

Interactive comment on “Sea-level fingerprints emergent from GRACE mission data” by Surendra Adhikari et al.

Xuebin Zhang (Referee)

xuebin.zhang@csiro.au

Received and published: 5 March 2019

This manuscript is a very timely contribution to the sea-level research community. Sea-level fingerprint, i.e., regional sea level distribution associated with land ice and hydrological mass changes (such as melting of polar ice sheets), can be estimated by considering effects of gravitation, rotation and solid-earth deformation. Sea-level fingerprint, not widely known to the research community before and not included in the current generation of climate models either, can have significant impacts in regional sea levels, in both near- and far-fields of the mass change sources. The GRACE satellite gravimetry provides the first-ever gravity measurements globally since 2002. So a sea-level fingerprint product based on the GRACE mission should be a very welcome product to the community. For example, this dataset can help physical oceanographers

C1

to separate sea-level fingerprint signals from ocean dynamics signals in altimetry observations.

As the other reviewer (Dr Don Chamber) pointed out, I also feel a converted dataset on longitude-latitude grid would be more user-friendly to most potential data users. Additionally, considering netcdf format has been widely used in ocean and climate community, it would also be helpful for many users if the authors can provide data in netcdf format.

The manuscript is written well and easy to follow. The technical details in the main text provides some important background information for most readers, and readers who are interested in more details can refer to the Appendix. I recommend it to be published after addressing the following minor comments.

Page 1, line 6, “decadal” may be more appropriate here than “interdecadal”

P5, L15, can you tell more information about your criteria for “convergence”? What’s the typical iteration needed to achieve convergence?

P6, L20-22, please add a bit more information here about this replacement (of degree 2 order 0 coefficients). Why is it necessary?

P7, L15-17, It would be nice to include the unstructured mesh solution (Adhikari et al. 2016) in Fig. 3, either for global or Mediterranean region, as a comparison with current solution.

P7, L25-26, this sentence about uncertainty is unclear to me. Rephrasing?

A comparison of sea-level fingerprint solution among three GRACE products would also be very helpful, so the readers can get a sense of sensitivity of fingerprint solution to GRACE products. It could be included as one or two panels in Fig. 3.