

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

William J. Gutowski Jr. et al.

gutowski@iastate.edu

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There are three issues discussed in the second paragraph that the reviewer wishes to see discussed further:

- (1) ESD activities fitting in – We agree that ESD needs to be identified more clearly in CORDEX2 efforts. We have revised the manuscript in some locations (lines 291, 297-308) to be more explicit about the roles ESD and RCM downscaling both have to play in CORDEX2, including roles that ESD can play distinct from RCM downscaling.
- (2) Observational challenges – As noted by the reviewer, we do mention observations in a few places in the paper. One full paragraph (lines 335-348 in the revised

C1

manuscript), in particular, discusses the important relationship CORDEX is establishing with obs4MIPs and ana4MIPs and the data needs posed by CORDEX for regional resolution and variables beyond temperature and precipitation. We have added an additional sentence that mentions that obtaining regional-resolution climatological datasets is challenging. Further discussion on the challenges of producing such data sets is beyond the intended scope of this paper.

(3) Dissemination of output – As a CMIP6-endorsed MIP, all regional downscaling output is expected to be disseminated on the ESGF following output formatting established for CMIP simulations, with output available for unrestricted use as established by CMIP. This text has been added to the manuscript at the end of the first paragraph of section 3.

Specific comments (line numbers refer to lines in the original manuscript, as identified by the reviewer; numbers in [] are the corresponding line numbers in the revised manuscript):

1. Abstract. It would be good to mention Flagship Pilot Studies here. – Added a sentence about the FPS.
2. Line 39 [41] Reference should be to Curry and Lynch, 2002 not ‘et al’. – Corrected.
3. Line 87 [95-96] Perhaps say how many domains there are. – Added with web site for details.
4. Line 112 [134] Is the value of information for VIA applications the same as it’s ‘scientific’ value? – One might argue that scientific value is a prerequisite for VIA value, but in any case, the two are not synonymous. Wording adjusted to note value for both scientific analysis and VIA applications.
5. Line 117 [139-143] Can you give some examples of how added value can be ‘carefully considered’? Perhaps insert ‘full’ before downscaling – some downscaling has to be done in order to evaluate its value. – The papers cited give examples of downscal-

C2

ing considerations for added value. We have modified the end of the sentence to state more why added value should be considered before doing a full downscaling exercise: “to ensure that there is sufficient improved information gained from the downscaling to justify the resource expenditure for a full downscaling exercise.”

6. Line 120 [146] Pattern scaling and bias correction are two very different things – it would be useful to include some references on both approaches. – We have added a relevant reference for each one, which helps distinguish the two. Since this is in a parenthetical statement, we have not tried to be exhaustive in citations.

7. Line 143 [178] ‘are large’ rather than ‘is large’ – Corrected.

8. Lines 153-154 [189-192] Perhaps comment on the lack of and limited open access to appropriate observed wind data – Although some wind measurements for energy resources are proprietary and often not available, we are not sure otherwise how restricted access is to appropriate wind data compared to other fields. We have added the point of inaccessibility of proprietary data sets, and we have added reference to inconsistencies seen in observation-based wind data sets that are available.

9. Line 165 [205] Should be Giorgi, 2001 – Corrected.

10. Line 160-170 [206-207] Observations could also be mentioned as a source of uncertainty. – Limitation of observations also noted.

11. Lines 156-170 [194-198] Can you comment on the extent to which all these ‘distillation’ issues fall within the CORDEX remit? – The paragraph was modified to more clearly delineate the role of CORDEX in the production of climate information.

12. Line 171 [222] Insert ‘which’ before ‘emerged’ – “that” inserted

13. Line 175 [226] ‘heterogeneity has’ – Corrected.

14. Lines 176-177 [228-229] I’m not sure I fully understand what you mean by ‘transfer know-how across the domains’. – “know-how” replaced with the more precise “scientific

C3

understanding gained on physical processes and downscaling procedures”.

15. Lines 180-181 [231-232] To what extent is the provision of actionable information within the CMIP6 remit? (also see earlier comment about the CORDEX remit). – The sentence was modified to delineate the role of CORDEX, which in this context is providing the simulation output that can be converted to actionable information.

16. Line 193 [248] Here and elsewhere I would specifically refer to RCPs (or emission scenarios) rather than just scenarios. – “scenarios” modified to “emissions and land-use scenarios” to recognize that projection scenarios in the RCPs and Shared Socioeconomic Pathways (SSPs) involve a variety of changes, of which the emissions and land use probably have the most direct influence on simulation evolution.

17. Lines 225-227 [290-291, 293] It is rather confusing to have a core set within CORE. Can another terminology be used for the former? You also refer to a ‘base ensemble’ but I’m not sure this terminology is appropriate either. – The use of “core” here is deliberate, intending to reference the CORE framework. To make this more clear, we have added “CORDEX-CORE framework” to this sentence: “in the new CORDEX-CORE framework, it is envisioned that a standard core set of RCMs and ESD methods downscale a core set of GCMs”. We have changed “base ensemble” to “foundational ensemble” to emphasize that the simulations performed under the CORE framework are the foundation for a broader set of simulations that downscalers could perform for different domains.

18. Line 227 [292] ‘high and low’ – Corrected.

19. Line 233 [309] I would change ‘shows’ to ‘indicates’. – Changed to “illustrate”, since a quantitative analysis is not included here.

20. Lines 253-254 [330-332] The WCRP regional climate information grand challenge is no longer formally a WCRP grand challenge. – Noted. The text now reads, “the WCRP grand challenge on climate extremes and the WCRP effort, in conjunction with

C4

other programs, to develop climate information for regions."

21. Line 309 [402-403 + Abstract] The climate service community also has great expectations of CORDEX2. Either here or elsewhere it would be good to refer to linkages between CORDEX and the CMIP6 VIACS Advisory Board. – Reference to the CMIP6 VIACS Advisory Board added here and in the abstract.

22. Line 328 [430] The third author should be 'Goodess' not 'Godess' – Corrected.

23. Line 372 [476] Should be EURO-CORDEX – Corrected.

24. Line 405 [527-528] Please indicate the source of observations in the Figure 1 caption. – Citation added.

25. Line 411 [533] Change to: Change in average precipitation for 2071-2100 minus 1980-2005 projected by the. . . . – Both corrections made.

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