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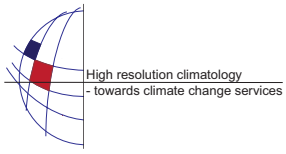

Evaluation of circulation classifications from the COST733 database: The ability to stratify surface climate elements

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A large number of classifications of circulation patterns have been produced within the international COST733 Action "Harmonization and Applications of Weather Types Classifications for European Regions." The classifications are produced by about 15 different classification methods, including cluster analysis, principal component analysis, leader algorithm methods, and threshold-based methods for unified data over the ERA-40 period (1957-2002) for 12 domains covering Europe. Here we examine the synoptic-climatological applicability of classifications, which is defined as their ability to stratify surface climate elements. The degree of stratification is quantified by conducting the two-sample Kolmogorov-Smirnov test between the distribution conditioned by a particular circulation type and the unconditional distribution. As the climate data, temperature and precipitation station series from the ECA&D database and gridded dataset produced in the ENSEMBLES project have been used. The results are sensitive to the number of classes (classifications with a lower number of classes tending to yield a better stratification) and depend on season. We examine whether sequencing (i.e. taking patterns on several consecutive days isntead of on a single day as a classified entity), seasonally specific definition (instead of that for a year as a whole), and including additional variables (500 hPha height, lower tropospheric thickness, and vorticity) to sea level pressure improve the stratification. Although the overall 'best' method (or a group of optimum methods) cannot be identified, methods with generally better and worse performance can be determined.