Northern Eurasia Earth Science Partnership

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NEESPI Integrative Projects: An update

Recognition
Coping with Growing Pains

While the NEESPI Science Plan is balanced, a quick growth and non-proportionate funding caused different paces of development of different NEESPI components. To mitigate this disproportionality in implementation, we:

• structure the Initiative by Topical and Regional Focus Research Centers

• move the NEESPI data support to Permanent Science Data and Services Centers, and

• promote clustering (integration) among the NEESPI Projects into virtual Mega-Projects and/or inception of interdisciplinary internally-integrated projects

These steps will: (a) secure the continuity of the research within the cluster (or FRC) when individual projects (usually 3 year-long) expire; (b) allow the data preservation; and (c) will gradually balance advances in different research directions
Dynamics of the NEESPI statistics

In July 2006, 364 scientists of 195 institutions from 31 countries participated in the first 54 funded projects.

In January 2007, 70 individual research projects (always with the international participation) were funded and approximately 30 funded projects were in process of recognition/joining NEESPI.

Current numbers: More than 400 scientists from more than 200 institutions are working on 108 individual funded projects under the Initiative umbrella and approximately 20 projects are in the process of joining NEESPI (+ in kind assistance from EU, US, Russian, Chinese, Japanese, and International Agencies and Institutions)
Example of in-kind assistance

To support a Summer Workshop-School in Fedorovskoe (Russia, July 14-28, 2007) on Boreal Forest Environmental Studies, sponsors from

- Japan (National Institute of Environmental Sciences),
- China (Beijing Normal University),
- Russia (Russian Foundation for Basic Research and private companies),
- European Union (European Environmental Agency), and
- USA (NASA, Maryland University, and The International Arctic Research Center, Fairbanks, Alaska)

swiftly came together with a 6-digit sum of money.
**Distribution of projects by major research themes in January 31, 2007.** One project could be included in several groups

- Biogeochemical Cycles: 19
- Hydrology: 25
- Cryosphere: 22
- Land Use: 27
- Land cover: 12
- Atmospheric Aerosols/Pollution: 13
- Human dimension: 18
- Biodiversity: 9
- Large scale, integrative: 39
- **Total**: 73

Since that time, two RAS Mega-Projects, on Biodiversity and IPY (15 & 16 individual projects respectively), joined NEESPI
From 82 currently listed at the NEESPI web site projects about half can be assigned Integrative, Large scale, Modeling Category
Projects devoted primarily to high-latitudinal energy & water cycles

- **PI:** Dennis Lettenmaier. *Diagnosis and Prognosis of Changes in Lake and Wetland Extent on the Regional Carbon Balance of Northern Eurasia*
- **PI:** Dennis Lettenmaier. *Use of International Polar Year data to improve attribution of long-term hydrologic changes in Arctic Eurasian land areas*
- **PI:** Eric Wood. *An integrated understanding of the terrestrial water and energy cycles across the NEESPI domain through observations and modeling*
- **PI:** Eric Wood. *Collaborative Research: Understanding Change in the Climate and Hydrology of the Arctic Land Region: Synthesizing the Results of the ARCSS Fresh Water Initiative Projects*
- **PI:** Charles Vörösmarty. *Role of land cover and land use change in hydrology of Eurasian Pan-Arctic*
- **PI:** Alex Shiklomanov. *Study of Dam/Reservoir-Induced Hydrologic Changes in Large Siberian Watersheds: Regional Analysis to Pan-Arctic Synthesis*
- **PI:** Larry Hinzman. *Current climate changes over Eastern Siberia and their impact on permafrost landscapes, ecosystem dynamics, and hydrological regime*
- **PI:** Vladimir Romanovsky. *Permafrost dynamics within the Northern Eurasia region and related impacts on surface and sub-surface hydrology*
- **PI:** Vladimir Romanovsky. *Thermal State of Permafrost (TSP): The U.S. contribution to the International Permafrost Observatory Network*
- **PI:** Vladimir Romanovsky. *Development of a Network of Permafrost Observatories in North America and Russia: The US Contribution to the IPY*
- **PI:** Peter Romanov. *Continuous fields of snow cover characteristics derived through coupling satellite data with snowpack model. Application in the river runoff modeling over NEESPI domain*
- **PI:** Andrey Shmakin. *Influence of snow vertical structure on hydrothermal regime and snow-related economical aspects in Northern Eurasia*
Projects devoted primarily to mid-latitudinal energy & water cycles

