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Climate change projections for Ukraine in the 21st century based on the best RCM ensembles

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Regional climate models (RCM) results obtained within the European project FP-6 ENSEMBLES for scenario SRES A1B were used for the analysis and projections of climate change in Ukraine. RCM ensembles of 10 RCMs for air temperature and 4 RCMs for precipitation were applied according to previous studies when the best models and ensembles for Ukraine were determined between 14 RCMs of the ENSEMBLES. Changes of key climatic characteristics (multiyear monthly and annual mean and extreme values of air temperature and amount of precipitation) for the territory of Ukraine were analyzed for 20-year periods in the past (1961-1990), modern time (1991-2010) and future periods: near (2011-2030), middle (2031-2050) and far future (2081-2100). Projections were obtained relative to modern reference period 1991-2010. Since the country has a large territory with a variety of orographic conditions and the underlying surface, climate of Ukraine has essential differences in various regions. That is why projections of climatic changes for the 21st century were obtained for the whole country and separately for 5 standard regions combined by similar physiographic conditions and usually used for weather forecast in Ukraine.

The main obtained results are as follows. Significant differences in air temperature growth and precipitation change distribution were found between the regions, seasons and months. In particular, the highest temperature rise was pointed in the South region in summer season (far future period) and in the North and East regions from November to January (near and middle future). The biggest differences in precipitation changes were found in the East, Center and South regions for all future periods. Decreasing by more than 50% in summer and increasing by 60% in autumn were determined at the end of the 21st century in the East region.

In overall more than 150 maps and datasets were obtained for whole Ukraine and her 5 regions based on the ensemble approach: 12 monthly plus annual mean for two climatic characteristics for three future periods as absolute values and changes over 1991-2010. This more than comprehensive information would be the basis for further research in climatology and other scientific fields, particularly for designing of adaptation and mitigation measures for different sectors of the national economy strongly dependent on projected climate change.