Geoscientific

Model Development

Open Access

Discussions

EGU

[GMDD]

Interactive

comment

Interactive comment on "Fast GCM – ice sheet model coupling software OBLIMAP 2.0, including on-line embeddable mapping routines" *by* Thomas Reerink and Roderik van de Wal

F. COLLEONI (Referee)

flocolleoni@gmail.com

Received and published: 29 June 2016

In this manuscript, Reerink et al. present an updated improved version of the interpolation tool OBLIMAP whose aim is to interpolate the GCM fields onto ice sheet models grid and vice-versa. I must say that I am myself a regular user of the first version of OBLIMAP since many years now. However, many of the ice sheets models that I use have grids projected on the ellipsoid and not on the sphere. Therefore at the time of OBLIMAP 1.0, I had to implement by myself the missing projection routines on ellipsoid grids. In addition, because I also needed to interpolate ocean vertical data, or create my own ISM regional grid, I also had to implement the additional level dimension in the netcdf routine and produce a slightly modified version of the first version of OBLIMAP to

create new ISM grids for boundary conditions. Recently, I needed to use the BEDMAP Antarctic topography, which comes in cartesian format already projected and the problem of re-interpolating it on a different grids surged. In this new version of OBLIMAP, all the points that I mentioned above have been fully improved and implemented, which demonstrate that those points were really the main weaknesses of the first version.

Several improvements that have been made in this version: it provides the geographical projections on ellipsoid and not only on a sphere as in the previous version. In fact, many ice sheet models have their cartesian grid projected on the ellipsoid and not on the sphere. This was a limiting aspect of the first version since one had to implement the projection on the ellipsoid by himself. the computation time performance of the scan method to interpolate from grid with numerous points has improved substantially. This was effectively a limitation. A suggestion could also be to provide a parallel version of this code for this specific loop. the re-interpolation of cartesian projected topographic or climate datasets on a defined ISM cartesian grid. Which is to me, one of the greatest improvements. it can maps 4D fields, such as ocean or winds, which is highly appreciable improvements.

OBLIMAP is a really useful tool for those who carry out ice sheet simulations and the difficulty of interpolating on cartesian grids can be understood only when facing this problem. On the coupling process, I would definitely say that OBLIMAP should be embedded in ice sheet models rather than in the coupler of coupled climate models. Given the variety of existing climate couplers, and sometimes their complexity (e.g. the NCAR model), it is much easier to host OBLIMAP within the ice sheet models. As I mentioned again in the Major comments below, the GLIMMER ice sheet model and I think also the CISM model (derived from GLIMMER), the TARAH ice sheet model (Pollar ad Deconto) already embed the projection of the climate fields onto the ice sheet grid within the ice sheet code itself, and by experience with both ice sheet and climate models, I would also recommend to put OBLIMAP in the ISM code.

Based my comments above, except minor typos or reformulations, I recommend the

publication of the manuscript in its current shape.

Florence Colleoni

Major comments

Maybe a stand-alone version, as for the first version could also be useful, not everybody uses coupled system. Or maybe this version is stand-alone but this is not clear and should be clarified with a sentence or so in manuscript. Line 50-55: after using OBLIMAP very often, I would say that perhaps hosting OBLIMAP in the ice sheet model is the most easiest way to deal with it. OBLIMAP is a small coupler model and very simple in its use, therefore, it is easily implemented in an ISM, as for example GLIMMER does, rather than embedded in a GCM. But this is only my opinion of user. In addition the climate coupler are built to interpolate on lon-lat grids most of the time.

Minor comments

line 45: substitute "albedo changes" by "ice sheet distribution" because an ISM does not provide albedo changes, it only provides ice distribution which affect albedo within the atmosphere model. A regional atmospheric model as RACMO on the contrary provides albedo changes, but this is not an ISM.

line 48: "surface mass balance" put a space between "mass" and "balance"

line 52: substitute "ocean surface temperatures" by "ocean temperatures.". Most of the basal melting methods uses vertical ocean temperature and salinity distribution (Holland and Jenkins 1999, Pollard and Deconto 2012, Martin et al., 2011).

line 63: substitute by "any regional energy balance model (e.g. RACMO or MAR)"

Figure 7: "surface mass balance" put a space between "mass" and "balance"