

Northern Eurasia Future Initiative (NEFI): Nine Science Foci of Research

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Northern Eurasia Future Initiative (**NEFI**) has emerged as an essential continuation of the Northern Eurasia Earth Science Partnership Initiative (**NEESPI**) –an interdisciplinary program of internationally-supported Earth systems and science research –that has addressed large-scale and long-term manifestations of climate and environmental changes over Northern Eurasia and their impact on the Global Earth system. Full-size (i.e. after release of internationally peer-reviewed Science Plan and launching of first individual projects) NEESPI was established in 2004 with its objectives covering the following decade. Since that time, we observed dramatic environmental changes over the continent, some of which strongly affected the human wellbeing and raising the new set of science questions. Shortly speaking, the questions “what is going on?” have been gradually appended by the questions “what to do?” . In some parts of Northern Eurasia (e.g., in the densely populated drylands of the interior of the continent), these “what to do” questions moved to the forefront. Therefore, when two years ago the NEFI researchers formulated the next generation of research objectives they narrow these objectives to nine research foci. These foci (listed in no specific order) are:

- ◆ Global change, particularly the warming of the Arctic;
- ◆ Increasing frequency and intensity of extremes (e.g., intense rains, floods, droughts, wildfires) and changes in the spatial and temporal distributions of inclement weather conditions (e.g., heavy wet snowfalls, freezing rains, untimely thaws and peak streamflows);
- ◆ Retreat of the cryosphere (snow cover, sea ice, glaciers, and permafrost);
- ◆ Changes in the terrestrial water cycle (quantity and quality of water supply available for societal needs);
- ◆ Changes in the biosphere (e.g., ecosystem shifts, changes in the carbon cycle, phenology, land-cover degradation and dust storms);
- ◆ Pressures on agriculture and pastoral production (growing supply and demand, changes in land use, water available for irrigation, and food-energy-water security);
- ◆ Changes in infrastructure (roads, new routes, construction codes, coping with permafrost thawing, air, water, and soil pollution, and strategic planning);
- ◆ Societal adaptations and actions to mitigate the negative consequences of the environmental change and to benefit from the positive consequences; and
- ◆ Quantification of the role of Northern Eurasia in the global Earth and socioeconomic systems to advance research tools with an emphasis on observations and models.

This presentation will briefly describe these foci and justify our selections. Socio-economic research challenges are the top priority for several of these foci. These challenges have not been overlooked in the past but have not been addressed satisfactorily NEESPI domain-wide, nor indeed globally. The introduction of the Future Earth research objectives is a response to this gap and the NEFI is designed to

contribute regionally to the objectives.

Keywords: Northern Eurasia, environmental change, Societal adaptations and actions to mitigate the negative consequences of the environmental change and to benefit from the positive consequences, NEFI Science Plan

