

Interactive comment on “Thermal structure of intense convective clouds derived from GPS radio occultations” by R. Biondi et al.

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Specific comments ===== Comment: P29097, Sec 2.a.3. More description is needed of the wetPrf data on the CDAAC website. These are the source data for the key results of the paper, on the lapse rates within convective clouds. How good are the wetPrf data? What covariances are used? Please provide a reference to some evaluation/validation of this data. Reply: It is correct that the wetPrf data from CDAAC are based on refractivity, but the wetPrf data not made using a traditional 1Dvar approach. Instead the refractivity observations are heavily weighted such that the resulting temperature is basically the same as the so-called dry temperature in the UTLS. To our knowledge, this is not really described in other papers, except briefly in our previous paper by Biondi et al (2011). However, we decided in the revision to not use the

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wetPrf data at all, since the dry temperature (which is in the CDAAC atmPrf files) in the ranges we are looking at in this paper is virtually identical to the temperature in the wetPrf files. We therefore redid all the analysis and figures using the dry temperature from the atmPrf files, and skipped all talk about wetPrf and 1Dvar in the paper. We have added a couple of references to previous works showing a few examples of how consistent the dry temperature in the UTLS region can be retrieved from different COSMIC platforms (Schreiner et al., 2007; Anthes et al. 2008). Comment: P29097, L9. Please provide a better reference to the 1dvar technique in RO, eg Healy and Eyre QJRMS 2000, or Palmer et al JGR 2000. (Probably H+E since that's based on refractivity retrievals and I think that's what's used to generate wetPrf.) Reply: We re-formulated the product description excluding the wetPrf data from the analyses and the discussion on 1Dvar. Comment: P29096. Is the given CDAAC URL correct? (It didn't work for me just now.) Why not <http://cdaac-www.cosmic.ucar.edu/cdaac/index.html> (which did)? Reply: Thank you for the suggestion. The URL was changed. Comment: P29097. Units of T, p and e need to be specified for eqn 3 to be meaningful. Units of N can be inferred from eqn 2, but it wouldn't hurt to spell them out. Reply: The sentence has been changed as: "... Atmospheric refractivity (N) is dependent on the temperature (T in Kelvin), pressure (p in millibar) and water vapor pressure (e in millibar) profiles according to: ...". Comment: P29102, L21. "... no significant anomalies above the cloud." It looks to be about 1.5K in Fig 7a, which is about half the peak. Perhaps you could say that the anomalies rapidly die off beyond $z-z_0=5$ for the high cloud top occultations - assuming they do. Reply: The sentence was re-phrased according to the suggestion. Comment: P29104, L4: suggest replacing "with excellent agreement" with "agree within about 1km". Reply: The sentence has been changed evaluating the agreement. Comment: P29109,29110, Figs 2 and 3: the writing on these figures is a bit small on a hardcopy. Please consider redrawing with a bigger font. Reply: Done

Technical corrections ===== 1) P29099, L14: typo form → from. Reply: Done 2) P29106, L2: typo "theMariner" → "the Mariner". Reply: Done 3) P29106, L4: typo "vapour" → "vapor". Reply: Done 4) P29107, L16: typo "vapour" →

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"vapor". Reply: Done 5) P29113 Fig 6 caption: do you mean "the green lines are the average \pm one standard deviation"? If not, what do you mean by the "average one standard deviation"? Reply: Yes, it is the average \pm one standard deviation, it has been corrected. 6) P29114, Fig 7 caption: ditto. Reply: Done 7) P29116, Fig 9: typo "Inversione" \rightarrow "Inversion". Reply: Done 8) P29116, Fig 9 caption: suggest replacing "... profile during the convective systems" with "... profile when a convective system is present", which sounds a bit better. Reply: Done

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 29093, 2011.

