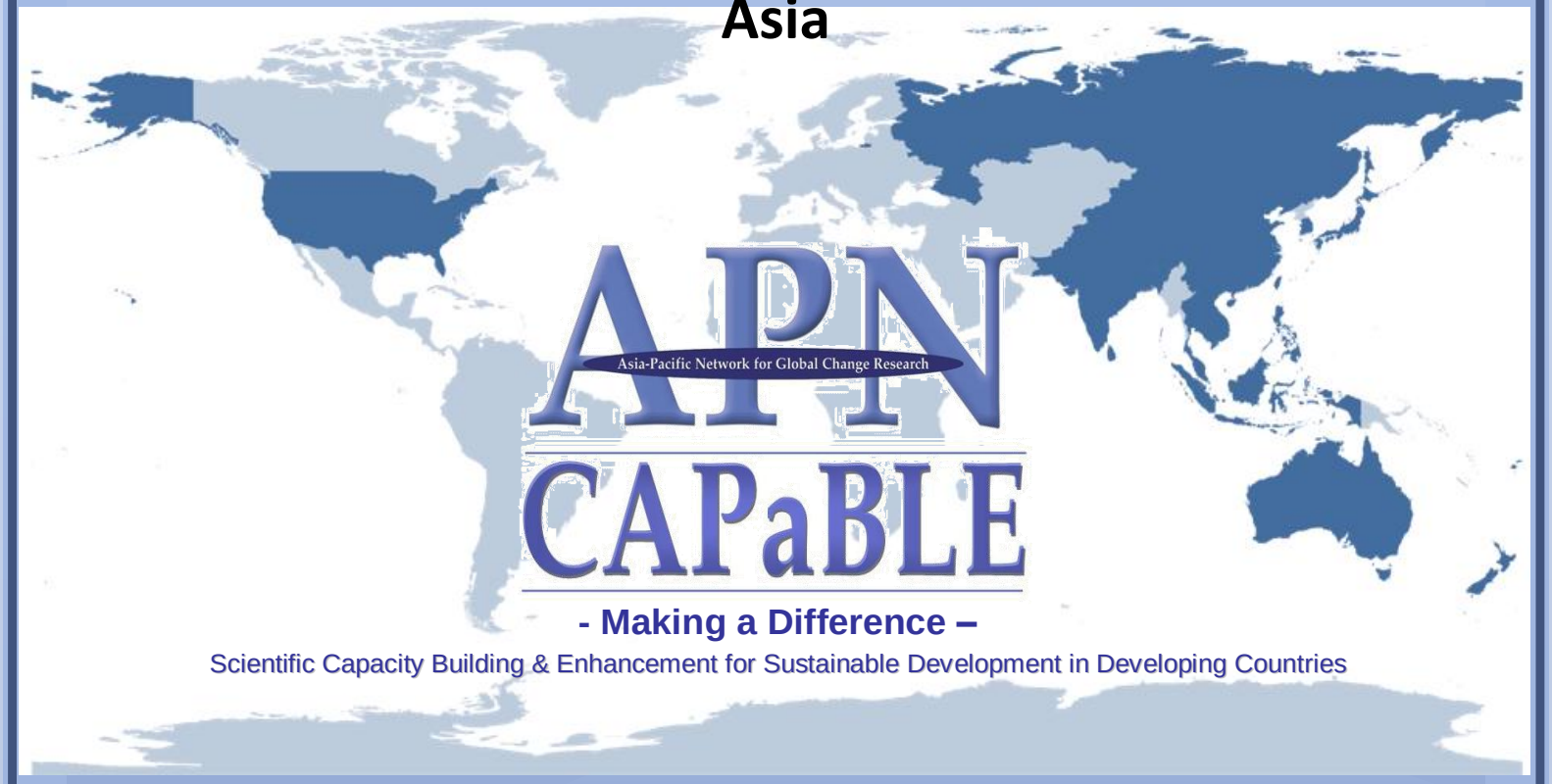
Capacity building to Study and Address Climate Change-induced Extremes in Northern Asia



The following collaborators worked on this project:

Prof. Evgeny GORDOV, Siberian Center for Environmental Research and Training/Institute of Monitoring of Climatic and Ecological Systems SB RAS, Russia, gordov@scert.ru

Dr. Ailikun, MAIRS IPO, China, aili@mairs-essp.org

Dr. P. Groisman, National Climatic Data Center, USA, Pasha.Groisman@noaa.gov

Capacity building to Study and Address Climate Change-induced Extremes in Northern Asia

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OVERVIEW OF PROJECT WORK AND OUTCOMES

Non-technical summary

The performed activity is aimed at involvement of regional research community, especially young scientists, into professional activity in the area of studies of climate change induced extremes with special emphasis on their manifestations in Northern Asia. To reach this objective, firstly the dedicated international APN Workshop “Climate change induced extremes in Northern Asia” with enlarged participation of young scientists from the targeted region was organized (Irkutsk, 2012). Major Workshop scientific and tutorial materials and key messages on potential role of climate change induced extremes in Northern Asia sustainable development are opened to young researchers and the regional decision makers via a specially developed and launched dedicated web site. Additional thematic material accessible at the site summarizes findings of the NEESPI/SIRS Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes" (Petrozavodsk, 2013). Both Workshops were embedded into the regular international events ENVIROMIS and CITES, which enlarge the number of young scientists and regional decision makers directly involved. Also, thematic educational tools aimed at young scientists’ education/training in the area of climate change including extremes analysis were developed and made accessible through the web site thus helping young scientists in development of professional skill.

Keywords

Climate change; climatic extremes; Northern Asia

Objectives

The main objectives of the project were:

1. To organize the international APN Workshop “Climate change induced extremes in Northern Asia” with enlarged participation of young scientists from the targeted region (Irkutsk, 2012);
2. To prepare on the basis of major Workshop scientific materials and key messages on potential role of climate change induced extremes in Northern Asia sustainable development information and education resources;
3. To organize the international NEESPI/SIRS Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes" (Petrozavodsk, 2013) and prepare on the basis of major Workshop scientific materials and key messages on potential role of climate change induced extremes in Northern Asia additional sustainable development information and education resources;
4. To develop and launch the dedicated project web site as a thematic information-educational system opening to young researchers and the regional decision makers which provide access to the prepared resources;
5. To develop and make accessible through the web site thematic educational tools aimed at young scientists’ education/training in the area of regional climate change induced extremes analysis thus helping young scientists in development of professional skill.

Amount received and number years supported

The Grant awarded to this project was:
US$ 40,000 for Year 1:

Activity undertaken

Firstly, the international workshop MAIRS/NEESPI/SIRS APN Workshop “Climate change induced extremes in Northern Asia”, 27 June-02 July 2012, Irkutsk, Russia with enlarged participation of young scientists from the targeted region was organized. It was devoted to different aspects of climate change induced extremes in Northern Asia. The Workshop was held within the framework of an educational event ENVIROMIS-2012 (24 June-02 July, 2012). This full format multidisciplinary

Conference (http://www.scert.ru/en/conferences/ENVIROMIS-2012/) comprised elements of Early Career Scientists School was devoted to the state-of-the-art and usage of modern environmental observation techniques, computational and information technologies for assessment, modeling and mitigation of Northern Eurasia environment variations under natural and anthropogenic pressures including those caused by the Global Climate Change. As usual, a number of regional decision makers participated in the ENVIROMIS event, which allowed us to provide them with knowledge about the most dangerous consequences of climate change in Northern Asia.

On the second step thematic educational materials on regionally important climate change induced extremes were prepared by the key APN Workshop participants selected by the ENVIROMIS Program Committee to deliver to young scientists thematic lectures to the young scientists. The first version was published in the ENVIROMIS Conference Proceedings and relevant presentations were prepared for online usage via the project web site (http://project.enviromis.scert.ru/Capacity/) . It was developed, launched and supported in operation as an information-educational system aimed at facilitation of young scientists' education/training in this domain thus involving regional research community into professional activity as well as attracting attention of local and regional population and decision/policy makers to these important for well being issues. To give the Project a vision, the site was embedded into the ENVIROMIS Network portal (http://enviromis.scert.ru/), which is a special information-computational system offering free Internet access for professionals, students and general public to thematic and general information resources gathered by SCERT in the course of carrying out several APN and EU projects in the area of Environmental Sciences.
Also, the next organized by SCERT event CITES-2013, Petrozavodsk, Russia, 25 August-5 September 2013, (http://www.scert.ru/en/conferences/Cites2013/) was used to get additional thematic information resources to enlarge those accessible at the site. Within the framework of the Conference a workshop on Northern Eurasia Earth System Partnership Initiative (NEESPI) and its mega-project on Siberia Integrated Regional Study (SIRS) as a part of ESSP, regional activity aimed at study global-regional linkages in climate dynamics and determination of measures to secure regional sustainable development was organized. Also during the Conference several open meetings of large scale international projects aimed at investigations of Northern Asia environment took place. After the Workshop and Conference, relevant thematic information and educational materials were prepared and made accessible via the site.

Specialized thematic educational tools aimed at young scientists' education/training in area of regional climate change induced extremes analysis were developed and made accessible through the web site (http://project.enviromis.scert.ru/Capacity/tools/) thus helping young scientists in development of professional skill. Currently the online educational course "Analysis of climate extreme indices on the regional scale" is opened. It includes basic thematic background (description of climate extreme indices defined by the Expert Team on Climate Change Detection and Indices (ETCCDI), of general methodology and of data analysis process) and sets of practical computational tasks aimed at analysis of climate extremes for specific territory. The tasks are aimed at studying extreme characteristics of surface temperature and precipitation on the regional scale and investigating the impacts of these changes on ecosystems and socio-economical sphere. All extreme indices and linear trend coefficients are calculated using web-GIS information-computational platform Climate (http://climate.scert.ru/) developed to support collaborative multidisciplinary investigations of regional climatic changes and their impacts. The platform includes dedicated modules providing large georeferenced datasets processing and relevant analysis (Gordov et al., 2012, Gordov et al., 2013). The online course provides users with knowledge on the techniques for climate extreme analysis and improves his/her understanding of meteorological processes responsible for observed climatic extremes on the regional scale.

Results

Participation of young scientists in these meetings gave them firsthand experience in the climate

change induced extremes and their consequences. The dedicated bilingual (English and Russian) web site containing thematic lectures and invited papers presentations as well as basic thematic information on climate change form a powerful instrument for young scientists' training and a platform for dissemination of important environmental information to local population and decision makers, thus growing their concern with important global change issues.
Total number of Workshops' participants is 154, among them 50 young scientists. Thirteen participants had been supported by APN. Among them 5 young scientists and 10 lecturers from APN countries.

Relevance to the APN Goals, Science Agenda and to Policy Processes

The output of the project contributes directly to the APN Science Agenda, capacity building activities and sustainable development in the targeted region. In particular, the Workshop has promoted the generation and transfer of new findings and methodologies in area of climate change induced extremes, which helps to identify and assist in the career development of promising young scientists in the region and their involvement with APN and the community of global change scientists represented at the ENVIROMIS and CITES events. The young scientists have joined the overall network of scientists interested in different aspects of global change in the Northern Asia region.

All the described above activities are directly related to the APN's Third Strategic Plan (2010-2015) and make valuable input to APN's Science Agenda and to Policy Processes.

Self evaluation

All Partners consider the Project as quite successful and useful activity providing the targeted audience with new knowledge about climate change induced extremes and tools to apply this knowledge to specific cases.

Potential for further work

Cooperation between American, Chinese and Russian researchers working in climate change area as well as cooperation between MAIRS, NEESPI and SIRS pave the way to future cooperative activities. First steps in this direction will be discussed during the MAIRS Open Science Conference 2014 "Future Earth in Asia", April 7-10, 2014, Beijing, China at the Session "Future Northern Asia" whose conveners are Prof. Gordov and Dr. Groisman.

Publications

1. Proceedings of the MAIRS/NEESPI/SIRS APN Workshop "Climate change induced extremes in Northern Asia", 27 June-02 July 2012, Irkutsk, Russia, CNTI Printing House, 2012, Tomsk, 150 pp.
2. Proceedings of the International Conference on Computational Information Technologies for Environmental Sciences, 25 August-5 September 2013, Petrozavodsk, Russia, CNTI Printing House, 2013, Tomsk, 160 pp.
3. Gordov, E.P., P.Ya. Groisman, and Sh. Maksyutov, 2013: Current Status and Future Earth System Studies in Northern Eurasia. EOS (in press).

References

Gordov E.P., Okladnikov I.G., Titov A.G., Bogomolov V.Yu., Shulgina T.M., Genina E.Yu. Geo-information system for investigation of regional climatic changes and first results obtained// Atmospheric and Oceanic Optics, 2012, V.25, No. 2, pp.137-143

Gordov E.P., Lykosov V.N., Krupchatnikov V.N., Okladnikov I.G., Titov A.G., Shulgina T.M. Computational-information technologies for monitoring and modeling climate changes and their consequences / Novosibirsk: Nauka Publishing House, 2013, 199 pp.

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Additionally to the APN support, valuable support of this project obtained from NEESPI, RFBR, SCERT, START, WMO. Input of numerous IMCES SB RAS and INM RAS resource persons is acknowledged.

Preface

Due to changes, the probability of extreme weather events (hot and cold spells, extreme rainfalls and prolonged dry spells) in Northern Asia is becoming an important factor for the region well being and for global change manifestations understanding. Targeted activity aimed at involvement of regional research and decision making community, especially young scientists, into activity in this area is described. It comprises organization of thematic Workshops; preparation of relevant information and educational resources; and development of a dedicated web site comprised those and thematic online educational tools aimed at young scientists' education/training in the area of climate change induced extremes analysis.

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1.0 Introduction

Contemporary surface air temperature changes in Northern Asia (north of 40°N) are among the largest in the world comprising more than 2°C (winter, spring and autumn) during the past 130 years (period of instrumental records). In the summer season, observations show that temperature changes manifested themselves only in the past 30 years but also were quite significant (about 1°C in the last two decades). In a fragile environment when approximately half of the region suffers from heat deficit and the second half suffers from water deficit; when slight changes in the state of the permafrost may (and have already been observed) impact regional infrastructure, land cover composition, and regional and global carbon budget, a thorough assessment of all aspects of environmental changes is warranted. The most dangerous among these changes are the changes in the probability of extreme weather events such as hot and cold spells, and also extreme rainfall and prolonged dry spells (droughts). Observations for the last several decades report that the changes in the frequency of these events have already occurred with some of these changes having a vivid anthropogenic component, (e.g. human-induced forest fires, land use changes, and changes in water management and industrial development) .

The described activity was aimed mainly at involvement of regional research community, especially young scientists, into professional activity in area of study of climate change manifestations and tendencies in Northern Asia with special emphasis upon their interrelations with observed and projected extremes and anthropogenic load. Another objective of the suggested activity was proving the regional decision makers with updated information on these important for regional population well-being issues thus paving a way to their concern with development of adaptation measures.

The specific objectives of the project were:

1. To organize the international APN Workshop “Climate change induced extremes in Northern Asia” with enlarged participation of young scientists from the targeted region (Irkutsk, 2012);
2. To prepare on the basis of major Workshop scientific materials and key messages on potential role of climate change induced extremes in Northern Asia sustainable development information and education resources;
3. To organize the international NEESPI/SIRS Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes" within framework of the CITES-2013 young scientists school and international conference (Petrozavodsk, 2013) and prepare on the basis of major Workshop and CITES event scientific materials and key messages on potential role of climate change induced extremes in Northern Asia sustainable development additional information and education resources;
4. To develop and launch the dedicated project web site as a thematic information-educational system opening to young researchers and the regional decision makers access to the prepared resources;
5. To develop and make accessible through the web site thematic educational tools aimed at young scientists’ education/training in area of regional climate change induced extremes analysis thus helping young scientists in development of professional skill.

2.0 Methodology

To reach the above objectives, a two step approach was used. On the first step young scientists were involved in the research domain via targeted Workshops organization. On the second step relevant information and educational resources were prepared by experts involved in Workshops’ organization and made accessible at the specially developed project web site. Also, a special online training course on analysis of climatic extremes was prepared and implemented into the site thus transforming it into thematic information-educational system aimed at young scientists’ education/training in the area of regional climate change induced extremes analysis as well as at providing regional decision makers with basic knowledge about regional impacts of global change.

Firstly, the international APN and MAIRS/NEESPI/SIRS Workshop "Climate Change induced extremes in Northern Asia" with enlarged participation of young scientists from the targeted region was organized. The Workshop devoted to different aspects of climate change induced extremes in Northern Asia and their impact was held within framework of an educational event ENVIROMIS-2012 (Irkutsk, July 2012). This biannual full format multidisciplinary Conference (http://www.scert.ru/en/conferences/) comprising elements of Early Career Scientists School is devoted to the state-of-the-art and usage of modern environmental observation techniques, computational and information technologies for assessment, modeling and mitigation of Northern Eurasia environment variations under natural and anthropogenic pressures including those caused by the Global Climate Change. Traditionally a number of regional decision makers are participating in the ENVIROMIS events, which is used to provide them with knowledge about the most dangerous consequences of climate change in Northern Asia. The International Conference and Early Career Scientists School on Environmental Observations, Modeling and Information Systems ENVIROMIS-2012 was comprised of the following Sessions: Ongoing climatic changes over Northern Eurasia; Regional climate modeling; Terrestrial ecosystems of Northern Eurasia and global biogeochemical cycles; Air pollution transport and climate change. The APN Workshop Sessions included: Environmental and socio-economical consequences of climate change and related extremes; Organizational, observational and ICT infrastructure support of regional scale environmental studies in Northern Asia; Meteorological extremes and climate change in Northern Eurasia; Drought and Flood Extremes; Geosphere-biosphere interactions and related extremes. Since traditionally the ENVIROMIS Conferences have no parallel Sessions, the APN Workshop had a significantly enlarged audience, which gave this targeted APN activity additional visibility. Leading experts in the area were invited to deliver a Lecture or Invited talk at the Workshop thus providing participants with cutting edge knowledge in meteorological and climatic extremes and their interrelations with anthropogenic load and climate change in Northern Asia. Also a Round table with representatives of regional environmental decision-makers titled "APN CAPABLE Project "Climate change induced extremes" as a set of targeted to decision-makers and young scientists' education & training activities" was organized.

