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Geoscientific Model Development Discussions

Interactive comment on "ISSM-SLPS: geodetically compliant Sea-Level Projection System for the Ice-sheet and Sea-level System Model v4.17" *by* Eric Larour et al.

Anonymous Referee #1

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The authors present a framework to produce probabilistic sea-level projections which allows to incorporate and update contributions from different models of the individual drivers in a flexible, yet consistent, way. It builds on the ISSM-SESAW sea level solver by Adhikari et al. (2016), which was also presented in this journal and which is based on an unstructured mesh, allowing high accuracy at very limited computational costs.

The manuscript is clear, it reads well and it presents enough graphics to show the working and capabilities of the software package. Below, I am suggesting a number of minor improvements, listed in the order as they appear in the manuscript.

Line 60: The argument about the time invariancy of fingerprints does not seem very

strong, since it is always possible to increase the number of fingerprints for a given source, with the option of using independent scaling factors for each sub-source. Besides, the authors do not seem to demonstrate the effect of time-variable fingerprints on sea level projections. The improvement could be from a computational point of view (due to, e.g., the modularity of the approach), but then it could be explained more clearly.

Line 65: Not sure what "profound geometry" means, it is possibly a typo.

Line 124: Could you add a reference about the "alternative approach" described here?

Line 148: I guess the term STR refers to a global mean value, not a local one as stated, since RSL_STR only depends on time.

Line 168: I am surprised by the fact that RSL_GRD includes viscoelastic deformation of the solid earth, rather than just elastic as in most studies of this kind. If this is the case, it should be highlighted in the introduction.

Line 215: I suggest adding that the number of elements is significantly smaller than in the case of an equiangular 1x1-deg grid, which would already be rather coarse.

Lines 225-241: I am not sure whether showing a few lines of code is normal in GMD, but, if possible, it would be nice to replace this by a flow chart.

Line 299: It seems a few words are missing, since Fig.8b shows GMSL values, while values for 9 cities around the world are shown in Fig.9. In addition, the caption of Fig.9 does not mention the timeframe for which the projections are generated.

Line 304: I suggest also mentioning that the width of the two PDFs shown in Fig.10 is different, rather than only the mean, because it makes an even stronger point about the benefit of this approach.

Line 316: "impact" (spelling).

Line 338: The importance of "geodetically compliant patterns", in spite of being part

of the manuscript title, is nowhere really discussed nor explained. From this line, my understanding is that it refers to the possibility of defining the mesh in such a way that it matches the location of specific geodetic observations, hence avoiding unnecessary interpolations. In any case, the issue warrants a more extensive discussion, possibly in the introduction.

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