

CORDEX SAT's response to comments on the Second Order Draft of the CORDEX experiment design for dynamical downscaling of CMIP6

18 May 2021

The Second Order Draft (**SOD**) of the CORDEX experiment design (protocol hereafter) for dynamical downscaling of CMIP6 was shared with the CORDEX community in February 2021. We are very grateful to all who have read the **SOD** in detail and provided comments. The final version of the new CORDEX-CMIP6 protocol is ready and we share it with the CORDEX community. In order to keep the process of developing the CORDEX protocol transparent and open for the community, here, the CORDEX Science Advisory Team (SAT) provides response to the comments on the **SOD** and how they have been addressed in the final version.

A general note

All together we received about 60 comments on the **SOD** and, similar to CORDEX SAT's response to the First Order Draft (**FOD**), the first priority has been given to topics with a number of similar comments. The CORDEX experiment design provides a common framework for all CORDEX domains. Comments related to specific CORDEX domains should be addressed within those domains (the regional CORDEX communities). The protocol provides a lot of freedom for the regional CORDEX communities to tune the protocol considering regional details, scientific questions, user needs and capacities. Please note, that many aspects of the protocol are not strictly mandatory but recommendations or simply minimum requirements. If you feel that your comments on the **SOD** have not been properly addressed, please contact the International Project Office for CORDEX (IPOC).

There are many questions about how to name different CORDEX activities (e.g. CORDEX-1, CORDEX-2 etc.). CORDEX has many different components and is a continuous activity that is not divided into phases (1st, 2nd, etc.) and not necessarily related to the CMIP cycles. The current framework described in the protocol is simply referred to as CORDEX-CMIP6. A clarification has been added.

Resolution/Grid spacing

There are a number of comments on native and regular grids mentioned at the end of this section in the **SOD**. These details have been deleted from the protocol and will be provided in the CORDEX archiving specifications.

Model complexity

A recommendation to run models in the atmosphere - land only configuration first led to a number of comments. Note, that this is only a recommendation (or a reminder), not a mandatory requirement.

Evaluation experiment

A number of small corrections/clarifications have been added. Among them i) the evaluation experiment must cover the entire 1979-2020 period (2020 = last full year, as of May 2021), ii) a recommendation to use the SSP3-7.0 scenario from 2015 onwards instead of the SSP2-4.5 (as it was in the **SOD**) and iii) a recommendation to use the driving reanalyses at 3-hourly update frequency and at their native resolution when possible.

Aerosol forcing

There are a number of comments/questions requesting to provide more details on the aerosol forcing. As written in the protocol such comments/questions should be directly posted in the living aerosol4cordex document (<https://tinyurl.com/aerosol4cordex>) or sent to the IPOC.

Land use/Land cover

Using the static land cover and land use maps is a recommendation that does not prevent RCM groups to run simulations with a transient land cover and land use forcing. In this case, please always coordinate your activity with the regional CORDEX communities (POCs).

Scenarios

There was a long round of additional discussions with different communities on selecting the scenarios for downscaling and their order of priority. It has been decided that the SSP3-7.0 (high impact) and SSP1-2.6 (low impact) are now two primary scenarios to be downscaled. All CORDEX domains have to follow this decision in order to have a consistent set of the two primary scenarios across the CORDEX domains. These two scenarios can be complemented by other CMIP6 ScenarioMIP scenarios (Tier1 and/or Tier2) without priority. It is up to the regional CORDEX communities to decide on what additional scenarios are most important, based for example on scientific questions and/or on user needs.

RCM Documentation

A number of comments request to provide the best practice or a template for RCM documentation. Currently, such best practice or a commonly accepted template are still missing in CORDEX, although work in this direction is ongoing. A recommendation to create RCM documentation and errata assumes a free format.

Selection of GCMs

Some small reformulations have been implemented. The main point is the same, it is up to the regional CORDEX communities to select GCMs and their members for downscaling.

Output variables, Archiving and publishing specifications

All details about output variables, archiving and publishing specifications will be provided in respective documents. The protocol will be updated by links to these documents when they are available.