The next targeted NEESPI Workshop was organized within the framework of the regular biannual International Conference and Young Scientists School on Computational Information Technologies for Environmental Sciences CITES-2013", Petrozavodsk, Russia, 25 August – 5 September, 2013. It was the twelve-days scientific educational action comprising International Young Scientists School on Computational Information Technologies for Environmental Sciences CITES-2013 with the International Conference devoted to the same theme. Major topic of Young Scientists School was Ocean and Climate. In particular, special attention was paid to atmosphere–ocean and atmosphere – inland hydrological objects interactions on different spatial and time scales but other questions of computational and informational technologies usage in environmental sciences were also addressed. The School scientific program included lectures delivered by key Russian specialists on the following themes: Interaction of atmosphere and ocean on different time and space scales; Modeling of ocean, seas and inland water bodies dynamics; System of hydro-physical fields assimilation; Regional aspects of atmosphere and hydrosphere interaction; Models of dynamical and evolutional games in ecology problems; Climatic problems of Arctic's and Sub-Arctic's; Short-term response of mid-latitude upper ocean layer on atmospheric impact; Long-term variability in climatic system; Information technologies in problems of climate modeling and climatic changes analysis; Study of ocean circulation sensitivity on the basis of fluctuation-dissipation theorem; Modeling of Ladoga and Onega Lakes climatic circulation; Modeling of surface waves; and Numerical weather forecast based on coupled atmosphere and ocean models. Also, during 3 days the Training Sessions were run in specially equipped computer classes of Petrozavodsk State University during afternoon time. The groups of 3-4 persons with assistance of tutors were able to perform the allocated climate modeling tasks on the basis of accessible INM RAS climate model and computational resources. After finishing the training course each group delivered a 15-minute report on the results of their work to

all CITES event attendants. After the School young scientists and Lecturers took part in the CITES-2013 International Conference whose audience was enlarged by a number of prominent scientists. At the Conference several additional invited one-hour lectures of leading Russian and foreign specialists on modern problems of computational information technologies development and their application in environmental sciences were delivered as well. The CITES conference was comprised of the following Sessions: Modeling and analysis of atmosphere processes; Modeling and analysis of land surface state and its hydrological regime; Data and information-computational systems for Earth System Sciences; and Mathematical methods in ecology.

The NEESPI Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes" included the following Sessions: Climate modeling and analysis; Dynamics of the land surface in the high latitudes of Eurasia and the Arctic Ocean; New areas of research of Northern Eurasia environment (with an emphasis on the study of extreme weather events); and Core environmental activities in Northern Eurasia. Also two round-table discussions "Role of modeling in integrated assessment of contemporary and future environmental changes over Northern Eurasia" and "Strategic Planning for the post-NEESPI period" were organized. Northern Eurasia is a sensitive and rapidly changing area with the signal of climate change effects already observed in many components of the Earth's system. The ongoing warming in the NEESPI domain since 1881 was 1.5˚C and during the past 50 years the steady rate of the annual temperature increase here was 0.33˚C per decade that was substantially larger than for the globe. Additionally, this region experienced a shock impact of the abrupt institutional and economic changes in the former Soviet Union countries, East Europe, Mongolia, and China. The goal of the Initiative launched nine years ago is to study climate-ecosystem interactions and societal impacts in Northern Eurasia. NEESPI became an international program involving more than 200 institutions from 30 countries. Over 750 scientists have been working in about 160 individual projects. NEESPI was implemented by developing international teams of scientists with mandatory participation of regional researchers and is in its concluding stage as a focused activity. The legacy of the Initiative is in its established connections, ongoing synthesis of the previous studies and a new generation of scientists that emerged from the NEESPI projects, with over 75 PhD students defending their theses in the NEESPI framework. The latest NEESPI research focus was on integrated assessments and projections and include summation of all knowledge in books and overview papers, expanding and maintaining of the regional observational database, and developing regional Earth System modeling capabilities to provide the knowledge required for societies in the region and beyond to face risks posed by global environmental change and to seize opportunities in a transition to global sustainability. This is a prelude to a new initiative by ICSU/ISSC *Future Earth*. Within this framework, an international Workshop was held within the Multidisciplinary Event that included an International Conference and Young Scientists School on Computational Information Technologies for Environmental Sciences (CITES; http://www.scert.ru/en/conferences/Cites2013/) and the Workshop itself (http://neespi.org/meetings/CITES_2013.html). Workshop attendees from Russia, China, Japan, and USA capitalized on participation of a representative group from the modeling community involved in climate, weather, hydrology, biosphere, and land use modeling as well as in expanding and maintaining of the Northern Eurasia observational data base to discuss the present status of NEESPI, its perspectives, and future development. A special statement was made regarding the role of modeling in the comprehensive assessment of contemporary and future changes in Northern Eurasia. The Workshop concluded that new challenges and science foci emerge. Among them are urgent needs to understand and project: (a) dynamics of extreme events in Northern Eurasia; (b) near-future and long-term impact of the rapid Arctic warming; and (c) regional carbon cycle and land cover changes and their feedbacks to the Global Earth System. Furthermore, it was concluded that regional food and water security can be at risk with observed and projected changes because most fertile lands of the densely populated southern half of the NEESPI domain are in the areas of risky agriculture. Workshop Summary is available at http://neespi.org/meetings/Petrozavodsk_2013.pdf.

During the ENVIROMIS-2012 and CITES-2013 events basic and applied environmental issues were addressed to post-graduates and recent doctorates through lecture courses and at training courses. At the conferences and Workshops young participants also presented their papers and got better understanding of the current trends due to lectures delivered by key NIS, Asian, European and US specialists in the area of «hot topics» of environmental sciences. Participation of young scientists in these meetings had given them firsthand experience of international cooperation and opened new directions and perspectives for their own research activity in this important domain. The thematic Workshops promoted the generation and transfer of new findings and methodologies in this area of climate change and helped to identify and assist in the career development of promising young scientists in the region and their involvement with APN and the community of global change scientists represented at the ENVIROMIS and CITES event. The young scientists became a part of an overall network of scientists interested in different aspects of global change in the Northern Asia region.

The second step of the project is comprised of preparation of educational materials on important climate change induced extremes in the region and development/launch and support in operation of dedicated web site as an information system aimed at support of young scientists' education/training in this domain thus involving 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 bilingual (English and Russian) site (http://project.enviromis.scert.ru/Capacity/) was developed, launched and is supported in operation as an information-educational system. To give the Project a vision, the site was embedded into the ENVIROMIS Network portal (http://enviromis.scert.ru/), which is a special information-computational system providing free Internet access for professionals, students and general public to thematic and general information resources gathered by SCERT in the course of carrying out several APN and EU projects in the area of Environmental Sciences. Development of the dedicated web site was based on specially designed middleware adjusted to support scientific web sites (see e.g. Enviro-RISKS web portal on Environmental Sciences http://risks.scert.ru). This approach guarantees the generation and transfer of new findings and methodologies in wide scope of Earth system science including 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 region intended to enhance sustainable development of its domain. As it is shown in Fig.1 the site presents the project, its objectives and partners involved.

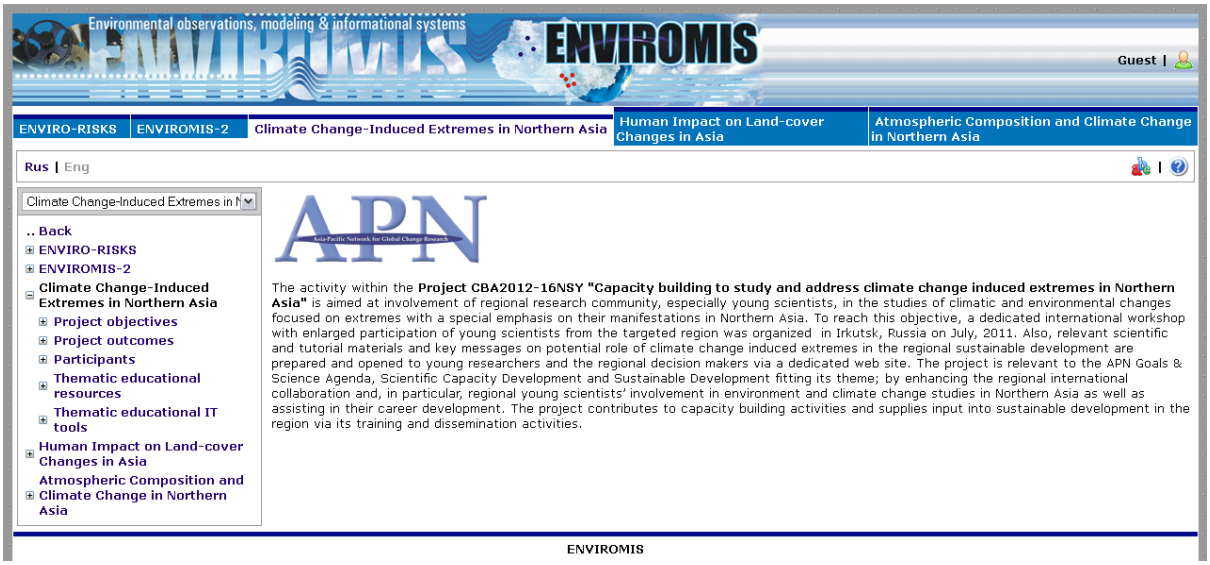


Fig.1. The project web site screenshot.

The educational materials have been prepared by key APN and NEESPI Workshops participants, selected by the ENVIROMIS and CITES Program Committees to deliver to young scientists thematic lectures during targeted Workshops and ENVIROMIS and CITES events (their first version was published in the events' Proceedings. On this basis under the Program Committees editorship an extended version of relevant presentations were prepared and deployed at the Project web site (http://project.enviromis.scert.ru/Capacity/resources/).

Specialized thematic educational tools aimed at young scientists' education/training in the area of regional climate change induced extremes analysis were developed and made accessible through the web site (http://project.enviromis.scert.ru/Capacity/tools/) thus helping young scientists in development of professional skill. Currently the online educational course "Analysis of climate extreme indices on the regional scale" is opened. It includes basic thematic background (description of climate extreme indices defined by the Expert Team on Climate Change Detection and Indices (ETCCDI), of general methodology and of data analysis process) and set of practical computational tasks aimed at analysis of climate extremes for a specific territory. The tasks are aimed at studying extreme characteristics of surface temperature and precipitation on the regional scale and investigating the impacts of these changes on ecosystems and socio-economical sphere. All extreme indices and linear trend coefficients are calculated using web-GIS information-computational platform Climate (http://climate.scert.ru/) developed to support collaborative multidisciplinary investigations of regional climatic changes and their impacts. The platform includes dedicated modules providing large georeferenced datasets processing and relevant analysis (Gordov et al., 2012, Gordov et al., 2013). The online course will provide users with knowledge on the techniques for climate extreme analysis, improve their understanding of meteorological processes responsible for observed climatic extremes on the regional scale.

3.0 Results & Discussion

3.1 Outputs of thematic Workshops

Both thematic Workshops made significant input into involvement of young scientists into a new domain of research activity. Fifty young scientists from 5 countries (3 APN countries) participated in the events, which promoted their future scientific careers development. The Workshops also resulted in preparation of the set of educational materials and development of online training tools, which will be described in the next subsection. Also, the level of understanding of Northern Asia responses on global change including climate change induced extremes role was determined. A roadmap for future thematic international efforts on this territory was charted and discussed. All these findings are described below.

Since Northern Asia is significant part of the largest Earth landmass of Eurasia and, in particular, of Northern Eurasia, its response on global change should be analyzed within context of the Northern Eurasia as a whole. It is a sensitive and rapidly changing area with the signal of climate change effects already observed in many components of the Earth's system. The surface warming in the domain since the commencement of extensive instrumental observations (around 1881) is 1.5˚C. During the past 50 years the rate of the annual temperature increase here was 0.33˚C per decade which is substantially larger than for the globe. Additionally, this region experienced a shock impact of the abrupt institutional and economic changes in the former Soviet Union countries as well as in East Europe, Mongolia, and China. In spite of efforts of a number of international teams, significant part of which are working under the Northern Eurasia Earth Science Partnership Initiative (NEESPI) umbrella the major regional scientific question: "How do Northern Eurasia's terrestrial ecosystems dynamics interact with and alter the biosphere, atmosphere, and hydrosphere of the Earth?" still remains intact. At the same time, new challenges and science foci emerge.

Among them are urgent needs to understand and project:

1. Dynamics of extreme events in Northern Eurasia in changing climate and environment (See Fig.2 below);

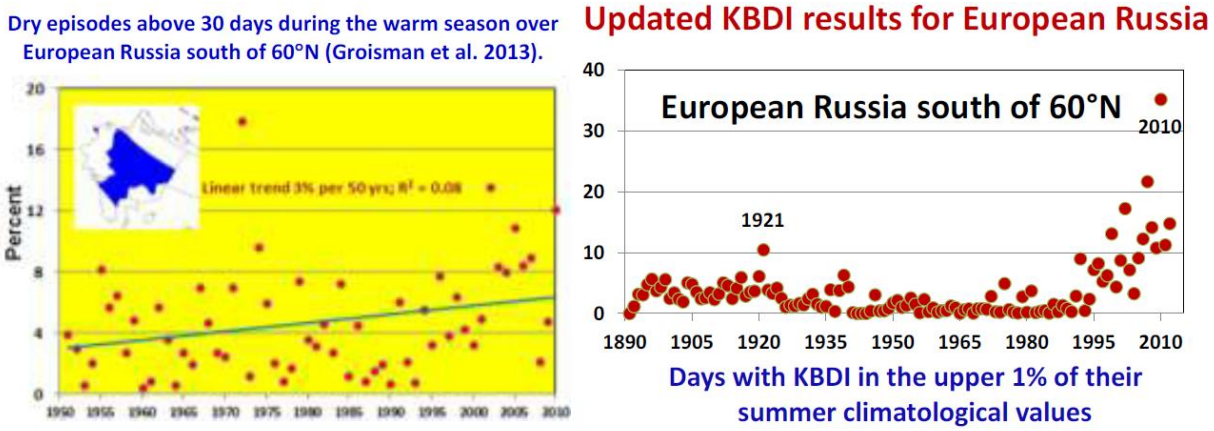


Fig. 2 illustrates the first challenge (Groisman et al. 2013). Changes of the frequency of unusually dry summers in European Russia. ***Left:*** Prolonged no-rain events in the past 60 years and ***Right:*** Time series of the region-wide frequency of unusually high values of the Keetch-Byram Drought Index (KBDI, which is a combination of high temperatures and low rainfall totals) responsible for intensification of the fire weather. Together, these two characteristics clearly show that the disastrous extreme summer of 2010 in this part of the world was not only a manifestation of rainfall deficit but also a function of high temperatures. In fact, July-August mean regional temperature over this region was 2˚C higher than in any year during the period of large scale instrumental observations (i.e., during the past 130 years).

2. Near-future and long-term regional and global impact of the rapid Arctic warming (see Fig.3 below);

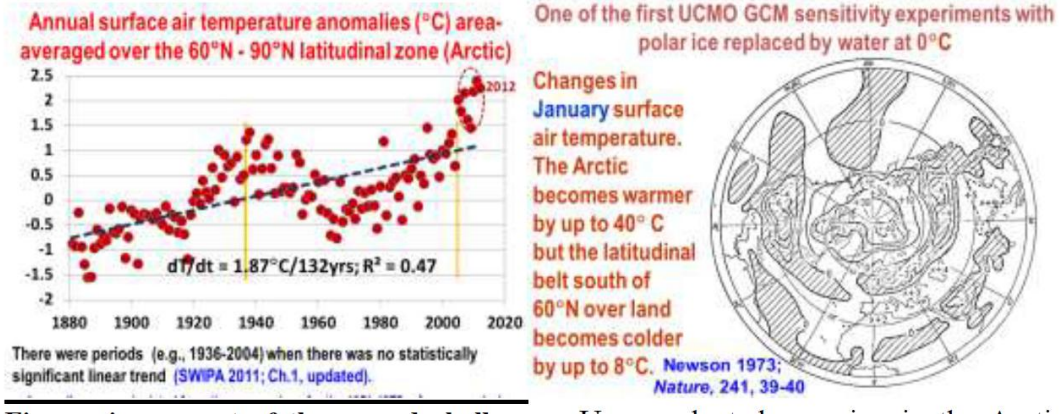


Fig. 3 in support of the second challenge. Unprecedented warming in the Arctic has already caused a significant sea ice retreat in the end of the warm season. As a result, open water areas in the Arctic Ocean are incresing, the sea ice cap is thinning, and additional influx of the water vapor and heat into the Arctic atmosphere may change atmospheric circulation in the northern extratropics as we know it (up to extremes shown in the 40-yrs-old modeling result).

3. Regional carbon cycle and land cover changes and their feedbacks to the Global Earth System (see Fig.4 below);

Northern Eurasia contains large areas of peatlands, boreal forests, grassland and tundra, which stores a large amount of organic matter and carbon in their vegetation, soils, and permafrost. The fate of this organic matter and carbon is uncertain under the future climate conditions and human

activities. The biogeochemical cycles of carbon, nitrogen, ozone as well as phosphorous could exert large feedbacks to the global climate system.

