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Variability of extreme climate events in the territory and water area of Russia

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The Fourth (2007) and Fifth (2014) Assessment Reports on Climate Change of the Intergovernmental Panel on Climate Change (IPCC) state that in the XXI century, climate change will be accompanied by an increase in the frequency, intensity and duration of extreme nature events such as: extreme precipitation and extreme high and low air temperatures. All these will lead to floods, droughts, fires, shallowing of rivers, lakes and water reservoirs, desertification, dust storms, melting of glaciers and permafrost, algal bloom events in the seas, lakes and water reservoirs. In its turn, these events will lead to chemical and biological contamination of water, land and air. These events will result in a deterioration of quality of life, significant financial loss due to damage to the houses, businesses, roads, agriculture, forestry, tourism, and in many cases they end in loss of life. These predictions are confirmed by the results of the studies presented in the RosHydromet First (2008) and Second (2014) Assessment Reports on Climate Change and its Consequences in Russian Federation.
Scientists predictions have been repeatedly confirmed in the last 15 years - floods in Novorossiysk (2002), Krymsk and Gelendzhik (2012), the Far East (2013), heat waves in 2010, unusually cold winter (February) of 2012 and unusually warm winter of 2013/2014 in the European territory of Russia. In this regard, analysis and forecasting of extreme climate events associated with climate change in the territory of Russia are an extremely important task. This task is complicated by the fact that modern atmospheric models used by IPCC and RosHydromet badly reproduce and predict the intensity of precipitation.
We are analyzing meteorological reanalysis data (NCEP/NCAR, 20th Century Reanalysis, ERA-20C, JRA-55) and satellite data (NASA and AVISO) on air, water and land temperature, rainfall, wind speed and cloud cover, water levels in seas and lakes, index of vegetation over the past 30-60 years (depending on the parameters) in the territory and water area of Russia for determining and mapping of the observed characteristics and trends in the extreme climate events and statistical forecast of these events for the next decades. Determination of a frequency, intensity and duration of extreme climate events in the territory and water area of Russia was done for the first time.
It was found that the interannual-scale dynamics of ENSO is actually reflected in the climate features of different regions of the Earth, including the Russian Arctic. In particular, when the boreal winter season coincides with an El Niño event it is indicative by a negative anomaly of near-surface temperature (about -1°C) and a positive anomaly of sea level pressure over the Russian Western Arctic Basin. In contrary, significant (about +1°C) positive anomaly of near-surface temperature along with reduced sea level pressure over the regions of the Barents, White and Kara Seas is typical for any La Niña event (up to 95% significance of Student's t-test).
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