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Changes in the extremes of temperature and precipitation due to anthropogenic forcing: IPCC AR4 ensemble and RCM scenarios

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The study is focused on the analysis of future changes in daily variability of the surface air temperature and precipitation including changes in their extreme values over the north-eastern Eurasia. The changes in climate extremes under A2 IPCC scenario of GHG/aerosols increase have been estimated from 9 AOGCM IPCC AR4 ensemble simulation for the mid 21st century relative to the late 20th century. The analysis has shown, in particular, that the cold extremes might likely warm more significantly as compared to winter mean temperatures. The changes of the annual temperature minima appear to be statistically significant over all territory of Russia. The bigger warming of extreme cold temperatures will be accompanied by decrease of interquartile range of the temperature probability distribution functions suggesting less extreme winter temperatures. The annual temperature maxima are expected to increase over most of Russian territory. However, the simulated trends of annual maxima are not significant at 5% level. The summer mean warming in the south of Russia and Ukraine is less than warming of the annual temperature maxima indicating at future increases in daily variability and climate extremes over these territories in summer. The changes in the extremes simulated by the global models are lacking credibility due to low resolution of current AOGCMs. It appears feasible to evaluate future changes in daily variability and extremes using a regional climate model (RCM) with sufficiently higher resolution. The MGO RCM has been developed for three domains: the Western Russia and Siberia (50 km resolution), and Europe (25 km resolution). The regional climate change simulation has been performed using A2 IPCC scenario. The analysis of regional changes in the extremes along with changes in the annual wild fire days and

permafrost conditions has been conducted.