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Atmospheric Measurement Techniques Discussions

Interactive comment on "On the effect of moisture on the detection of tropospheric turbulence from in situ measurements" *by* R. Wilson et al.

Anonymous Referee #2

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This is a well-written paper which seems well suited to the objectives of this journal.There are just a few typogtaphical errors, and a few concepts I would like to see expanded.

One point that does arise - I have seen many reports on Thorpe analysis, which is the main focus of this paper, but I have never seen a really good discussion of how it is carried out in real life.The idea is to shuffle the layers around so that their potential temperature (or an equivalent parameter) increases linearly, and then to calculate some sort of average displacement. But it is not clear whether this shuffling is done by some sort of logical sequence, or whether it involves random shuffling over many different combinations until the "right" one is found - i.e. is it a computer-intensive process,

or a very simple one? Some details added as an appendix would be a nice adjuct, though maybe there is insufficient room.

Equations (2) and (3) use finite differences - the authors should really discuss the resolution at which this is applicable.. they do discuss the balloon resolution a bit later, and note that they use slow ascent balloons, with resolutions of a few metres, but some discussion at (2) and (3) about the maximum allowed Delta-z might be suitable, to prevent others from using this at inappropriate values of Delta-z in future.

Page 8228 - line 10 - change the sentence to read The calculation of theta_* first requires the IDENTIFICATION OF the saturated regions using relative humidity (RH) profiles measured by radiosondes.

Page 8228 - I am aware that some radiosondes are very bad at measuring humidity at low temperatures, and the authors so discuss this.. but on page 8229 they say "These empirical methods are evolving with the improvements of the humidity sensors" -the fact that things "are improving" begs the question "have they improved enough?" I guess the authors must feel they have, though they may want to say so. Some grammatical change would be good too e.g. "These empirical methods are evolving with improvements in modern humidity sensors".

Page 8230 – first line – the authors say that "weak precipitation", in which the VHF scatter is dominated by clear-air scatter, occurs for precipitation less than 10 mm/h. A reference about this would be good, as the number seems arbitrary e.g. maybe see Campos, Radio Sci., 42, RS3003, doi:10.1029/2006RS003540 might have something.

Page 8231 - line 6 - the choice of the words "parallel (or superimposed)" seems odd - probably "identical" would be better. Indeed the whole sentence might be better as "Indeed, the two profiles in dry regions are identical and only differ when a saturated layer is encountered, i.e. below the altitude of 5.7 km in Fig. 1c."

Page 8231 - the radar seems to be only used to determine the anisotropy - was it

used at all to measure the energy dissipation rate? Did I miss it, or was it felt to be of insufficient value.

In regard to radar aspect-sensitivity and moisture, the paper by Hocking and Hocking, J. Atmos. Oceanic Technology, 24, 40-51, 2007 might be of value.

Page 8232, line 6- "In average" –> "On average", ...

Page 8232 - section 4.2 - this seems critically dependent on the assumption that the RH and moisture measurements are reliable - some comment here about errors associated with potential errors in these moisture measurements would be appropriate. The authors do claim that the reults are "proven" by Durran and Kemp (1982), but at the same time RH measurements close to 0C are known to be a bit unreliable,as the authors themselves suggest on page 8228 – so some caution is advised.

Page 8233, line 14- should "founded" be "funded"?

But overall, a good paper. Hopefully improved with these suggestions, but certainly this will be a valuable document in years to come.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 8223, 2012.