Numerical modeling of dynamics of propane escape accompanied by burning in the atmospheric surface layer

11. Kilanova N., Klimova E.
Suboptimal data assimilation algorithms for an estimation of passive pollutions concentration

12. Konstantinov P.I., Rubinstein K.G.
Research of quality of the description a three-dimensional Moscow region-temperature mode by means of mesoscale model MM5

13. Konstantinov P.I., Kislov A.V.

Simulation of summer temperature regime of Moscow region
14. Marchenko M.
Simulation of coagulation process with Monte Carlo method using parallel computers
15. Nochvay V.I., Beyko I.V.
Urban emission parameters control in model of calculation of surface ozone pollution
16. Nuterman R.B., Starchenko A.V., Baklanov A.A.
Development and evaluation of microscale meteorological model for air flow and pollution transport investigation in urban canopy
17. Panasenko E.A., Starchenko A.V.
Numerical solution of some problems of impurity distribution in the atmosphere
18. Penenko A.V.
Pollutant sources identification with the use of variational technique
19. Pyanova E. A.
Numerical study of water body effect on spreading passive admixture from the point source
20. Temnikova. Z.V., Kamaev D.A.
Numeral solution the third dimension model of flow over surface with barriers
21. Ushakov K.V.
Explicit difference schemes with variable time-steps in large-eddy simulation
22. Voitsekhovskaya O.K., Golub I.Yu., Shefer O.V., Zaprjagaev A.Yu.
Radiant heat exchange modeling for determination of the thermodynamic parameters of the inhomogeneous gas mixtures
23. Vrazhnov D.A., Starchenko A.V.
Parallel realization of high order schemes for solving problems of gas-disperse cloud transprort and particles sedimentation
24. Zimenko P.A., Smyshlyaev S.P., Galin V.Ya.
Model simulation of the natural and anthropogenic effects on the variability of the gas composition and temperature in the atmosphere
25. Yu-jun QIU, Sheng-jie NIU, Mu-ning CHENG
Preliminary study on the relationship between dust event and atmosphere visibility variance

Session 1.3 (SCERT Seminar Hall)
1. Bart A.A., Belikov D.A., Starchenko A.V., Fazliev A.Z.
Information-computational system for the study of homogeneous boundary layer over Tomsk
2. Boichenko I.V., Kataev M.Yu., Petrov A.I.
Distributed informational system for lidar data processing
3. Bun A., Matthias J.
Russia and Ukraine as potential participants in greenhouse gas market: tendencies and prognosis
4. Dyakonov I.
Informational analytic system GeoMETA
5. Glagolev V., Kogan R.
Elaboration of modules for territorial pollutions spatial analysis on basis of geoinformation systems overlay operations
6. Kataev M.Yu., Chugunov A.G.
Computing features of the slope/aspect ratio according to base SRTM
7. Boichenko I.V., Kataev M.Yu., Sykhanov A.Ya., Chugunov A.G.
Geophysical computing system for solving of the tasks of the atmosphere monitoring from space
8. Kataev M.Yu., Boichenko I.V., Kataev S.G., Kuskov A.I.
Spatial interpolation of the meteoparameters according to the NCEP database
9. Mirkarimova B.M.
Development of the complex model of ecological system dynamics for Northeast Caspian Sea
10. Okladnikov I.G., Titov A.G., Melnikova V.N., Shulgina T.M.

Web-system for processing and visualization of meteorological and climatic data
11. Fazliev A.Z., Kozodoev A.V., Privezentsev A.I.
Information resources formation for the atmospheric spectroscopy
12. Rykova V.V.
Electronic resources of SPSTL SB RAS' own generation as the information base of atmospheric and environmental researches
13. Pyankov S.V., Shavnina Yu.N., Shvalev V.N.
Website «The dangerous natural phenomena of the Perm krai»
14. Shmirko K.A., Salyuk P.A., Bulanov A.V., Glazkov M.N.
Interactive system for data analysis (ISAD) for FEB RAS CCU in laser researches (LR) of environment
15. Timofeev A.A.
Global aerological datasets descriptive information presentation on the Internet
16. Titov A.G., Belikov D.A.
Web-system for Tomsk air quality assessment based on the pollution transport and transformation mathematical model
17. Toropov P.A., Tkachuk S.A.
Regional estimation of quality of some archives of the climatic information
18. Tusseyeva N, Dedova T, Abdrahmanova N.
Development of GIS technologies of dust storms monitoring and modeling

