



## **Extraordinary Heat Wave over European Russia in Summer 2010: What do the Data say?**

Irena Borzenkova (2), Pavel Groisman (1,2), Anna Mescherskaya (3), Olga Bulygina (4), and Vyacheslav Razuvaev (4)

(1) UCAR at National Climatic Data Center, University Corporation for Atm, Asheville, North Carolina, United States (pasha.groisman@noaa.gov, 1-828 254-1225), (2) State Hydrological Institute, St. Petersburg, Russia, (3) Voeikov Main Geophysical Observatory, St. Petersburg, Russia, (4) Russian Institute for Hydrometeorological Information, Obninsk, Russia

An extraordinary weather Anomaly over European Russia (ER) in summer 2010 was caused by a 60-day-long hot anticyclonic weather system with daily temperature anomalies as high as +10K and either no rainfall, or a negligible amount. The Anomaly first decimated crops in the forest-steppe zone of ER, gradually dried wetlands in the forest zone and, finally, caused numerous natural and anthropogenic fires, loss of lives directly and/or indirectly related to it, and multimillion dollars in property and harvest losses. ER is well covered by meteorological observations for the past 130 years. These data and historical weather records (yearbooks or "letopisi", which were carried on in the major Russian monasteries) all show that the Anomaly was well above all known extremes in the past 1000 years. We shall show the precursors of the current outbreak using meteorological records and historical data. Among these precursors are: (1) a century-long tendency of reduction of equator minus pole temperature differences which is the meridional temperature gradient that controls westerly flow over the extratropics; (2) a well documented global temperature rise which is directly related to the increase in frequency of large blocking waves over Europe; (3) an earlier onset and a shorter period of snowmelt documented over East Europe for the past several decades; (4) paleoclimatic evidence that summer conditions were drier than now during the warmer periods of the past; and (5) a significant increase in the frequency of "hot nights" over ER that are known to directly correlate with health problems (including premature death rates) in the mid-latitude countries. Of course, nobody could predict the size and timing for this Anomaly using climate change considerations. However, the ongoing climatic changes staged the scene for it over ER and increased its probability.