Seasonal Prediction of Mediterranean temperature and precipitation anomalies by statistical model ensembles

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Seasonal predictions provide basic information about the probable climatic character over a longer period of time (month to season) and hence differ from forecasting individual atmospheric conditions (as done in weather forecasts). Using Canonical Correlation Analysis with time lags from 1 to 12 months, statistical relationships between Mediterranean climate variables and large-scale predictor fields of atmospheric, oceanic, and terrestrial variables are established in the observational period 1950-2003. In particular sea surface temperatures and so-called centres of teleconnectivity play a decisive role within these relationships. The derived statistical models are verified in years being excluded from the model calibration periods. For several times in each case, a particular year is randomly selected for verification including the two years before and after this year (thus removing 5 years from the corresponding calibration period). Forecast set performance is measured against 'climatology', represented by the long-term mean. Other standard quantities (e.g. root mean square error, bias, correlation of forecasted and observed values) are also used for verification. Models which pass the verification procedure are pooled into an ensemble of models. This ensemble is subsequently used to generate probabilistic predictions of the occurrence of temperature and precipitation anomalies in the Mediterranean area from particular configurations in the predictor fields. Adequate predictor combinations are identified for each month and season in consideration of relevant time lags. The predictors-predictand- relationships are further investigated using composite and analogue techniques, to take into account instationarities and long-term trends thus further enhancing forecast performance.