July 23, Monday
2. Workshop on Climate Change Assessment and Modeling Chairs Prof. M. Kabanov and Prof. V. Lykosov (Russia) (IMCES Conference Hall)
9:00-17:45 Session 2.1. Physics of Climate (Chair Vasily Lykosov)
Invited lecture
1. Endejan M.
Global Water System– a multi-disciplinary view
Invited reports
1. Lykosov V.N.
Mathematical modeling climate and climate change: regional aspects
2. Tolstykh A.M.
Modeling of regional atmosphere circulation with the help of a high-resolution hydrodynamic model
3. Krupchatnikoff V.N.
Transport and mixing in two-dimension atmospheric flow on beta- plane
4. Sterin A.M.
Estimating trends in climate time series: effect of statistical techniques on the resultant conclusions
5. KuzinV.I.
To the question of the ocean climate study
Oral reports
1. Rubinstein K., Egorova E.
Experiments with special surface characteristics of a megapolis area by the model of General Circulation of Atmosphere Hydrometcentre of Russia
2. Chavro A.I., Nogotkov I.V., Dmitriev E.V.
Statistical model for reconstructing small-scale fields of extreme temperatures in Moscow region
3. Dmitriev E.V.
Reconstruction of the mean European temperature over the past 600 years using the proxy data
4. Kostrykin S.V.
Choosing and implementation of the new advection scheme in the wave model WAM-4
5. Esau I.
Convective feedback in climate change
6. Dmitriev E.V., Churilova T.Y., Chami M., Khomenko G., Berseneva G.A., Martynov O.V., Shybanov E.B., Lee M. E-G., Korotaev G.K.
Parameterization of the light absorption by components of sea water in the Black

sea coastal zone
7. Protasov A.V.
Method of computation of spatio-temporal functions of primary factors on the basis of climatic ensembles of realizations of fields of meteorological elements
8. Salyuk P.A., Akmaykin D.A., Shmirko K.A., Lastovskaya I.A.
Phytoplankton communities in Earth's climate system
9. Platov G.A., Golubeva E.N.
Numerical modeling of the Arctic Ocean and Siberian shelf: problems and approaches
10. Stepanenko V.M., Mikushin D.N.
Numerical modeling of mezoscale dynamics of atmosphere above hydrologically heterogeneous surface
11. Krupchatnikoff V., Borovko I.
Modelling of coupling of the troposphere and stratosphere circulation

17:45- 19:45 Poster presentations (IMCES Conference Hall)
Session 2.1
1. Bogoslovskii N., Shlyaeva A., Tolstykh M.
Data assimilation of surface and soil variables in the global semi-Lagrangian NWP model
2. Fadeev R.Yu., Tolstykh M.A.
Two-dimensional non-hydrostatic dynamical core for the model of atmosphere
3. Grankina T.B.
Mathematical model of the ice-thermal regime of water body
4. Kochetkov E.L.
Numerical modelling of 3-dimensional channel flows with a free surface
5. Nogotkov I.V., Dmitriev E.V.
On the influence of missing values in observational data on accuracy and stability of the retrieval of regional meteorological fields
6. Novikova I.V.
Improvement of dynamic downscaling of wind and sea level pressure forecasts over the Baltic sea region using MM5 model
7. Palamarchuk Y., Ivanov S.
Systematic errors of parameterization schemes in the MM5 model
8. Rodimova O.B., Bogdanova Yu.V.
On thermodynamic behaviour of the coefficients of expansion of the radiation characteristics into series of exponents
9. Scherbakov A.V., Malakhova V.V.
Simulation the global ocean response to warming and cooling the surface waters with time scale of the few thousand years
10. Shlyaeva A., Tolstykh M.A.
Finite-element scheme for the vertical discretization of the global semi-lagrangian forecast model

Session 2.2
1. Dyukarev E.A., Artyomova E.P.
Estimation of Western Siberia climate variability on different time scales
2. Badashova L.F., Murkina E.A., Khokhlova A.V.
Long-term variation of sea ice extent in Arctic Seas on satellite observations
3. Kharyutkina E.V., Loginov S.V.
Estimates of energetic balance components of cyclones on the Siberian region by reanalysis data NCEP/NCAR
4. Martynova Yu.V.
Estimation of influence of a variation of vegetation of northern hemisphere on dynamics of temperature and humidity during 21 century
5. Shishlov V.I.
Features and tendencies of climatic changes in northern regions of Eurasia
6. Zoloeva M., Rubinstein K.

Variability of the physical properties of the snow cover for general circulation model of atmosphere validation
7. Zolotov S.Yu., Ippolitov I.I., Loginov S.V.
Forecast estimations of change of temperature of ground air with use of a method of wavelet-transformation

July 24, Tuesday
9:00-12:00 Session 2.2. Regional Climate Change Assessment (Chair Michael Kabanov)
Invited reports
1. Polishchuk Yu.M., Dneprovskaya V.P., Bryksina N.A.
Study of warming influence on permafrost state in Western Siberia using space images
2. Begni G., Makhtar-Schuster M., Escadafal R., Fontannaz D.
European DesertNet (E-DN): a new structure to strengthen research about desertification in Europe, including a wider and wiser use of remote sensing technology
3. Azizov A.A., Petrov Yu.V., Skripnikova L.E.
Approaches to climate change evaluating in cities of Uzbekistan
4. Penenko V.V., Tsvetova E.A.
Generalized quantitative description of climate dynamics for goals of environmental design and ecological risk assessment
Oral reports
1. Arkhipova I.V.
Assessment of Altai Krai meteorological vulnerability
2. Podnebesnykh N.V., Ippolitov I.I., Gorbatenko V.P.
Dynamic characteristics of cyclonic and anticyclonic activity above the Western Siberia

