Observed and Projected Aridity Trends in the CASCADE Project Mediterranean Drylands

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Recently observed trends and projections from climate model ensembles for the Mediterranean region indicate a strong susceptibility to change in hydrological regimes that can possibly lead to aridification or desertification of the sensitive local dryland ecosystems. Here we consider the E-OBS dataset from the EU-FP6 project ENSEMBLES as historical observations while climate model data is obtained from 9 GCMs for RCP2.6, RCP4.5 and RCP8.5 of the 5th phase of the Coupled Model Intercomparison Project and corrected for biases in mean and variance using Gaussian bias correction (Haerter et al., 2011). The derived dataset is used to estimate the UNEP Aridity Index AIu from Precipitation (P) and Potential Evapotranspiration (PET), the latter estimated using the Blaney and Criddle method. Focus is given on a domain between latitudes 34oN to 44oN and longitudes 10oW to 35oE that includes the European Mediterranean and the CASCADE FP7 Project Study Sites: Várzea (PT), Alicante (ES), Valencia (ES), Castelsaraceno (IT), Messara (GR) and Randi Forest (CY). All sites face different degrees of aridity, with Alicante representing the lowest and Várzea the highest part of the gradient. Results show that, from the 50 year historical record, it is unclear whether permanent aridity regime shifts are currently taking place in the European Mediterranean drylands. Assessment of future aridity trends (present–2050 and 2051–2100) shows minor changes according to RCP26; a gradual increase in semi-arid and arid areas and elimination of humid zones by 2050 according to RCP45; and arid zones covering as much as a devastating 20% of Southern Europe after 2050 according to RCP8.5.