Northern Eurasia Terrestrial Processes, their Change and Role in the Global Earth System: A Summary of the Northern Eurasia Earth Science Partnership Initiative (NEESPI) Workshop held by the Aspen Global Change Institute, Aspen, Colorado, 12-17 August 2007.

NEESPI study area includes: Former Soviet Union, Northern China, Mongolia, Fennoscandia, & Eastern Europe. This region 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 landmass in the northern extratropics (and ~ 20% of the global land mass) interact and affect the rate of the global change through atmospheric circulation and 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 is currently uncertain and hampers projections of the Global Change rates which are among the WCRP major objectives. One of the primary reasons for this lack of regional Earth system understanding is the relative paucity of well-coordinated, multidisciplinary and integrating studies of the critical physical and biological systems. Furthermore, the critical measurements needed to monitor changes in the area are not available. 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. Lack of concise efforts to deliver both understanding and information for Northern Eurasia makes studies of climatic changes in this region an important contribution to reduction of uncertainties in our understanding of the Global Change far beyond the Northern Eurasia domain. NEESPI, an interdisciplinary program of internationally-supported Earth systems and science research, was established to address the problems listed above. *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? NEESPI Science Plan was published on the web at http://neespi.org and Its Executive Overview in Groisman and Bartalev (2007). Since 2004, more than 100 international research projects officially joined NEESPI, for other projects a process of their recognition by NEESPI is on the way. Among the first NEESPI public steps were: presentations at the International Conferences, several successful proposals to the International Polar Year, publication of the special NEESPI issue of "Global and Planetary Change" journal (April 2007), establishment of the network of the NEESPI Focus Research and Science Support Centers in the United States, Russia, China, and Germany, and organization of 1st NEESPI Science Team Meeting April 2006) and several regional NEESPI Workshops. 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. The NEESPI program has been endorsed by several Earth System Science Partnership Program (ESSP) Programs and Projects: International Geosphere and Biosphere Programme (IGBP), World Climate Research Programme (WCRP) through the Climate and Cryosphere Project, Global Energy and Water Cycles Experiment (GEWEX), Global Water System Project, Global Carbon Project, Global Land Project, and Integrated Land Ecosystem – Atmosphere Processes Study. Thereafter, the NEESPI program has requested from ESSP the status of *an ESSP Integrated Regional Study* in the northern part of Eurasia. The NEESPI scientists were quite productive during the past two years publishing more than 200 books, book chapters, and papers in refereed journals. List of NEESPI meetings, workshops, and conference sessions consist of 19 titles and the present Aspen Workshop (held in August 12-17, 2007 at the Aspen Global Change

Institute, Aspen, Colorado) was the 20th of them. While the NEESPI Science Plan is balanced, a quick growth and non-proportionate funding caused different paces of development of different NEESPI components. Therefore, the major themes of the Aspen Workshop were:

- **How to balance and coordinate various NEESPI activities? And, in particular,**
- **How to secure integration of NEESPI regional studies with global climate and Earth System modeling activities?**

An overarching objective of the Aspen Workshop was to provide a venue for the NEESPI researchers and researchers from the interdisciplinary climate and Earth system modeling communities for the discussion and synthesis of the current knowledge of ongoing changes in Northern Eurasia and their linkages with global changes, regional and global modeling capabilities, and emerging problems and needs. The following three major objectives were set in front of the Workshop Participants: (a) evaluation of the state of the art of the modeling efforts in the region along three spatial scales: micro-scale (or at the process level), regional scale (or within major biomes of the region and in the transitional zones between them), and on the global scale; (b) development of recommendations for collaboration between the Global Earth Modeling Community and the NEESPI region researchers, and (c) identification of missing research topics critical for achievement of the NEESPI objectives and thus for global change research.

The Workshop Results

Synthesis of current state of knowledge of changes and modeling capabilities

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Recommendations for integration of NEESPI regional studies with global climate and Earth System modeling activities

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Recommendations on integration of land surface models in the NEESPI domain

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Identification of missing research topics critical for achievement of the NEESPI objectives and thus for global change research

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Outreach

References:

Groisman, P.Ya., S.A. Bartalev, and the NEESPI Science Plan Team, 2007: Northern Eurasia Earth Science Partnership Initiative (NEESPI): Science plan overview. *Global and Planetary Change,* **56**, issue 3-4, 215-234, 215-234.

Northern Eurasia Earth Science Partnership Initiative (NEESPI), 2004: *NEESPI Science Plan* (Eds., P.Y. Groisman and S.A. Bartalev), 217 pp. [Plan is available for download at http://NEESPI.org/]