

Earth Syst. Sci. Data Discuss., referee comment RC1
<https://doi.org/10.5194/essd-2022-235-RC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on **essd-2022-235**

Anonymous Referee #1

Referee comment on "The ULR-repro3 GPS data reanalysis and its estimates of vertical land motion at tide gauges for sea level science" by Médéric Gravelle et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-235-RC1>, 2022

Review of the Paper:

Gravelle, M., Wöppelmann, G., Gobron, K., Altamimi, Z., Guichard, M., Herring, T., and Reischung, P.: The ULR-repro3 GPS data reanalysis and its estimates of vertical land motion at tide gauges for sea level science, Earth Syst. Sci. Data Discuss. [preprint], <https://doi.org/10.5194/essd-2022-235>, in review, 2022.

The topic important and the paper is very useful for the sea level community. It gives a condensed overview about the new ULR GNSS(GPS) solution for sites at or near tide gauges as part of the IGS reprocessing effort. The paper is well written and easily to understand also for non GNSS-experts. The data is available at a data repository.

A shortfall of paper is the analysis of the results, which is only done against ULR's previous version. The latter has a different time span and short overlap. The comparison with own previous reprocessing is helpful but may not reveal problems associated with the general processing strategy or setup. Since ULR participated in the IGS reprocessing campaign, I assume there are more in-depth analyses of the ULR contribution against other contributors. Reischung et al. 2021 (EGU and AGU) are slides of presentations and are less helpful to gain confidence in the new ULR solution. Years ago, Deng et al. (https://doi.org/10.1007/1345_2015_156, unfortunately not open access) did a comparison of their processing with the (older) ULR analysis providing, which may also be a way to evaluate this new data set. I strongly encourage the authors to perform similar studies using external solutions and provide results within the paper.

In general, I recommend to publish the paper with minor corrections.

Comments which may help the authors to further improve the paper:

Title: the term GPS is used, but later consequently GNSS, better have consistent naming

Line 46: I assume the GNSS orbit estimate is CoM, but is this also true for GNSS derived coordinates and velocities?

Line 89: Although the authors using "continuous" only here and Fig.4, most of the Geoscientist may understand this term as the opposite to "campaign" GNSS. Also, the two citations using this term refer to it as long-term. I suggest another wording.

Line 98: is 3 months correct? For me this sounds contrary to the statements in line 86ff.

Line 99: Santamaria-Gomez et al., 2017: the supplementary material says 757 stations with data between 1995.0 and 2015.0

- here the authors wrote 2013.
- any statement, why the authors processed less stations
- any statement, why this solution starts later than their previous reprocessing effort?

Line 113: could you specify the terminus "many corrections", likely for the supplementary material

Line 138/Table1: which IONEX files are used, IGS combined?

Line 138/Table1: FES2014b also contains Ssa and Sa.

- Are you truncating this model, and if yes, to which tides; what leakage do you expect?
- How (if) does Ssa & Sa map to the spectral behavior of your orbits (and coordinates). Since a correction for tides are sensed by both, satellites and tide gauges, this would help the user to understand possible side effects.

Line 195: pls specify "several" and supply plots with the subnetworks in supplementary material.

Line 195: The subnetworks are fixed though 2000.0 till 2021.0? or vary day by day?

Lines 198 to 205: This section needs some more explanations. For those not familiar with GNSS processing it is interesting to understand how the alignment and transformation of the sub-networks is performed, but I failed to understand the concept.

Line 230ff: pls give some more information about the handling at earthquake sites. - How many days are used to estimate offsets; - any outlier control of the daily solutions, - how you handle postseismic deformation; - what, if new earthquakes occur within your fitting period?

Line 292: The data doi web site say 554 stations, while here only 546 are mentioned

Line 330/Fig.5: what causes the peak near $7 \cdot 10^1$ cpy

Line 368ff: Did you perform the comparison for 2000.0 – 2013(15).0?

Some (likely) typos

Line 23: university -> University

Line 83: RINEX: any link to or citation of?

Line 213: Herring et al., 2021 is missing in the reference list

Line 225: experimented or experienced?

Line 240: per decade and station?

Line 265: is Gobron et al. in press: Gobron, K., Rebischung, P., de Viron, O. *et al.* Impact of offsets on assessing the low-frequency stochastic properties of geodetic time series. *J Geod* **96**, 46 (2022). <https://doi.org/10.1007/s00190-022-01634-9>? Or a different paper?

Line 269: correct research center for geosciences -> Research Center for Geo...

Line 408: CMSLT should all be upper case letters