Fourth International Conference on Earth System Modelling
4ICESM-34-1, 2017

Detecting regional climate change using data on extreme temperatures

V. Khokhlov, O. Umanska, and N. Yermolenko
Odessa State Environmental University, Department of Meteorology and Climatology, Ukraine (khokhlovv@odeku.edu.ua)

Climate change and especially extreme climatic events can greatly affect the nature, and the consequences will be felt in the economic, environmental and social spheres. It is widely recognized that the rise of global mean temperature, which are calculated using daily mean (TG) one, during last century is the most prominent feature of current climate. The extreme temperatures, minimum (TN) and maximum (TX), have also drastically changed. This study develops the approach using annual, winter and summer indices of extremes – TG10p, TN10p, TX10p are the numbers of days with TG, TN and TX less than 10th percentile, and TG90p, TN90p, TX90p are the numbers of days with TG, TN and TX greater than 90th percentile. These indices were calculated for Ukrainian sites focusing on Kyiv in the northern part and Odessa in the southern one – the sites with longest records. In this study, we analyzed not the numbers of appropriate days but the linear trends for the three periods – 1894-2014, 1981-2014, and 1998-2014. It is well known that the recent global warming was most prominent starting from the 1980s as well as it was reported in some studies that the steady increase in global surface temperature around a linear positive trend has paused in the 2000s. Nevertheless, the records do not reveal any hiatus in the third period as the number of cold days decreased and warm days increased in most cases. Moreover, the linear trends were sharper in the last 15 years compared with the period of 1981-2014 and, especially, with the period of 1894-2014. The small increase of cold day-times in Southern Ukraine must be single manifestation of the hiatus. The number of warm events increased more intensively than the number of cold ones decreased, especially in Southern Ukraine. For example in Odessa, the linear trend of TG10p showed the decrease by the 1 event per year whereas the TG90p increased by the 2 days per year. We can conclude that in order to assess regional climate change the use of extreme temperature indices can be more representative than common mean temperature.