Trends in soil moisture and real evapotranspiration in Douro River for the period 1980-2010

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This study analyzes the evolution of different hydrological variables, such as soil moisture and real evapotranspiration, for the last 30 years, in the Douro Basin, the most extensive basin in the Iberian Peninsula. The different components of the real evaporation, connected to the soil moisture content, can be important when analyzing the intensity of droughts and heat waves, and particularly relevant for the study of the climate change impacts.

The real evapotranspiration and soil moisture data are provided by simulations obtained using the Variable Infiltration Capacity (VIC) hydrological model. This model is a large-scale hydrologic model and allows estimates of different variables in the hydrological system of a basin. Land surface is modeled as a grid of large and uniform cells with sub-grid heterogeneity (e.g. land cover), while water influx is local, only depending from the interaction between grid cells and local atmosphere environment.

Observational data of temperature and precipitation from Spain02 dataset are used as input variables for VIC model. The simulations have a spatial resolution of about 9 km, and the analysis is carried out on a seasonal time-scale. Additionally, we compare these results with those obtained from a dynamical downscaling driven by ERA-Interim data using the Weather Research and Forecasting (WRF) model, with the same spatial resolution.

The results obtained from Spain02 data show a decrease in soil moisture at different parts of the basin during spring and summer, meanwhile soil moisture seems to be increased for autumn. No significant changes are found for real evapotranspiration.