

Northern Eurasia Earth Science Partnership Initiative (NEESPI)

Reporting Period: December 2004-July 2006

Starting Date: 2004

End Date: activities are expected to continue for a 10-year-long period

URL: <http://neespi.org>

Chair(s) and other leaders:

Chair of the NEESPI Science Advisory Panel: Prof. Christiane Schmullius (Fridrich Schiller University, Jena, Germany),

Chief Scientists: Herman H. Shugart (University of Virginia, USA) and Alexander Isaev (CEPL, Moscow, Russia)

Project Scientist: Pavel Groisman (UCAR at NCDC, Asheville, North Carolina, USA)

NEESPI Topical Focus Research Centers:

- *Center for Cold Land Processes and Arctic Coastal Studies*, Leader: Prof. Vladimir Romanovsly (University of Alaska-Fairbanks, Alaska, USA)
- *Center for Water System Studies*, Leader: Prof. Charles Vörösmarty (University of New Hampshire, Durham, New Hampshire, USA)
- *Center on Atmospheric Aerosol and Air Pollution Studies*, Leader: Prof. Irina Sokolik (Georgia Institute of Technology, Atlanta, Georgia, USA)
- *Center for Land Use Studies*, Leader: Prof. Dennis Ojima (Colorado State University, Fort Collins, Colorado, USA)
- *Center for Biogeochemical Cycle Studies*, Leader: Prof. Martin Heimann (Max Planck Institute for Biogeochemistry, Jena, Germany)
- *Center for Land Cover Studies*, Leader: Prof. Christiane Schmullius (Fridrich Schiller University, Jena, Germany)

Overview:

NEESPI is an interdisciplinary program of internationally-supported Earth systems and science research that addresses large-scale and long-term manifestations of climate and environmental change. NEESPI addresses all Northern Eurasian ecosystems and needs to draw on all environmental scientific disciplines during the coming decade. NEESPI strives to understand how the land ecosystems and continental water dynamics in northern Eurasia interact with and alter the climatic system, biosphere, atmosphere, and hydrosphere of the Earth. Its overarching Science Question is: How do we develop our predictive capability of terrestrial ecosystems dynamics over Northern Eurasia for the 21st century to support global projections as well as informed decision making and numerous practical applications in the region? The foci of the NEESPI research strategy are the deliverables, which support both national (e.g., the National Climate Change Science Programs) and international science (e.g. IGBP) programs. Major NEESPI-related research deliverables, in approximately ten years, will be a suite of process-oriented models for each major terrestrial process in all its interactions; a suite of global and regional models that seamlessly incorporate all major regionally specific feedbacks associated with terrestrial processes; an integrated observational knowledge data base for environmental studies; and an environmental hazards warning system in place that can serve the emergency needs of the society. A synergetic approach to projections of the future changes is a core of the NEESPI.

Status:

NEESPI Science Plan Preparation Team (that worked in 2003-2004) included more than 90 scientists from 11 countries with the majority of them being from the United States and Russia. From the beginning, three terms characterize the NEESPI:

- **Global** - Priorities were assigned to projects and topics that address regional changes that affect (or may affect) Global Earth System

- **Interdisciplinary** –It was early recognized and shown in examples, that strong interactions within the system terrestrial ecosystem, hydrosphere, cryosphere, atmosphere, and human society in the region require interdisciplinary studies
- **Active** - Preparation of the NEESPI Science plan (2003-2004) occurred simultaneously with pilot projects initiation and the writing of proposals (some of them have been already funded)

Since 2004, NEESPI participants were able to seed a first set of proposals to the international (NATO, European Union, GEF) and national funding agencies and institutions (e.g., in the United States, Russia, Japan, UK, Germany, Finland, and Hungary), and to the International Polar Year (IPY). Some of these proposals have already been funded and officially joined to NEESPI (54 of them), other proposals have been funded (more than 20 of them) and a process of their recognition by NEESPI is on the way, but a large group of proposals is still under review. During the past 18 months, the NEESPI program has been endorsed by several Earth System Science Partnership Program (ESSP) Programs and Projects (IGBP through iLEAPS, WCRP through CliC, and ESSP through GCP, GWSP, and GLP). Thereafter, the NEESPI program has requested from ESSP the status of an ESSP Integrated Regional Study in the northern part of Eurasia.

Among the first NEESPI public steps were:

- Presentations at the International Conferences, including Open Science Sessions at the American Geophysical Union Fall Meeting (San Francisco, USA, December 2004) and at the 31st International Symposium on Remote Sensing of Environment (St. Petersburg, Russia, June 2005),
- Several successful proposals to the International Polar Year,
- Preparation of the special NEESPI issue of “Global and Planetary Change” journal Establishment of the network of the NEESPI Focus Research and Science Support Centers in the United States, Russia, China, and Germany, and
- The 1st NEESPI Science Team Meeting in IIASA, Laxenburg, Austria (February 22-24, 2006).

As a result of these steps, NEESPI is widely recognized and endorsed as being potentially valuable to the international scientific community for development of the scientific plan that fostered regional research and has already created scientific research partnerships around the world. Several International Projects (e.g., Global Water System Project, Global Carbon Project, Global Land Project, Integrated Land Ecosystem – Atmosphere Processes Study, and the WCRP Climate and Cryosphere Project endorsed NEESPI while major Earth Science Programs (in particular, IGBP and WCRP) have been requested to consider NEESPI as their *Integrated Regional Study Programs*.

