Avaliação do forçamento de larga escala nas simulações históricas EURO-CORDEX

Evaluation of the large scale forcing for EURO-CORDEX historical data

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SUMMARY

This work aims to perform an intermodel comparison of the large scale forcing of the EURO-CORDEX historical simulations, as well as assess their performance. Using a K-Means Cluster Analysis of the Principal Components of the sea level pressure, weather-types for the forcing Earth System Models (ESM) were computed for the historical period (1986-2005). These weather-types were then used to produce composites of relevant meteorological variables such as maximum and minimum temperatures, precipitation and wind. This approach aims to provide a large scale overview of the different forcing models, which are then used to force Regional Climate Models, producing regional-scale simulations.

Resumo

Regional Climate simulations have been used to project future climate changes. However, all simulations are affected by uncertainties from a multitude of sources: sampling, (regional) model numerics, lateral boundaries (Earth System Model), and climate scenario. In this work, the large-scale uncertainties associated with the lateral boundary as well as the those associated with the Regional Climate Model (RCM) will be addressed.
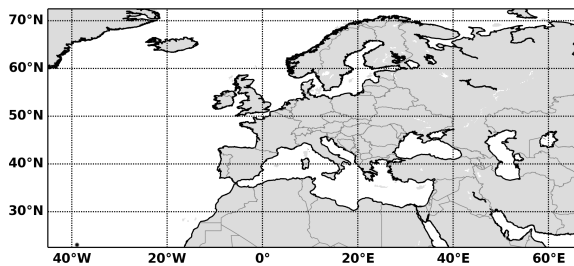

Fig. 1: EURO-CORDEX domain.

The EURO-CORDEX (Coordinated Downscalling Experiment – European Domain) provides state-of-the-art high resolution data – Fig. 1 – simulated by several Earth System Models (ESM) and RCM pairs. As of this date, the available daily simulations of historical data are as shown in Table I, on a 0.11° x 0.11° horizontal grid.

A weather-type analysis was applied to the ESM sea level pressure daily data. Using the calendered categories of each ESM the composites of relevant meteorological variables such as minium and maximum temperatures, precipitation and wind for each weather type were computed.

Tabela I: EURO-CORDEX pairs of ESM-RCM simulations of daily historical data available so far.

ESM \ RCM	CCLM4-8-17	RCA4	RACMO22E	HIRHAM5-v1	WRF
CNRM-CM5	✓	✓			
EC-EARTH	✓	✓	✓	✓	
IPSL-CM5A-MR		✓			✓
HADGEM2-ES		✓			
MPI-ESM-LR	✓	✓			

By comparing the ESM mean sea level pressure fields, an intermodel comparison can be performed and differences in large-scale features of each model analysed. On the other hand, the composites of other meteorological variables such as minimum and maximum temperatures, precipitation and wind, provide information on the smaller scale features associated with each of the weather-types, for each model.