



Ongoing Climatic Changes in Northern Eurasia

P. Ya. Groisman (1), O.N. Bulygina (2), V.N. Razuvayev (2), A.V. Meshcherskaya (3), S.V. Ivanov (4), Zh. K. Akhmadiyeva (5), N.A. Speranskaya (6), P. Zhai (7), and K. Shein (8)

(1) UCAR at National Climatic Data Center, University Corporation for Atmospheric Research, Asheville, North Carolina, USA (pasha.groisman@noaa.gov, 1-828 271-4347), (2) Russian Institute for Hydrometeorological information, Obninsk, Russia, (3) Main Geophysical Observatory, St. Petersburg, Russia, (4) Odessa State Environmental University, Odessa, Ukraine, (5) Kazakhstan Scientific Research Institute of Ecology and Climate, Almaty, Kazakhstan, (6) State Hydrological Institute, St. Petersburg, Russia, (7) Headquarters, Chinese Meteorological Administration, Beijing, China, (8) NOAA National Climatic Data Center, Asheville, North Carolina, USA

Northern Eurasia is the region where the contemporary warming and associated climatic and environmental changes are among the most pronounced globally, with winter temperature increased by more than 2K and summer temperature by 1.35K during the period of instrumental observations since 1881. The summer warming is a new phenomenon observed during the past several decades. Summer temperature controls most of vegetation in the polar region, where surface radiation balance (SRB) is positive only for a short period of the year. But, in the middle of this period, it exceeds the SRB values in Sahara or southern California. North of the Eurasian coast, the Arctic Ocean is moving to perennial ice-free conditions and has already lost nearly half of its end-of-summer extent since the late 1970s. This changes the regional albedo and dramatically affects the cold season heat fluxes from the ocean to the atmosphere. Thus, Northern Eurasia and, particularly, its Arctic part is being affected by global and regional factors that are contributing to these observed changes and the positive feedbacks to this forcing may further exaggerate the situation. Climatic changes over Northern Eurasia during the 20th century have been reflected in many atmospheric and terrestrial variables. These include various snow cover, agricultural and phenological characteristics, temperature and precipitation changes, as well as changes in derived variables of economic, social and ecological interest. Among these variables are the frequency of extremes in precipitation and temperature; frequency and duration of no-rain periods; agricultural and hydrological droughts; frequency of thaws and days with severe fire danger; heating degree days; growing season duration; sum of temperatures above/below a given threshold; days without frost; day-to-day temperature variability; precipitation frequency; and precipitation type fraction. We shall systematically present these changes observed during the past 50 to 100 years. Many of them are noticeably significant above the confidence level for weather noise and thus should be further investigated in order to adapt to their impacts.