New directions:

Increase of the number of funded projects and their diversity creates a real challenge with scientific coordination among the projects and access to their data. Therefore, in summer-autumn 2005, the NEESPI community realized a need for clustering the research (and researchers) around several Thematic and Regional Focus Research Centers and Science and Data Support Centers. These Centers (12 of them, 3 under construction, and 3 more projected) began gradually evolving around the lead scientists with funded NEESPI Projects who are linked to international Research Projects (GLP, GWSP, CliC, etc) and/or to major World Data Centers in Russia, the United States, and China. These Centers are securing scientific and informational support of NEESPI and it is anticipated that they will continue doing it in the future. Nevertheless, the NEESPI Science Advisory Panel is seriously concerned with the problem of integration across the diversity of the NEESPI projects and tasked the Leaders of NEESPI FRCs to address this issue.

Future:

In addition to several meetings and workshops, there are anticipated:

- establish NEESPI International Secretariat in Europe
- further growth of the Initiative with new members (projects) included, and
- establish NEESPI Focus Research Center for Integration of the NEESPI Results and Modeling Studies.

Key results:

Most of the projects are in the first or second year of their activities.

So far, the key results are:

- an Initiative full size launch (up to 70 projects) and
- the First NEESPI Science Team Meeting

Issues and Recommendations.

Critical for the Initiative are:

- Strengthening of the Initiative Organizational structure, and
- Development of NEESPI integrative projects

Contributions to WCRP strategic framework

Northern Eurasia is undergoing rapid and significant changes associated with warming climate and with socio-economic changes during the entire 20th century. Climatic changes over this largest land mass in the northern extratropics (and ~ 20% of the global land mass) interact and affect the rate of the Global Change through atmospheric circulation and (which is a unique feature of the region) through strong biogeophysical and biogeochemical feedbacks. These feedbacks arise from changes in surface energy, water, and carbon budgets of the continent. How this *carbon-rich, cold region component of the Earth system* functions as a regional entity and interacts with and feeds back to the greater global system is to a large extent unknown. Thus, the capability to predict future changes that may be expected to occur within this region and the consequences of those changes with any acceptable accuracy are currently uncertain and hampers projections of the Global Change rates which are among the WCRP major objectives.

Contributions to society and to WCRP/GEWEX visibility

Introduction of the biosphere and socioeconomic changes into the framework of Global Change is among the most challenging problems for society as well as for the Earth Science community. In the Northern Eurasian domain we have both challenges:

- strong hydrology-biosphere feedbacks that may (and do) affect sign of changes in surface energy budget and/or net ecosystem exchange and
- socioeconomic changes that several times during the past century dramatically affected land use and water management practices causing changes that far exceeded (in some cases) climate variability and affected the societal well-being and environmental health.

Studies of climatic changes in this region became an important contribution to reduction of uncertainties in our understanding of the Global Change far beyond the Northern Eurasia domain.

List of key publications

The NEESPI Science Plan (260 pp) and its Executive Summary (18 pp.) have been published at the NEESPI web site (<http://neespi.org>)

The special NEESPI issue of "Global and Planetary Change" journal is currently in press.

List of meetings, workshops*International Conferences:*

- June 20-24, 2005, NEESPI Special Session at the 31st International Symposium on Remote Sensing of Environment, St. Petersburg, Russia.
- February 3-5, 2005 "International Conference on Land-Cover and Land-Use Change Processes in North East Asia Region" Harbin, China
- December 13-17 2004, NEESPI Special Session at AGU Fall Meeting, San Francisco. USA
- May 11-16, 2006 "NATO 'Science for Peace' Program and NEESPI Joint Workshop on extreme precipitation events: their origins, predictability and societal impacts.", Odessa, Ukraine
- April 6-8, 2006 NEESPI Cold Land & Arctic Coast (CLAC) Focus Research Center. First Workshop, IARC, Fairbanks, Alaska, USA

- April 11-13, 2006 "NASA Land-Cover and Land-Use Change Science Team Meeting February 22-24, 2006 The 1st NEESPI Science Team Meeting in IIASA, Laxenburg, Austria
- December 4, 2005 NEESPI Briefing for the IGBP Leadership, San Francisco, California, USA as a pre-meeting workshop at the AGU Fall Meeting
- June 19, 2005 NEESPI Briefing for Lead Scientists and Representatives of Other Programs, St. Petersburg, Russia, as a pre-symposium workshop at the 31st International Symposium on Remote Sensing of Environment
- June 18-19, 2005, Regional GOF-C-GOLD workshop "Observations of Land Cover and Needs of Research Projects in Northern Eurasia". St. Petersburg, Russia
- June 7, 2005 Second NEESPI Inter-Agency Meeting, Washington DC, USA
- December 9-10, 2004 First Inter-Agency Northern Eurasia Earth Science Partnership Initiative and Science Review Meeting for the U.S., Europe and Eurasia, Washington DC, USA

Planned meetings, workshops:

- 18-20 September, 2006: "International Symposium: Environmental change in Siberia: Insights from Earth Observation and modelling" is being organized by Sib - E S S – C (SIBERIA-II Earth System Science Cluster Group)
- November 7-8, 2006: First Regional NEESPI Focus Research Center on Dry Land Processes Studies Workshop, Beijing, China
- November 13, 2006: NEESPI Science Services and Data Support Centers Workshop, Beijing, China
- December 11-15, 2006: Open Science Session at the American Geophysical Union Fall Meeting (San Francisco, USA, December 2006)
- Summer 2007. 2d NEESPI Science Team Meeting (location and exact dates, TBD).

List of members

The list of senior scientists (funded projects only) is provided at the NEESPI web site (<http://neespi.org>). As of April 6, 2006, 353 scientists from 186 institutions from 30 countries have been participating in 52 funded projects. Additionally two national mega-projects of the Russian Academy of Sciences have joined NEESPI in February 2006 and several more projects are in the process of the NEESPI recognition.