Geophysical Research Abstracts
Vol. 16, EGU2014-726, 2014
EGU General Assembly 2014

Recent and future extreme precipitation over Ukraine

Olena Vyshkvarkova and Elena Voskresenskaya
Marine Hydrophysical Institute NAS of Ukraine, Sevastopol, Ukraine, aveiro_7@mail.ru

The aim of study is to analyze the parameters of precipitation extremes and inequality over Ukraine in recent climate epoch and their possible changes in the future.
Data of observations from 28 hydrometeorological stations over Ukraine and output of GFDL-CM3 model (CMIP5) for XXI century were used in the study. The methods of concentration index (J. Martin-Vide, 2004) for the study of precipitation inequality while the extreme precipitation indices recommended by the ETCCDI – for the frequency of events.
Results. Precipitation inequality on the annual and seasonal scales was studied using estimated CI series for 1951-2005. It was found that annual CI ranges vary from 0.58 to 0.64. They increase southward from the north-west (forest zone) and the north-east (forest steppe zone) of Ukraine. CI maxima are located in the coastal regions of the Black Sea and the Sea of Azov. Annual CI spatial distribution indicates that the contribution of extreme precipitation into annual totals is most significant at the boundary zone between steppe and marine regions. At the same time precipitation pattern at the foothill of Carpathian Mountains is more homogenous. The CI minima (0.54) are typical for the winter season in foothill of Ukrainian Carpathians. The CI maxima reach 0.71 in spring at the steppe zone closed to the Black Sea coast. It should be noted that the greatest ranges of CI maximum and CI minimum deviation are typical for spring. It is associated with patterns of cyclone trajectories in that season.
The most territory is characterized by tendency to decrease the contribution of extreme precipitation into the total amount (CI linear trends are predominantly negative in all seasons).
Decadal and interdecadal variability of precipitation inequality associated with global processes in ocean-atmosphere system are also studied. It was shown that precipitation inequality over Ukraine on 10 – 15 % stronger in negative phase of Pacific Decadal Oscillation and in positive phase of Atlantic multidecadal oscillation.
Typical space distribution of extreme precipitation (R95p) for seasons and for year is characterized by their southward intensity increasing from North-East and North-West. Summer precipitation extremes are characterized by quite homogeneous distribution. Linear trends of indices of precipitation extremes (R95p, R20mm and R30mm) for period 1951 – 2005 are mainly negative in winter season and positive in summer.
To analyze the possible changes of extreme precipitation it was calculated the R95p index for recent climate period (1986 – 2005) and for periods 2046 – 2065 and 2081 – 2100 (as it was recommended by IPCC). Its difference between 1986 – 2005 and 2046 – 2065 shows that intensity of extreme precipitation will decrease in the north-east and increase in the south-west regions, especially in summer season. Magnitude of intensity changes of extreme precipitation will be $\pm$ 4 – 5 mm/day. The intensity changes of extreme precipitation since the recent climate period till the end of the century will be some less (2 – 3 mm/day) than in previous period, except summer months. Number of cases with precipitation extremes will be increase in southern regions of Ukraine in summer seasons. In other seasons it will be at the recent climate level.