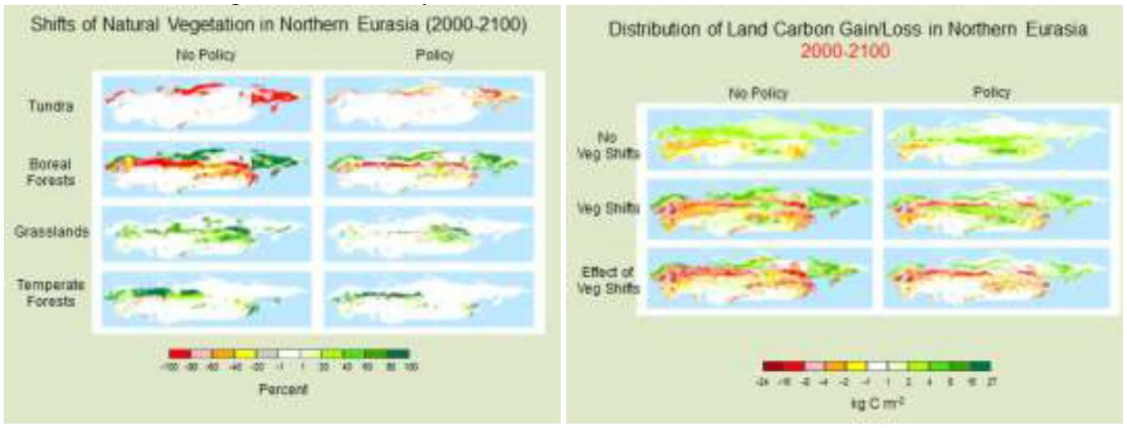


Fig. 4 illustrates the third challenge (Zhuang et al. 2013). Biospheric models indicate major changes in the biogeochemical cycle in Northern Eurasia and show our ability to mitigate them to some extent.

4. Regional hydrology (see Fig.5 below).

It was concluded that global and regional food and water security can be at risk with observed and projected changes because most fertile lands of the densely populated southern half of the NEESPI domain are in the areas of risky agriculture due to the increasing water deficit. This raises demand for further studies of societal feedbacks to detrimental changes across Northern Eurasia (i.e., adaptation and mitigation problems).

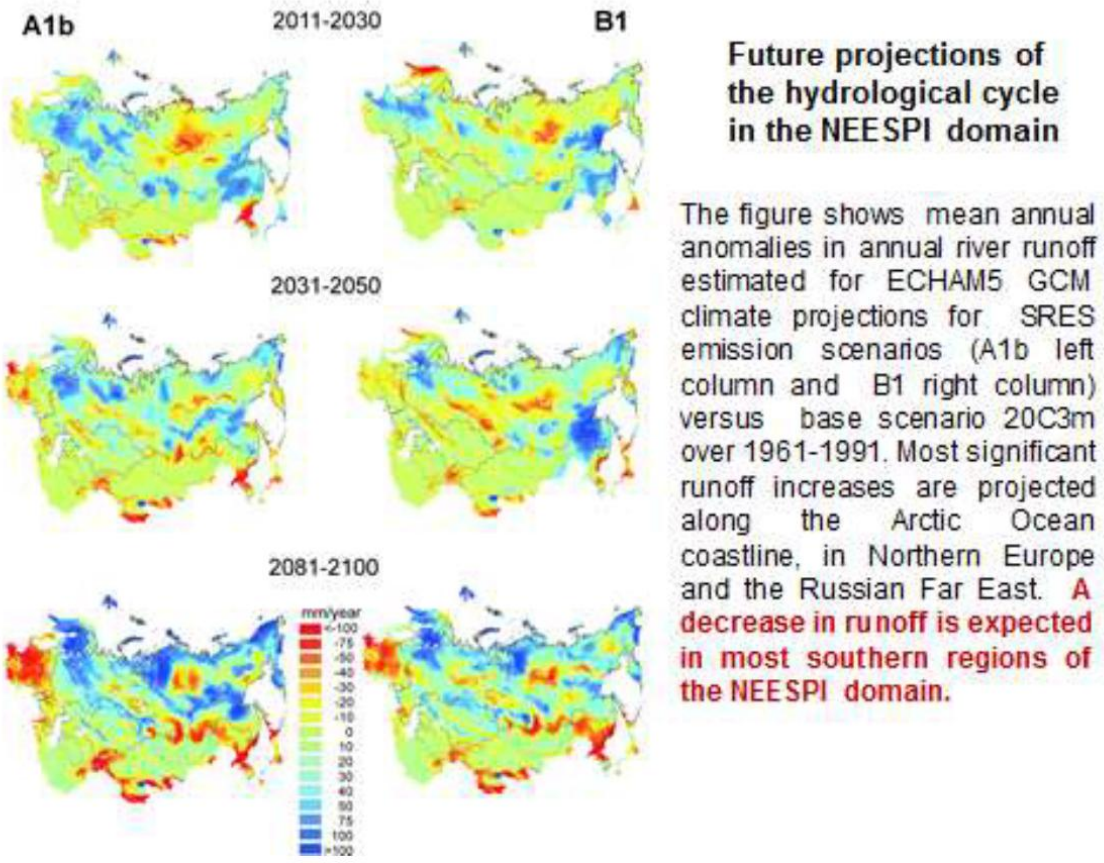


Fig. 5 illustrates the fourth challenge (Shiklomanov et al. 2013).

Special attention at the both Workshops was paid to analysis of temperature and precipitation extremes on Siberia territory. Last decades studies of surface air temperature and precipitation amount in Siberia have shown increase of extreme events under observed warming in the region. Such changes have major impact on local ecosystems and the severity of this impact is spatially inhomogeneous. To obtain the complete pattern of observed climatic changes in Siberia, it is necessary to get detailed knowledge of the geography, intensity and frequency of climate extremes occurrence. It should be added that it is impossible to get it from meteorological observations only, since the Siberian station network is rather sparse and uneven. Intensive discussions at the Workshops lead to special study performed at SCERT/IMCES and recently reported at the CORDEX-2013 Conference by young scientist T. Shulgina (Shulgina, et al. 2013). Based on our previous results (Shulgina et al., 2011), data of ECMWF ERA Interim Reanalysis and APHRODITE JMA have been selected, respectively, to characterize temperature and precipitation extremes over the time period 1979-2012. In the context of this study the term 'extreme' is defined as a value in the tail of the variable's probability distribution. Such value characterizes the climatic event which can lead to environmental and/or socio-economic disasters. The following percentile threshold indices recommended by ETCCDI (Klein Tank et al., 2009) have been considered:

Index	Definition
Cold nights (TN10p)	Number of days with Tmin < 10th percentile
Warm nights (TN90p)	Number of days with Tmin > 90th percentile
Cold days (TX10p)	Number of days with Tmax < 10th percentile
Warm days (TX90p)	Number of days with Tmax > 90th percentile
Very wet days (R95p)	Number of days with PRCP > 95th percentile

The percentile thresholds have been calculated for the climatological base period 1961 – 1990 using the following formula:

$$perc = \frac{(100-p)\cdot y_k + p \cdot y_{k+1}}{100}$$

Here p is percentile, y_k and y_{k+1} are two neighboring positions within the series collected from values of base period sorted by ascending, n is the size of the sorted time series.

Although in the initial definitions (Klein Tank et al., 2009) these indices are referred in percent of days, the results were converted into number of days. Temporal dynamics of the indices (with seasonal output intervals) was estimated by decadal linear trends with 5% significance level (Student's test). All calculations have been realized using information-computational web-GIS system "Climate" (http://climate.scert.ru/) developed to support collaborative multidisciplinary investigations of regional climatic changes and their impacts (Gordov et al, 2012). The archive of results is available for further applications in the system. Calculated trends in climate extremes are illustrated by the maps in Fig.6.

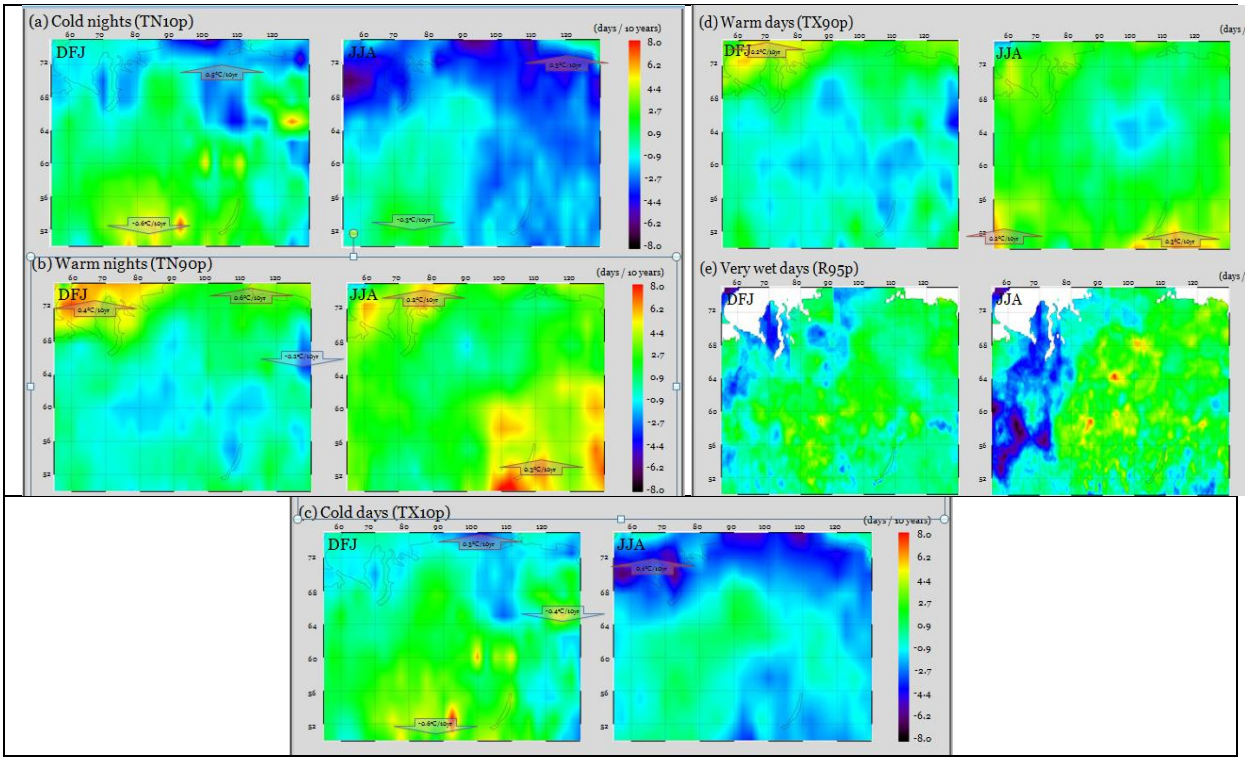


Fig.6. Linear trend estimated for selected temperature extreme indices with seasonal output intervals. Only winter (DFJ) and summer (JJA) trend estimates are presented here. Decadal dynamics (days / 10 years) of frequency of cold nights (a), warm nights (b), cold days (c), warm days (d) and very wet days (e) are illustrated in colors. The arrows show daily maximum and minimum temperature changes (^{0}C/10 years for (a-d) and mm/10 years for (e), respectively) for these extreme indices. Temperature extreme trends have been estimated over the period 1979–2012 (percentile thresholds were calculated from ECMWF ERA-40 reanalysis data), precipitation extremes – 1979-2007, respectively.

Dynamics of temperature extremes observed over the last decades (1979-2012) shows asymmetric changes according to determined tails of extreme indices distribution. Namely, the warming during winter cold nights is stronger than during warm nights, especially over the north of Siberia. Increases in minimum temperatures are more significant than in maximum temperatures. Warming determined at the high latitudes of the region is achieved mostly by winter temperature changes and less due to autumn temperature changes (case of autumn temperature extreme changes is not presented here). South area of Siberia has slight cooling during winter (mostly out of cold temperature extremes) and during summer (associated with warm temperature extreme decrease). Precipitation extremes studied for the time period 1979-2007 show their dramatic uneven distribution. The largest increase in frequency and intensity of heavy precipitation is observed in the north of East Siberia. Decrease in very wet days is determined in the central area of West Siberia and the south area of East Siberia. Since currently ecological and socio-economical risks are becoming larger and more apparent, obtained guidance about past changes of temperature and precipitation extremes is very important for supporting adaptation and mitigation measures to the climate extreme effects in Russia.

Both Workshops also resulted in compilation of a special suite of statements and recommendations regarding the role of modeling in the comprehensive assessment of contemporary and future changes in Northern Eurasia:

1. GCMs are not designed for regional assessments. Therefore, only GCMs with adequate spatial resolution (i.e., the resolution that allows the description of key regional processes) should be used for the region if we need to account for its specifics. We would like to use those GCMs that meet certain criteria regarding consistency with observations, to show major large scale patterns that directly or indirectly impact the NEESPI domain from all directions beyond its boundaries.
2. In addition, most existing GCMs and Earth System Models do not include representations for a number of processes, such as dust storms, forest fires and land use, which are likely to have large impact on the climate change in the NEESPI domain. Changes in snow cover, permafrost, glaciers, biosphere, and Arctic shelf sea ice all have special impact to Eurasia. Therefore, parameterizations of the physical processes governing changes in these components should be improved. When needed, the use of regional models should be promoted.
3. It was specifically noted that only two GCMs are available in the Russian Institutions that can capitalize on local knowledge; other modeler groups should seek international collaboration to better address the regional specifics (land cover species specifics, permafrost and soil distributions, etc.). Most of the climate models do not include the detailed land surface model or the biological/hydrological cycle model. The stand-alone specific models are not suitable for the regional analysis. Therefore, sharing observational data with different modeling groups for climate model assessment and analysis should be considered mandatory and encouraged on the international level (a good example is the collaboration between NASA and the Russian Academy of Sciences). These days, many observational data can be found through networking.
4. In the NEESPI domain, the socio-economic issues are very closely connected with the climate change problems. Therefore, Earth System Models (ESMs) are needed that incorporate the above mentioned specifics of the domain and incorporate the controls (by decision makers) and economic (socio-economic) models directly into the ESMs. Generally, the regional studies in the NEESPI domain require models that are “larger” and more complicated than climatic models. They might include biospheric, meteorological, hydrological, and permafrost models as well as socio-economic model and/or decision-makers considerations. So, these ESMs should include anything that can change the Earth System and affect the society well-being.
5. Methods for the data processing and analysis of the CMIP5 results should be further developed. From CMIP5 models we have to select the so-called trusted climate models, e.g. the models that simulate reasonably well the regions we are interested in. It is necessary to define the rules for model selection, such as their ability to simulate (in addition to climatology and major tendencies) the prime modes of variability (NAO, ENSO, PDO, North Atlantic Multidecadal Oscillation, etc.).
6. A bias correction approach should be further explored. This means to correct the modeling results for the historical period (20th century) and then apply the same correction for the future climate scenarios.
7. While we hope to use mostly a “feedback approach” (when regional changes interact with large-scale climatic, environmental, and societal processes), impact models are still required that are seamlessly linked to GCMs and address specific concerns of the regional societies.
8. Negative experience with NCEP/NCAR reanalyses was mentioned. These products are not quite good enough for the Eurasian continent because few synoptic data were provided by the Meteorological Agencies for reanalysis data production and ERA40 reanalysis data are also not quite suitable for the model inter-comparison. ERA40 Interim reanalysis data are much improved and may be useful for regional research.
9. We have to emphasize an attention to the processes that can produce the issues in the future, such as the permafrost thaw, change of the snow cover characteristics, and other changes that may affect different components of the Earth environment, human life, and economic activity.

Summarizing, one can see that Integration of models describing different aspects of the regional Earth System is occurring but has to be further intensified. In the past, the outputs of the Global climate models (GCMs) were used as an input for regional climatic and hydrological models (RCMs

and HMs) that were thereafter used for impact assessments. Currently, RCMs and models of the surface block: HMs, biospheric models, cryospheric models, dust formation models, and socio-economic models began interacting among themselves, use the output of each other and are moving together towards a suite of integrated models comprehensively describing natural and anthropogenic terrestrial processes. This suite eventually would be able to explain and project the processes in context of the Earth System change. Also, new opportunities are coming that are emerging in the Earth Systems studies including new generation of the Global Earth System models and new remote sensing products that have been already delivered to the scientific community and/or those that are just on the horizon (e.g., Global Precipitation Mission, GPM, that for the first time will cover high latitudes including Northern Asia).

3.2 Project web site and online educational tools

To meet the project objective, the project web site was developed as an information-educational system. It carries out thematic information and educational resources for future training (http://project.enviromis.scert.ru/Capacity/resources/). The web sire starting page is shown in Fig. 7.

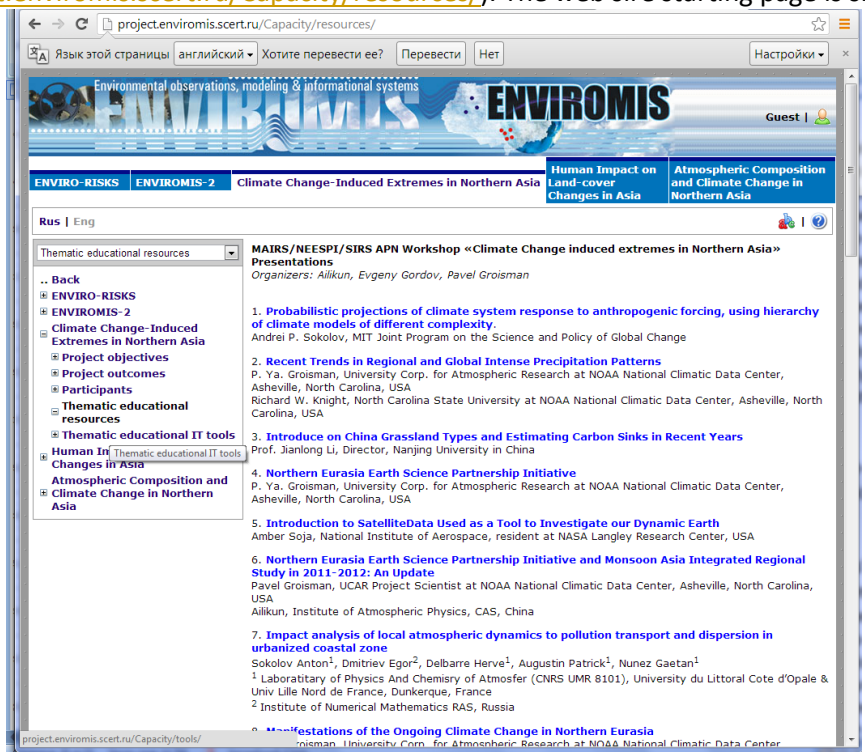


Fig. 7. The starting page of the "Thematic educational resources" module.

Also accessible through the web site (http://project.enviromis.scert.ru/Capacity/tools/) thematic educational tools aimed at young scientists' education/training in the area of regional climate change induced extremes analysis were developed and implemented (see Fig.8) thus helping young scientists in development of professional skill.

