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Precipitation Regimes in Europe: An Intercomparison of Classification Methods

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An analysis of monthly precipitation data over Europe in 1951-1990 is carried out for a dataset consisting of 102 stations distributed across whole Europe. Data from the European Climate Assessment Project are used. The objectives of this study are (i) to identify the groups of stations (regions) with similar time variations of precipitation and (ii) to compare several classification methods for this purpose. The classification methods examined are: Lund correlation method, average linkage, K-means, and rotated principal component analysis. Of these methods, only the rotated PCA and K-means define groups of stations with a reasonable spatial coherency. The orthogonally and obliquely rotated PCA define six spatially homogeneous classes of precipiation variation over Europe, while the K-means method define nine of them. The quality of classifications is assessed by criteria of between- and within-group separability. We also examine whether the annual variation or long-term changes dominate in determining the distribution of stations into groups.