

Northern Eurasia Future Initiative (NEFI) Focus on Human-Associated Extreme Events

*Pavel Groisman^{1,2,3}, Alexander Shiklomanov⁴, Irina Yesserkepova⁵, Sergey Gulev², Ildan Kaipov⁶

1. NC State University Research Scholar at NOAA National Centers for Environmental Information, Asheville, North Carolina, USA, 2. Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia, 3. Hydrology Science and Services Corporation, Asheville, North Carolina, USA, 4. University of New Hampshire, Durham, New Hampshire, USA, 5. Joint Stock Company "Zhasyl Damu", Almaty, Kazakhstan, 6. National Center for Space Research and Technologies, Almaty, Kazakhstan

NEFI was conceived at the Workshop “*Ten years of Northern Eurasia Earth Science Partnership Initiative (NEESPI): Synthesis and Future Plans*” in April 2015. One year later, a NEFI White Paper was posted at <http://nefi-neespi.org/> and, thereafter, the peer-reviewed NEFI Science Plan paper was published (Groisman et al. 2017). NEFI is a continuation of NEESPI and addresses two significant and intertwined changes with focus on Northern Eurasia: 1) continued and exacerbated change in the global Earth system, and 2) societal changes with need for mitigation and adaptation approaches. The changes have already occurred and keep growing. Their impacts on (and feedbacks to) atmospheric, biospheric, cryospheric, hydrologic, oceanic, and macro-socioeconomic processes are ongoing. To develop effective mitigation and adaptation strategies, future NEFI activities will need to consider three unique features of Northern Eurasia: (1) the sensitivity of land surface characteristics to global change that feedback to influence the global energy budget; (2) potential changes in the Dryland Belt of Northern Eurasia that will have a large influence on the availability of water for food, energy, industry, and transportation; and (3) the role of the evolving social institutions and economies.

While natural processes (except the high amplitude of their variations) are mainly the same as in other parts of the World, human factors and changes in land cover and land use in Northern Eurasia during the past decades were dramatic and unique. They have ultimately transformed human-environment interactions. This in turn has transformed regional land cover and water resources towards conditions that endanger the resilience of natural ecosystems. Institutional changes in Northern Eurasia over the past few decades have led to large changes in the socio-economic fabric of the societies in the region, affecting land use and the natural environment. One overarching challenge has been the transition from command-driven to “transitional” and more market-driven economics in the countries of the region. This phenomenon has occurred at different rates, with differing levels of success, and often with societal costs.

The core motivation of NEFI is to best use science to serve the decision-making process to maintain Earth system health and to sustain society. Therefore, we have to reconsider/expand the definition of term “extreme events” from rare events (as it was used in climatology) to events that are “human-related”, i.e., are important for human well-being and are not necessary rare. The Earth climatic system does not know extremes. Unusually rare weather situations can be named disturbances or deviations and these terms do not have emotional connotations. Term “extremes” is used by humans when some events or their anomalous manifestations affect quality of human life, prevent or restrict socioeconomic activities, or endanger human life and/or man-made infrastructure. Using this anthropocentric paradigm, we would rather name “extreme” a gradual thawing of the ground under roads and buildings that causes their destruction than the temperature anomalies above the upper 5% of their daily values. This presentation has a particular focus on several types of human-associated extreme events. They are not necessarily rare,

but such events can be legitimately named as “human-associated extremes” (HAE) and deserve our attention, when their occurrence cause serious disruption in socioeconomic activity and/or endangers human life and/or when we observed significant changes in their occurrence and intensity. In our presentation, we present a few examples of HAE and their changes over Northern Eurasia.

Reference: Groisman, Shugart, Kicklighter *et al* 2017: Northern Eurasia Future Initiative (NEFI): facing the challenges and pathways of global change in the twenty-first century. *Progress in Earth and Planetary Science*, **4**:41; doi:10.1186/s40645-017-0154-5

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