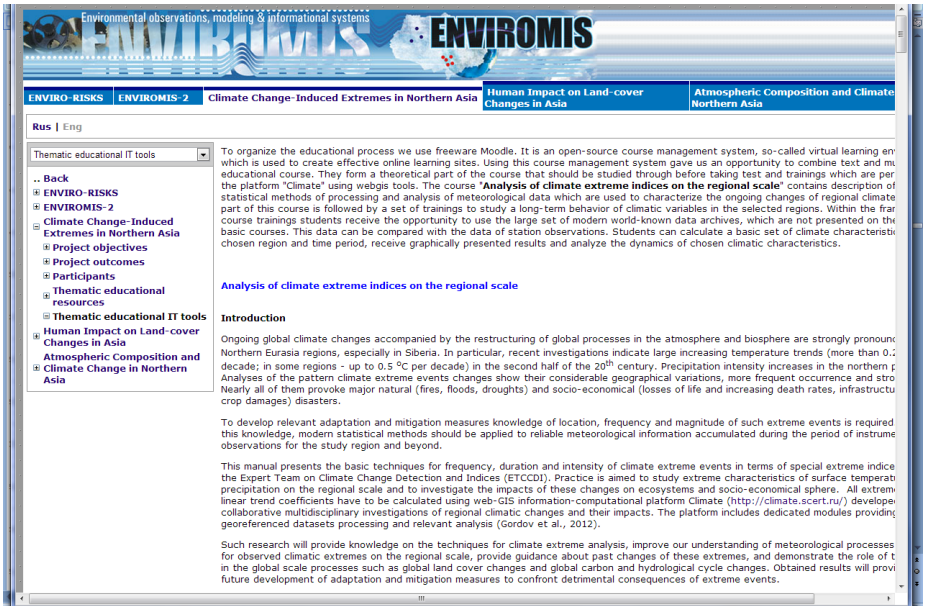


Fig.8. The starting page of the online educational tools.

To organize the educational process, we use freeware Moodle. It is an open-source course management system, so-called virtual learning environment which is used to create effective online learning sites. Using this course management system gave us an opportunity to combine text and multimedia in our educational course. They form a theoretical part of the course that should be studied through before taking tests and trainings which are performed within the platform "Climate" using web-GIS tools. The course "Analysis of climate extreme indices on the regional scale" contains description of the main statistical methods of processing and analysis of meteorological data which are used to characterize the ongoing changes of regional climate. To develop relevant adaptation and mitigation measures, knowledge of location, frequency and magnitude of such extreme events is required. To acquire this knowledge, modern statistical methods should be applied to reliable meteorological information accumulated during the period of instrumental observations for the study region and beyond. Theoretical part of this course is followed by training to study a long-term behavior of climatic variables in the selected regions. Within the framework of the course training, graduate and post-graduate students receive the opportunity to use the large set of modern world-known data archives, which are not presented on their university basic courses. This data can be compared with the data of station observations. Students can calculate a basic set of climate characteristics for a chosen region and time period, receive graphically presented results and analyze the dynamics of chosen climatic characteristics.

The manual presents the basic techniques for frequency, duration and intensity of climate extreme events in terms of special extreme indices defined by the Expert Team on Climate Change Detection and Indices (ETCCDI). Practice is aimed at studying extreme characteristics of surface temperature and precipitation on the regional scale and investigating the impacts of these changes on ecosystems and socio-economical sphere. All extreme indices and linear trend coefficients have to be calculated using web-GIS information-computational platform Climate (http://climate.scert.ru/) developed to support collaborative multidisciplinary investigations of regional climatic changes and their impacts. The platform includes dedicated modules providing large georeferenced datasets processing and relevant analysis (Gordov et al., 2012). Theoretical course and practical training provide knowledge on the techniques for climate extreme analysis, improve understanding of meteorological processes responsible for observed climatic extremes on the regional scale, provide guidance about past changes of these extremes, and demonstrate the role of these changes in the global scale processes such as global land cover changes and global carbon and hydrological cycle changes. Obtained experience provide a basis for future young scientists' professional career development while results

of such investigations would form a basis for elaboration of adaptation and mitigation measures to confront detrimental consequences of extreme events.

The following percentile threshold indices (climate indices) related to intensity and frequency of temperature and precipitation extremes (Klein Tank et al., 2009 and Zhang et al., 2011) can be calculated:

Table 1. List of considered percentile-based threshold indices

Index	*Definition*	*Meas.*
Extreme indices related to surface temperature		
Maximum temperature (TXx)	maximum value of daily maximum temperature for the period	^{o}C
maximum value of daily minimum temperature (TNx)	maximum value of daily minimum temperature for the period	^{o}C
minimum value of daily maximum temperature (TXx)	minimum value of daily maximum temperature for the period	^{o}C
Minimum temperature (TXx)	minimum value of daily minimum temperature for the period	^{o}C
Daily / annual temperature range (DTR / ETR)	difference between Daily / annual maximum and minimum temperature	^{o}C
Number of frost days_(FD)	Annual count of days when daily minimum temperature < 0^{o}C.	days
Number of frost days_(SU)	Annual count of days when daily maximum temperature > 25^{o}C	days
Number of icing days_(ID)	Annual count of days when daily maximum temperature < 0^{o}C	days
Number of tropical nights_(TN)	Annual count of days when daily minimum temperature > 20^{o}C	days
Number of Cold nights (TN10n)	Percentage of days when the daily minimum temperature < 10th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	% (days)
Number of Warm nights (TN90n)	Percentage of days when the daily minimum temperature > 90th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	% (days)
Number of cold day-times (TX10n)	Percentage of days when the daily maximum temperature < 10th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	% (days)
Number of warm day-times (TX90n)	Percentage of days when the daily maximum temperature > 90th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	% (days)
Number of cold days (TNM10n)	Percentage of days when the daily mean temperature < 10th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	% (days)
Number of warm days	Percentage of days when the daily mean temperature >	% (days)

(TMN90n)	90th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	
Cold spell duration index (CSDI)	Annual count of days with at least 6 consecutive days when TN < 10th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	days
Warm spell duration index (WSDI)	Annual count of days with at least 6 consecutive days when TX > 90th percentile calculated for each calendar day for the base period (1961-1990) using running 5-day window	days
Extreme indices related to precipitation		
Precipitation maximum (RXd)	Highest precipitation amount for the period	mm
Simple pricipitation intensity index (SDII)	Quotient of amount of days with precipitation and number of days with precipitation	mm
Heavy precipitation days (RNNmm)	Annual count of days when precipitation amount ≥ 10, 20, or nn mm	mm
Rainfall extreme intensity (RTOT95p)	Annual total of precipitation when daily precipitation amount on a wet day > 95 percentile of precipitation on wet days calculated for each calendar day for the base period (1961-1990) using running 5-day window	mm
Rainfall extreme frequency (R95n)	Number of days when daily precipitation amount on a wet day > 95 percentile of precipitation on wet days calculated for each calendar day for the base period (1961-1990) using running 5-day window	% (days)
Maximum length of dry spell (CDD)	maximum number of consecutive days with precipitation < 1mm	mm
Maximum length of wet spell (CWD)	maximum number of consecutive days with precipitation ≥ 1mm	mm

The percentile thresholds have been determined from data for the selected basic period 1961 - 1990 and are calculated using the following formula:

$$PREC = \frac{(100-p)\cdot y_k + p\cdot y_{k+1}}{100}, \text{ with } k = \text{int}\left(\frac{n\cdot p}{100}\right).$$

Here *p* is percentile, y_k and y_{k+1} are two neighboring positions within the series collected from values of basic period (1961-1990) sorted by ascending, *n* is the size of the sorted time series.

For temperature, the percentile thresholds are calculated from 5-day windows centered on each calendar day to account for the mean annual cycle (Klein Tank et al., 2009). For precipitation, the percentile thresholds are calculated from the sample of all wet days (PRC greater than 1 mm per day) in the period. Due to short time series, non-linearity of changes cannot be assessed and temporal dynamics of these indices was estimated using linear trend analysis (Storch and Zwiers, 1999). The trend significance was tested using a Student's *t* test with 5% significance level. Calculated regression coefficients estimate change per decade (10 years).

General pattern of the training/research process comprises the following steps. In the first stage the user, hereafter referred as researcher, needs to: choose from a list a dataset to describe meteorological values in which he/she is interested; fix the spatial coordinates and the time range

of research; choose needed extreme climatic characteristics from an available for the calculation set and statistical estimates from a list. The calculation of climatic characteristics and conducting statistical evaluations are supported by a complex web GIS software portal platform "Climate» (http://climate.scert.ru/). The software modules of the complex are implemented in a programming language GDL.

During the second stage, program starts using a formed set of input parameters. The program calculates these climatic characteristics using given calculation formulas and / or conducts appropriate statistical evaluations. The calculation results are displayed graphically in the form of two-dimensional surface maps showing color fields for calculated climatic and / or carried out statistical evaluations. The files are in an Encapsulated Postscript format and supplemented by NetCDF format files with numerical values of calculated indicators. The file contains values of latitude, longitude, altitude, time and a value of the calculated climatic characteristics and / or statistical evaluation. Further, the investigator interprets results received in a graphical form according to set tasks. A file with numerical values of calculated climatic characteristics and / or statistical evaluations gives an opportunity to use received results for further research tasks.

There are the following test questions in the course:
1. Describe the current state of climate in Siberia, including the estimates of extreme climatic characteristics.
2. Compare the dynamics of identified climate changes and indicators of vegetation in the region.
3. Assess the quality of representation of the climate changes observed in Siberia by modern global climate models.

The set of training comprises the following two, including several specific tasks.

Training 1: Analysis of the spatial and temporal changes in extreme values of daily temperature, climatic characteristics of the frequency and continuous duration of such phenomena in Siberia during the last decades.

Data on air temperature measurements are presented in the data array of daily temperature and precipitation at 600 meteorological stations in Russia and the former Soviet Union published on RIHMI-WDC site meteo.ru. Reanalysis archive ECMWF ERA Interim is used as a data for modeling of the thermal regime which covers the data of term measurements of air temperature in Siberia with a spatial resolution of 0.75 ° × 0.75 ° for the period from 1979 to 2012.

Task 1. To quantify seasonal changes in extremes of daily temperature according to the station observations and modeling in Siberia for the period from 1979 to 2012. To do this, it is necessary to calculate linear trends of the following climatic characteristics, using term temperature measurements at 2 m for the area 50 ° - 75 ° N and 55 ° - 130 ° E and the time period from 1979 to 2012: (a) the maximum / minimum value of daily maximum / minimum temperatures, (b) the daily / annual range of temperatures.

Task 2. To quantify seasonal changes of climatic characteristics of the frequency of extreme values of daily air temperature in Siberia from 1979 to 2012. To do this, one should calculate linear trend of the following climatic characteristics, using term temperature measurements at 2 m for the area 50 ° - 75 ° N and 55 ° - 130 ° E and the time period from 1979 to 2012: (a) the number of days with frost / light frost / hot days and stuffy nights number, (b) the frequency of cold / warm nights / days.

Task 3. To quantify seasonal changes of climatic characteristics of continuous duration of events with extreme daily temperature in Siberia from 1979 to 2012. To do this, one should calculate linear

trend of the following climatic characteristics, using term temperature measurements at 2 m for the area 50 ° - 75 ° N and 55 ° - 130 ° E and the time period from 1979 to 2012: duration of extreme cold / warm period.

Training 2: Analysis of the spatial and temporal changes in extreme values of rainfall, climatic characteristics of the frequency and continuous duration of such phenomena in Siberia during the last decades.

The measurement data of daily rainfall are presented in the data array of daily temperature and precipitation at 600 meteorological stations in Russia and the former Soviet Union published on RIHMI-WDC site meteo.ru. Data archive APHRODITE JMA is used as the simulation data of moistening regime, which is a grid field 0.25 ° × 0.25 ° of daily precipitation for the region in the period from 1951 to 2007.

Task 1. To quantify seasonal changes in extremes of daily precipitation according to the station observations and modeling observed over the period from 1979 to 2007 in Siberia. To do this, one should calculate linear trend of the following climatic characteristics, using the data on rainfall for the area 50 ° - 75 ° N and 55 ° - 130 ° E and the time period from 1979 to 2007: the maximum daily / 5-days total precipitation and precipitation intensity.

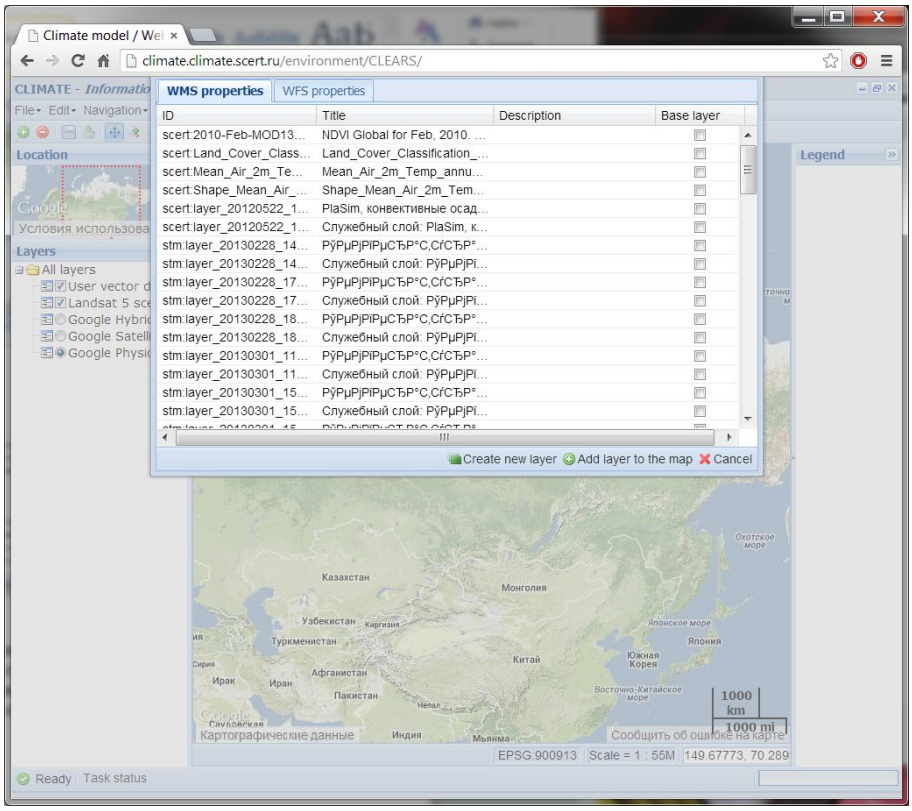
Task 2. To quantify seasonal changes in climatic characteristics of the frequency of heavy precipitation in Siberia between 1979 and 2007. To do this, one should calculate linear trend of the following climatic characteristics, using the data on daily precipitation for the area 50 ° - 75 ° N and 55 ° - 130 ° E and the time period from 1979 to 2007: number of days with daily rainfall exceeding 10 mm and 20 mm / day and the proportion of heavy rainfall.

Task 3. To quantify seasonal changes in climatic characteristics of continuous duration of events with intense precipitation and without it in Siberia between 1979 and 2012. To do this, one should calculate linear trend of the following climatic characteristics, using the data on rainfall for the area 50 ° - 75 ° N and 55 ° - 130 ° E and the time period from 1979 to 2007: maximum duration of periods with and without precipitation.

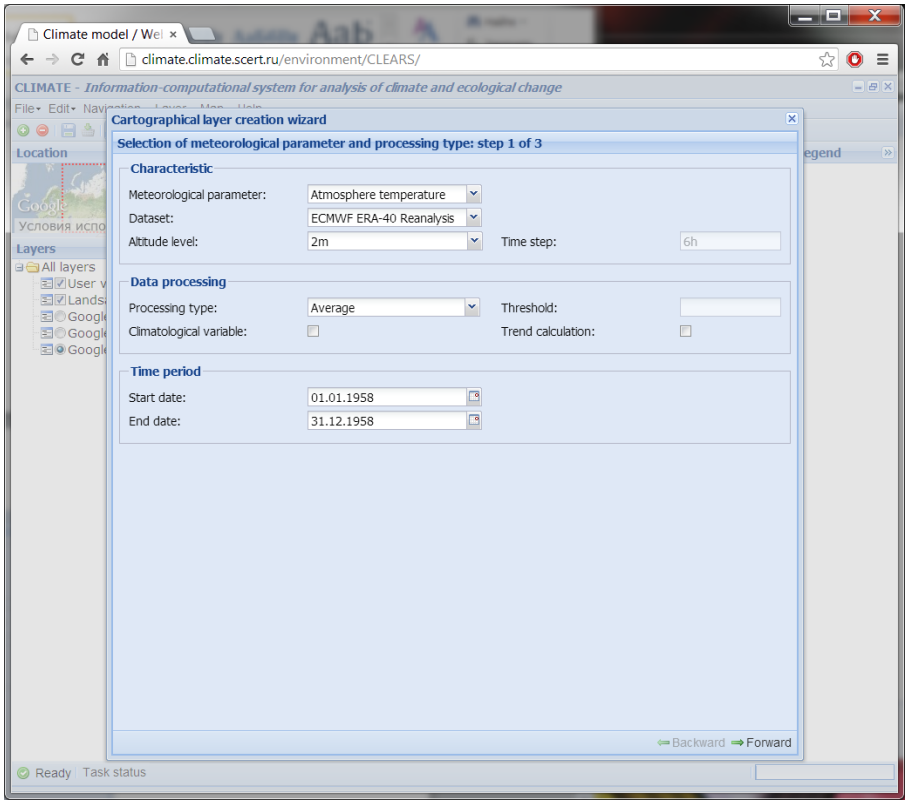
Climate Change Indices definitions are given in Appendix A, while Appendix B describes the sequence of work with the information-computational web-GIS portal "Climate".
In particular, the work procedure on the portal of "climate" includes the following steps. The researcher should:
- Register at the portal "Climate." The registration procedure is presented on the site.
- After registering on the website one should go to the subsection "Courses and lectures" in "Educational Resources" section.
- Choose a training and practical course "Analysis of climate extreme indices on the regional scale" and log in to receive access to an educational course.
- The designed course is divided into two parts: theoretical and practical. In the theoretical part main methods of processing and analysis of meteorological data are described.
- After reviewing the theoretical foundations of the course the user must go to the tab "Trainings" to practical tasks.
- After reading the task one should go into the software portal "Climate" tab and choose "Web-GIS system" to perform necessary calculations.
- To switch to the parameter window of calculation tasks, it is necessary to press the green "+" button in the upper left corner of the window "CLIMATE - Information-computational system for the analysis of climatic and environmental changes" (Fig.9).

