Interactive comment on "Description of the resolution hierarchy of the global coupled HadGEM3-GC3.1 model as used in CMIP6 HighResMIP experiments" *by* Malcolm J. Roberts et al.

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I found this manuscript to offer a readable and well organized description for a variety of simulation features from the Hadley Centre HighResMIP hierarchy of AOGCMs. As a purely descriptive manuscript, I have little to critique since any such effort is subjective. I generally found the authors touched upon most of the key features that climate modelers might find of relevance.

My main concern is with the following statement on page 15, lines 9-10:

"Due to intellectual property rights restrictions, we cannot provide either the source code or documentation papers for the UM 10 or JULES."

That is a very unsatisfying situation that, in effect, means these simulations are not reproducible by any willing and able person outside of the Hadley Centre. I am disappointed that the Hadley Centre has failed to fully embrace scientific programming of the 21st century where open development / open access greatly supports the climate science endeavour by enabling reproducibility.

I recommend publication with the following minor points.

page 6 lines 14 and 15: please give units

page 6: line 28: please add following citation along with Griffies et al 2015:

Preconditioning of the Weddell Sea polynya by the ocean mesoscale and dense water overflows, 2017: C.O. Dufour, A.K. Morrison, S.M. Griffies, I. Frenger, H.M. Zanowski, M. Winton, Journal of Climate, vol. 30, 7719-7737, doi:10.1175/JCLI-D-16-0586.1

page 10, paragraph with line 15: Is worth noting that interior biases can be exacerbated by spurious mixing, especially at the 1/4 ocean resolution. Citations to work from Alex Megan as well as Griffies, Illicak, others can be made.

Figures 7,8,12 could be more useful with statistical information such as mean bias and rms.

I offer my wish list for additional figures that might serve well to enhance this manuscript.

–AMOC circulation streamfunction. Alhtough not directly observable, it is rather commonly shown in papers like this and it greatly adds to modeler-speak communication.

–Global and indo-pac ocean heat transports. I am particularly interested in Southern Ocean transports given the rather different ACC transports found in the models documented here.

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