

Assessing drought hazard under non-stationary conditions on southeast of Spain

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Abstract The vulnerability of semi-arid basins such as the Segura River basin (southeast Spain), to rainfall variability, implies uncertainties in agricultural activities. Increasing the knowledge about plausible trends of drought events will improve the adaptation and mitigation measures. The non-stationary character of hydrometeorological series, based on climate and anthropogenic changes, is the main criticism of traditional frequency analysis. An innovative methodology for non-stationary analysis of droughts events, applying GAMLSS (Generalized Additive Models for Location, Scale and Shape) is presented. The analyses were based on observed data and selected regional climate models (RCMs). The series of maximum length of dry spells (MDSL) from observed data show an intensification of drought events in headwater catchments from the 1980s onwards. From various RCMs, plausible trends of MDSL are identified. By adjusting pdf to series of observed MDSL, applying GAMLSS and bootstrapping techniques, the assessment of regional trends associated to return period, from hazard maps is possible.

Key words drought; non-stationary probabilistic models; GAMLSS; Segura River Basin; Spain