Fig.9.

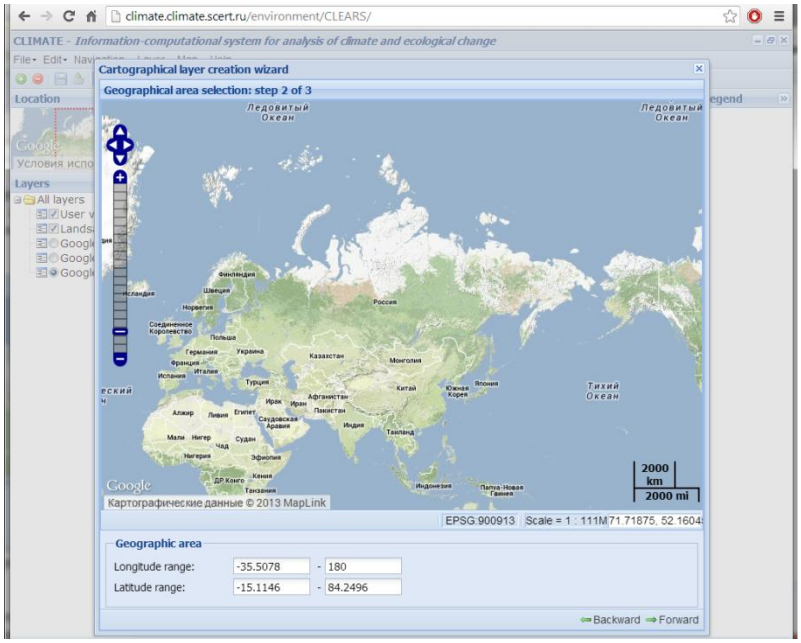
- In the window "Available Layers" click on "Create a new layer".

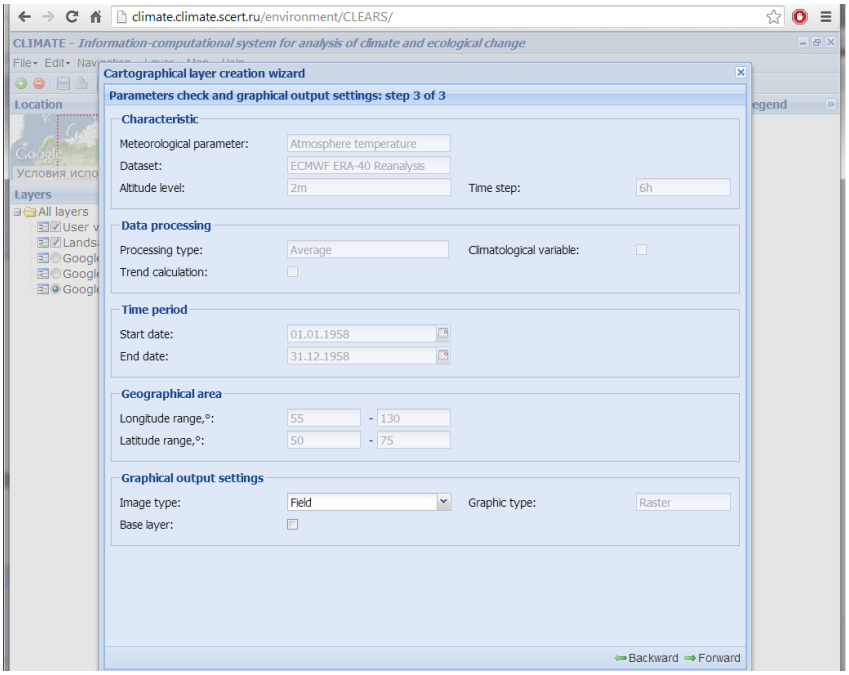


- In the window "Mapping layer wizard" consistently set the calculation characteristics (meteorological parameters, data set, height), a type of data processing, a time interval of the study according to instructions to the lab. Press "Next".



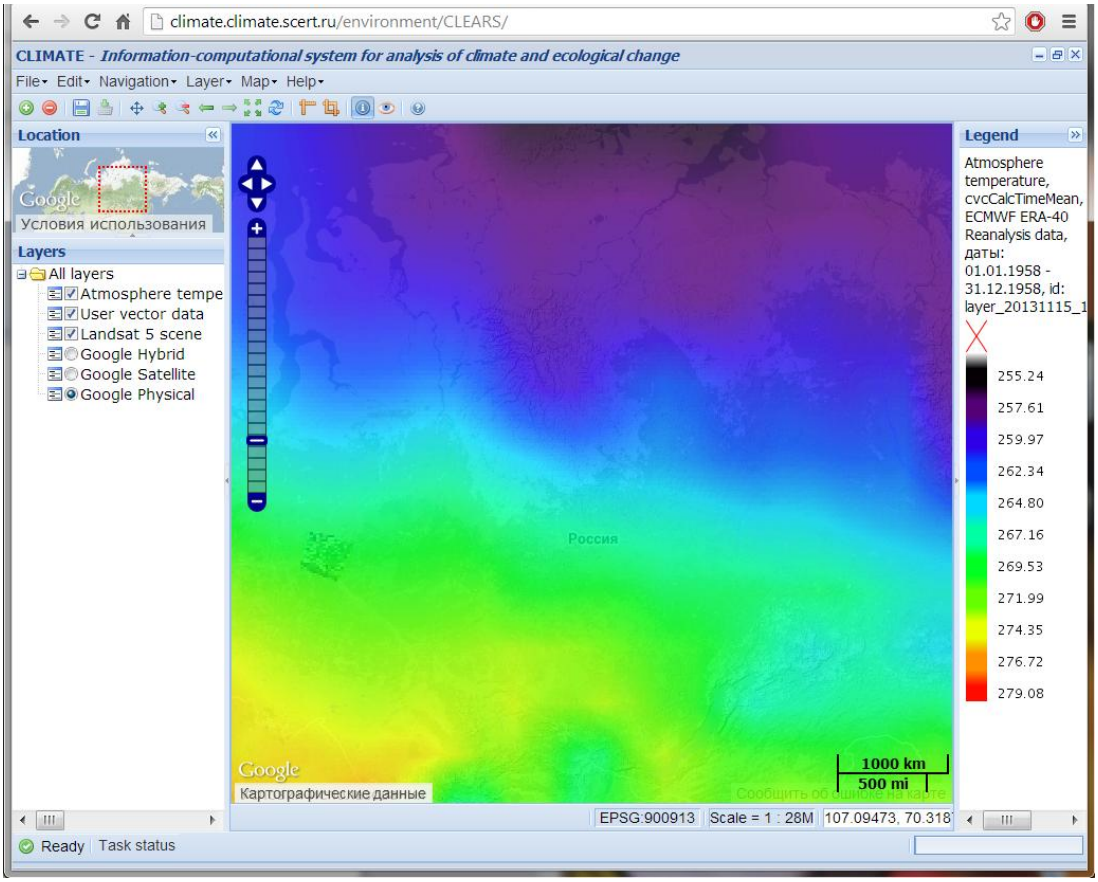
- The next step is to choose the graphics area of research. The area can be defined on the map with the key «Shift» and mouse, as well as manually by specifying the longitude and latitude coordinates ranges. Press "Next".





- At the next stage, the test of set calculation parameters and graphical display is performed.

- Click on "Next" to start the calculation. The resulting climatic characteristics field will automatically appear in the "Layers". It is a two-dimensional color map of the surface, where every color has fixed quantitative values of calculated climatic characteristics. One should check the box near a new layer to trace it on the map.



- To obtain a quantitative value of the calculated climatic characteristics of each individual point, just click on the toolbar button «i» and click the mouse on the point of the geographical area. Information about the selected point: the latitude and longitude for a particular point, the quantitative value of the calculated climatic characteristics will be displayed in a new window.

After completing all the steps of the algorithm, the researcher receives the result of the calculations presented graphically that he needs to interpret according to the set task.

4.0 Conclusions

The main objective of the project is to stimulate involvement of regional research community, especially young scientists, into professional activity in the area of studies of climate change induced extremes in Northern Asia. Its specific objectives comprise the following activities:

1. Organization of the international APN Workshop “Climate change induced extremes in Northern Asia” with enlarged participation of young scientists from the targeted region (Irkutsk, 2012);
2. Preparation on the basis of major Workshop scientific materials and key messages on potential role of climate change induced extremes in Northern Asia sustainable development of information and education resources;
3. Organization of the international NEESPI/SIRS Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes" (Petrozavodsk, 2013) and preparation on the basis of major Workshop scientific materials and key messages on potential role of climate change induced extremes in Northern Asia sustainable development of additional information and education resources;
4. Development and launching the dedicated project web site as a thematic information-educational system providing access for young researchers and the regional decision makers to the prepared resources;
5. Development and making accessible through the web site thematic educational tools aimed at young scientists’ education/training in the area of regional climate change induced extremes analysis thus helping young scientists in development of professional skill.

In course of project carrying out all specific objectives were reached. In particular, the dedicated international APN Workshop “Climate change induced extremes in Northern Asia” with enlarged participation of young scientists from the targeted region was organized (Irkutsk, 2012). Major Workshop scientific and tutorial materials and key messages on potential role of climate change induced extremes in Northern Asia sustainable development as well as additional thematic material summarizing findings of the NEESPI/SIRS Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes" (Petrozavodsk, 2013) are available to young researchers and the regional decision makers via a specially developed and launched dedicated web site (http://project.enviromis.scert.ru/Capacity/). To give the Project a vision, the site was embedded into the ENVIROMIS Network portal (http://enviromis.scert.ru/), which is a special information-computational system providing free Internet access for professionals, students and general public to thematic and general information resources gathered by SCERT in course of carrying out of several APN and EU projects in the area of Environmental Sciences. Both Workshops were embedded into the regular international events ENVIROMIS and CITES, which enlarged the number of young scientists and regional decision makers directly involved and gave the project additional vision. Thematic educational tools aimed at young scientists’ education/training in the area of climate change induced extremes analysis were developed and made accessible through the web site (http://project.enviromis.scert.ru/Capacity/tools/) thus helping young scientists in development of professional skill.

The output of the project contributes directly to the APN Science Agenda, capacity building activities and sustainable development in the targeted region. In particular, the Workshops promoted the

generation and transfer of new findings and methodologies in the area of atmospheric composition, air quality and climate change; it helped to identify and assist in the career development of promising young scientists in the region and their involvement with APN and the community of global change scientists represented at the ENVIROMIS event. The young scientists became a part of an overall network of scientists interested in different aspects of global change in the Northern Asia region.

The above description shows that the performed activity facilitated involvement of regional research community, especially young scientists, into professional activity in the area of studies of climate change induced extremes with special emphasis on their manifestations in Northern Asia.

5.0 Future Directions

To strengthen cooperation between the two large international activities in the region, which are MAIRS and NEESPI with its megaproject SIRS.
To harmonize future NEESPI within emerged Future Earth Program
To initiate and set up some projects for early career scientists (ECS) in area of basic and applied studies of climatic extremes and their impact on Northern Asia environment and population. Experience of the present NASA and RFBR dedicated Calls for ECS Proposals should be explored and improved as much as possible.

References

E.P.Gordov, I.G.Okladnikov, A.G.Titov, V.Yu.Bogomolov, T.M.Shulgina, E.Yu.Genina, 2012: Geo-information system for investigation of regional climatic changes and first results obtained. *Atmospheric and Oceanic Optics*, 2012, **25**, No. 2, 137-143.

E.P.Gordov, V.N.Lykosov, V.N.Krupchatnikov, I.G.Okladnikov, A.G.Titov, T.M.Shulgina, 2013: Computational-information technologies for monitoring and modeling climate changes and their consequences / Novosibirsk: Nauka Publishing House, 2013, 199 pp.

Kunkel, Kenneth E., and Coauthors, 2013: Monitoring and Understanding Trends in Extreme Storms: State of Knowledge. *Bull. Amer. Meteor. Soc.*, 2013, **94**, 499–514,
doi: http://dx.doi.org/10.1175/BAMS-D-11-00262.1

Qianlai Zhuang et al. *2013:* Environ. Res. Lett. **8,** No. 1, 015020, doi:10.1088/1748-9326/8/1/015020

J. W. McClelland, S.E. Tank, R.G.M. Spencer, and A.I. Shiklomanov, 2013: Coordination and sustainability of river observing activities in the Arctic. *Arctic Observing Summit*, 2013.

T.M. Shulgina, E.Yu. Genina and E.P. Gordov, 2011: Dynamics of climatic characteristics influencing vegetation in Siberia. *Environmental Research Letters,* 2011, **6,** 045210 (7pp). doi:10.1088/1748-9326/6/4/045210.

T. Shulgina, E. Gordov, E. Genina, 2013: Temperature extremes dynamics over Siberia: reanalysis data and in-situ observations // Abstract booklet of the conference programme: International Conference on Regional Climate - CORDEX 2013. 4-7 November 2013, Brussels, Belgium. - p. 185.
http://cordex2013.wcrp-climate.org/cordex2013_documents/abstract_book.pdf

A. M.G. Klein Tank, F. W. Zwiers and X. Zhang, 2009, Guidelines on Analysis of extremes in a changing climate in support of informed decisions for adaptation. *Climate Data and Monitoring* WCDMP-No. 72, WMO-TD No. 1500, 56pp.

Zhang, Y.X., S. Sun, S.C. Olsen, M.K. Dubey, and J.H. He, 2011: CCSM3 simulated regional effects of anthropogenic aerosols for two contrasting scenarios: Rising Asian emissions and global reduction of aerosols. Intl. J. Climatol., 31, 95-114, doi:10.1002/joc.2060.

Storch H. von and Zwiers F.W., 1999: Statistical analysis in climate research Cambridge University Press, Cambridge. 484.

Appendix

Conferences/Symposia/Workshops

MAIRS/NEESPI/SIRS APN Workshop "Climate Change induced extremes in Northern Asia", June 27 – July 2, 2012, Irkutsk, Russia

Program

27 June

Introductory

P. Ya. Groisman (UCAR at NOAA/NCDC) and Ailikun (Institute of Atmospheric Physics, CAS)
"Northern Eurasia Earth Science Partnership Initiative and Monsoon Asia Integrated Regional Study in 2011-2012: An Update"

Joint Conference/Workshop Session C5/W1. Environmental and socio-economical consequences of climate change and related extremes. Chair: V.M. Plusnin

Invited reports

C5/W1.1. A. Soja (National Institute of Aerospace, NASA Langley Research Center, Hampton, VA, USA)
"The influence of climate and weather on high-impact fires in Russia and resultant changes in ecosystems"
C5/W1.2. Loboda T.V., French N.H.F., Owen R.C., Koziol B.W., Thelen B., Johnson J., Ginsberg M., Wu S., Billmire M. **(**University of Maryland, Michigan Technological University, San Diego County Health and Humans Services Agency, USA**)**
"The role of satellite observations in assessing impacts of wildfire occurrence on respiratory health of population"

Poster session

28 June

Practical Session (Field trip along the Baikal Lake to examine the state of environment and ongoing coastal processes)

29 June

Joint conference/Workshop session C5/W1. Environmental and socio-economical consequences of climate change and related extremes (continued). Chair: V.M. Plusnin

Lectures

C5/W1.3. Baklanov A. (DMI)
"Rapid urbanisation: atmospheric pollution and climate interactions"

Invited reports

C5/W1.4. Jianlong Li, Chengcheng Gang, Yizhao Chen (Nanjing University, China)
"Correlation Analysis between Herbage Yield and Ecoclimatic Factors and Carbon Storage Accounting of Desert Grassland in Xingjiang, China"
C5/W1.5. Baklanov A. (DMI)
"New approach of integrated physical, chemical and biological weather modeling"

Oral reports

C5/W1.6. Borzenkova A.V., Shmakin A.B. (IG RAS)

”Changes of applied cold season climatological characteristics for 1950-2006 in Russia”
C5/W1.7. Tungalag A., Tsolmon R., Bolortuul B. (National University of Mongolia)
“Monitoring of Land degradation in the mining impacted areas of Mongolia”
C5/W1.8. Batbileg B., Tsolmon R. (National University of Mongolia)
“Monitoring of crop yield in Bornuur soum using leaf area index”
C5/W1.9. Oyunbileg TS. (Mongolian State University of Agriculture)
“Using satellite data for the monitoring survey of soil moisture at the arable land”
C5/W1.10. Robert Kopack (Michigan State University)
“Land Use Change on Nuclear Ground: The Semipalatinsk Nuclear Test Site as Research Laboratory and Traditional Pastureland”
C5/W1.11. Zmijewski K., Becker R. (University of Toledo) “Assessing spatial and temporal variability of water storage within the Aral Sea watershed using GRACE (Gravity Recovery and Climate Experiment) and TRMM (Tropical Rainfall Monitoring Mission) data from 2002-2011”
C5/W1.12. Balakay L., Zakarin E., Mirkarimova B. (JSC "KAZGEOKOSMOS"), Mahura A., Baklanov A., Sorensen Jens H. (DMI)
”Estimation of dioxide sulfur emissions influence from sources in Atyrau region of Kazakhstan on the neighbor States”
C5/W1.13. Razikova I.R. (NIGMI)
”Comparative analysis of the water quality of rivers with different types of sources on the basis of monitoring data in the Republic of Uzbekistan“
C5/W1.14. Usmanova SH.S. (NIGMI)
”Investigation of pollution of surface waters of small rivers of the Fergana valley with nitrogen-containing compounds”
C5/W1.15. Tusseyeva N., Dedova T. (JSC "KAZGEOKOSMOS")
“Construction of the modelling complex for the ecological risks analysis”