3. Workshop on Siberia Integrated Regional Study (SIRS) chaired by Dr. G. Begni (France), Prof. E. Gordov (Russia), Prof. M. Heimann (Germany), RAS corr. member M. Kabanov (Russia), RAS corr. member V. Lykosov (Russia), Prof. A. Shvidenko (Austria) and Ac. E. Vaganov (Russia) (IMCES Conference Hall)
12:00-15:30 Session 3.1. Development of SIRS information-computational infrastructure (Chair Evgeny Gordov)
Invited reports
1. Gordov E.P.
State of the art of SIRS
2. Gordov E.P., Fedotov A.M., Kolchanov N.A.
Development of Information-computational SIRS Infrastructure: SB RAS input
3. Begni G., Ultre-Guerard P., Leroy M.
Earth observation French space policy and its potential use in the SIRS project
Oral reports
1. Melnikov Yu.B.
Approaches to shaping the mechanism of the a priori determination non-account factors of the risk
2. Pyanova E. A., Faleychik A. A., Faleychik L. M.
Estimation of region of artificial reservoir effect on microclimate using a mathematical model and GIS technologies

15:30-18:30 Session 3.2. Siberia Environment Dynamics in context of global and Northern Eurasia changes (Chairs Michael Kabanov and Alexander Onuchin)
Invited lecture
1. Shvidenko A.Z., Gordov E.P., Kabanov M.V., Lykosov V.N., Onuchin A.A., Vaganov E.A.
Global change in Siberia: realities and expectations
Invited reports
1. Heimann M.

Monitoring biogeochemically driven atmospheric greenhouse gases over Eurasia
2. Kabanov M.V., Krutikov V.A., Ippolitov I.I.
Dynamics of natural processes at Great Vasyugan Bog
Oral reports
1. Dyukarev E.A., Golovatskaya E.A., Veretennikova E.E.
Modeling of carbon balance of southern taiga peatland ecosystems at various scenarios of climate change
2. Preis Yu. I., Antropova N.A., Sharapova N.A.
Regional features of the mire formation in the forest zone of Western Siberia

18:30-19:30 Poster presentations (IMCES Conference Hall)
Session 3.1
1. Melnikov B.N., Melnikov Yu.B.
Model of the firm development territory as base of the forecasting and analysis of the manifestation risk
2. Murkina E.A., Badashova L.F., Khokhlova A.V.
Long-term variations of snow cover extent and duration over the territory of Western Siberia on satellite observations
3. Noskova N.A., Peremitina T.O., Polishchuk Yu.M.
Questions of deciphering multispectral based on the method of principal component analysis

Session 3.2
1. Dneprovskaya V.P.
Analysis of geobotanic structure of West-Siberian taiga zone in depend of climatic state indices
2. Dubrovskaya O., Klimova E.
Description of distribution of smoke aerosols from forest fires in territory of Siberia
3. Sorokovenko O., Preis Yu. I.
Stratigraphy and dynamics ridge-hollow complexes of Iksinskoe bog (Southern taiga of Western Siberia)
4. Yurkevich N.
Pit lakes: features of composition and ecological risk

July 25, Wednesday
9:30- 13:00 4. Workshop on Man-made Environmental Risks in Siberia
Chairs Prof. A. Baklanov (Denmark) and Prof. E. Gordov (Russia) (IMCES Conference Hall)
Invited review papers
1.Baklanov A., Gordov E.
Overview of man-made environmental risks in Siberia: major finding and perspectives
2. Penenko V., Baklanov A.
Atmospheric pollution and risks (thematic group results/findings)
3. Heimann M.
Biogeochemical interactions and climate change feedbacks in the permafrost regions (thematic group results/findings)
4. Lykosov V.
Climate/Global change (thematic group results/findings)
5. Kabanov M., Shvidenko A.
Terrestrial ecosystems and hydrology (thematic group results/findings)
6. Gordov E., Zakarin E.
Information systems, integration and synthesis (thematic group results/findings):
Oral reports
1. Mahura A., Baklanov A., Rigina O., Sorensen Je.-H., Bergman R., Golikov V., Amosov P., Segerståhl B., Sickel M., Bergan T., Nielsen S.
Evaluation of doses, risks, vulnerabilities, and consequences for population and environment employing GIS analysis
2. Penenko V.V.

