Earth Surface Dynamics Discussions

Earth Surf. Dynam. Discuss., referee comment RC1
https://doi.org/10.5194/esurf-2020-108-RC1, 2021

Comment on esurf-2020-108

Anonymous Referee #1

Referee comment on "Precise water level measurements using low-cost GNSS antenna arrays" by David J. Purnell et al., Earth Surf. Dynam. Discuss., https://doi.org/10.5194/esurf-2020-108-RC1, 2021

The manuscript is indeed very interesting and presents to my knowledge an innovative approach to GNSS-R . The authors use several low-cost antennas together in kind of an array. They use the well established inverse-modelling technique for their GNSS-R analyses. It appears that using several co-located antennas mounted vertically above each others significantly reduced the SNR noise and thus produces more precise water level results. I think the manuscript is already in a good shape and can be accepted after a minor revision. I would like the authors to address a few issues in their minor revision:

- The used term "array" implies a common analysis of the data received with the individual GNSS antennas. However, it seems that the four GNSS-R sensors are analyed completely independently, i.e. not as an array, and then the B-spline coefficients are simply averaged. Please try additionally to analyse the four sensors in one combined inversion directly. Does this improve the performance even more?
- Concerning the temporal resolution, one question is whether the sampling needs to be synchronized, and/or whether there could be advantagous by purposely sampling at different epochs, in partcular when doing a real combined analysis (see question above).
- Is there any benefit in additionally installing a horizontal array, so kind of a cross installation with both vertical and horizontal extension?
- There is at least one typo that I found, line 167 "geodeti-standard", but there might by further typos that I missed. So please check the mansucript carefully with a spell checker.