

Answers to the Interactive comment on “Noise characteristics in Zenith Total Delay from homogeneously reprocessed GPS time series” by Anna Klos et al. written by Anonymous Referee #2

Dear Anna, and co-authors,

Thank you for your paper. I think the approach you have taken to analyze the noise of the time-series is a good one, had you converted your time series to IWP then you would be adding another source of potential error to the time series, whether that had been obtained from a collocated meteorological sensor or interpolated from a grid.

Restricting your study to ZTD is valid and highlights the uncertainties just obtained from the GPS-derived estimates, without further complicating the matter with other potential noise sources.

Thank you very much for your valuable comments. In the new version of the manuscript, we restricted ourselves to ZWD data. So, we do not consider ZTD series anymore. Analysis of ZWD series have more climatological sense than analysis of ZTD data, as suggested by other Reviewers. For now, we have re-ran all analyses with ZWDs, made new homogenization and described the deterministic and stochastic models of ZWD data.

I think you give a good coverage of the approach you have taken, however, I would like to have had more detail on the exact source of the time series, was this a solution submitted by GRG to the IGS reprocessing effort, or from a different source? It's not clear to me what modeling was applied in the time series from the GPS processing, and whether this had been derived from a PPP or network based solution. I think it would be also important to give some justification on why you choose to remove the number of harmonics from the time series.

Section 2.1 clearly describes the raised points.

The paper could be improved with some discussion on the applicability of your technique under stationary and non-stationary conditions, and particularly to the autoregressive models, you have restricted your analysis too.

For now, we focus on the combination of autoregressive process of first order plus white noise (AR(1)+WH). We show that even adding the simple AR(1) to a pure white noise which was widely used up until now, gives more reliable results than a WH noise itself. Naturally enough, if one wants to go to higher orders of AR part, one can, but one has to be aware so as not to provide too complex stochastic model. We re-wrote the discussion and a part about the preferred noise model. Also, we shortened the part about seasonal models.

The conclusion of the paper should be re-written, it reads like a discussion presented earlier in the paper and is too verbose. The work you have put together here effectively highlights that white noise statistics are unreliable and has the potential to lead to the misinterpretation of solutions, such as incorrectly assessing a trend exists.

Thank you for all your comments. The discussion is now re-written.