EMS Annual Meeting Abstracts
Vol. 15, EMS2018-347, 2018

Evaluation of general circulation models with respect to atmospheric teleconnection systems over the North Atlantic/European region with special focus on the Pannonian Basin

Erzsébet Kristóf (1), Judit Bartholy (1,2), Rita Pongrácz (1,2)

(1) Eötvös Loránd University, Dept. of Meteorology, Budapest, Hungary, (2) Eötvös Loránd University, Faculty of Science, Excellence Center, Martonvásár, Hungary

Climate predictions serve as the basis of further impact study for various sectors, thus, physically-based predicting model tools should thoroughly be evaluated. Due to the overall large scale features and spatial resolutions of these models, the effects of atmospheric oscillation phenomena should be carefully analysed with a synoptic scale approach using a statistical climatological viewpoint.
Specifically, the presented analysis consists of the following steps. First the variability of the oscillation phenomena over the North Atlantic/European region and their effects on the weather conditions of the Pannonian Basin are explored by analysing the geopotential height fields of the European Centre for Medium-Range Weather Forecasts' (ECMWF) ERA-20C reanalysis dataset. Then, simulations of the Coupled Model Intercomparison Project Phase 5 (CMIP5) general circulation models (GCMs) are compared to the ERA-20C using various model metrics. On the basis of the comparison the best-performing GCMs are chosen for further detailed analysis. Finally, the outputs of the selected model simulations are evaluated for the future time periods concerning the variability of the detected oscillation phenomena and their effects on the Pannonian Basin.
The above-mentioned analyses are carried out by multivariate statistical methods such as empirical orthogonal function (EOF) analysis, which is a common tool to assess the spatial and temporal variability of a given field. This method is advantageous because a major fraction of the total variability is expressed by the first few EOFs, and enables us to compare the GCMs' outputs to the reanalysis dataset. The method is applied to the periods of 1951-1980, 1961-1990 and 1971-2000 as well as the decades of the second half of the 21st century. Our study focuses on the winter months (December, January and February) only because large-scale atmospheric circulation systems are expected to affect the Pannonian Basin substantially more in wintertime than in summertime. Our ultimate goal is to contribute to the improvement of climate predictions for the region of the Pannonian Basin for the 21st century.