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Statistical downscaling of seasonal precipitation on different mediterranean regions

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We present the results of statistical downscaling of seasonal precipitations in 4 Mediterranean regions of agricultural interest: Puglia (south-east Italy), Ebro river basin (north east Spain), Po valley (northern Italy), Antalya (South Turkey). We use as predictor the EMULATE dataset of daily averaged Sea Level Pressure for a period from 1850 to 2003 covering the region from 70 W-70N (top left corner) to 50E-25N (bottom right corner) with a 5 degrees resolution. As predictand we use the Climate Research Unit (East-Anglia University) precipitation data on a grid 0.5 x 0.5 degrees. We first test three different statistical downscaling techniques: the Canonical Correlation Analysis (CCA) after a Principal Component Analysis (PCA) filtering on the predictors (CCA-PCAX), the CCA after a PCA filtering of both predictors and predictands (CCA-PCAXY) and the analog method after PCA filtering of predictors (ANALOG). The first part of the time series is used for the training of the procedure and the second part for its validation. The CCA-PCAXY is shown to produce the best results and is used for the downscaling of three different Global Circulation Models: the CSIRO-Mk2, the Hadley Center HCCPR HADCM3 and the Canadian Center for Climate Modelling and Analysisn CCCma CGCM2. All the climate projections are relative to scenarios A2 and B2 of IPCC-TAR. The Mann-Whitney test is used for assessing the statistical significance of the climate change of seasonal precipitations over the 4 regions studied.