



Assessment of extreme drought episodes over Po Plain (Italy)

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Drought is a normal and recurrent climate feature, but one of the most important climate hazard that can produce negative effects on natural and socioeconomic systems. In central Mediterranean basin (Italian peninsula) several efforts were devoted in the study of drought episodes, due to the very significant rainfall reduction recorded in the southern Italian regions during the last 50 years. On the other hand, the northern part of Italy (Po Valley) is historically rich in water resources, and one of the most fertile and productive agricultural area. But recently drought events increased influencing the hydrological behaviour of the Po river. In fact, since the 2000s an increase of the prolongation of the Po river lean period was recorded. In this work past (1985-2017), near future (2020-2049) and far future (2070-2099) weakly drought events for the Po Plain region, based on 60 weather stations and 5 EURO-CORDEX Regional Climate Models were expressed and mapped. Firstly, a quality control was performed on the climatic series and all unreasonable values were removed. Subsequently daily values were converted to weekly and the homogeneity of the series was checked. Finally, the obtained weekly homogenised data were reconstructed. Subsequently in order to facilitate the spatial analysis of drought events, weekly temperature and precipitation series were interpolated by means to the Universal Kriging. Reference evapotranspiration (ET_o) was estimated by means of the Hargreaves ET_o equation. Then the model validation was performed. For each model 10 precipitation and temperature daily series were extracted and compared with the respective quality controlled series recorded at the ground. The statistical comparison was developed by means of Co.Temp and Co.Rain software classifying episodes in weak, mean, heavy and extreme. Subsequently, severe and extreme drought episodes were detected by means of two drought indices (SPI and SPEI) calculated at short (3 months) and long (12, 24 and 36 months) time scale. Trends were analysed, and the main drought events were characterised, identifying duration, magnitude and length.

The results figured out that drought becomes more frequent and longer after the 2000s. In the future more frequent extreme precipitation events and longer dry spells will be observed, which will lead to an intensification of drought in terms of length and percentage of area.