

## ***Interactive comment on “On the inclusion of GPS precipitable water vapour in the nowcasting of rainfall” by P. Benevides et al.***

**Anonymous Referee #2**

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Review of ‘On the inclusion of GPS precipitable water vapour in the nowcasting of rainfall’ by Benevides et al.

The manuscript is of interest and worthy of publication after a major revision. The data sources, methods and the results are well presented; my main concerns are that the conclusions drawn from the evaluation are hardly scientifically discussed and - from technical point of view - I found the quality of writing very poor. There were many instances of awkwardly worded sentences, bad grammar, and missing punctuation. I realize that English is likely not the author’s native language, so I recommend to have someone carefully review the revised manuscript.

General comments:

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1. The introduction gives a clear overview about GNSS/GPS data and its applications, especially with respect to water vapour. As the paper focuses on the application of rainfall nowcasting, the authors should also provide more information about the state-of-the art on the use of GPS data for NWP and/or nowcasting (i.e. assimilation issues).

2. In chapter 3, last sentence, the authors mention the influence of westerly flow, occasionally leading to torrential rainfall. Could you be more precise, what do you mean with ‘fast transformation in various temporal and spatial scales’?

3. Chapter 4 ‘Methods’: Generally, the method is well described, but the strategy to reduce the ZTD discrepancy between daily estimates is not fully clear. Maybe a graphical example could help here.

4. Chapter 5: The evaluation focuses on heavy precipitation events rather than medium or weak precipitation for one station. Could you provide an estimate of applicability of the method for non-extreme events and other locations at different climate regions?

5. In the discussion it is stated that some of the mismatch between PWV and precip is due to the sparse rain gauge network. Did the author take radar data also into account? A radar – rain gauge merging method which combines both data source would help to overcome this problem (at least in areas where radar problems with beam blockage etc. are not that relevant).

Technical comments:

1. P. 3862, line 8: it should read: ‘It is found that most severe rainfall events occur ...’

2. P. 3862, line 19: ‘... and one that is notoriously difficult to monitor’ sounds odd.

3. P. 3862, line 19: ‘... are unable to do a sufficient time and space sampling of its distribution’: please rewrite.

4. P. 3863: line 3-9: split up into 2 sentences

5. P. 3863: line 26/27: with cloud and precipitation patterning: what do you mean

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exactly? Please reformulate.

6. P. 3863, line 29: an advection cannot be 'large', please rewrite.
7. P. 3863, first paragraph: split into 2 sentences
8. P. 3867, line 12: should read '...can be related to a more ...'
9. P. 3867, line 22: 'by a sufficient set' is strange. I guess, the set should be large enough.
10. P. 3869, line 1: '... favours the penetration ...' is odd, should read '... favors the advection of ...'
11. P. 3870, line 25: 'Outside 2012 the analysis looked ...': what do you mean? Please rewrite.
12. P. 3871, line 26: '...bringing maritime ...' sounds odd, please rewrite.
13. P. 3873-3874, line 26-2: Split into 2 sentences.
14. P. 3874, line 3: 'the relation is not one-to-one' sounds odd. Please rewrite.
15. P. 3874, line 13-16: Please rewrite the sentence, it reads very clumsily.
16. P. 3875, line 16: 'a raining probability' is wrong. Should read 'rain probability'
17. P. 3875, line 27: 'In the other extreme' is awkward, please rewrite.
18. P. 3876, line 12: 'occur' instead of 'occurs'. This is only an example of bad grammar which I do not comment all of them.
19. P. 3877, line 16: '... and most events are forecasted with 1 to 2h of anticipation'. What do you mean?
20. P. 3877, line 17: 'unforecasted' should be replaced by something like 'non-forecasted'

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21. P. 3878, line 1: what do you mean with 'recovers'??

22. P. 3879, line 2: 'until it is out of range' sounds odd, please rewrite.

23. P. 3880, line 12: 'Seco et al. looked at' is odd. Such phrase is repeated several times in the manuscript.

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