



Variability of winter and summer precipitation in Serbia and Montenegro

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The main characteristics of the spatial and temporal variability of winter and summer precipitation observed at 30 stations in Serbia and Montenegro were analyzed for the period 1951–2000. The rainfall series were examined spatially by means of Empirical Orthogonal Functions (EOF) and temporally by means of the Mann-Kendall test and wavelet analysis.

One of the main purposes of EOF is to reduce the number of variables to be studied whilst retaining most of the information contained in the original set of variables in order to understand and interpret the structure of the data. The temporal variability of the time series associated with the main EOF configurations (the Principal Components, PCs) are examined. The EOF analysis gave three winter and summer dominant modes of variations, which explained 89.7% and 70.4% of the variance, respectively. The time series (PC1) associated with the first pattern showed a decreasing trend in winter precipitation.

The first winter and summer patterns indicated that the large-scale atmospheric circulation could be responsible for the winter and summer precipitation variability. Strong correlation between the winter PC1 and the NAO index indicated that the NAO could be responsible for the winter precipitation variability. The second winter and summer EOF patterns showed an opposite sign of climate variability between areas with Mediterranean and continental climates, which highlighted the influence of relief and the Adriatic Sea on the precipitation regime. Also, the third EOF pattern showed a dipolar structure that suggested an orographic influence.

Wavelet analysis showed that a quasi-cycle of 8 and 16 years was found in the winter PC1 and a quasi-triennial oscillation in the summer PC1, while a quasi-cycle of about 7 years was found in the winter PC2. The quasi-periodic oscillations found over Serbia and Montenegro are consistent with the quasi-periodic oscillations reported in other studies on fluctuations of European precipitation.