



Assessing changes in drought characteristics with standardized indices

Jean-Philippe Vidal (1), Julien Najac (2), Eric Martin (2), Laurent Franchistéguy (3), and Jean-Michel Soubeyroux (3)

(1) Cemagref, HHLY, Hydrology-Hydraulics Research Unit, Lyon, France (jean-philippe.vidal@cemagref.fr), (2) CNRM/GAME, Météo-France and CNRS, (3) Météo-France, Climatology Department

Standardized drought indices like the Standardized Precipitation Index (SPI) are more and more frequently adopted for drought reconstruction, monitoring and forecasting, and the SPI has been recently recommended by the World Meteorological Organization to characterize meteorological droughts. Such indices are based on the statistical distribution of a hydrometeorological variable (e.g., precipitation) in a given reference climate, and a drought event is defined as a period with continuously negative index values.

Because of the way these indices are constructed, some issues may arise when using them in a non-stationary climate. This work thus aims at highlighting such issues and demonstrating the different ways these indices may – or may not – be applied and interpreted in the context of an anthropogenic climate change.

Three major points are detailed through examples taken from both a high-resolution gridded reanalysis dataset over France and transient projections from the ARPEGE general circulation model downscaled over France. The first point deals with the choice of the reference climate, and more specifically its type (from observations/reanalysis or from present-day modelled climate) and its record period. Second, the interpretation of actual changes are closely linked with the type of the selected drought feature over a future period: mean index value, under-threshold frequency, or drought event characteristics (number, mean duration and magnitude, seasonality, etc.). Finally, applicable approaches as well as related uncertainties depend on the availability of data from a future climate, whether in the form of a fully transient time series from present-day or only a future time slice.

The projected evolution of drought characteristics under climate change must inform present decisions on long-term water resources planning. An assessment of changes in drought characteristics should therefore provide water managers with appropriate information that can help building effective adaptation strategies. This work thus aims at showing the potential of standardized indices to describe changes in drought characteristics, but also possible pitfalls and potentially misleading interpretations.