Atmospheric quality: from risk assessment to sustainable development
Short oral reports
1. Svetlov A., Baklanov A., Mahura A., Sorensen Je.-H.
Influence of long-term continuous anthropogenic emissions from Russian Arctic sources on Siberian and Ural cities environment
2. Tridvornov A.A.
Estimation of man-caused and complex risks of emergencies for Krasnoyarsk Krai territory

13:00-13-30 Conference closure
15:00-17:00 Enviro-RISKS project management meeting (SCERT Seminar Hall)

List of CITES-2007 participants

Siberian Center for Environmental Research and Training, Tomsk, Russia (10/3, Akademichesky av., Tomsk 634055, Russia, tel. +7-3822-492187, fax +7-3822-492537)

1. **Gordov Evgueni P.** gordov@scert.ru
2. **Gordova Yulia E.** office@scert.ru
3. **Okladnikov Igor G.** oig@scert.ru
4. **Titov Alexander G.** titov@scert.ru

Tomsk State University, Tomsk, Russia (36, Lenina av., Tomsk 634050, Russia, tel. +7-3822-529553, fax +7-3822-529740)

5. **Bart Aleksey A.** bart@math.tsu.ru
6. **Belikov Dmitry A.** belikov@iao.ru, dimon@math.tsu.ru
7. **Kharyutkina Elena V.** meteo@ggf.tsu.ru
8. **Melnikova Vera N.** melnikova@mail.ru
9. **Nuterman Roman B.** nutrik@gmail.com
10. **Panasenko Elena A.** ea403@mail.ru
11. **Shulgina Tamara M.** shulgina@mail.ru
12. **Starchenko Alexander V.** starch@math.tsu.ru
13. **Voitsekhovskaya Olga K.** vok@elefot.tsu.ru
14. **Vrazhnov Denis A.** vrazhnov@math.tsu.ru

Institute of Atmospheric Optics SB RAS, Tomsk, Russia (1, Akademichesky av., Tomsk 634055, Russia, tel. +7-3822-492-277, fax +7-3822-492086)

15. **Akhlyostin Aleksey Yu.** faz@iao.ru
16. **Fazliev Alexander Z.** faz@iao.ru
17. **Lavrentiev Nikolai A.** faz@iao.ru
18. **Privezentsev Aleksey I.** faz@iao.ru
19. **Rodimova Olga B.** rod@iao.ru
20. **Zuev Vladimir V.** ref_zuev@iao.ru

Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Russia (10/3, Akademichesky av., Tomsk 634055, Russia, tel. +7-3822-492265, fax +7-3822-491950)

21. **Atyomova Elena P.** egor@imces.ru
22. **Dyukarev Egor A.** egor@imces.ru
23. **Genina Elena Yu.** genina@imces.ru
24. **Golovatskaya Evgueniya A.** golovatskaya@imces.ru
25. **Ippolitov Ivan I.** ceo@imces.ru
26. **Kabanov Mikhail V.** kabanov@imces.ru

27. **Krutikov Vladimir A.** krutikov@imces.ru
28. **Loginov Sergey V.** ceo@imces.ru
29. **Lyapina Elena E.** eeldv@mail.ru
30. **Podnebesnykh Nataliya V.** podnebesnykhnv@inbox.ru
31. **Preis Yulia I.** sorokovenko@rambler.ru
32. **Shishlov Victor I.** egor@imces.ru
33. **Sorokovenko O.** sorokovenko@rambler.ru
34. **Tikhomirov Alexander A.** tikhomirov@imces.ru
35. **Zolotov Sergey Yu.** zolotov@asu.tusur.ru
36. **Yablokova Olga V.** post@imces.ru

Institute of Petroleum Chemistry SB RAS, Tomsk, Russia (3, Akademichesky av., 634021, Tomsk, Russia , Tel.: (3822) 491457 FAX: (3822) 491457)

37. **Dneprovskaya Victoria P.** vpi@ipc.tsc.ru
38. **Noskova Natalia A.** nna@ipc.tsc.ru
39. **Peremitina Tatyana O.** pto@ipc.tsc.ru
40. **Polishtchouk Yuri M.** yuri@ipc.tsc.ru

Tomsk State University of Control Systems and Radioelectronics, Tomsk, Russia (40, Lenina av., Tomsk, Russia, 634050, Tel.: (3822) 41-34-29)

41. **Boichenko I.V.** kmy@asu.tusur.ru
42. **Kataev Mikhail Yu.** kmy@asu.tusur.ru

Tomsk Polytechnic University, Tomsk, Russia (30, Lenina av., Tomsk, Russia, 634050, Tel: (3822) 911-477, FAX: (3822) 41-89-10)

43. **Talovskaya Anna V.** talovskaj@yandex.ru

Research Institute of Applied Mathematics and Mechanics, Tomsk, Russia (634050, Tomsk, Lenin av., 36, Tel.: +7 (3822) 529-562, Fax: +7 (3822) 529-547)

44. **Baranovsky Nikolay V.** firedanger@narod.ru

Institute of Oil and Gas Geology, Tomsk, Russia (3, Akademichesky av., Tomsk 634055, Russia, Tel./FAX: (3822) 492-163)

45. **Shvartsev Stepan L.** tomsk@igng.tsc.ru

Moscow Institute of Physics and Technologies, Dolgoprudny, Russia (141700, Moscow region, Dolgoprudny, Istitutsky lane, Tel:(495) 408 5355 FAX: (495) 408 5233)

46. **Fadeev Rostislav Yu.** tolstykh@inm.ras.ru
47. **Kholodov Alexander S.** xolod@crec.mipt.ru
48. **Nogotkov Ilya V.** ilya@4ka.mipt.ru

Institute of Atmospheric Physics RAS, Moscow, Russia (3, Pyzhevsky per, Moscow, 119017, Tel./FAX: (495) 953 1652)

