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Atmospheric Measurement Techniques Discussions

Interactive comment on "Tropospheric products of the 2nd European reprocessing (1996–2014)" *by* Jan Dousa and Pavel Vaclavovic

Anonymous Referee #1

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Dousa and Vaclavovic provide a clear and systematic report on the tropospheric products from a reprocessing of the EUREF network. They use both internal metric - the RMS of coordinate repeatabilities - as well as an external comparison with numerical weather model reanalyses to assess the performance of the standard reprocessing approach as well as a suite of variants designed to test the impact of possible alternative strategies. They are able to validate a significant improvement in the reprocessed time-series and identify recommendations for optimal performance in the future processing. The most notable result from their work is that a low - 3-degree - cutoff angle for the data provides the best results. Although this is expected to improve the geometric distribution and help decorrelate the vertical position and troposphere parameters, the mapping functions and antenna models are not expected to be well described for very low elevation angles. It is therefore noteworthy that this processing strategy improved

the results.

Although their results might not be ground-breaking, they are carefully performed and provide valuable information to a range of researchers. With a few minor modifications I recommend this for acceptance and publication.

There are a few areas that I think should be cleaned up or further explained in order to ensure that (particularly non-specialists) can better understand the work and its implications: 1) Section 2: I assume, though it is not stated, that a set of (global?) IGS sites were included in the processing of each of the sub-networks, both to ensure strong ties to IGS08 as well as provide the long-baselines necessary to ensure retrieval of absolute ZTDs?

2) Section 3: It is definitely important that artifacts at day-boundaries are mitigated, and the strategy followed to ensure ZTD continuity seems perfectly good. The smoothness of the RMS across midnight is a good indicator that the strategy is performing as expected, it would be nice, however, to see a quantitative validation of the positive impact. Can this be pulled out of the ERA-Interim comparisons?

3) Figure 4: I am uncertain what the panel titles mean? In the text (line 173) this figure is referenced as Figure 3, and suggests the data are from 1999, though the x-axis labels indicate 1996?

4) Seasonality of coordinate RMS (Figure 5 & lines 228-230). Some statement about the source of the seasonality seems called for. This may include a citation where this has been previously described, though it might also/instead reference Figure 7 which indicated that the tropo gradients show a similar seasonality suggesting that the limiting factor may be in the modeling of the atmosphere (rather than a seasonal source(s) of increased ground motion).

Minor comments: Section 4.2: discussion first of Table 5 and then Figures 6 & 7 (lines 270-324) means jumping back and forth between ZTD and tropo gradients. I would

suggest re-ordering the discussion to address the ZTD portion of Table 5 along with Figure 6 and then the gradient section and Figure 7.

Gradient units: tropo gradients are not entirely straightforward to describe - and it is not clear in the paper what the numbers given actually represent, and strictly speaking the units of the gradients in ZTD (or ZWD) cannot be mm... so how are the tropo gradients being implemented, and what do the values given physically mean?

Suggestions: Abstract, line 24. "assessing" = "comparing"?

Intro, line 33. "... (GPS) became fully operational in 1995..."

Intro, line 85. "enhance" = "improve"?

Section 3. Line 155. "... an interval, or b) by..."

Section 3. Line 165. "Finally, we represented the piece-wise linear solutions in terms of offsets,..."

Section 4.2 lines 241-242. Not quite sure what/where the "yield values" are refering to? This sentence needs a little work for clarity. Section 4.2 line 249: "...as the same blind mapping function and a priori ZHD values are used for both the GO0 and..."

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