



Comparison of different atmospheric circulation pattern classification methodologies for rainfall modelling in the Jordan region

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Different circulation pattern (CP) classification methodologies are applied for the Jordan region. The obtained daily CP time series are statistically tested for mutual dependency using the χ^2 -test. The magnitude of the dependency is assessed by means of the adjusted contingency coefficient and Cramér's coefficient, separately for the whole-year-round and the seasonal consideration. The persistence of the mutual dependencies is analyzed using a moving-window approach for the period 1961-1990. In order to estimate the possibility of making predictions of a certain CP classification, the Guttman's λ is calculated. The different methodologies are tested for usability for CP conditional rainfall modelling.

Most of the mutual CP classification approaches are found to be non-independent. The highest correlation occurs between Beck's and Alpert's classification approach for the whole-year-round consideration, different results are obtained for the seasonal consideration. The strength of the mutual dependencies between the different classifications is found to depend strongly on the season. The greatest dependencies exist for winter, the lowest for summer. The relationships are found to remain relatively stable over the analyzed period.

The performance of the different classification schemes for rainfall modelling within the Jordan region is analyzed. Except for two observation stations in the southern part of the research area, all the CP conditional approaches are superior to the unconditional rainfall modelling. The semi-objective Alpert CP classification is found to perform slightly better than the fully objective methodologies.

Keywords circulation pattern analysis; Jordan region; χ^2 -test; Cramer's V; adjusted contingency coefficient; Guttman's λ