Observed and future changes of dry spells in Croatia

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Drought in Croatia causes the highest economic losses inflicting serious damages, especially in agricultural and water management sector. In this study dry spells (DS) in Croatia are analyzed. DS are defined as consecutive sequences of days having daily precipitation less than a given precipitation-per-day threshold (5 mm in this study). Daily precipitation data from a dense national rain-gauge network (grouped into seven climatological regions) and spanning the time period 1961–2015 are employed. Spatial and temporal characteristics of mean and maximum seasonal and annual DS are analyzed as well as recent changes in DS using the trend estimations by means of Kendall' tau method.

Additional period 1971–2000 is defined. For this period both observation based DS and regional climate models' based DS analysis is performed. Three regional climate models, RegCM4, CLM and RCA4, cover the EURO-CORDEX domain, and they are forced at the lateral boundaries using four CMIP5 global climate models. Regional climate models are applied at the 12.5 km horizontal resolution, resulting in a realistic orography and land-sea fields over Croatia. For the 1971–2000 period, models' systematic errors in terms of the DS climatology are examined.

Finally, projections and future changes in the DS are based on the simulations under the high and medium greenhouse gases concentration scenarios (i.e., RCP8.5 and RCP4.5). The focus is on the climate change signal between 1971–2000 and the two future periods, 2011–2040 and 2041–2070.

Reports on drought impacts for the period 2000–2018 were collected from the national newspapers and analyzed. The severity of drought impacts for the few selected years is linked to the satellite products available on the drought monitoring web platform – Drought Watch (mainly to the soil moisture and vegetation status) and Standardized Precipitation Index (SPI).

Key words: drought, dry spell, climate model, impacts, Drought Watch