Joint Conference/Workshop Session C6/W2. Organizational, observational and ICT infrastructure support of regional scale environmental studies in Northern Asia. Chairs I. Bychkov and V. Krutikov

Lectures
C6/W2.1. T. Loboda **(**University of Maryland**)**
”Analyzing spectral information in satellite imagery”
C6/W2.2. O. Targulyan, S. Mikhaylov, A. Sarychev (Scanex)
”The Art of Thematic Interpretation of Satellite Images”

30 June
Joint Conference/Workshop Session C6/W2. Organizational, observational and ICT infrastructure support of regional scale environmental studies in Northern Asia (continued). Chairs I. Bychkov and V. Krutikov

Invited reports
C6/W2.3. I.V. Bychkov and G.M. Ruzhnikov (ISDCT SB RAS)
”Spatial data infrastructure as a basis for integration of interdisciplinary research of regional environment ”
C6/W2.4. Wyn Cudlip (GeoSeren Ltd.), Efim Kudashev (SRI RAS)
“Remote Sensing and International Co-operation for Virtual Data Centres and Environmental Studies”
C6/W2.5. Csiszar (NOAA), C. Justice, K. Vadrevu, W. Schroeder, L. Giglio, E. Ellicott (University of Maryland)
“New biomass burning observing capabilities from NPP VIIRS for continuing regional fire monitoring in Northern Eurasia”

C6/W2.6. Arutyunyan R.V., Semenov V.N., Sorokovikova O.S., Pripachkin D.A., Dzama D.A.(IBRAE RAN), Rubinstein K.G., Smirnova M.M., Ignatov R.Yu.(Hydrometcenter of RF)
"Application of regional hydrodynamic model WRF-ARW and computer code NOSTRADAMUS to simulate transport of radioactive impurities in the atmosphere using the NPP Fukushima-1 accident as an example. Project system to forecast emergency spread of radionuclides in the atmosphere for operating Russian nuclear power plants (PARRAD)"
C6/W2.7. Dmitriev E.V. (INM RAS), Kozoderov V.V. (MSU), Sokolov A.A. (Université du Littoral Côte d'Opale), Scherbakov M.V. (NPO Lepton), Kamentsev V.P. (TSU)
"Hard- and software system of airborne hyperspectral sensing of natural and man-made environment"
C6/W2.8. Yakubailik O.E., Kadochnikov A.A., Tokarev A.V. (ICM SB RAS)
"Formation of information & computing support for environmental monitoring problems"
C6/W2.9. Polikarpov S.A., Vishnyakov Yu.S., Zhizhchenko A.B., Sotnikov A.N. (CC RAS), Koshkarev A.V., Medvedev A.A. (IG RAS)
"Distributed system for remote sensing data integration in the interest of the Earth science"
C6/W2.10. Krutikov V.A. (IMCES SB RAS)
"Modern informational technologies of climate and ecological monitoring and modeling"
C6/W2.11. Gordov E.P. (IMCES SB RAS, TSU), Bogomolov V.Yu., Genina E.Yu., Gordova Yu.E. (IMCES SB RAS/SCERT), Krupchatnikov V.N. (SibrHRI), Lykosov V.N. (INM RAS, CC MSU), Okladnikov I.G. (IMCES SB RAS, ICT SB RAS), Titov A.G., Shulgina T.M. (IMCES SB RAS/SCERT)
"Web-oriented production and research center "Climate" for monitoring of regional climatic and ecological changes and education support"

Oral reports
C6/W2.13. Martynova Yu. (SibrHRI, IMCES SB RAS), Zaripob R. (Hydrometcentre of RF), Petrov A. (SibrHRI), Krupchatnikov V. (SibrHRI)
"Weather forecasting system for Siberia based upon the WRF ARW model"
C6/W2.14. Abasov N.V. (MESI SB RAS)
"Long-term forecasting and analyzing system GeoGIPSAR of the natural-climatic factors of energetics'
C6/W2.15. Kurbatov G.A., Smirnova M.M. (MSU)
"System for atmospheric boundary layer monitoring in Moscow region"
C6/W2.16. Bazarov A.V., D.D. Darizhapov(IPM SB RAS)
"Information system of processing TOMS ozone and ultraviolet data'
C6/W2.17. Istomina E.I., Voropay N.N., Vasilenko J.V. (IG SB RAS)
"Algorithm of Calculation of Air Temperature at Tunkinskaya Hollow with The Use of Data of Ground Measurements and Landsat Space Images"
C6/W2.18. Batueva E.V., KirbizhekovaI.I. (IPM SB RAS)
"Seasonal changes of polarimetric characteristics of forest"
C6/W2.19. Krasnov O.A. (IAO SB RAS), Maksyutov S. (NIES), Kataev M.Yu., Kataev S.G., and Korobko A.P. (TSUCSR)
"Information system of processing and analysis of measurements of methane and carbon dioxide flow in atmosphere from Vasyugan wetlands"
C6/W2.20. Zolotov S.Yu. (IMCES SB RAS)
"Automated meteorological information and measuring system"
C6/W2.21. Neradovsky L.G. (MPI SB RAS)
"Role and Place of Geophysical Methods in Diagnostics, Control and Regional Prediction of the Thermal State of Permafrost in Siberia and Far East"

Session W3. Meteorological extremes and climate change in Northern Eurasia. Chair P. Groisman

Invited reports

W3.1. Alexeev V.A. (University of Alaska)
"Polar amplification and atmospheric heat transport"

1 July
Joint Conference/Workshop Session C6/W2. Organizational, observational and ICT infrastructure support of regional scale environmental studies in Northern Asia (continued). Chairs I. Bychkov and V. Krutikov

Short oral reports

C6/W2.22. Penenko A.V. (*ICMMG SB RAS*)
"Numerical algorithms for estimating thermal diffusivity of layered medium with application to thermodynamic processes in soil"
C6/W2.23. Kukanova E.A., Konstantinov P.I. (MSU)
"Creating a database of urban underlying surface parameters for high-resolution meteorological models"
C6/W2.24. Firsov K.M. (VSU), Frolkis V.A. (СПГУПС), Kozodoeva E.M., Kozodoev A.V. (IAO SB RAS)
"Information-computational system "Atmospheric radiation". New section for modified radiation code'
C6/W2.25. Zuev D.V., Kashkin V.B. (SFU), Simonov K.V. (ICM SB RAS)
"Data processing of emissions sulfur dioxide in atmospheric"
C6/W2.26. Dagurov P.N., Chimitdorzhiev T.N. (IPM SB RAS)
"Radar interferometry of moist soil"
C6/W2.27. Dorzhiev B.Ch, Ochirov O.N. (IPM SB RAS)
"Studies of seasonal variations in electrical properties of a deciduous forest in the microwave range"
C6/W2.28. Sinyutkina A.A. (SibRIAP RAAS)
"GIS mapping of Tomsk region wetlands"
C6/W2.29. Kataev S.G., Kataev M.Yu. (TSUCSR)
"Mathematical method of compression of multidimensional time series of atmospheric gases distribution"
C6/W2.30. Konoshonkin A., Kustova N., Borovoi A. (IAO SB RAS)
"The application of scanning polarization lidar to observe the changes in clouds"
C6/W2.31. Bykov M.E., Chimitdorzhiev T.N., Tubanov Ts.A., Tatkov G.I., Zakharov A.I., Kirbizhekov I.I., Dmitriev A.V. (IPM SB RAS, ИГ СО РАН, IR RAS)
"Assessment of ice cover horizontal movements of the Baikal Lake on ALOS PALSAR interferometric data"
C6W/2.32. Kolotkov G.A., Penin S.T. (IAO SB RAS)
"Radiometer as an advanced device for monitoring radioactive emission from NPP"
C6/W2.33. Petrov A. (SibrHRI), Blinov D. (Hydrometcenter of RF), Martynova Yu. (SibrHRI, IMCES SB RAS), Zaripov R. (Hydrometcenter of RF), Krupchatnikov V. (SibrHRI)
"Technology mesoscale numerical weather prediction in the Siberian region on the base model COSMO-RU/SIB (7)'
C6/W2.34. Glagolev V.A. Kogan R.M. (CARPI FEB RAS)
"Creation electronic probability maps of emergence fires on the vegetation of natural and anthropogenic factors"
C6/W2.35. Titov A.G., Gordov E.P., Okladnikov I.G.
"Software framework of web-oriented production and research center for monitoring and forecasting of regional climatic and ecological changes and lifelong education support "Climate"
C6/W2.36. Gordova Yu.E., Martynova Yu.V., Titov A.G., Shulgina T.M. (IMCES SB RAS/SCERT)
" Support of education courses within platform "Climate"

Session W3. Meteorological extremes and climate change in Northern Eurasia. Chair P. Groisman

Invited reports

W3.2. Sokolov A., Monier E., Scott J., Forest C. (Pennsylvania State University), Schlosser A. (MIT)
"Possible climate change over Eurasia under different emission scenarios"
W3.3. Groisman P. (NOAA)
"Manifestations of the Ongoing Climate Change in Northern Eurasia"
W3.4. Krupchatnikov V. (SibrHRI), Martynova Yu. (SibrHRI, IMCES SB RAS)
"Investigation of a global climate change influence on Northern Hemisphere storm-track evolution using idealized model of climate system"
W3.5. Shiklomanov A.I., Prusevich A.A. (University of New Hampshire)
"Analysis of hydrological changes across Russia resulted from climate variability and human impact"
W3.6. Perekhodtseva E.V. (Hydrometcenter of RF)
"The automated forecast of the severe squalls and tornadoes over the territory of Russia, included Siberia and Far East, on the base of hydrodynamic-statistical forecast models"
W3.7. Rong Liu, Jun Wen, Xin Wang (CAREERI)
"Net radiation estimated from the geostationary satellite at all sky cases over the source region of the Yellow River"

Oral reports

W3.8. Shiryaev M.V., Rubinstein K.G. (Hydrometcenter of RF)
"Methods for forecasting the hazard categories of meteorological events"

Poster session

2 July
Session W4. Drought and Flood Extremes. Chairs Dr. Jianlong Li and P. Groisman

Invited reports

W4.1. Groisman P. (NOAA)
"Extreme events (droughts, wild fire, and downpours) over Northern Asia: Climatology, trends, and possible future changes"
W4.2. Renchin Tsolmon (Ulaan-Baator Universiry)
"Historic fire regime modeling elements using GIS and Remote Sensing"
W4.3. Peng Shi (Hohai University, Texas A&M University), Yuanbing Hou, Qiongfang Li, Zhicai Zhang, Simin Qu, Chao Chen, Tao Cai, Xiuqin Fang (Hohai University)
"Effects of land-use and climate change on hydrological processes in the upstream of Huai River, China"
W4.4. Wu Zhang (Lanzhou University), Qingyun ZHAO (Lanzhou Central Meteorological Observatory), Jianping Huang (Lanzhou University)
"Analysis of the Characteristics of Dust Event Occurred in the Hexi Corridor, China"

Oral reports

W4.5. Voropai N.N. Maksyutova E.V. Balybina A.S. (IG SB RAS)
"Analysis and Reconstruction of Droughts and Waterlogging Periods in the Baikal Natural Region"

W4.6. Kaif Gill, Irfan Ashraf, Urooj Saeed, Naeem Shahzad (Pakistan WWF)
"Pre and Post Flood Assessment through Space Technology"

Session W5. Geosphere-biosphere interactions and related extremes. Chair V. Zuev

Invited reports

W5.1. Zuev V. (IMCES SB RAS)
"A new look at impact mechanisms of volcanogenic disturbance of the stratosphere on climate and ecological systems ".
W5.2. Xiaodong Chen, Theodore J. Bohn, Dennis P. Lettenmaier (University of Washington)
"Model estimates of Pan-Arctic lake and wetland methane emissions"
W5.3. Jianlong Li, Chengcheng Gang, Yizhao Chen (Nanjing University, China)
"Advances in the Carbon Source/Sink Researches of Typical Grassland Ecosystem in China"

Short oral reports

W5.4. Savel'eva E.S., Zuev V.V., Zueva N.E (IMCES SB RAS)
"Intensification of Antarctic ozone hole by volcano effect"
W5.5. Shelekhova E.A., Zuev V.V. (IMCES SB RAS), Semenov V.A. (IAF RAN, Helmholz Marine Center, MSU)
"Climate response in the north part of Eurasia to a decrease in oceanic heat transport in the North Atlantic and Barents Sea"

Round table with representatives of regional environmental decision-makers
APN CAPABLE Project "Climate change induced extremes": Targeted to decision-makers and young scientists education & training activities Organizers E.Gordov and P Groisman

Conference and Workshop Closing Remarks

List of the Workshop participants

Baklanov A.A.	Danish Meteorological Institute, Denmark , Lyngbyvej 100, DK-2100 Copenhagen , Tel. +45 3915 7500, e-mail: alb@dmi.dk
Genina E.Yu.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: genina@imces.ru
Kudashev E.B.	Space Research Institute, Space Research Institute, 84/32 Profsouznaya str., Moscow, 117997, Russia, e-mail: eco@iki.rssi.ru
Zhang Tangtang	Cold and Arid Regions Environmental and Engineering Research Institute, China, e-mail: ttzhang@lzb.ac.cn
Zhang Wu	Lanzhou University, South Road #222, Lanzhou, Gansu, 730000, P.R.China, Phone/Fax Number: 86-931-8915695, e-mail: wzhang@lzu.edu.cn
Li Jianlong	College of Life Science,Nanjing University, No.22 Hankou Road, Nanjing City, Jiangsu province, China, e-mail: jlli2008@nju.edu.cn
Renchin Tsolmon	NUM-ITC-UNESCO laboratory for Remote Sensing and GIS, National University of Mongolia, Building 1, Street of university, Ulaanbaatar, 210646 Mongolia Tel +976-77307730-1311, Fax +976-11-329993

	e-mail: tzr112@psu.edu
Amar Tungalag*	NUM-ITC-UNESCO laboratory for Remote Sensing and GIS, National University of Mongolia, Building 1, Street of university, Ulaanbaatar, 210646 Mongolia Tel +976-77307730-1311, Fax +976-11-329993 e-mail: amar_tungalag@num.edu.mn
Vova Oyudari*	NUM-ITC-UNESCO laboratory for Remote Sensing and GIS, National University of Mongolia, Building 1, Street of university, Ulaanbaatar, 210646 Mongolia Tel +976-77307730-1311, Fax +976-11-329993 e-mail: tzr112@psu.edu
Batsukh Bolortuul*	NUM-ITC-UNESCO laboratory for Remote Sensing and GIS, National University of Mongolia, Building 1, Street of university, Ulaanbaatar, 210646 Mongolia Tel +976-77307730-1311, Fax +976-11-329993 e-mail: tuul_bolor@yahoo.com
Razikova Iroda*	Departmenbt of Environmental Pollutions' Research and Prediction, Hydrometeorological Research Institute (NIGMI) Uzbekistan, Tashkent, 72, Makhsumov str., tel: (99871) 2331150, fax: (99871) 2331150 e–mail: nigmi@albatros.ru , iroda_2215@mail.ru
Titov A.G.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: tag@scert.ru
Soja Amber	National Institute of Aerospace, NASA Langley Research Center, USA, NASA Langley Research Center (LaRC) 21 Langley Boulevard, Mail Stop 420, Hampton, VA 23681-2199; Phone: (757) 864-5603 Fax: (757) 864-7996 , e-mail: Amber.J.Soja@nasa.gov
Shiklomanov Alexander	Water Systems Analysis Group, Earth Systems Research Center, Institute for the Study of Earth, Ocean, and Space, Morse Hall, University of New Hampshire, Durham, NH 03824, USA Telephone- 1-603-862-4387, e-mail- alex.shiklomanov@unh.edu
Loboda Tatiana	Department of Geographical Sciences, University of Maryland, USA, 2181 LeFrak Hall, College Park, MD 20742, email: **loboda@umd.edu**, phone: 1-301-405-8891
Alexeev Vladimir	Vladimir A. Alexeev, International Arctic Research Center, University of Alaska Fairbanks, 930 Koyukuk Drive, Fairbanks, AK 99775, USA, e-mail: valexeev@iarc.uaf.edu
Zmijewski Kirk*	The University of Toledo, Department of Environmental Sciences 2801 Bancroft St. M.S. 604, Toledo, Ohio, 43607 United States Tel. 734-731-2960, e-mail: kirk.zmijewski@rockets.utoledo.edu

	e-mail: kirk.zmijewski@rockets.utoledo.edu
Sokolov Andrey	Massachusetts Institute of Technology, Center for Global Change Science, Cambridge, MA, United States, Ph. (617) 253-6691 Fax (617)253-9845, e-mail: sokolov@MIT.EDU
Gordova Yu. E.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: yulia@scert.ru
Shulgina T.M.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: stm@scert.ru
Bogomolov V.Yu.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: bogomolov@scert.ru
Okladnikov I.G.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: oig@scert.ru
Savelieva E.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, e-mail: kapitosha89@gmail.com
Martynova Yu.V.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: foxy@scert.ru
Podnebesnykh N.V.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822 491944, e-mail: podnebesnykhnv@inbox.ru
Gordov E.P.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: gordov@scert.ru
Krutikov V. A.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: krutikov@imces.ru
Zuev V. V.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, phone +73822492187, fax +73822492537, e-mail: vvzuev@imces.ru
Dyukarev E. A.	Institute of Monitoring of Climatic and Ecological Systems SB