49. **Klyatskin Valery I.** klyatskin@yandex.ru

Space Research Institute, Moscow, Russia (117997, Moscow, 84/32 Profsoyuznaya ul., Tel.: +7(495) 333-52-12, FAX +7(495) 913-30-40)

50. **Kudashev Efim B.** kudashev@iki.rssi.ru

Institute of Numerical Mathematics RAS, Moscow, Russia (119991 Moscow, GSP-1, 8, Gubkina ul., Tel.:. 938-17-69, 938-3786, FAX: 938-18-21)

51. **Aloyan Artash E.** aloyan@inm.ras.ru
52. **Bogoslovskii Nikolay N.** dorgun@mail.ru
53. **Chavro Anatoly I.** chavro@inm.ras.ru
54. **Dmitriev Egor V.** yegor@inm.ras.ru
55. **Kostrykin Sergey V.** kostr@inm.ras.ru
56. **Lykossov Vasily N.** lykossov@yandex.ru
57. **Tolstykh Mikhail A.** tolstykh@inm.ras.ru
58. **Ushakov Konstantin V.** ushakovkv@mail.ru

Hydrometeorological Research Center of Russia, Moscow, Russia (11-13, B. Predtechensky per., Moscow, 123242, Russia, tel.: (7-095) 252-34-48, fax: (7-095) 255-15-82)

59. **Gritsan Elena V.** gritsan@gmail.com
60. **Ignatov Roman Yu.** ignatovroman@mail.ru
61. **Konstantinov Pavel I.** kostadini@mail.ru
62. **Novikova Irina V.** inovikova78@mail.ru
63. **Rubinstein Konstantin G.** k_rubin@mecom.ru
64. **Shlyaeva Anna V.** shlyaeva@gmail.com
65. **Zoloeva Marina A.** mzoloeva@yandex.ru

Nuclear Safety Institute RAS, Moscow, Russia (52, B.Tul'skaya str., Moscow 115191)

66. **Semenov Vladimir N.** sem@ibrae.ac.ru

Moscow State University, Moscow, Russia (GSP-2, Leninskie Gory, Moscow, 119992, Russia, Tel.: (495) 939-10-00, FAX: (495) 939-01-26)

67. **Kochetkov Evgeny L.** eugkoch_su@mail.ru
68. **Stepanenko Victor M.** stepanen@srcc.msu.ru
69. **Voevodin Vladimir V.** voevodin@parallel.ru

Computational Center RAS, Moscow, Russia (40, Vavilova str., Moscow, Russia, Tel.: +7((926)228-52-99)

70. **Serebryakov Vladimir A.** serebr@ccas.ru
71. **Dyakonov Ilya** nypko@mail.ru

Russian State Hydrometeorological University, Saint-Petersburg, Russia (98, Malookhtinsky prospect , Russia, Saint-Petersburg, Tel.: (812) 444-41-63, Fax: (812) 444-60-90)

72. **Smyshlyaev Sergey P.** smyshl@rshu.ru

Russian Research Institute for Hydrometeorological Information – World Data Center (RIHMI-WDC), Obninsk, Russia (6, Koroleva str., 249035, Obninsk, Kaluga region, Tel: (48439) 7-41-81, (495) 255-21-94 FAX: (495) 255-22-25)

73. **Murkina Ekaterina A.** r620@meteo.ru
74. **Sterin Alexander M.** sterin@meteo.ru
75. **Timofeev Arseny A.** arsenit@yandex.ru

Obninsk State Technical University of Nuclear Energy, Obninsk, Russia

76. **Vyazilov Evgeny D.** vjaz@meteo.ru

Institute of Complex Analysis of Regional Problems FEB RAS, Birobidzhan, Russia (4, Sholom-Aleykhema str., Birobidzhan 679000, Tel.: 42622-20539 FAX: 42622-61362)

77. **Glagolev Vladimir A.** carpi@yandex.ru

V.I. Il'ichev Pacific Oceanological Institute FEB RAS, Vladivostok, Russia (43, Baltiyskaya str., 690041, Владивосток, Tel: (4232) 312579, FAX: (4232) 312573)

---

78. **Salyuk Pavel A.** psalyuk@mail.ru
79. **Shmirko Konstantin A.** shmirko.konstantin@gmail.com

Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Russia (6, Akademika Lavrentjeva av., Novosibirsk, 630090, Russia, Tel. (+7 383)330-83-53, Fax (+7 383)330-87-83, 330-66-87)

80. **Krupchatnikoff Vladimir N.** vkrup@ommfao1.sscc.ru
81. **Kuzin Victor I.** kuzin@sscc.ru
82. **Kuznetsov Yuri I.** ykuznetsov@mail.nsk.ru
83. **Penenko Aleksey V.** aleks@ommgp.sscc.ru
84. **Penenko Vladimir V.** penenko@sscc.ru
85. **Platov Guennady A.** plat@ommfao.sscc.ru
86. **Protasov Alexander V.** sasha@ommfao.sscc.ru
87. **Pyanova Elza A.** pianova@ngs.ru
88. **Raputa Vladimir F.** raputa@sscc.ru
89. **Yudin Mikhail S.** yudin@ommfao.sscc.ru

