

Changes in large-scale air circulation and connection with climate variables in Romania

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The aim of this paper is the analysis of the relationship between climate variables (seasonal mean air temperature – T2m, and seasonal amount of precipitation - PP) and large-scale air circulation. In order to achieve this, the air circulation types were derived from GrossWetterTypen (GWT) and WetterLagenKlassifikation (WLK) Catalogues developed within COST733 framework. Daily air circulation types are divided into 18 groups according to the GWT Catalogue and in 40 groups according to the WLK Catalogue and for each type winter (DJF) and summer (JJA) occurrence frequency were calculated. To this end the Pearson correlation coefficient between climate variables and circulation type's frequency were computed. The results reveals that in wintertime the GWT circulation types captures better than WLK circulation types the T2m variability in time that for summer the WLK circulation types captures better than GWT circulation types. This is due to the seasonal variability of the horizontal extension of air masses. We found that the T2m is positive correlated to anticyclonic circulation types and negative correlated with cyclonic types and the PP is correlated to the cyclonic circulation and negative correlated to anticyclonic ones. Additionally, the trend significance of the climate variables as well as air circulation types have been analysed with the non-parametric Mann-Kendall test. The changes of the trends were detected by employing the non-parametric Pettit test. From the trend analysis we can state that some of the anticyclonic circulation types presents upward tendency and some of the cyclonic circulation presents downward tendency. This is an important results because explain the upward trend of the T2m and the downward trend of the PP.