Relationship between climate extremes in Romania and their connection to large-scale air circulation

Nicu Barbu (1,2) and Sabina Ştefan (1)

(1) University of Bucharest, Faculty of Physics, P.O.BOX MG-11, Magurele, Bucharest, Romania., (2) National Meteorological Administration, Sos. Bucuresti-Ploiesti nr. 97, Bucuresti, Romania.

The aim of this paper is to investigate the connection between climate extremes (temperature and precipitation) in Romania and large-scale air circulation. Daily observational data of maximum air temperature and amount of precipitation for the period 1961-2010 were used to compute two seasonal indices associated with temperature and precipitation, quantifying their frequency, as follows: frequency of very warm days (FTmax90 $\geq$ 90th percentile), frequency of very wet days (FPp90; daily precipitation amount $\geq$ 90th percentile). Seasonally frequency of circulation types were calculated from daily circulation types determined by using two objective catalogues (GWT - GrossWetter-Typen and WLK - WetterLargenKlassifikation) from the COST733Action. Daily reanalysis data sets (sea level pressure, geopotential height at 925 and 500 hPa, u and v components of wind vector at 700 hPa and precipitable water content for the entire atmospheric column) build up by NCEP/NCAR, with 2.5°/2.5° lat/lon spatial resolution, were used to determine the circulation types. In order to select the optimal domain size related to the FTmax90 and the FPp90, the explained variance (EV) has been used. The EV determines the relation between the variance among circulation types and the total variance of the variable under consideration. This method quantifies the discriminatory power of a classification. The relationships between climate extremes in Romania and large-scale air circulation were investigated by using multiple linear regression model (MLRM), the predictands are FTmax90 and FPp90 and the circulation types were used as predictors. In order to select the independent predictors to build the MLRM the collinearity and multicollinearity analysis were performed. The study period is dividend in two periods: the period 1961-2000 is used to train the MLRM and the period 2001-2010 is used to validate the MLRM. The analytical relationship obtained by using MLRM can be used for future projection of the considered predictand. Preliminari results sows that in case of the FTmax90 the optimal domain size must by larger compared to TPp90. We have obtained some good correlation between registered and estimated values of the FTmax90 and the TPp90.