Institute of Computational Technologies SB RAS, Novosibirsk, Russia (6, Acad. Lavrentjev Ave., 630090, Novosibirsk, Phone.: +7(383) 330-61-50 Fax: +7(383) 330-63-42)

90. **Kilanova Nataliya V.** kilanova@mail.ru
91. **Klimova Ekaterina G.** klimova@ict.nsc.ru

Institute for Water and Environmental Problems (Novosibirsk Department), Novosibirsk, Russia (6, Morskoy av., Novosibirsk 630090, Tel.: +7(3832)302005, FAX: +7(3832)302005)

92. **Grankina Tatiana B.** grankina@gmail.com

Institute of Theoretical and Applied Mechanics SB RAS, Novosibirsk, Russia (4/1, Institutskaya str., Novosibirsk, 630090, Tel: (383) 330-42-68, Fax: (383) 330-72-68)

93. **Kurbatskii Albert F.** kurbat@nsu.ru

Scientific-Technological Library SB RAS, Novosibirsk, Russia (15, Voskhod str., 630200, Novosibirsk, Tel.: +7(383) 266-18-60 Fax: +7(383) 266-25-85)

94. **Rykova Valentina V.** onbryk@spsl.nsc.ru

Department of Physical Problems, Buryat Science Center SB RAS, Ulan-Ude, Russia (Тел:8(3012)43 4664 Факс: (3012)433238)

95. **Dementeva** Ayuna **L.** adem80@mail.ru

Institute of the Northern Ecological Problems, Apatity, Russia (Apatity, Murmansk reg., Russia, Tel.: 81 555 79 745, Fax: 8 1 555 7 49 64)

96. **Svetlov Anton** svetlov@inep.ksc.ru

Institute of Computational Modeling SB RAS, Krasnoyarsk, Russia (Akademgorodok, 660036, Krasnoyarsk, Tel.: (3912) 432756, FAX: (3912) 907476)

97. **Tridvornov Alexander V.** tridvornov_alexander@yahoo.co.uk

Urals State Pedagogical University, Ekaterinburg, Russia (26, Kosmonavtov str., 620017, Ekaterinburg, Tel.: (343) 336-12-43, 235-76-43)

98. **Melnikov Yury B.** melnikov@k66.ru

Perm State University, Perm, Russia (15, Bukireva str., Perm' 614990, GSP, Tel.: +7 (342) 2396855, FAX: +7 (342) 2396852)

99. **Shavina Yulia N.** shavninaj@psu.ru

Birsk State Pedagogical Academy, Birsk, Russia (10, Internatsional'naya, Birsk 452453, Resp. Bashkortostan, +7(34714) 26490, FAX +7(34714) 26455)

100. **Khamidullin Ildar R.** ildar_kh_r@rambler.ru

KazGeoKosmos, Kazakhstan (34 A/8A, Manasa str., Almaty 050040, Tel: +7 (327) 2-44-51-15 FAx: 2-44-51-14)

101. **Gabbasova Nailya N.**
102. **Mirkarimova Bibigul M. bibigul@kgc.kz**
103. **Tusseeva Natalia V. nutt@kgc.kz**
104. **Zakarin Edige** A. **Zakarin@kgc.kz**

National University of Uzbekistan, Tashkent, Uzbekistan (S. Rakhimov district, Talabalar shaharchasi, Tashkent 700094, Tel.: +998 71 114-52-36, Fax: +998 71 144-73-12)

105. **Azizov Azamat A. azazizov@rambler.ru**

Scientific Research Hydrometeorological Institute, Tashkent, Uzbekistan (72, K. Mahksymov str. Tashkent, Uzbekistan, Tel.: 8 998 71 133 11 50, Fax: 8 998 71 133 11 50)

106. **Goryaeva Violetta S. NIGMI@ALBATROS.UZ**
107. **Rakhmatova Natella I. NIGMI@ALBATROS.UZ**
108. **Tolkacheva Galina A. tolkachevag@mail.ru**

Dnipropetrovs'k National University, Dnipropetrovs'k, Ukraine (13, Nauchnaya str., Dnepropetrovsk 49050, Tel.: +38(056)7765885, FAX: +38(056)7765833)

109. **Dubickaya Svetlana V. dubickaya@gmail.com**

National University "Kyiv-Mogyla Academy", Ukraine (2, Skovorody str., Kiev, Ukraine, Tel. : 80449756148)

---

110. **Nochvay Vladimir I. fhvortex@yahoo.com**

Hydrological and Meteorological Center for the Black and Azov Seas, Odessa, Ukraine (89, Frantsuzsky bulvar, Odessa 65009, Tel.: (80482) 63-42-60, FAX: (80482) 22-08-74)

111. **Palamarchuk Yulia O. odessa.pogoda@paco.net**

Odessa State Ecological University, Ukraine (15a, L'vovskaya str., Odessa, Tel.: 80667921914)

