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Atmospheric Measurement Techniques Discussions

Interactive comment on "Reduction of ZTD outliers through improved GNSS data processing and screening strategies" *by* Katarzyna Stepniak et al.

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We would like to thank the Anonymous Referee #1 for valuable comments and suggestions, we are pleased to answer all the questions.

Questions:

1. P.1, Line 17: "…maximizing the number of observations strategy" in many GNSS software…". The work is done with Bernese v.5.2. Any suggestions for non-Bernese, where the suggested network design could be possible? Is it so, that the automatic network modification (p. 5, line 1), happens with Bernese by default and the new

baseline strategy (section 4) has something to do with post-processing, or is it like reconfiguring the Bernese-processing according to the results from initial solution?

Answer: Our strategy can be used in any software in which the user can modify the baseline design. In case of Bernese software, we do initial analysis of the available GPS data from the reference network only to get the number of observations per baseline (we do not carry out any initial float solution, see section 4). Then we apply our strategy to construct optimal baselines, and next we run the complete processing. We hope this clarifies this issue.

2. Initial data processing strategy (section 2): According to Tregoning and Herring (2006) a priori zenith hydrostatic delay errors project into GPS height estimates and errors in zenith delay estimates. Is there any reason why the realistic meteorological situation is not considered important, or is this effect estimated negligible for initial data processing strategy? Not always can be relied on standard atmosphere model.

Tregoning, P., and T. A. Herring (2006), Impact of a priori zenith hydrostatic delay errors on GPS estimates of station heights and zenith total delays, Geophys. Res. Lett., 33, L23303, doi:10.1029/2006GL027706.

Answer: Tregoning and Herring (2006) showed that unrealistic surface pressure used to calculate hydrostatic delay led to errors in estimated ZWD and station heights. Hydrostatic delay errors project into GPS height up to -0.2 mm/hPa, what causes height errors of up to 10 mm and seasonal variations of up to 2 mm amplitude. Errors in ZTD estimates are about half of magnitude of the height errors.

In our processing for all three strategies, a priori meteorological parameters from the Global Pressure and Temperature (GPT) model were used together with Global Mapping Function (GMF) and Chen-Herring gradient model. We realized that this was not specified in the text, hence we will add a following sentence (Page 3; line 8-9):

"In the processing for all three strategies, a priori tropospheric delays were computed from the Global Pressure and Temperature (GPT) model combined with the Global Mapping Function (GMF) (Boehm et al., 2006) and Chen-Herring gradient model (Chen and Herring, 1997)."

According to Tregoning and Herring (2006), using a priori atmospheric pressure from the GPT model eliminates the majority of the mean height biases caused by a standard/constant pressure value (as it was done in the past).

Note, however, that in this paper we aim at improving the baseline design strategy only, and leave the discussion on a priori hydrostatic delay and its effects for future study.

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