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Synoptic-climatological applicability of multiple circulation classifications

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The database of classifications of atmospheric circulation patterns, which was produced within the COST733 Action, consists in its version v2.0 of 423 different classifications for each of 12 domains over Europe. The classifications differ from each other in five characteristics: (i) the classification method used, (ii) the number of types, (iii) the classified variable, (iv) sequentiality (whether instantaneous circulation patterns or their 4-day sequences are classified), and (v) the seasonality of definition (whether classifications are defined for a whole year or separately for each season). The goal of the study is to evaluate how successful are the classifications in characterizing (stratifying) surface climate elements, viz., daily minimum and maximum temperature and precipitation. To this end, we employ several criteria: explained variance, pseudo-F statistic, and Kolmogorov-Smirnov statistic. Both station datasets (ECA&D) and reanalysis (ERA-40) are used. The classifications are ranked in each domain separately. This allows one to evaluate the effect the options (i) to (v) have on the quality of classifications in terms of the stratification of surface temperature and precipitation, to compare the performance among the criteria, and to assess the geographical dependence of the findings.