---

112. **Ivanova Elena V. zelvyazek@yandex.ru**

Lviv National Polytechnic University, Lviv, Ukraine (PO Box 5446, Lviv-31, 79031, Tel.: 380322231151, FAX: 380322922025)

113. **Bun Andrey Andr.Bun@gmail.com**

Danish Meteorological Institute, Denmark (Danish Meteorological Institute Lyngbyvej 100, DK-2100 Copenhagen, Denmark)

114. **Baklanov Alexander** alb@dmi.dk

Japan Agency for Marine-Earth Science and Technology, Japan (3173-25 Showa-machi, Kanazawa-ku, Yokohama 236-0001)

115. **Akimoto Hajime** akimoto@jamstec.go.jp
116. **Irie Hitoshi** irie@jamstec.go.jp
117. **Kanaya Yugo** yugo@yhc.att.ne.jp
118. **Takigawa Masayuki** mtakigawa@mac.com

CNES, France (CNES – Bpi 2912, 18 Avenue Edouard Belin 31401 – TOULOUSE CEDEX 9)

119. **Begni Gerard** gerard.begni@cnes.fr

Nansen Environmental abs Remote Sensing Center, Norway (Thormohlensgt. 47, 5006 Bergen, Norway, Tel. +47 55205876, FAX +47 55205801)

120. **Esau Igor** igore@nersc.no

Max-Plank Institute for Biogeochemistry, Germany (Max-Planck-Institute for Biogeochemistry,, Beutenberg Campus, Hans-Knoell-Straße 10, D-07745 Jena, Tel. +49-3641-57-6350/6301, Fax.: +49-3641-57-7300)

121. **Heimann Martin** Martin.heimann@bgc-jena.mpg.de

International Institute for Applied Systems Analysis, Laxenburg, Austria (Schlossplatz 1, A-2361 Laxenburg, Austria, Tel: +43-2236-807-497, Fax: +43-2236-807-599 or 71313)

122. **Shvidenko Anatoly** shvidenk@iiasa.ac.at

Workshop on "Thematic educational resources providing necessary foundation to study interrelations between atmospheric composition, anthropogenic load and Climate Change in Northern Asia and their IT-based implementation/usage"

Frontier Research Center for Global Change /JAMSTEC, Yokohama, Japan
February 7-8, 2008

Objectives:
To discuss thematic educational resources prepared by the Project participants devoted to thematic basic and applied topics; and
To elaborate an approach for effective usage of the prepared educational resources on the base of IT tools implemented at the project web site.

Agenda for Yokohama Workshop:

February 7 (Thursday)

Morning session 9:00 – 12:30 (20 min per presentation with 10 min discussion)

9:00-9:30 Welcome and presentation of FRCGC
Dr. Y. Kanaya (on behalf of Hajime Akimoto)

9:30-9:40 Overview of tasks
Professor E. Gordov

9:40-10:10 Thematic educational resources on "Atmospheric Composition"
Part 1: Atmospheric Photochemistry
Dr.Y. Kanaya (FRCGC/JAMSTEC)

10:30-11:00 Thematic educational resources on "Atmospheric Composition"
Part 2: Air Quality Modeling
Dr. M. Takigawa (FRCGC/JAMSTEC)

11:00-11:30 Thematic educational resources on "Atmospheric Composition"
Part 3: Remote sensing for Air Quality Measurement
Dr. H. Irie (FRCGC/JAMSTEC)

11:30-12:00 Thematic educational resources on Regional Anthropogenic Load
Dr. L. Shardakova (Research Hydrometeorological Institute of the Republic of Uzbekistan, Tashkent)

Afternoon session 14:00 – 18:00 (20 min per presentation with 10 minute discussion)

14:00-14:30 Thematic educational resources on "Atmospheric Composition"
Part 0: Overview on Tropospheric Ozone Pollution
Prof. H. Akimoto (FRCGC/JAMSTEC)

14:30-15:00 Thematic educational resources on Web based information systems for Environmental Sciences and their usage in Siberia Integrated Regional Study Prof. E. Gordov (Siberian Center for Environmental Research and Training, Tomsk, Russia)

15:20-15:50 Thematic educational resources on GIS based information systems for Environmental Sciences
Prof. E. Zakarin (KazGeoCosmos, Almaty, Kazakhstan)

15:50-16:20 Thematic educational resources on GIS based information systems for description of pollution transport
Dr. B. Mirkarimova (KazGeoCosmos, Almaty, Kazakhstan)

16:20-16:50 Thematic educational resources on Climate Change in Northern Asia
Prof. V. Lykosov (RAS Institute for Numerical Mathematics, Moscow, Russia)
Prof. E. Gordov (Siberian Center for Environmental Research and Training, Tomsk, Russia)

16:50-17:20 IT tools implemented at the project site and their possible usage for education.
Dr. A. Titov (Siberian Center for Environmental Research and Training, Tomsk, Russia)

February 8 (Friday)

9:00-10:30 Wrap-up discussion Moderator; E. Gordov

Workshop closure H. Akimoto

11:00-12:00 Tour to FRCGC facilities (Earth Simulator and the Earth Science Museum)