	RAS, Akademicheskii ave. 10/3, Tomsk, Russia, tel. +73822492187, fax +73822492537, e-mail: egor@imces.ru
Lokhov S.K.*	V.B. Sochava Institute of Geography SB RAS, Irkutsk, Ulan-Batorskaya st. 1, Russia, e-mail: shukhrat_l@mail.ru
Solodyankina S.V.*	V.B. Sochava Institute of Geography SB RAS, Irkutsk, Ulan-Batorskaya st. 1, Russia, e-mail: sveta@irigs.irk.ru
Zolotov S.Yu.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Akademicheskii ave. 10/3, Tomsk, Russia, e-mail: zolotov@asu.tusur.ru
Vasilenko O.V.*	V.B. Sochava Institute of Geography SB RAS, Russia, Irkutsk Ulan-Batorskaya St., 1, Phone +73952426920, fax +73952422717 , e-mail: oksa_na85@mail.ru
Istomina E.A.*	V.B. Sochava Institute of Geography SB RAS, Irkutsk, Ulan-Batorskaya Str. 1 e-mail: elena@irigs.irk.ru
Plyusnin V. M.	V.B. Sochava Institute of Geography SB RAS, Irkutsk, Ulan-Batorskaya Str. 1 e-mail: plyusnin@irigs.irk.ru
Voropay N. N.	V.B. Sochava Institute of Geography SB RAS, Irkutsk, Ulan-Batorskaya Str. 1 e-mail: voropay_nn@mail.ru
Cherkashin A. K.	V.B. Sochava Institute of Geography SB RAS, Irkutsk, Ulan-Batorskaya Str. 1 e-mail: cherk@mail.icc.ru
Mordvin E.Yu.	Altai State University, Radiophysics and theoretical physics department, Altai krai, Barnaul, Lenin ave., 61, phone +7-3852-36-70-75, fax (3852) 66-76-26, e-mail: mordvin@theory.asu.ru
Marchenko O. Yu.	Energy Systems Institute SB, RAS, Irkutsk, Lermontov st., 130, тел.: (3952) 424 700, e-mail: olgayumarchenko@gmail.com
Mordvinov V. I.	Institute of Solar-Terrestrial Physics SB RAS, Irkutsk p/o box 291; Lermontov st., 126a, tel.: (3952) 564520, fax: (3952) 51-16-75, e-mail: v_mordv@iszf.irk.ru
Oznobikhina O. A.	Institute of Solar-Terrestrial Physics SB RAS, Irkutsk p/o box 291; Lermontov st., 126a, tel.: (3952) 564520, fax: (3952) 51-16-75, e-mail: ozn_olesya@yandex.ru

Devyatova E. V.	Institute of Solar-Terrestrial Physics SB RAS, Irkutsk p/o box 291; Lermontov st., 126a, tel.: (3952) 564520, fax: (3952) 51-16-75, e-mail: devyatova@iszf.irk.ru
Vysotskaya G. S.	Institute of Computational Modeling of SB RAS, Krasnoyarsk, Akademgorodok, tel. +7-3912494834, e-mail: g_vys@rambler.ru
Yakubailik O. E.	Institute of Computational Modeling of SB RAS, Krasnoyarsk, Akademgorodok, tel. +7-3912494834, e-mail: oleg@icm.krasn.ru
Panov A.V.*	V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Akademgorodok ,50/28, Tel. +7 (391) 249-44-47, fax +7 (391) 249-36-86, e-mail: alexey.v.pavov@gmail.com
Timokhina A. V.*	V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Akademgorodok ,50/28, Tel. +7 (391) 249-44-47, fax +7 (391) 249-36-86, e-mail: nastimoti@mail.ru
Prokushkin A. S.	V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Akademgorodok ,50/28, Tel. +7 (391) 249-44-47, fax +7 (391) 249-36-86, e-mail: prokushkin@ksc.krasn.ru
Makhnykina A. V.*	Siberian Federal University, Krasnoyarsk, Svobodny av., 72, e-mail: sunlife1408@yandex.ru
Sergeeva O. V.*	Siberian Federal University, Krasnoyarsk, Svobodny av., 72, e-mail: magic192005@yandex.ru
Zuev D. V.*	Siberian Federal University, Krasnoyarsk, Svobodny av., 72, e-mail: dmvzuew@yandex.ru
Morozova P. A.*	Institute of Geography RAS, Moscow, Staromonetny St., 29, e-mail: morozova_polina@mail.ru
Borzenkova A. V.*	Institute of Geography RAS, Moscow, Staromonetny St., 29, e-mail: alexandra_borzenkova@mail.ru
Toropov P. A.	Moscow State University, Moscow, GSP-1, Leninskie gory, e-mail: tormet@inbox.ru
Sergeev D. E.*	Moscow State University, Moscow, GSP-1, Leninskie gory, e-mail: dennis.sergeev@gmail.com
Stepanenko V. M.	Moscow State University, Moscow, GSP-1, Leninskie gory, e-mail: stepanen@srcc.msu.ru

Kurbatov G.A.*	Moscow State University, Moscow, GSP-1, Leninskie gory, e-mail: kurbatov_ga@physics.msu.ru
Eliseev A. V.	A.M. Obukhov Institute of Atmospheric Physics RAS, Moscow, 3 Pyzhevsky, tel.: +7 (495) 951-5387, fax: +7 (495) 953-1652, e-mail: eliseev@ifaran.ru
Zavalishin N. N.	A.M. Obukhov Institute of Atmospheric Physics RAS, Moscow, 3 Pyzhevsky, tel.: +7 (495) 951-5387, fax: +7 (495) 953-1652, e-mail: nickolos@ifaran.ru
Moiseenko K. B.	A.M. Obukhov Institute of Atmospheric Physics RAS, Moscow, Pyzhevsky, 3, tel.: +7 (495) 951-5387, fax: +7 (495) 953-1652, e-mail: konst.dvina@mail.ru
Gritsun A.S.	Institute of Numerical Mathemathics, Moscow, Gubkina str., 8, tel. +7(495)9381769, fax +7(495)9381821, e-mail: asg@inm.ras.ru
Dmitriev E.V.	Institute of Numerical Mathemathics, Moscow, Gubkina str., 8, tel. +7(495)9381769, fax +7(495)9381821, e-mail: yegor@mail.ru
Ushakov K.V.*	P.P Shirshov Institute of Oceanology of the Russian Academy of Sciences. 117997, Moscow, Nakhimovsky prospekt, 36. Tel. +7 499 1247394, fax +7 499 1245983, e-mail: ushakovkv@mail.ru
Korzh V.D.	P.P Shirshov Institute of Oceanology of the Russian Academy of Sciences. 117997, Moscow, Nakhimovsky prospekt, 36. Tel. +7 499 1247394, fax +7 499 1245983, e-mail: okean41@mail.ru
Smirnova M. M.*	Hydrometcenter of Russia, Moscow, B. Predtechenskii line, 9-11, tel. +7-910-4858958, fax +7(499)2551285, e-mail: marj_a@mail.ru
Sorokovikova O.S.	Nuclear Safety Institute RAS, Moscow, Bol'shaya Tul'skaya str., 52, tel. +7 495 955-22-86, fax +7 495 958-11-51, e-mail: olga_sorokov@mail.ru
Dzama D.V.*	Nuclear Safety Institute RAS, Moscow, Bol'shaya Tul'skaya str., 52, tel. +7 495 955-22-86, fax +7 495 958-11-51, e-mail: ddv@ibrae.ac.ru
Polikarpov S. A.	Dorodnitsyn Computing Center RAS, Moscow, Vavilova str., 40,

	tel. +7-(495) 938-16-93, fax +7- (495) 938-14-66 e-mail: polik@vmail.ras.ru
Kuzin V.I.	Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Academician Lavrentiev av., 6, tel. +7 383 3306152, fax +7 383 3308783, e-mail: kuzin@sscc.ru
Yudin M.S.	Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Academician Lavrentiev av., 6, tel. +7 383 3306152, fax +7 383 3308783, e-mail: m.yudin@ommgp.sscc.ru
Yusupova D.F.*	Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Academician Lavrentiev av., 6, tel. +7 383 3306152, fax +7 383 3308783, e-mail: yusupova.dina.f@gmail.com
Penenko V. V.	Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Academician Lavrentiev av., 6, tel. +7 383 3306152, fax +7 383 3308783, e-mail: penenko@ommgp.sscc.ru
Krupchatnikov V.N.	Siberian Regional Hydrometeorological Research Institute, Novosibirsk, Sovetskaya st., 30, e-mail: vkrupchatnikov@yandex.ru
Kurbatsky A.F.	Khristianovich Institute of Theoretical and Applied Mechanics SB RAS, Novosibirsk, e-mail: albert.kurbat@yandex.ru
Maximova T. A.*	Institute of Chemical Kinetics and Combustion SB RAS, Novosibirsk, Institutskaya str., 3, tel. +7 (383) 333-15-19, fax +7(383) 330-73-50, e-mail: vanadiumum@gmail.com
Klimova E.G.	Institute of Computational Technologies SB RAS, Novosibirsk, Ac. Lavrentiev ave., 6, tel. +7-(8383)324257, fax +7-(3832)341342, e-mail: klimova@ict.nsc.ru
Kilanova N. V.	Institute of Computational Technologies SB RAS, Novosibirsk, Ac. Lavrentiev ave., 6, tel. +7-(8383)324257, fax +7-(3832)341342, e-mail: kilanova@ict.nsc.ru
Molorodov Yu.I.	Institute of Computational Technologies SB RAS, Novosibirsk, Ac. Lavrentiev ave., 6, tel. +7-(8383)324257, fax +7-(3832)341342, e-mail: yumo@ict.nsc.ru
Kopylov V. N.	Centre (RIHMI-WDC), Obninsk, Koroleva str., 6, tel. +7-(848439) 6-40-85, fax +7- (48439) 6-86-11, e-mail:

	kvn@meteo.ru
Klimeshina T. E. *	Institute of Atmospheric Optics SB RAS, Tomsk, Ac Zuev sq., 1, tel. +7- (3822) 492277, fax +7-(3822)492086, e-mail: klimeshina@sibmail.com
Kozodoev A. V.	Institute of Atmospheric Optics SB RAS, Tomsk, Ac Zuev sq., 1, tel. +7- (3822) 492277, fax +7-(3822)492086, e-mail: kav@iao.ru
Arshinov M. Yu.	Institute of Atmospheric Optics SB RAS, Tomsk, Ac Zuev sq., 1, tel. +7- (3822) 492277, fax +7-(3822)492086, e-mail: michael@iao.ru
Sinyutkina A.A.*	Siberian Research Institute of Agriculture and Peat of Russian Academy of Agricultural Sciences, Tomsk, Gagarina Str., 3, tel. 8(3822)527541, e-mail: ankalaeva@yandex.ru
Batueva E. V.	Institute of Physical Materials Science of the SB RAS, Ulan-Ude, Sakhyanova st., 6, tel. +7- (3012)433285; fax (3012)433224, e-mail: elizavlad@mail.ru
Dembelov M.	Institute of Physical Materials Science of the SB RAS, Ulan-Ude, Sakhyanova st., 6, tel. +7- (3012)433285; fax (3012)433224, e-mail: mdembelov@yandex.ru
Dagurov P.N.	Institute of Physical Materials Science of the SB RAS, Ulan-Ude, Sakhyanova st., 6, tel. +7- (3012)433285; fax (3012)433224, e-mail: dpn@pres.bscnet.ru
Bykov M.E.*	Institute of Physical Materials Science of the SB RAS, Ulan-Ude, Sakhyanova st., 6, tel. +7- (3012)433285; fax (3012)433224, e-mail: evgomod@yahoo.com
Neradovsky L. G.	P.I. Melnikov Permafrost Institute SB RAS, Yakutsk, Merzlotnaya St. 36, tel. +7- 8(411-2) 36-00-72, e-mail: leoner@mpi.ysn.ru
Zilitinkevich S.	Finnish Meteorological Institute, P.O. BOX 503 FI-00101 HELSINKI, FINLAND, **tel. +358 29 539 1000**
Cudlip W.	GeoSeren Ltd., Great Britain, e-mail: wcudlip@geoseren.com
Klehmet K.*	Institute of Coastal Research, Max-Planck-Straße 1, 21502 Geesthacht, Germany, fax: 0049 - (0)4152 87-41836 tel: 0049 - (0)4152 87-1836, e-mail: Katharina.Klehmet@hzg.de

	e-mail: Katharina.Klehmet@hzg.de
Zeller B.	UR 1138 Biogeochemistry in Forest Ecosystems INRA de Nancy, Route d'Amance, 54280 Champenoux, fax: 0033 3 83 39 40 69, tel.: 0033 3 83 39 40 77, e-mail: zeller@nancy.inra.fr
Sokolov A. A.	Université du Littoral Côte d'Opale & Univ Lille Nord de France, 189A Avenue Maurice Schumann - 59140 Dunkerque, France, fax : +33 (0)3 28 65 82 44, e-mail: msaa@mail.ru
Groisman P. Ya.	UCAR at NOAA National Climatic Data Center, USA, e-mail: pasha.groisman@noaa.gov
Csiszar I.	NOAA/NESDIS Center for Satellite Applications and Research E/RA2 WWB Room 711, 5200 Auth Road, Camp Springs MD 20746 USA, tel.: (1) 301-763-8053 x 114, fax: (1) 301-763-8580, e-mail: ivan.csiszar@noaa.gov

Note. Asterisk denotes young scientist.

Young Scientists School, 25 – 30 August, 2013, Petrozavodsk, Russia

Program

25 August

1. Key lectures

V.P. Dymnikov (INM RAS, Moscow) Interaction of atmosphere and ocean on different time and space scales
V.B. Zalesny (INM RAS, Moscow). Modeling of ocean, seas and inland water bodies dynamics

26 August

G.K. Korotaev (Marine Hydrophysical Institute of the National Academy of Sciences of Ukraine, Sevastolpol). System of hydro-physical fields assimilation
V.N. Lykossov (INM RAS, Moscow). Regional aspects of atmosphere and hydrosphere interaction
V.V. Mazalov (nstitute of Applied Mathematical Research KRC RAS, Petrozavodsk). Models of dynamical and evolutional games in ecology problems
N.G. Iakovlev (INM RAS, Moscow). Climatic problems of Arctic's and Sub-arctic's

27 August

N.A. Diansky (INM RAS, Moscow) Short-term response of mid-latitude upper ocean layer on atmospheric impact

2. Thematic lectures

E.M. Volodin (INM RAS, Moscow). Long-term variability in climatic system

Training

28 August

E.P. Gordov (SCERT, IMCES SB RAS). Information technologies in problems of climate modeling and climatic changes analysis
A.S. Gritsun (INM RAS, Moscow). Study of ocean circulation sensitivity on the basis of fluctuation-dissipation theorem

Training

29 August

L.A. Rukhovets (Saint-Petersburg Economic Mathematical Institute RAS), N.N. Filatov (Northern Water Problems Institute KarRC of RAS). Modeling of Ladoga and Onega Lakes climatic circulation
D.V. Chalikov (Saint-Petersburg department of Institute of Oceanology RAS). Modeling of surface waves I

Training

30 August

D.V. Chalikov (Saint-Petersburg department of Institute of Oceanology RAS). Modeling of surface waves II
M.A. Tolstykh (INM RAS, Moscow). Numerical weather forecast based on coupled atmosphere and ocean models

NEESPI/SIRS Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes", September 3-5, 2013, Petrozavodsk, Russia

Program

3 September

Session 1. Climate modeling and analysis (Joint with CITES)

Invited reports
1.Penenko V.V., Tsvetova E.A., Penenko A.V. Advanced variational modeling technologies for environmental studies
2.Perekhodtseva E.V. On the operative hydrodynamic-statistical forecast of summer storm winds and heavy precipitation over the northwest Russia including territory of Karelia

Oral reports
1.Moraru E.I., Loginov S.V., Ippolitov I.I. Variability of trends of ocean surface temperature, heat fluxes and effective radiation in Northern Atlantics over 1975-2011 global warming period.
2.Ushakov K., Ibrayev R. Simulation of the World Ocean climate by means of the INM – IO RAS numerical model.

Lectures
1.Andrei Sokolov, Erwan Monier, Adam Schlosser, Jeff Scott and Xiang Gao. Studying different sources of uncertainty in the projection of the future climate change over Northern Eurasia.

2.Larissa Nazarenko, Nick Tausnev, and Gavin Schmidt. Simulation of the Present and Future Climate Change with the GISS ModelE2

Oral reports

3.Borzenkova A.V., Shmakin A.B. Changes of climatological conditions of automobile transport functioning in north of European part of Russia

4. Shtabkin Yu. A., Moiseenko K. B. Seasonal variations of CO and NO_x near-surface concentrations in central Siberia: observations and model simulations

Short oral reports

1. Martynova Yu.V., Krupchatnikov V.N. The influence of anthropogenic climate forcing on some storm track characteristics in the Northern Hemisphere
2. Morozova P.A., Kislov A.V. Response of mounting glaciation to climate variations: stochastic approach

4 September

Session 2. Dynamics of the land surface in the high latitudes of Eurasia and the Arctic Ocean.