- **PI:** Irina Sokolik. *Understanding the role of changes in land use/land cover and atmospheric dust loading and their coupling on climate change in the NEESPI study domain drylands*
- **PI:** Jaakko Kukkonen. *Evaluation and Forecasting of the atmospheric concentrations of allergenic pollen in Europe (POLLEN)*
- **PI:** Charles Vorosmarty. *Contributions of Changes in Land Use/Land Cover, Water Use, and Climate to the Hydrological Cycle Across the Central Asia*
- **PI:** Jiquan Chen. *Effects of Land Use Change on the Energy and Water Balance of the Semi-Arid Region of Inner Mongolia*
- **PI:** Pavel Groisman. *Precipitation intensity over the northern extratropics*
- **PI:** Clemens Simmer. *Extreme precipitation events: their origins, predictability and societal impacts*
- **PI:** Pavel Groisman. *Representativeness of estimates of changes in weather extremes*
- **PI:** Andrey Velichko. *Environmental conditions of the epoch of the earliest human inhabitat of Northern Eurasia in the late pleistocene and holocene*
- **PI:** Vladimir Aizen. *Estimation of seasonal snow cover, glacial and lake area changes at the Ob'/Yenisey river heads during the last 40 years using NASA ESE products and in situ data*
- **PI:** Evgeny Vaganov. *Siberia Integrated Regional Study (SIRS)*
- **PI:** Alexander Baklanov. *Enviro-RISKS: Man-induced Environmental Risks: Monitoring, Management and Remediation of Man-made Changes in Siberia*
- **PI:** Paul Vlek. *Integrated interdisciplinary research on ecological and economic problems in the Aral Sea region of Uzbekistan*
- **PI:** Gregory Leptoukh. *NASA Earth Sciences Data Support System and Services for the Northern Eurasia Earth Science Partnership Initiative*
Projects devoted primarily to the biogeochemical cycle

- **PI: Syndonia Bret-Harte.** *IPY: Collaborative Research on Carbon, Water, and Energy Balance of the Arctic Landscape at Flagship Observatories and in a PanArctic Network*
- **PI: Jon Ranson.** *Assessing forest-tundra transition zone in the Northern Hemisphere with multisensor satellite data*
- **PI: Dennis Ojima.** *Northern Eurasian C-land Use Climate Interaction in the Semi-Arid Regions*
- **PI: Gen Inoue.** *Integrated Study for Terrestrial Carbon Management of Asia in the 21st Century Based on Scientific Advancements [Theme-2: Top-down approach to a regional carbon budget estimation]*
- **PI: Masami Fukuda.** *Forest fire impact on carbon cycle in Siberia and its contribution to global warming*
- **PI: Amber Soja.** *Wildfire, Ecosystems, and Climate: Examining the relationships between weather, extreme fire events, and fire-induced land-cover change in the changing climate of Siberia*
- **PI: Olga Krankina.** *Northern Eurasia Landcover Dynamics Analysis (NELDA): Monitoring and validating the distribution and change in land cover across NE*
- **PI: Hank Shugart.** *Modeling the carbon dynamics of the Eurasian Boreal Forest*
- **PI: Francesco Tubiello.** *Carbon, Climate and Managed Land in Ukraine: Integrating Data and Models of Land Use for NEESPI*
- **PI: Changsheng Li.** *Quantifying CO₂ Fluxes from Boreal Forests in Northern Eurasia: An Integrated Analysis of Flux Tower Data, Remote Sensing Data and Biogeochemical Modeling*
- **PI: Jiaguo Qi.** *Land Use and Land Cover Dynamics of China in Support of GOFC/GOLD and NEESPI Sciences*
- **PI: Ivan Csiszar.** *Development of an Integrated System of Ground-, Air- and Space-Based Observations of Biomass Burning in Northern Eurasia*
Peculiarity of the NEESPI region

