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Trends of Teleconnection indices that affect Mediterranean climate under warming conditions

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Given the importance of the teleconnections in influencing extreme weather events and representing low frequency variability, the modifications in their structure and changes in the trend under future scenarios are expected to have impacts on regional climates. There are many different studies that link the teleconnections with climate and ecosystems over the Mediterranean area using observed data. In order to investigate possible future impacts in that region is necessary to evaluate the teleconnections with model data under present and future scenarios of climate. Our work is focused on the current four teleconnection indices that affect the Mediterranean climate, the North Atlantic Oscillation (NAO), the East Atlantic pattern (EA), the East Atlantic-Western Russia pattern (EATL/WRUS) and the Scandinavian pattern (SCAND). These indices are reconstructed with CMIP3 models data using the 20C3M and A1B experiments for the periods 1901-1999 and 2000-2098 respectively, on the basis of those defined by the Climate Prediction Center (CPC, NOAA). Previous studies on teleconnections with model data and using EOF analysis indicate the difficulties of the models to reproduce the observed temporal behavior. In our study we filtered from model data the signal of the teleconnection patterns that are defined currently by the CPC by using Partial Least Squares (PLS) regression method. This methodology provides better temporal agreement among observed and model data, which allows us to analyze the trends of the teleconnection indices for present and future. For the period 2000-2098 and winter season, we obtained an increasing trend for the NAO and a decreasing one for the SCAND. These results are consistent with the changes in the trend of the geopotential over the Euro-Atlantic area under warming conditions. Possible connections with changes in the sea surface temperature will be also analyzed. An interest of this work is the potential application for statistical downscaling prediction over this region.