Invited reports

1. Groisman P.Ya. and Lawford R.G. Northern Eurasia Earth Science Partnership Initiative (NEESPI) in the past two years

2. Shiklomanov A.I., Prusevich A.A. Modeling hydrological processes across Northern Eurasia with a new Water Balance Model - Transport from Anthropogenic and Natural Systems (WBM-TrANS)

Lecture

1. Qianlai Zhuang Land-use and land-cover changes and their effects on carbon and water cycling in Northern Eurasia

Invited reports

3. Marchenko S., Wisser D., Romanovsky V., Chapman W., Frolking S., Walsh J. E. Coupled Hydrological and Thermal Modeling of Permafrost and Active Layer Dynamics: Implications to Permafrost Carbon Pool in Northern Eurasia

4. Charles R. Lane, Hongxing Liu, Oleg Anenkhonov, Brad Autrey, and Victor Chepinoga. Using high-resolution multispectral WorldView-2 imagery and Indicator Species Analysis to map freshwater deltaic wetlands

Session 3. New areas of research of Northern Eurasia environment (with an emphasis on the study of extreme weather events)

Invited reports

1. Ailikun. MAIRS Review

2. Krutikov V.A., Zuev V.V., Gordov E.P. Arctic dimension of research at the Institute of Monitoring of Climatic and Ecological Systems (IMCES) of the Siberian Branch of RAS

Oral report

1.Shulgina T.M., Gordov E.P. Temperature and precipitation extreme changes in Siberia

5 September

Round-table discussion “Role of modeling in integrated assessment of contemporary and future environmental changes over Northern Eurasia” (Joint with CITES)

Session 4. Core environmental activities in Northern Eurasia

1. Gutman G., Groisman P. The NASA LCLUC Program in Northern Eurasia: An Update
2. Gordov, E.P. Siberia Integrated Regional Study: the state of the art and projections
3. Gordova Yu., MartynovaYu., Shulgina T., Titov A., Genina E., Gorbatenko V., Gordov E., Groisman P., Lykossov V. NEESPI/SIRS capacity building program: from CITES/ENVIROMIS YS conferences to continuous learning on the base of web-GIS platform “Climate”

Writing the papers (*EOS; draft of strategic plan for the post-NEESPI period in the northern half of the NEESPI domain*)

Participants of CITES-2013 event and NEESPI/SIRS Workshop "Different aspects of the Northern Eurasia regional climate dynamics and its interrelations with global processes"

Dymnikov V.P.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: dymnikov@inm.ras.ru
Lykossov V. N.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: lykossov@inm.ras.ru
Zalesny V.B.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: zalesny@inm.ras.ru
Tolstykh M.A.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: tolstykh@inm.ras.ru
Iakovlev N.G.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: iakovlev@inm.ras.ru
Diansky N.A.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: dinar@inm.ras.ru
Volodin E.M.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: volodin@inm.ras.ru
Gritsun A.S.	Institute for Numerical Mathematics RAS, Moscow, Gubkina Str., 8, tel. (495)9848120, fax (495)9898023, e-mail: asg@inm.ras.ru
Shtabkin Yu.A.*	A.M.Obukhov Institute of Atmospheric Physics RAS, Moscow, Pyzhyovskiy pereulok, 3, tel. 8(495)953-37-62, e-mail: yuryshtabkin@gmail.com
Perekhodtseva E.V.	Hydrometcenter of Russia (Moscow, B. Predtechenskii line, 9-11, Fax +7(499)2551285, Tel. +7(499)7952248, e-mail: perekhod@mecom.ru
Morozova P.A.*	Institute of Geography RAS, Moscow, Staromonetny St.,

	29, e-mail: morozova_polina@mail.ru
Borzenkova A.V.*	Institute of Geography RAS, Moscow, Staromonetny St., 29, e-mail: alexandra_borzenkova@mail.ru
Georgiadi A.G.	Institute of Geography RAS, Moscow, Staromonetny St., 29
Konstantinov P.I.*	Lomonosov Moscow State University, Moscow, GSP-1, Leninskye Gory, tel.: (495) 9392942, fax: (495) 9328836, e-mail: kostadini@mail.ru
Ushakov K.V.*	P.P Shirshov Institute of Oceanology, Moscow, Nakhimovsky ave., 36, tel. +7-(499)124-73-94, fax (499)124-59-83, e-mail: ushakovkv@mail.ru
Ol'chev A.V.	A.N. Severtsov Institute of Ecology and Evolution, Moscow, Leninsky ave., 33, e-mail: aoltche@yandex.ru
Vargin P.N.	Central Aerological Observatory, Dolgoprudny, Moscow region, e-mail: p_vargin@mail.ru
Dmitry V. Chalikov	St-Petersburg Branch of P. P. Shirshov Institute of Oceanology of RAS, St. Petersburg, e-mail: dmitry-chalikov@yandex.ru
Monzikova A.K.*	Russian State Hydrometeorological University, St-Petersburg, Malookhtisky ave., 98, tel. +7- (812) 372-50-92, fax +7- (812) 444-60-90, e-mail: monzik@rshu.ru
Frol'kis V.A.	Petersburg State Transport University, St-Petersburg, e-mail: VFrolkis@VF13868.spb.edu
Kadochnikov A.A.*	Institute of Computational Modeling SB RAS Krasnoyarsk, Akademgorodok, tel.: +7 (391) 243–27–56, fax: +7 (391) 290–74–76, e-mail: scorant@icm.krasn.ru
Kurbatsky A.F.	Khristianovich Institute of Theoretical and Applied Mechanics SB RAS, Novosibirsk, e-mail: albert.kurbat@yandex.ru
Penenko A.V.*	Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Akad. Lavrentjev ave., 6, tel. (+7 383)3306152, fax (+7 383)3308783, e-mail: aleks@ommgp.sscc.ru
Martynova Yu.V.*	Siberian Regional Hydrometeorological Research Institute, Novosibirsk, Sovetskaya str., 30, e-mail: foxyj13@gmail.com
Arzhanova N.M.*	Centre (RIHMI-WDC), Obninsk, Koroleva str., 6, tel. +7-(848439) 6-40-85, fax +7- (48439) 6-86-11, e-mail: ashatan84@mail.ru
Filatov N.N.	*Institute of Northern Water Problems, Karelian Research Center of RAS, Petrozavodsk, Alexander Nevsky ave.,* 50, tel. +7- (814-2) 576381, fax +7- (814-2) 578464, e-mail: nfilatov@rambler.ru
Zdorovennova G.	*Institute of Northern Water Problems, Karelian Research Center of RAS, Petrozavodsk, Alexander Nevsky ave.,* 50, tel. +7- (814-2) 576381, fax +7- (814-2) 578464, e-mail: zdorovennova@gmail.com
Pridacha V. B.	Forest Research Institute, Karelian Research Centre of

	RAS, Petrozavodsk, Pushkinskaya St., 11, tel. +7 (8142) 768160, fax +7 (8142) 768160, e-mail: pridacha@krc.karelia.ru
Sazonova T.A.	Forest Research Institute, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya St., 11, tel. +7 (8142) 768160, fax +7 (8142) 768160, e-mail:alt86@rambler.ru
Mazalov V.V.	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13, e-mail: vmazalov@krc.karelia.ru
Kostikova E.K.*	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13, e-mail: eka-fe@mail.ru
Rettieva A.N.*	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13, e-mail: annaret@krc.karelia.ru
Pavlov Yu.L.	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13, e-mail: pavlov@krc.karelia.ru
Leri M.M.	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13, e-mail: leri@krc.karelia.ru
Ivashko A.A.*	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13, e-mail: aivashko@krc.karelia.ru
Khvorostyanskaya E.V.	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13, e-mail: cher@krc.karelia.ru
Smirnov N.V.*	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk, Pushkinskaya str., 11, tel. +7 (8142) 78-11-08, fax +7 (8142) 76-63-13
Kisternaya M.V.	The Kizhi State Open-air Museum, Petrozavodsk, Neglinskaya str., 23, tel. +7- (8142) 593400, e-mail: kisternaya@kizhi.karelia.ru
Korotaev G.K.	Marine Hydrophysical Institute Ukraine NAS, Sevastopol', Kapitanska Str., 2, tel. (+380 692) 54 0452, Fax: (+380 692) 55 4253, e-mail: gkorotaev@gmail.com
Gordov E.P.	Siberian Center for Environmental Research and Training, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492187, fax +7-3822-492537, e-mail: gordov@scert.ru
Zuev V.V.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492265, fax +7-3822-491950, e-mail: vvzuev@imces.ru

Dyukarev E.A.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492265, fax +7-3822-491950, e-mail: egor@imces.ru
Gordova Yu.E.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492265, fax +7-3822-491950, e-mail: office@scert.ru
Genina E.Yu.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492265, fax +7-3822-491950, e-mail: genina@imces.ru
Okladnikov I.G.*	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492265, fax +7-3822-491950, e-mail: oig@scert.ru
Shulgina T.M.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492265, fax +7-3822-491950, e-mail: stm@scert.ru
Moraru E.I.	Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Akademichesky ave., 10/3, tel. +7-3822-492265, fax +7-3822-491950, e-mail: janey@sibmail.com
Nazarenko L.	NASA Goddard Institute for Space Studies, Center for Climate Systems Research, Columbia University, 2880 Broadway, New York, NY 10025, tel. +1 212 678 5617, e-mail: larissa.s.nazarenko@nasa.gov
Groisman P.	University Corp. for Atmospheric Research at NOAA/NCDC, Asheville, North Carolina, USA, e-mail: pasha.groisman@noaa.gov
Marchenko S.	Geophysical Institute, University of Alaska Fairbanks, USA, e-mail: ssmarchenko@alaska.edu
Gutman G.	The NASA Land-Cover/Land-Use Change Program, Landsat Program Scientist Washington, DC USA Tel. +1 202-358-0276; fax:+1 202-358-3172 e-mail:ggutman@nasa.gov
Lane Ch.R.	US Environmental Protection Agency (EPA), Cincinnati Ohio USA, e-mail: Lane.Charles@epa.gov
Autrey B.	US Environmental Protection Agency (EPA), Cincinnati Ohio USA, e-mail: Autrey.Brad@epa.gov
Zhuang Q.	Purdue University, West Lafayette, IN 47907; e-mail: qzhuang@purdue.edu
Shiklomanov A.I.	University of New Hampshire, Durham, NH 03824, USA Tel. 1-603-862-4796, e-mail- alex.shiklomanov@unh.edu
Sokolov A.	Massachusetts Institute of Technology, USA, e-mail: sokolov@MIT.EDU
Maksyutov Sh.	National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Japan, e-mail: shamil@nies.go.jp
Tyutyunov Yu.	Institute of Arid Zones, Southern Scientific Center RAS,

	Rostov-on-Don, Chekhova Str., 41, tel. +7-(863) 297-52-29; e-mail: tyutyunov@sfedu.ru
Titova L.	Vorovich Research Institute of Mechanics and Applied Mathematics, Southern Federal University, Rostov-on-Don, Stachki Str., 200/1, tel.+7- (863) 297-52-29; e-mail: ltitova@sfedu.ru
Ailikun	MAIRS, e-mail: aili@mairs-essp.org

Note. Asterisk denotes young scientist.

Funding sources outside the APN

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START (through travel cost of 12 participants from US) 36 000USD
World Meteorological Organization 10 000 USD
Total funding outside the APN 71 000 USD

List of Young Scientists

List of young scientists trained in the framework of ENVIROMIS-2012 event

No.	Name	Organization	Age	Sex	Country
1.	Egor Yu. Mordvin (mordvin@theory.asu.ru)	Altai State University	28	M	Russia
2.	Oksana V. Vasilenko (oksa_na85@mail.ru)	Institute of Geography SB RAS	29	F	Russia
3.	Shukhrat K. Lokhov (shukhrat_l@mail.ru)	Institute of Geography SB RAS	24	M	Russia
4.	Olga Yu. Marchenko (olgayumarchenko@gmail.com)	Melent'ev Energy System Institute SB RAS	25	F	Russia
5.	Anastasiya V. Timokhina (nastimoti@mail.ru)	V.N. Sukachev Institute of Forest SB RAS	27	F	Russia
6.	Alexey V. Panov (alexey.v.pavov@gmail.com)	V.N. Sukachev Institute of Forest SB RAS	32	M	Russia
7.	Anastasiya V. Makhnykina	Siberian Federal	27	F	Russia

	(sunlife1408@yandex.ru)	University			
8.	Oksana V. Sergeeva (magic192005@yandex.ru)	Siberian Federal University	27	F	Russia
9.	Dmitry V. Zuev (dmvzuew@yandex.ru)	Siberian Federal University	25	M	Russia
10.	Polina A. Morozova (morozova_polina@mail.ru)	Institute of Geography RAS	23	F	Russia
11.	Alexandra V. Borzenkova (alexandra_borzenkova@mail.ru)	Institute of Geography RAS	26	F	Russia
12.	Denis E. Sergeev (dennis.sergeev@gmail.com)	Moscow State University	28	M	Russia
13.	Viktor M. Stepanenko (stepanen@srcc.msu.ru)	Moscow State University	34	M	Russia
14.	Konstantin V. Ushakov (ushakovkv@mail.ru)	P.P Shirshov Institute of Oceanology	29	M	Russia
15.	Mariya M. Smirnova (marj_a@mail.ru)	Hydrometeorological Research Center of Russian Federation	32	F	Russia
16.	Dmitry A. Dzama (ddv@ibrae.ac.ru)	Nuclear Safety Institute RAS	25	M	Russia
17.	Dina F. Yusupova (yusupova.dina.f@gmail.com)	Institute of Computational Mathematics and Mathematical Geophysics SB RAS	28	F	Russia
18.	Yulia V. Martynova (foxyj13@gmail.com)	Siberian Research Hydrometeorological Institute	28	F	Russia
19.	Tatiyana A. Maximova (vanadiumum@gmail.com)	Institute of Chemical Kinetics and Combustion	30	F	Russia

20.	Tatyana E. Klimeshina (klimeshina@sibmail.com)	Institute of Atmospheric Optics SB RAS	26	F	Russia
21.	Nataliya V. Podnebeshykh (podnebesnykhnv@inbox.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	33	F	Russia
22.	Tamara M. Shulgina (stm@scert.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	27	F	Russia
23.	Yulia E. Gordova (office@scert.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	33	F	Russia
24.	Vasiliy Yu. Bogomolov (bogomolov@scert.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	30	M	Russia
25.	Igor G. Okladnikov (oig@scert.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	34	M	Russia
26.	Ekaterina S. Savel'eva (kapitosha89@gmail.com)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	23	F	Russia
27.	Anna A. Sinyutkina (ankalaeva@yandex.ru)	Siberian Research Institute of Agriculture and Peat RAAS	32	F	Russia
28.	Mikhail E. Bykov (evgomod@yahoo.com)	Institute of Physical Materials Science SB RAS	28	M	Russia
29.	Iroda R. Razikova (iroda_2215@mail.ru)	Research Hydrometeorological Institute	26	F	Uzbekistan
30.	Katharina Klehmet (Katharina.Klehmet@hzg.de)	Institute of Coastal Research	29	F	Germany
31.	Tungalag Amar (amar_tungalag@num.edu.mn)	National University of Mongolia	26	F	Mongoliya
32.	Oyudari Vova	National University of	25	F	Mongoliya

	(tzr112@psu.edu)	Mongolia			
33.	Bolortuul Batsukh (tuul_bolor@yahoo.com)	National University of Mongolia	24	F	Mongoliya
34.	Kirk Zmijewski kirk.zmijewski@rockets.utoledo.edu	The University of Toledo	25	M	USA

Message from Mongolian group

The summer school "Early Career Scientists Summer School lectures which was held on 24 - 27 June, 2012, provided cooperation among not only young scientists but scientists in the region to experience modern methodologies for research on extreme weather. The Participants were provided by educational and awareness-raising materials on extremes in Northern Asia disaster risk. There were informative lectures on reduction and climate change adaptation by integrating Remote Sensing and scientific knowledge with local and region knowledge.

Mongolian three young scientists and one University professor attended in this activity. During ENVIROMIS 2012 we discussed climate change and variability for extreme weather and the ability of mitigation and manage the impact of extreme events.

We learned how climate change will increase weather-induced disasters in North Asia and various measures and methodologies to monitor current and future vulnerabilities using Remote Sensing and GIS techniques.

Our young scientists learned and experienced to forecasts on how climate change will affect weather-related hazards.

After the summer school participation we, Mongolian group, transferred our knowledge obtained during ENVIROMIS-2012 to Mongolian environmentalists and geoscientists.

We thank organizers of ENVIROMIS-2012 for their invitation and wonderful organization the summer school.

We also thank APN for their support.

Prof. Renchin Tsolmon

Young scientists:

Ms. Tungalag Amar

Ms. Oyudari Vova

Ms. Bolortuul Batsukh

List of young scientists trained in the framework of CITES-2013 event

No.	Name	Organization	Age	Sex	Country
1.	Anna K. Monzikova (monzik@rshu.ru)	Russian State Hydrometeorological University, St-Petersburg	22	F	Russia
2.	Aleksey A. Kadochnikov (scorant@icm.krasn.ru)	Institute of Computational Modeling SB RAS, Krasnoyarsk	33	M	Russia
3.	Aleksey V. Penenko (a.penenko@gmail.com)	Institute of Computational Mathematics and Mathematical Geophysics SB RAS	30	M	Russia
4.	Nataliya M. Arzhanova (ashatan84@mail.ru)	Centre (RIHMI-WDC), Obninsk	28	F	Russia
5.	Ekaterina K. Kostikova (eka-fe@mail.ru)	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk	31	F	Russia
6.	Anna N. Rettieva (annaret@krc.karelia.ru)	Institute of Applied Mathematical Research, Karelian Research Centre of RAS, Petrozavodsk	34	F	Russia
7.	Polina A. Morozova (morozova_polina@mail.ru)	Institute of Geography RAS	24	F	Russia
8.	Alexandra V. Borzenkova (alexandra_borzenkova@mail.ru)	Institute of Geography RAS	27	F	Russia
9.	Yury A. Shtabkin (yuryshtabkin@gmail.com)	A.M.Obukhov Institute of Atmospheric Physics RAS, Moscow	24	M	Russia

10.	Pavel I. Konstantinov (kostadini@mail.ru)	Moscow State University	32	M	Russia
11.	Konstantin V. Ushakov (ushakovkv@mail.ru)	P.P Shirshov Institute of Oceanology	30	M	Russia
12.	Yulia V. Martynova (foxyj13@gmail.com)	Siberian Research Hydrometeorological Institute	29	F	Russia
13.	Evgeniya I. Moraru (janey@sibmail.com)	Institute of Monitoring of Climatic and Ecological Systems SB RAS (janey@sibmail.com)	25	F	Russia
14.	Tamara M. Shulgina (stm@scert.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	28	F	Russia
15.	Yulia E. Gordova (office@scert.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	34	F	Russia
16.	Igor G. Okladnikov (oig@scert.ru)	Institute of Monitoring of Climatic and Ecological Systems SB RAS	35	M	Russia

Glossary of Terms

Include list of acronyms and abbreviations

CITES - Computational Information Technologies for Environmental Sciences

MAIRS- Monsoon Asia Integrated Regional Study

NEESPI- Northern Eurasian Earth Science Partnership Initiative

SIRS – Siberia Integrated Regional Study

SCERT – Siberian Center for Environmental Research and Training

IMCES SB RAS – Institute of Monitoring of Climatic and Ecological Systems of Siberian Branch of Russian Academy of Sciences

INM RAS – Institute for Numerical Mathematics of Russian Academy of Sciences

The presentations of Conferences and Workshops are available at:

http://www.scert.ru/en/conferences/ENVIROMIS-2012/materials/

http://project.enviromis.scert.ru/Capacity/resources/

NEESPI workshop report will be published in EOS, supporting material is available at

http://neespi.org/meetings/Petrozavodsk_2013.pdf