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Interactive comment on "Noise characteristics in Zenith Total Delay from homogeneously reprocessed GPS time series" *by* Anna Klos et al.

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Dear Authors, Thank you for interesting paper. Below you can find a few remarks:

1. I have two general comments to the first part of the paper: a. In the introduction you have written a lot about IWV and its usage as a product for, e.g. climate studies. Why you don't analyses it instead of ZTD? b. I think that you should write more about homogenization of ZTD. You have written themselves about how much important it is, but you didn't write which method/algorithm did you use in for discontinuities detection, why this one, what criteria you take on. The same remarks relating to their removal. I would be grateful for more information about it.

2. The performed analyses look quite good but I have some doubts about the noise nature. Is it stationary? I'm familiar with statistical analyses and I know, that usage of

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Discussion paper

AR models is possible and properly methodically, when the character of the noise is stationary. In your paper I have not found any information about it. if so I would ask you to give some statistics which confirm the stationarity.

3. I suggest to change Figure 9, the bottom one, and provide the percentage change. I think that it would be more readable and easier for interpretation.

4. I have also some remark about result presentation. You estimate trend values for long time series of ZTD. Whether the observation time for all sites was the same? In your paper I could not find clear information about it. As it was mentioned by the e.g. Baldysz et al 2016 (Baldysz, Z., Nykiel, G., Araszkiewicz, A., Figurski, M., and Szafranek, K.: Comparison of GPS tropospheric delays derived from two consecutive EPN reprocessing campaigns from the point of view of climate monitoring, Atmos. Meas. Tech., 9, 4861-4877) or Nilsson and Elgered 2008 (Nilsson, T. and Elgered, G.: Long-term trends in the atmospheric water vapor content estimated from ground-based GPS data, J.Geophys. Res., 113, D19101, 2008) adopted length of the time series can have significant effect on the statistic parameters like a trend. So please, if you can, write more information about it. I think that all analysis of any global characteristics (e.g. Fig 4, Fig 5 etc.) can be presented only on homogeneous data of a similar period of time. Only such results can be used for reliable interpretation of tropospheric changes in case e.g. climate studies.

5. Moreover I think you should compare your results of trend or amplitude with other studies (e.g. mentioned above, Baldysz et al. 2016). Are there large differences, are they significant and which results are more reliable?

6. For most station your trend estimation are similar, both for WH and AR+WH, regardless which noise model was adopted. The only difference can be seen in the error values. Why do you think that greater value is more reliable? I think that you should extend your discussions / comment just on such elements. Currently, I get the impression, it focuses more on the applied some method but without any meaningful

statements.

I wish you success in further work.

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