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Interactive comment on "Extracting the time variable gravity field from satellite gravity data using a sawtooth filter" *by* E. Gurria and C. López

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General comments

The topic of reducing the stripes in GRACE-based gravity fields is relevant, as geophysical interpretation might be improved. In the past years, several filters for GRACE processing have been proposed and applied. Some of them are mentioned in that paper, but some important filters (e.g. from Kusche et al. and others) are missing. To better understand the behaviour and benefit of the proposed filter, it should be discussed in the context of those de-striping filters.

Furthermore, it would be helpful, if the autors applied their filter to a region with a significant geophysical or hydrological process, like the Amazone region or Greenland, and then compare their results with results of other papers. Can they, e.g., really obtain a better spatial resolution to distinguish between different basins in Greenland. Is then

the achieved accuracy higher than in other studies, etc.

Specific comments

For me it is not obvious, why the derivative of W in north-south direction should be noise free. This has not been shown in the paper or mathematically derived.

Also statements like, the filter amplifies certain signals and attenuates the noise, are not obvious to me. Their filter re-scales the harmonic coefficients in a certain way, but it does not distinguish between noise and signal. What is the physical meaning of the resulting coefficients and the derived gravity field quantities? In my opinion, the interpretation of the resulting 're-scaled' gravity field is completely unclear. Whether their filter really helps in analyzing GRACE data still has to be shown by applying it to a region with significant geophysical signal.

In figure 3b and the corresponding text, the authors say the peaks now are at the zonal coefficients. But this is only partly true: Many peaks also are at the tesseral coefficients. Moreover, the level of the standard deviation, when applying their sawtooth filter, increases by one order of magnitude. Therefore, also the noise level is increased correspondingly. This could mean, that the 'stripes' are not removed, but are hidden in the noise. The authors themselves seem to have some doubts about the meaning of the resulting filtered gravity field (see their discussion in sections 5 and 6) and its interpretation.

I would propose, that the effect of the filter should first (before publication) be studied in more detail and compared to other de-striping filters. And in any case, it should be appllied to a real geophysical phenomenon.

Technical corrections

Some expressions are not used in a way given in the textbooks. The discussed spatial derivatives of W correspond to gravity disturbance, and the two deflections of the vertical in north-south and east-west direction.

Saying "vertical striping" also is somewhat misleading as vertical normally means 'vertical on Earth' and thus it were closer to the radial direction. "Dispersion" is a further example for unusual use.

Page 1879: What do the numbers 10152181, ...mean?

On page 1878, the authors mention that they use data (12 months) from 2011 in this study. On page 1881, however, average values from 2009 have been taken. And in figure 3a, data from 2010 were used.

Caption above figure 3b indicates that a 'Global Gauss Filter' has been used, the caption below the figure however says, it was the sawtooth filter.

Interactive comment on Solid Earth Discuss., 5, 1871, 2013.