- Opposite to North America, Europe, and several other parts of the Globe, we are still lacking many essential tools (e.g., well developed RCMs, hydrological models, and regional reanalyses) that are a prerequisite for answering the major NEESPI science questions =>
  (a) An urgent need for modern models’ development and
  (b) Investments in Education
Northern Eurasia “dream” modeling suite

- Ecosystem block
- Physical climate
- Global Earth System Model(s)
- Cryospheric block
- Human dimension block
- Suite of Regional Land Surface models (with an adequate description of energy and water cycles; scalable; able to use modern input and interact with)
FOR MORE INFORMATION SEE THE NEESPI WEB SITE:
http://neespi.org

Side Note:
“NEESPI” is pronounced approximately like the Russian phrase for “Don’t sleep”

Northern Eurasia Earth Science Partnership Initiative
The State and Resource-Ecological Potential of Terrestrial Ecosystems of Northern Eurasia in the Conditions of Global Changes (PI, A.S. Isaev)

- Methodology for monitoring of biodiversity in Russian forests
- Relationships between soil variety and biodiversity in forest ecosystems
- Integrated databases on biodiversity of forests ecosystems in European part of Russia
- Dynamics of forest cover in central part of Russian Plain and tendencies for changes in biodiversity of natural and artificial forest ecosystems for the last century
- Succession dynamics and typology of boreal ecosystems in European part of Russia
- Dynamics of organic matters and biogenic elements in the southern taiga under global changes.
- Biogeochemical cycles in the northern taiga forests: natural and pollution-induced changes
- Mapping of forests ecosystems in Russia on remote sensing data
- Satellite products sets for databases on Northern Eurasia’s terrestrial ecosystems

Above is a subset of 16 individual projects of the 1st Russian Mega-project (program of the RAS Presidium on NEESPI)
RAS Mega-Project in support of IPY activities; subset of NEESPI-related projects (Program P-16 of the Presidium of Russian Academy of Sciences; PI, Acad. V.M. Kotlyakov)

- Climate Modeling and diagnostic in polar and sub-polar latitudes
- Temperature, small atmospheric constituents, and atmospheric chemistry in high latitudes
- Snow cover changes in Northern Eurasia and the atmospheric processes
- State of the Arctic cryosphere (glaciers and icebergs)
- Soil dynamics with environmental changes in high latitudes
- Analytical data base creation for the International Polar Year
- Arctic air pollution and its redistribution through the trophic chains
- Flora and fauna changes in the Arctic with climatic change and anthropogenic impact
- Environmental conditions when humans first came to Northern Eurasia
- Sustainability of social infrastructure of indigenous population in the Arctic
- In search for sustainability of ecosystems and society in the Arctic

Above is a subset of 15 individual projects
Siberian Integrated Regional Study (SIRS)

- Integrated study of natural and climatic changes and accompanying land-use risks
- Functioning, biodiversity, ecological and resource potential of Siberian forests (PI, Evgeny Vaganov)
- Study of hydrological and ecological processes in Siberian water bodies ...
- Comparative analysis of patterns of man-caused radionuclides migration in large water ecosystems ...
- State, structure and changes of cryosphere: Cryogenesis and its influence on natural and man-caused geosystems
- Development of distributed informational analytical media for ecological systems study
- Evolution of natural processes, man and his culture in late Cenozoic in Siberia and their influence on eco- and geosystems stability
- Development of tools for satellite ecological monitoring of Siberia and Far East on the basis of new informational and telecommunicational methods and technologies
- Enviro-RISKS: Man-induced Environmental Risks: Monitoring, Management and Remediation of Man-made Changes in Siberia
Regional NEESPI Focus Research Center on Dry Land Processes Studies (First Workshop, Beijing, China, 7-8 November 2006)

- Ecosystem Monitoring and Assessment
- Water issues in arid regions
- LCLUC ecological impact
- Aeolian Desertification
- Socio-economic responses to climatic and environmental changes
- Regional environmental modeling