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Standardized Precipitation Index and Long-range Aridity Index for Croatia



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1. Introduction

Standardized Precipitation Index (SPI) is a probability index that was developed to give better representation of abnormal wetness and dryness than traditionally used Palmer Drought Severity Index (PDSI), what has been published by Guttman (1999). Although there are some correction of statement cited, because of the DMCSEE (Drought Management Centre for Southern Europe) project, 24-month period SPI has been calculated for Zagreb-Grič weather station for the secular period 1862-2010. A comparison of cited SPI with 30-year average precipitation amounts as well as with aridity indeks is represented. As expected, short-term variability is emphasised at SPI time series while a long-term is more emphasised in the case of 30-averages of precipitation amounts and aridity index.

2. Methodology and data

Computation of the 24-month period SPI involves fitting a gamma probability density function to a given frequency distribution of precipitation totals for a station (McKee et al., 1993; Mihajlović, 2006). In our case 24-monthly precipitation data for period 1862-2010 have been available for Zagreb-Grič weather station. Own software has been developed for calculation of SPI on the base of cited data. In addition 30-moving averages of annual average air temperature, annual precipitation amounts and aridity index defined as:

$$I = P/PET,$$

Where I is aridity index, P is annual precipitation amount and PET is annual amount of potential evapotranspiration.

3. Results

24-month period SPI for Zagreb-Grič weather station for the period 1862-2010 are represented at the top of Figure 1. As by SPI is impossible to consider other water cycle components in addition to precipitation amounts (the second diagram from the top of Figure 1) annual potential evapotranspiration is considered (the third diagram from the top of Figure 1). Finally, aridity index is represented at the bottom of Figure 1. That diagram shows strong decreasing negative trend of aridity what has not been shown by SPI or precipitation amounts themselves. It can be expected that the results for Zagreb are also good estimation for the rest territory of Croatia especially for its northern part.

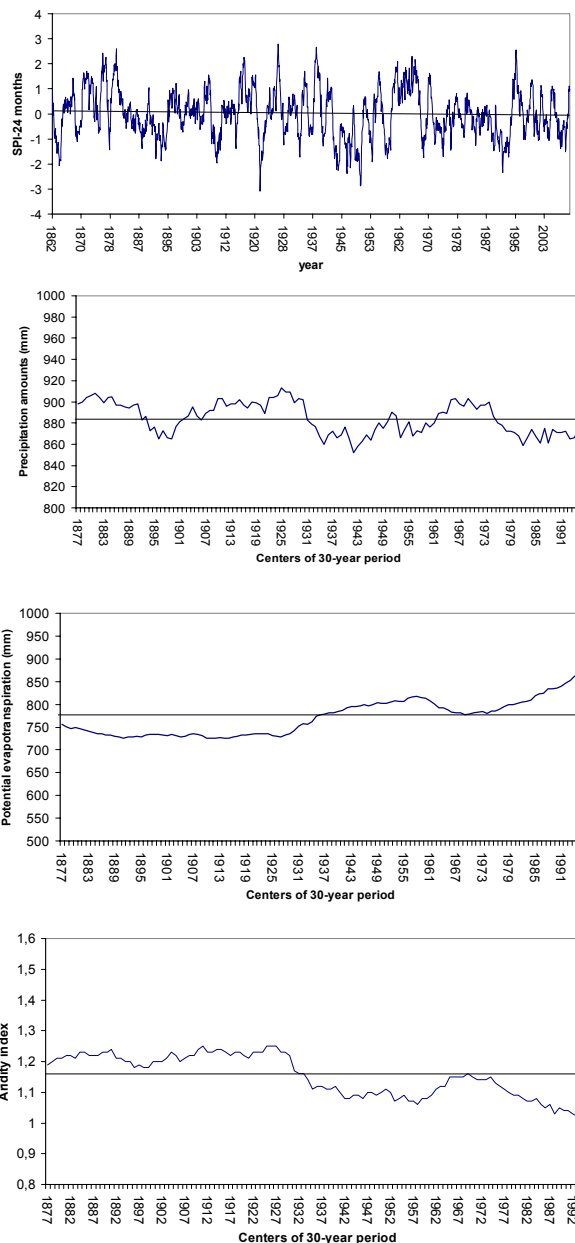


Figure 1. Time series of SPI-a for 24 months periods (the first upper diagram), 30-year precipitation, air temperature and aridity index are represented on the second, the third and the fourth diagram from up to down of the figure, respectively. All refer to Zagreb-Grič weather station during period 1862-2010

References

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