Standardized Precipitation 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, SPI has been calculated for Croatia since recent time (Mihajlović, 2006). This index has been calculated for Zagreb-Grič weather station for the period 1862-2008 and a case-study is considered for summer 2010 for the whole territory of Croatia.

2. Methodology and data

Computation of the 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 monthly precipitation data for period 1862-2008 have been available for Zagreb-Grič weather station and monthly precipitation data for 40 weather stations from Croatia for the summer season 2010 (June, July and August). Own software has been developed for calculation of SPI on the base of cited data.

3. Results

SPI for Zagreb-Grič weather station for the period 1862-2008 are represented in Figure 1 for different time subperiods: 1, 6, 12 and 24 months. In the first case, i.e. for 1-month subperiods there are the strongest time variability while for the 24-month subperiods the variability is the smallest. SPI for longer time subperiods represent some kind smoothing (moving average) of SPI for shorter time subperiods. A quasi decadal fluctuation of SPI can be observed for 24-month subperiods.

A case study results for summer 2010 are represented in Figure 2 for subperiods: 1, 3, 6, 12, 24 and 48 months. It can be noticed a difference in space distribution of drought severity depending on subperiod considered. Some wet regions for e.g. 1-month suberiods become even dry for longer time subperiod or oppositely.

It should be mentioned that a bad side of SPI is impossibility to consider other water cycle components in addition to precipitation amounts. Because of that some other solutions should be also considered.

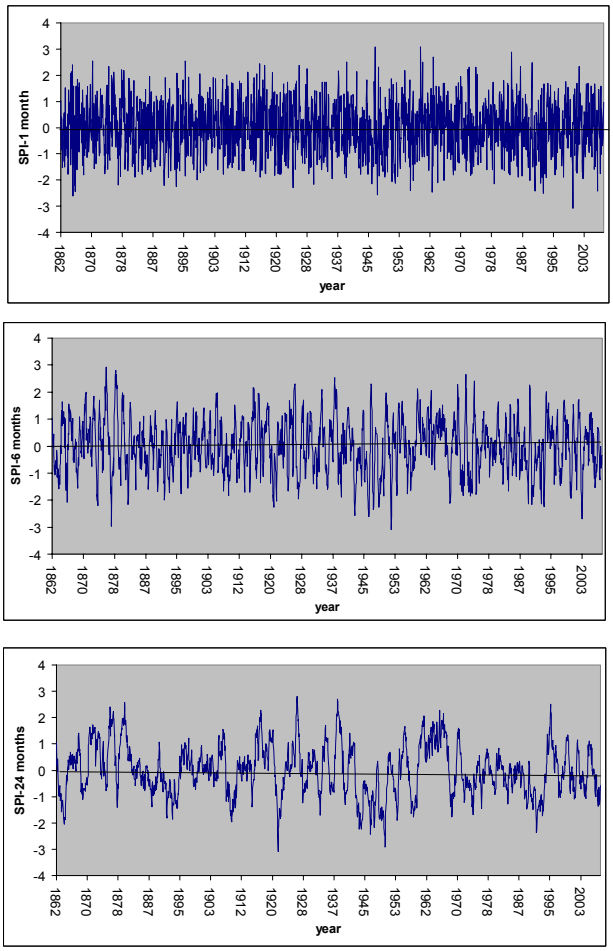

Figure 1. Time series of SPI-a on different time scales (1, 6, 12, 24 months) for Zagreb-Grič weather station during period 1862-2008

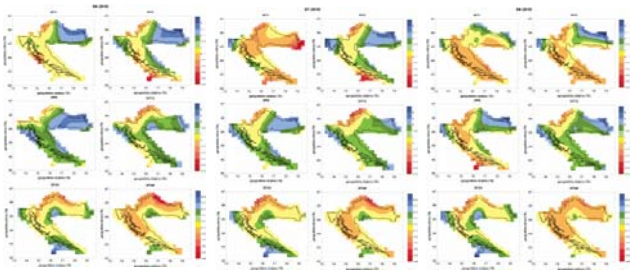

Figure 2. Space distribution of SPI-a on different time scales (1, 3, 6, 12, 24 and 48 months) during the summer 2010

References

Guttman, N.B., 1999: Accepting the standardized precipitation index: a calcuation algorithm. Journal of the American Water Resources Association 35, 311-322.

McKee, T.B., Doeksen, N.J. and J. Kleist, 1993: The relationship of drought frequency and duration on Time scales. *Proceedings of the 8-th Conference on Applied Climatology.* AMS, Boston, 17-22 January.

Mihajlović, D., 2006: Monitoring the 2003-2004 meteorological drought over Pannonian part of Croatia. International Journal of Climatology. DOI: 10.1002/joc.1366.