Session: C39 Poster: TH107B

Climatological context and intraseasonal evolution of the Russian summer heat wave 2010

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Blocking anticyclone over European Russia that persisted from late June to mid August 2010 resulted in anomalously hot and dry weather conditions over the region. Mean July air temperature significantly (by 3o-8oC) exceeded its climatological values over entire European Russia. In particular, in Moscow mean July temperature exceeded climatological value by record 7.8oC. This anomaly is the largest for the period of instrumental observations (more than 130 years). Our estimates show that anomalies of the spatially averaged air temperature (AT) from the NCEP/NCAR reanalysis over European Russia in July and August 2011 were more than three times larger than standard deviations of the respective time series. The EOF analysis of the sea level pressure (SLP) performed for the anomalously hot summers (i.e., when AT anomalies exceeded one standard deviation) has revealed that the first EOF mode, describing 24% of SLP variability, is characterized by dipole structure with opposite SLP variations over Greenland and eastern North Atlantic/northern Europe. The second EOF explaining 18% of SLP variability is represented by the wave train structure extending from the North Atlantic into the Arctic region. Analysis of intraseasonal evolution of the spatially averaged reanalysis AT over European Russia has revealed its consistency with day-to-day variability of AT observed at the several randomly selected meteorological stations in the region. It is shown that regional AT variability was strongly linked to the first EOF mode of SLP obtained from analysis of the daily data. For entire summer season correlation between regional AT and the NAO index was relatively large (R=0.57). However it varied significantly during the season and the largest correlation was revealed for the period from late July to mid August.