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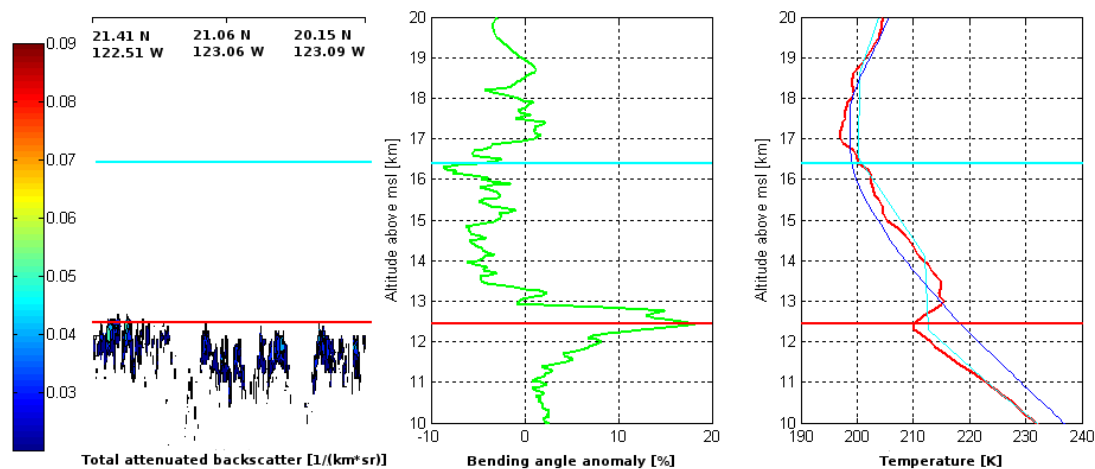


Fig. 1.

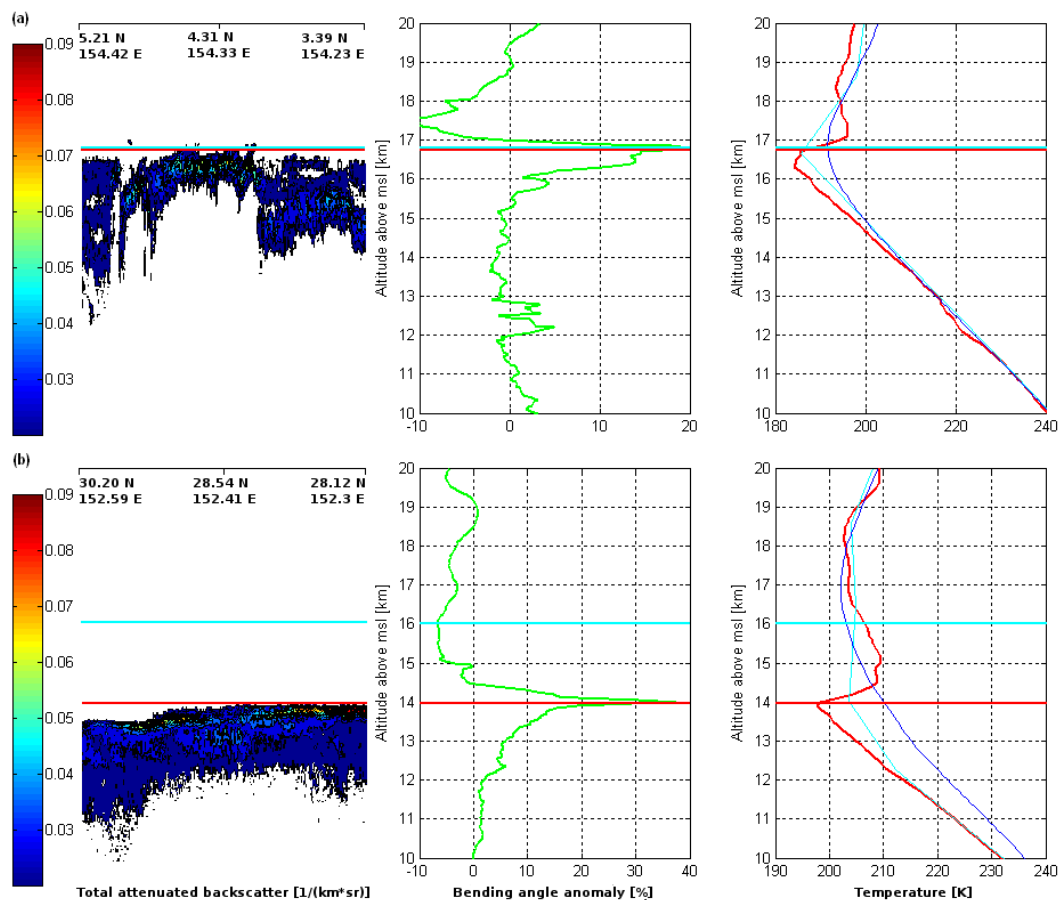


Fig. 2.