

Atmos. Meas. Tech. Discuss., author comment AC3  
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## Reply on RC2

Chaiyaporn Kitpracha et al.

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Author comment on "Validation of tropospheric ties at the test setup GNSS co-location site Potsdam" by Chaiyaporn Kitpracha et al., Atmos. Meas. Tech. Discuss.,  
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Review of "Validation of tropospheric ties at the test setup GNSS co-location site Potsdam", by Kirpracha, Heinkelmann, Ramatschi, Balidakis, Mannel and Schuh, AMT-2021-87

### GENERAL

This is an interesting article on atmospheric ties. The purpose is to find ways to reduce atmospheric delay biases, thereby improving positioning, which can potentially also improve the global reference frame. The paper is well written, almost ready for publication.

In the original pdf fig 2 and 3 lacked proper axis and curve labels. On my request via the editor the correct figures we made available by the authors. Thanks. They are OK and should substitute the figures in the manuscript uploaded.

### Response:

We would like to thank you for your time reading our manuscript in detail and for your insightful comments. We carefully considered your comments and addressed all your points in the text.

### SPECIFIC COMMENTS

I 6 as a antenna -> as an antenna

### Done

I 10 This sentence is not meaningful.

**Response:**

Thank you. We have rephrased the sentence in our manuscript.

l 11 It is not unexpected that a radome causes a bias, that has been known for a long time. (But we know that in certain environments snow that settle on a choke ring antenna can confuse things even more.)

**Response:**

Thank you for your comment on this issue. The key of this experiment is the very precise assessment of the quality of tropospheric ties, excluding instrumental effects. Therefore, we applied the same antenna and receiver types with different heights but quasi no horizontal distance. Our experiment can thus be understood as a best-case scenario, where instrumental effects are mitigated. Due to the various heights, multi-pathing, and radome-related effects deteriorate the antennas in different ways, as clearly demonstrated. All these error sources will have to be considered, if tropospheric ties are to be used for the combination of space geodetic techniques or if GNSS-derived information is to be assimilated in meteorological models.

l 16 Many met services assimilate GNSS ZTD, but I don't know of services assimilating gradients operationally.

**Response:**

We apologize for the misunderstanding. We have rephrased the sentence in our manuscript (line 17).

l 18 It takes only pressure to derive ZWD from ZTD. But remember it requires on top the average of the humidity weighted inverse temperature to derive PWV from ZWD. As you don't consider PWV later in your article, maybe you should just avoid mentioning PWV. It only becomes relevant if you start considering for example water vapour radiometers as a source of atmospheric information.

**Response:**

Yes, you're right. We added the dependence of temperature. Nevertheless, we still think it is worth mentioning PWV shortly as it is a quantity that is well known by the meteorological community and thus, improves the readability for those readers of AMT.

l 82 whether there is any utility in applying -> whether there is any benefit in applying

**Done**

l 113 A duration of two weeks contrasts the period Jan. 30 to March 7 mentioned in line 82, and the five weeks mentioned in line 208.

**Done**

l 150 significantly mitigate -> significantly reduce

**Done**