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The Cryosphere
Discussions

Interactive comment on "Using Satellite Laser Ranging to measure ice mass change in Greenland and Antarctica" *by* Jennifer A. Bonin et al.

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The paper is a helpful exploration of the potential, and limitations, of using Satellite Laser Ranging to extend GRACE gravity field time series backward in time to the early 1990s. It's a good basis for future work to explore the propagation of systematic error and try and improve on these estimates in the future. I wasn't clear of a few things which I personally would appreciate if the authors could clarify.

The C2,0 term of GRACE is replaced by the SLR C2,0 (from the Cheng 5x5 solution?). This results 100% of the variance explained in Fig 1a (although I note percents are not shown since the scale is 0->1) but lower variance explained when comparing to the

Sosnica solution. Is that correct and if so, is it a fair comparison. PS beware rainbow colour scales (https://www.climate-lab-book.ac.uk/2016/04/)

Given the duplication of the C2,0 term, should not it be excluded from the comparison to GRACE?

it would be good to see in the supplement degree,order specific time series comparisons for GRACE and SLR to see where the differences occur.

I wasn't sure if autocorrelation was really treated correctly - the authors assume it is diminished by 13-month averages and reduce the degrees-of-freedom appropriately but I think the assumption the series is white noise after this averaging (ie, uncorrelated). Exploration of the noise model by examining the spectra and fit of various noise models could be worth considering although I see an argument here that an exact specification of uncertainty is not the key message but the bias magnitudes. If interested in this see Williams et al EPSL 2014 for example - there's some nice tools available to test different noise models; see HECTOR (Bos et al) or est_noise (Langbein et al) for example. By the way, I don't think 13-month averages really reduce all signal with periods less than 13 months to zero.

anyhow, I thought it an interesting paper and hopefully these remarks contribute to the authors' thinking in a constructive way

Matt

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