



## Seasonal statistical-dynamical forecasts of droughts over Western Iberia

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The Standard Precipitation Index (SPI) has been used here as a drought predictand in order to assess seasonal drought predictability over the western Iberia. Hybrid (statistical-dynamical) long-range forecasts of the drought index SPI are estimated with lead-times up to 6 months, over the period of 1987-2008. Operational forecasts of geopotential height and total precipitation from the UK Met Office operational forecasting system are considered. Past ERA-Interim reanalysis data, prior to the forecast launching, are used for the purpose of build a set of SPI predictors, integrating recent past observations. Then, a two-step hybridization procedure is adopted: in the first-step both forecasted and observational large-scale fields are subjected to a Principal Component Analysis (PCA) and forecasted PCs and persistent PCs are used as predictors. The second hybridization step consists on a statistical/hybrid downscaling to the regional scale based on regression techniques, after the selection of the statistically significant predictors. The large-scale filter predictors from past observations and operational forecasts are used to downscale SPI and the advantage of combining predictors with both dynamical and statistical background in the prediction of drought conditions at different lags is evaluated. The SPI estimations and the added value of combining dynamical and statistical methods are evaluated in cross-validation mode. Results show that winter is the most predictable season, and most of the predictive power is on the large-scale fields and at the shorter lead-times. The hybridization improves forecasting drought skill in comparison to purely dynamical forecasts, since the persistence of large-scale patterns displays the main role in the long-range predictability of precipitation. These findings provide clues about the predictability of the SPI, particularly in Portugal, and may contribute to the predictability of crops yields and to some guidance on users (such as farmers) decision making process.