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Balanced subsampling of future regional climate ensembles of opportunity

Jesús Fernández and María Dolores Frías

Meteorology Group, Dept. Applied Mathematics and Comp. Sci., Universidad de Cantabria, Santander, Spain
(fernandej@unican.es)

International model intercomparison initiatives, such as CORDEX or CMIP5, along with several relatively recent projects at international and national level, provide a wealth of model simulations of future regional climate. In a recent work, Fernandez et al (2019) collected 196 different future climate change projections over Spain, considering data from ENSEMBLES, ESCENA, EURO- and Med-CORDEX, along with their driving global climate projections from CMIP3 and CMIP5. This ensemble mixed different multi-model initiatives in an ensemble of opportunity, in the sense that it does not respond to any scientific design beyond the exploration of multi-model uncertainty. This ensemble of opportunity is not only the result of the mixture of different initiatives, but also responds to the lack of a balanced experimental design within most of the initiatives. Many of the initiatives -especially those unfunded, such as CORDEX- are carried out on a voluntary basis, with no strong constraint in the global climate models (GCMs) used as boundary conditions or in the number of contributing members per regional climate model (RCM).

Fernandez et al (2019) found in this ensemble a strong influence of the driving GCM on the regional climate change signal, along with favored GCMs, selected by many regional climate modelling groups to the detriment of GCMs publishing their output later or not at all. In this work, we quantitatively assess the impact of unbalanced GCM-RCM ensembles. For this purpose, we subsampled the ensemble of opportunity to obtain balanced sets of members according to different “what-if” situations: What if all RCMs had contributed a single member to the ensemble? What if each GCM had been dynamically downscaled only once? What if a given GCM/RCM had not contributed to the ensemble? For each hypothesis, there are a number of alternative sub-ensembles, which are used to evaluate uncertainty.

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References:

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