Review

Title: A Last Glacial Maximum forcing dataset for ocean modelling

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MS No.: essd-2019-79

1. General Comments

The paper describes the content of the data and its use case in a structured way. The methodology incl. paper references is discussed. The data itself is complete and accessible, checksums are provided.

There are possibilities to improve the paper:

- Improvable Data References:

References for the source data should be added. As part of the terms of use for CMIP5 data, apart from the existing acknowledgement, data collections should be referenced in the article's body and cited in the reference list. For CMIP5 references could be found on the IPCC DDC web page for the AR5 Reference Data Archive: http://www.ipcc-data.org/sim/gcm_monthly/AR5/Reference-Archive.html

- Improvable provenance information:

CMIP5 datasets used should be specified using the full DRS (Data Reference Syntax) including their versions and tracking_ids. All additionally needed datasets like 'psl' and 'ts' (p.3 l. 30) should be specified. An additional table is suggested.

- Question: Why did the authors not use the 3D CMIP5 datasets?

The authors state that only the selected four models provided all the required variables. Could the authors explain why they did not use the 3D fields of the model output but based their study on the interpolated (post-processed) surface variables? The 3D fields were provided by more modeling centers. As the authors apply a vertical interpolation to 10 m height for some variables, the direct model output seems to be better suited as source data. Moreover, the number of models could be increased, on which the data is based. These 3D variables are e.g. 'ta' instead of 'tas', 'hus' ('huss') or 'so' ('sos'). Especially the sea surface salinity anomaly, which is currently based on only two CMIP5 datasets (p.5 ll. 24/25), will become more reliable.

- Reuse of the data:

As the paper on the 'CORE forcing fields' is cited as reference for the usefulness of the chosen spatial-temporal resolution of the provided datasets for common ocean-only model runs, it should be made accessible (e.g. on zenodo) if possible. Alternatively, have the authors used the datasets for the forcing of a second ocean-only model run to show the reusability of the dataset, yet?

- Further reuse of the data:

The authors state that data users could adjust the data using the spread of the CMIP5 model results (p. 6 ll. 29-31). Then the authors need to provide this information in their data.

2. Specific Comments

- Please delete 'CMIP-type' as additional characterization of complex fully coupled models, as it is unclear what that means and it does not add information.

- Data files do not contain any history of the applied commands. cdo writes information on the applied commands into the global attribute 'history'. This provides useful information about dataset creation. Why is that not in the file?
- Data files could include more information not only on the above-mentioned history but also on the methodology. I suggest, the authors add the data doi as a reference to the global attributes, which leads the data user to the doi page with further information.
- Why was the unit of precipitation_flux changed from the NetCDF/CF recommended and within CMIP5/PMIP3 used kgm-2s-1 to mm/day? The unit should not be changed if not required.
- The provided datasets same as the CMIP5 datasets should comply with the NetCDF/CF conventions. This seems to be the case, though I did not check it. Then the version of the convention should be specified in the global attributes as described at: http://cfconventions.org/Data/cf-conventions/cf-conventions-1.7/cf-conventions.html.
- The authors should add a sentence on the relation of PMIP3 and CMIP5 (PMIP4 and CMIP6 resp.) for readers less familiar with these large intercomparison projects.
- Is there a reason why the current version 1.9.7 of the cdo package was not used but the old version 1.7.0? Moreover, on the cdo's page 1.7.0 cannot be downloaded (https://code.mpimet.mpg.de/projects/cdo/files). The authors should consider using the current or a more recent version of the cdos.

3. Technical Corrections
- CMIP stands for *Coupled* Model Intercomparison Project.
- 'lgm' and 'piControl' are the CMIP5 experiment acronyms. It is confusing and unnecessary to introduce the additional acronyms 'LGM' and 'PI' for them.