

**Journal: ESurf**

Title: Earth's surface mass transport derived from GRACE, evaluated by GPS, ICESat, hydrological modeling and altimetry satellite orbits

Author(s): Christian Gruber et al.

MS No.: esurf-2017-70

MS Type: Research article

Iteration: Major Revision

Dear Associate Editor,

thank you very much for your comments to the esurf-2017-70 manuscript. Please find below our answers (marked in blue) to your comments (given in black). We hope, the changes done in the revised manuscript and our response will allow to accept this manuscript.

With kind regards,

Christian Gruber (on behalf of co-authors)

**Associate Editor Decision: Reconsider after major revisions** (27 May 2018) by David Lundbek Egholm

Comments to the Author:

Based on the updated text and the authors' response to reviewers I suggest that the text is returned to the authors for major revision based on my comments. The text is in my opinion far from ready for publication. I will explain below:

- I fully agree with reviewer 1 that the methods used here need a thorough introduction, preferably in a separate methods section. The authors have largely ignored this reviewer suggestion because the methods are apparently described in a GJI paper under review. However, the GJI paper is not yet accessible to Esurf readers, and, even if it was, the methods need more introduction here in order for this to a stand-alone-contribution. Please provide a methods section after the introduction in order to clarify to the readers how exactly the radial basis functions are used.

The RBF method used by us in the esurf-2017-70 manuscript is thoroughly described in the manuscript "Short latency monitoring of continental, ocean- and atmospheric mass variations using GRACE inter-satellite accelerations" still being under review at "Geophysical Journal International (GJI)". The revised version of this manuscript (attached) will be submitted to GJI next days. However, in order to mature the esurf-2017-70 manuscript into a self-consistent publication we have now added in this manuscript a separate section 'Methodology' describing the RBF-method used by us. Here, we refer also to the used Kernel function, derived by Novak (2007) that provides the basis for the transformation of the ranging observations into gradient-like values and their further mapping to the time-variable surface mass.

- The quality of the written English is still too poor, and it has not improved during revision. If improving the English is problematic for the author team they must seek professional help before resubmitting the text. I list a few examples below these general comments, but following up on those is not enough, as the text need thorough revision.

We have now significantly improved English in the whole manuscript. We consistently use present tense instead of past tense and perfect tense, when describing our analysis. Past tense is used when mentioning the research and results performed and obtained before this our study.

- The citation style is wrong in many cases, e.g. in lines 33, 51, 63, 129, 156.

We have checked the citation style and changed it according to the “Manuscript preparation guidelines for authors”.

- The text is often fragmented with paragraphs of one or two sentences (e.g. lines 144-146, 273-277, 326-328).

We agree with this comment of the Associate Editor and excluded the unnecessary fragmentation of the text at lines 158-160, 176-177, 182-183, 276-277, 291-292, 321-322, 363-364.

- Regarding structure, I would like to see sections 2-5 as subsections of a results section.

As we have mentioned in the response to the first comment, the detailed description of the RBF method is described in the GJI manuscript, while the Esurf manuscript is devoted to the validation of the RBF and a few other methods. Therefore we would prefer to keep the current structure of the manuscript.

line 24: Please add an extra s to ‘asses’.

This has been done.

line 34: ‘... highly accurately’ – please explain what you mean by this.

We have added the words “to only a few tens of  $\mu\text{Gal}$ ” to explain this.

line 43: ‘...gain further access to mass transport’ do you mean something like ‘in order to gain further knowledge/insight/information on mass transport...’

We have reformulated these words as “to gain further knowledge on mass transport”.

line 51-55: This needs further explanation

As soon as the GJI manuscript Gruber et al. (in review) will be accepted, these words will be replaced by “Gruber et al., GJI, 2018, accepted”.

line 63: ‘...has been applied by us...’ In this study? If so, present tense is more appropriate. If not please give reference.

Yes, this is applied by us in this study. Therefore, we consistently use the present tense to describe our study and past tense when citing the studies performed before this our study.

lines 86-94: These bullet points were added in revision, but they are full of grammatical errors and typos.

This has been corrected.

line 112: doesn’t -> does not

This has been corrected, as suggested by the Associate Editor.

lines 119-127: Why all the hyphens in this paragraph?

The hyphens have been erased in this paragraph in all cases, except the cases “center-of-figure”, “center-of-mass” and “de-aliasing”, since these are terms commonly used in scientific publications in this field of research.

line 141: ‘thus’ -> ‘whereby’ and ‘was’ → ‘is’

The word “thus” has been replaced by “whereby”.

line 142: ‘is’ -> ‘are’

This has been corrected, as suggested.

lines 144-146: This looks to be a figure caption in the wrong place.

This sentence discussed Fig. 1. The unnecessary paragraph has been erased just after this sentence.

line 172: delete ‘has’

Done.

line 176: delete ‘thus’

Done.

line 223: ‘it’s’ -> ‘its’

This has been corrected.

line 230: ‘find out’ -> ‘determine’

This has been replaced, as suggested.

line 233 and elsewhere: ‘have been found’ – the use of passive voice should be reduced.

This has been corrected here and also in many other cases.

line 245: ‘Still it remains difficult’?

It has been changed to “Still, it remains difficult”.

line 256: Please make sure to correct this one also

This sentence is, from our point of view, correct.

line 308: ‘Their’?

replaced by

“The results of our evaluation confirm once again”

line 312: Please rephrase this too.

This sentence is, from our point of view, correct and clear.