

## ***Interactive comment on “Sensitivity of GPS tropospheric estimates to mesoscale convective systems in West Africa” by Samuel Nahmani et al.***

### **Anonymous Referee #1**

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General comments In this paper the characteristics of GPS tropospheric estimates (ZWD and gradients) and post-fit phase residuals during the wet season of the WAM have been investigated using two different GPS approaches (regional network of GPS stations, observations in PPP mode). MCS passages are analysed based on a case study from the AMMA period in 2006 and on a statistical approach. The aims of the investigation are clearly given. The paper is clearly structured and well written and the added value of GPS information concerning MCS analysis is quite obvious. I recommend publication of the paper - some minor recommended changes are given below.

specific comments Section 2.3.1: I am not very familiar with the two parameters tropospheric gradients and post-fit phase residuals. E.g. a gradient normally is defined by  $dy/dx$  (unit1/unit2). However, here gradients are given in mm (e.g. Figure 4). I.e. the

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“gradients” are more related to spatial (north-south, east-west) inhomogeneities rather than real gradients. Therefore, I would recommend to add some more information how to interpret the “gradient” data (can any information be given over which horizontal distance the values occur?). Concerning post-fit phase residuals: some more information what it really means and how to interpret the values would help readers which are not that familiar with this kind of GPS data analysis. Page 13, line 9: I wonder why you discuss ZWD together with relative humidity and not with absolute or specific humidity. As in most cases, i.e. in the WAM region, too, the IWV should be mainly determined by the humidity in the boundary-layer (this is e.g. obvious from specific humidity profiles, Schwendike et al., 2010). Thus, ZWD should show a better correlation with the near-surface absolute humidity than relative humidity does. Schwendike, J.; Kalthoff, N.; Kohler, M., 2010: The impact of mesoscale convective systems on the surface and boundary-layer structure in West Africa: Case-studies from the AMMA campaign 2006. doi:10.1002/qj.599 . See also comment below. Figure 6 and 10 include ground clutter. Could ground clutter be removed so that backscatter from rain remains.

Technical corrections There are several typos etc. a few (not all) are listed below Page 1, line 14: should be ‘... the case of an MCS’ Page 4, line 37: should be “... Whose parameter is ten times ..” Page 7, PTU200 data and figure 7 and page 8 lines 14-20: as the PTU200 data are not really discussed, I would recommend to remove them from the diagram. The good agreement between ARM and PTU200 data could be mentioned in one sentence (when used in sect. 4). Page 7, line 29: it would be sufficient to give wind speed with one digit “5.8 m/s” instead of “5.81 m/s” as done before. Page 8, line 2: 3:33 UTC until 6:41 UTC would be 188 minutes. Where does 182 minutes come from? Page 8, line 5: the start of the convective phase is given by 3:33 UTC. Here you give 3:32 UTC. Shouldn’t the times be the same? Page 8, line 36: do you really mean 37 min? from line 3 and 4 it should be 41 min (29 min +12 min). Page 9, line 10: should read “... to reach a maximum of “ Page 10, line: should read “ ... make it easy to ...” -, line 13: delete “to” after UTC. Page 11, line 9: delete “at” “... Cold pools during ...” Figure 7: I would even here show the accumulated precip (instead of

showing three times the same precip data in 7b,c,d) because it is discussed in the text on page 8.

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