

Classification of circulation types: a new flexible automatic approach applicable to NCEP and GCM data

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This study is motivated by an interest in obtaining a new automatic classification scheme of daily circulation types being applied everywhere in Europe. The automatic circulation type classification is developed using spatial methods of topology and geometry. The classification scheme is performed on anomalies of different geopotential fields (NCEP Reanalysis data: SLP, 1000hPa, 500hPa, $2.5^{\circ} \times 2.5^{\circ}$) depending on the selected study regions. The center of each study area is defined by eight grid points. Five anticyclonic types (Anw, Anw, A, Asw and Ase) and seven cyclonic types (C, Cnnw, Cwnw, Cwsw, Csw, Cse, Cne) are defined. Each of the circulation types has a distinct underlying synoptic pattern that produces the expected type and direction flow over the study area.

The classification scheme was applied to three different Mediterranean regions, central Italy, southern Aegean Sea (Greece) and Cyprus. The precipitation percentage of the cyclonic type total and the mean seasonal correlation coefficients for all circulation types are the two criteria used evaluating the classification applicability. The capability of the General Circulation Model HadAM3P (Hadley center) to reproduce the mean pattern and the frequency of circulation types concerning the selected geopotential height fields over the study regions against the NCEP/NCAR dataset for the period 1960-1990 are also evaluated.

According to the first results, the percentage of rainfall of the cyclonic circulation types is greater than 85% for all the study regions. Furthermore, the examination of the correlation coefficients for the three classifications was very satisfying for almost the total number of the days of the study period. The model (HadAM3P) is able to capture the mean patterns of the circulation types but it generates different frequencies of circulation types from those observed, using the NCEP data, over the study regions.