Objective climate classification of Slovenia

Katja Kozjek (1), Mojca Dolinar (2), and Gregor Skok (1)

(1) University of Ljubljana, Faculty of Mathematics and Physics, Ljubljana, Slovenia (gregor.skok@fmf.uni-lj.si), (2) Slovenian Environment Agency, Ljubljana, Slovenia

In this study the climate regions of Slovenia were determined. The procedure was done predominately objectively, with methods of statistical clustering using climate data as input. The climate data in regular grid was used representing the period between 1981-2010. Preliminary analysis of climate data identified key climate variables that were later used to obtain climate regions. Classification was performed as a combination of two statistical methods. Firstly, factor analysis was applied which was followed by k-means clustering. With factor analysis the initial number of 31 variables was reduced to 4 variables or so called factors. These factors were then taken as input in cluster analysis process. The most logical and representative results were given by classification into 6 climate regions. With such classification we divided Slovenia into Littoral region, very wet region of northwestern Dinaric-Alpine barrier, higher region of Dinaric-Alpine world, the region of the highlands, dry lowland region of eastern and central Slovenia and higher, wetter region of central Slovenia. The entire analysis was repeated using data from the period 1961-1990 and the resulting classification was compared to classification from the original period. The comparison showed that these classifications are quite similar. The borders between regions were slightly changed, most notably in the regions that are most similar to each other. We also analyzed climate change in each region between the two periods. Significant climate changes have occurred within each of the six regions. In all of the regions temperature increased and rainfall decreased, some regions also experienced changes in precipitation regime. The climate within regions therefore changes over time, while the regions themselves are quite stable over time.