Geophysical Research Abstracts
Vol. 16, EGU2014-14144, 2014
EGU General Assembly 2014

An assessment of the drought hazard in the Tiber River Basin in Central Italy, and a comparison of new and commonly used meteorological indicators.

Pamela Maccioni (1), Maggie Kossida (2), and Tommaso Moramarco (1)

(1) Research Institute for Geo-Hydrological Protection, National Research Council, Italy (pamela.maccioni@irpi.cnr.it), (2) National Technical University of Athens, Greece (mkossida@chi.civil.ntua.gr)

Drought is one of the most common natural hazards with adverse impacts on agriculture and the water resources. This study aims to spatially analyze the drought hazard in Tiber River Basin and find a representative indicator on the basis of meteorological data which are widely available. To this end, the significance of using solely precipitation, or including ET as proxy of drought is thoroughly investigated. Three relevant indicators are considered: 1) the new index SPET0I (Standardized Precipitation-Reference EvapoTranspiration Index) incorporating evapotranspiration losses; 2) the commonly used SPI12 (Standardized Precipitation Index) and 3) RDI (Drought Reconnaissance Index). A comparison has been undertaken at annual scale (12-months time step) using precipitation and temperature data from 2 stations for the period 1947-1999, for which all data were available. This analysis, although somehow limited by the spatio-temporal availability of the temperature data necessary for calculating the Potential/Reference Evapotranspiration, demonstrated that the evolution and trends of the 3 compared indices are very similar, and confirmed the reliability of the SPI for drought monitoring in the case of the Tiber Basin. Though effective precipitation and reference evapotranspiration are important parameters in water resources losses in the Tiber River Basin, however SPI was found accurately capture and represent the prevailing drought events, and while simpler it is equally effective.
Based on that, a wider data set of available precipitation data (37 stations, 96 years long time series from 1916-2011) has been used to calculate the SPI12 since proven an adequate indicator, and post-process it results to derive four new sub-indicators reflecting the intensity, magnitude, duration and frequency of drought events. These sub-indicators, once classified, were blended to identify the representative indicator for the Tiber Basin, i.e, the Drought Hazard Index (DHI), thus providing a more holistic characterization of the hazard in a scale 1-4. A spline interpolation using GIS was finally performed across the resulting DHI values of the 37 stations in order to map the most drought prone area in the catchment. It is observed that most vulnerable areas are located in the central and south-central part of the Tiber River Basin, while the northern part is much less affected.