Geoscientific

Model Development

Discussions

[GMDD]

Interactive

comment

Interactive comment on "WCRP COordinated Regional Downscaling EXperiment (CORDEX): A diagnostic MIP for CMIP6" *by* William J. Gutowski Jr. et al.

Anonymous Referee #1

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This article briefly summarizes the objectives and methodology of the international coordinated downscaling experiment (CORDEX) - phase 1 program with some illustrations. It builds on the finding of excessive heterogeneity between the various CORDEX domains to ptoposde a CORDEX - phase 2 framework.

CORDEX-2 is structured in two main components: 1) a CORE farmework in which a core set of RCMs downscales a core set of GCMs over all CORDEX domains at 10-20 km resolution; 2) flagship pilot studies (FPS) addressing specific scientific questions with regional relevance.

The first approach is a top-down approach which fully mimics the traditional CMIP approach and is conceptually not different, except for the number of simulations which

appears to increase considerably. The FPS concept is a bottom-up approach and seems much more innovative and clearly complements CMIP approach as it builds on the simulation and analysis of processes of regional relevance, and facilitates the interactions with the VIA community and regional stakeholders.

I am not convinced at all by the CORE framework of CORDEX-2, especially with global models reaching very high resolutions. The CORE framework appears as a race for higher resolution against GCMs (which will probably be lost in the next 20 years), and so CORDEX does not differentiate from CMIP, while it really brings novelty from its bottom-up approach. Regional modelling groups which are not part of the huge CMIP exercise contributed to CORDEX-1 and focused the analysis of the regional simulations on processes relevant for their regions (heavy Mediterranean precipitation, African monsoon, cyclones in the Indian ocean,...). Some groups found that increasing the number of coupled components (ocean, atmosphere,...) was a higher priority than reaching very high-resolution to simulate regional relevant processes (for instance for cyclone modelling). The second problem I see is that this CORE framework is extremely ambitious and resource consuming. The groups engaged in CMIP6, with global models, struggle to allocate CPU and storage resources. Probably, these goups are the ones that can contribute to the CORE framework, but I am not sure they will be able to commit to both CMIP6 and CORDEX-2. With such appelation (CORE framework), the smaller regional modeling groups, which can not participate to the CORDE framework will feel excluded and probably will not participate to the FPS. This is not for sure, but it is a real danger. In detail, the core set of RCM is a fuzzy concept. What will it be? What are the criteria to define the core set of RCMs?

In brief, instead of pushing as far as possible the FPS concept which really differentiates CORDEX from CMIP, by involving VIA community, stakeholders in order to bring novelty and bring relevant information for IPCC groups 1 and 2, the CORE framework objectives appear as a paste and copy of the CMIP approach which at the end will be fully integrated in CMIP when the global models will reach few kilometer resolution. The

FPS bottom-up approach is comparatively the added-value of CORDEX and probably the authors should elaborate the concept with more ambition in terms of bottom-up approach. Indeed, the FPS objectives can be very ambitious in terms of resolution, coupled components, relevance of regional sensitivity experiments (land-use, aerosol emissions,...), relevance of regional applications tailored to stakeholders' needs (in line with climate services, but zalso with IPCC group 2).

In conclusion, I am not convinced by the CORDEX-2 approach. The CORE framework is the example of what should not be done as it will probably kill what makes CORDEX a really different and innovative program, i.e. the bottom-up.

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