List of the Workshop participants

Frontier Research Center for Global Change, Japan Agency for Marine-Earth Science and Technology, Japan (3173-25 Showa-machi, Kanazawa-ku, Yokohama 236-0001)

1. Akimoto Hajime akimoto@jamstec.go.jp
2. Irie Hitoshi irie@jamstec.go.jp
3. Kanaya Yugo yugo@yhc.att.ne.jp
4. Takigawa Masayuki mtakigawa@mac.com

Siberian Center for Environmental Research and Training, Tomsk, Russia (10/3, Akademichesky av., Tomsk 634055, Russia, tel. +7-3822-492187, fax +7-3822-492537)

5. Gordov Evgeny P. gordov@scert.ru
6. Titov Alexander G. titov@scert.ru

KazGeoKosmos, Kazakhstan (34 A/8A, Manasa str., Almaty 050040, Tel: +7 (327) 2-44-51-15 FAx: 2-44-51-14)

7. Mirkarimova Bibigul M. bibigul@kgc.kz
8. Zakarin Edige A. Zakarin@kgc.kz

Scientific Research Hydrometeorological Institute, Tashkent, Uzbekistan (72, K. Mahksymov str. Tashkent, Uzbekistan, Tel.: 8 998 71 133 11 50, Fax: 8 998 71 133 11 50)

9. **Shardakova Ljudmila lsh_wm@rambler.ru**

Appendix 3 Contence of special issue of the Journal of Computational Technologies with selected papers of CITES-2007 participants to be published in June 2008

1. Gordov E.P., Lykosov V.N. ICT for Environmental Sciences: Synthesis of Science and Education

2. Fazliev A.Z., Lavtent'ev N.A. Workflow management in web based information-computational systems.

3. Goryaeva V.S., Tolkacheva G.A. Role of atmospheric precipitations as ecological indicators in the monitoring of the environment conditions of the urbanized territories in the arid zones

4. Rakhmatova N., Tolkacheva G., Panteeva N., Starovatov O. Spatial-temporal variability of Total Column Ozone over Uzbekistan by using ground and satellite (TOMS) data

5. Talovskaya A.V., Yazikov E.G. Geochemical composition of dust aerosols within ground "Tomsky" in Tomsk region

6. Nuterman R.B., Starchenko A.V., Baklanov A.A. Development and evaluation of microscale meteorological model for air flow and pollution transport investigation in urban canopy

7. Penenko A.V. Pollutant sources identification with the use of variational technique

8. Balakay L., Tusseyeva N.
Analysis of distant carrying of pollutants from Kazakhstan territory

9. Khamidullin I.R., Bayanov I.M. Numerical modeling of dynamics of propane escape accompanied by burning in the atmospheric surface layer

10. Piyanova E.A.
Numerical study of water body effect on spreading passive admixture from the point source

12. Okladnikov I.G., Titov A.G., Melnikova V.N., Shulgina T.M.
Web-system for processing and visualization of meteorological and climatic data

13. Dmitriev E.V. Reconstruction of the mean European temperature over the past 600 years using the proxy data

14. Kostrykin S.V. Choosing and implementation of the new advection scheme in the wave model WAM-4

15. Esau I. Convective feedback in climate change

16. Stepanenko V.M., Mikushin D.N.
Numerical modeling of mezoscale dynamics of atmosphere above hydrologically heterogeneous Surface

17. Bogoslovskii N., Shlyaeva A., Tolstykh M.
Data assimilation of surface and soil variables in the global semi-Lagrangian NWP model

18. Nogotkov I.V., Dmitriev E.V.
On the influence of missing values in observational data on accuracy and stability of the retrieval of regional meteorological fields

20. Martynova Yu.V. Estimation of influence of a variation of vegetation of northern hemisphere on dynamics of temperature and humidity during 21 century

21. Dyukarev E.A., Golovatskaya E.A., Veretennikova E.E. Modeling of carbon balance of southern taiga peatland ecosystems at various scenarios of climate change

22. Murkina E.A., Badashova L.F., Khokhlova A.V. Long-term variations of snow cover extent and duration over the territory of Western Siberia on satellite observations

Young scientists directly supported by APN are printed in bold.

Funding sources outside the APN

Russian Ministry of Education and Science 500000 RUR
EC FP6 project ENVIROMIS-2 40000 Euro
EC FP6 project Enviro-RISKS 10000 Euro
SCERT own funding (in kind) 200000 RUR
With general support of the Russian national Committee for IGBP.

The final project report must follow the template outlined in this document.

The report is to be submitted to Linda Stevenson (lstevenson@apn-gcr.org) one month before the end of the term of the Contract in the following formats:

1. Soft Copy – 30 CD-ROMS, appropriately labeled and covered using the design and information on the cover page of the Report Template
2. Hard Copy – 2 bound copies appropriately labeled and covered using the design and information on the cover page of the Report Template

The reports should be sent by airmail to the address below:

APN Scientific Officer
APN Secretariat
IHD Centre Building, 5F
1-5-1 Wakinohama Kaigan Dori
Chuo-Ku, Kobe 651-0073 JAPAN