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Teleconnections between ENSO and summer Palmer Drought Severity Index time series in Europe

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The Palmer Drought Severity Index (PDSI) for the summer time over the 1891-1991 period, as it was calculated by Briffa et al. (1994)[1], is defined in this paper for 6 regions: the northwestern europe (NWEUR); the northwest Mediterranean (NWMED); the Danube Basin (DANUB); the Romania zone (ROMZ); the northern Fennoscandia (NFENN); the lower Volga (LVOLG).
We introduced a drought index (EEOFDI), which was estimated by means of the first component of the empirical orthogonal functions (EOF) decomposition for temperature and precipitation fields for 1951-1997. This drought index has given, in the case of Romania, similar results with Palmer Drought Severity Index, defined by Briffa et al. (1994) [1]. The behaviour of the two indices is very similar, except for their signs that are reverse. The quantification of ENSO effect in this paper is made by means of the Southern Oscillation Index (SOI).
In order to test the connections between SOI and PDSI, the correlation technique has been applied using the lags from 1 to 4 seasons. Results with statistical significance at a 99% confidence level have been obtained for the lower Volga (LVOLG), for which the SOI behaviour in wintertime can influence the moisture condition during the summer in this area. For Romania region, the statistically significant results at 99% confidence level have been obtained, the moisture state from summer time is sensitive to SOI anomalies in spring, and namely an EL-Nino event favours a wetter summer. Our results are partially in accordance with the findings of Oldenborgh et al. (2000) [2] who have taken into account the evolution of NINO3 index for El-Nino quantification. The ENSO impact on the precipitation field in Europe may be explained either by SSTA from Indian Ocean or by means of SSTA behaviour fron tropical Atlantic.

Keywords: EOF decomposition, Southern Oscillation Index, Temperature, precipitation.

References

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