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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Estimating the atmospheric boundary layer height over sloped, forested terrain from surface spectral analysis during BEARPEX " *by* W. Choi et al.

Anonymous Referee #1

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General Comments

The manuscript treats the problem of determination of boundary-layer height from surface sonic measurements. It is interesting and it ahs potential applications for routine monitoring. However there are some points that should be addressed before publication as specified in my specific comments.

Specific comments

In some cases lateral wind is used in other cross-wind. It would be better to use the same name in all the manuscript.

In the introduction it is reported "these compounds are in general emitted from the sur-

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face, or produced secondarily within the ABL, possessing lifetimes similar to or shorter than the time scales associated with the largest eddies confined by zi.". The formation of secondary pollutants, like for example secondary aerosol, could have time scale of several hours or days (in some cases) so it necessarily a time scale comparable with that of the large eddies.

In the introduction it is reported "In addition, it is essential to determine the stable nocturnal boundary layer (NBL) height (h), because the impact of dry deposition on chemical species budgets at night is determined by h, and dry deposition can be a major loss mechanism for many reaction products." It is not clear the dependency of dry deposition on h. Actually the deposition velocity in stable conditions is related to friction velocity and to particle diameter (for aerosol).

In section 3.1. The surface layer stability was unstable whenever tethersonde measurements were conducted even in the early morning with values (z/L) ranging from 0.03$\sim$0.29." The values should be negative. Further, in table 1 zd/L arrives at -0.313.

In section 3.1. "the NBL depths are shown in table III-2 during the period of radiosonde measurements in 2009." It actually appears to be Table 4. It would be useful to have this as Table 2 because it is mentioned just after Table 1.

In Section 4. It is reported that Oncley et al. (2004) used the relationship to estimate zi over flat and open snow cover at the South Pole under unstable conditions. However in the introduction this reference was referred for stable environments. There are both stability analysed in the paper?

In Section 4. "the ratio of integral length scale in our study" it should likely be "length scale".

Section 5. Measurements of the NBL show limited range (standard deviation 7m corresponding to less than 10% of the NBL height). This is a very limited range of variation so that it is necessary to discuss the uncertainty in the measurements to understand if

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actually it is possible to see a variation less than 7m in the NBL height. This is important also to understand Figure 11.

In the concluding remarks. The estimated mean zi in the CBL environments (10:00∼16:00 PST) is 780 m (median 810 m) in August and 640 m (median 660 m) in September of 2007. The monthly variations in the fully developed CBL depths most likely resulted from the variations in solar radiation intensities and hence in the surface heat flux. Again it is not clear if this seasonal difference is statistically significant. A discussion o this should be included in the manuscript.

In the caption of Table 1 it is used Zi instead of zi as in the text. The same in Table 2.

The fit results in Table 2 should include the uncertainty on the fitted parameters. It is reported the case of all data and the case of 2007 but not the case of 2009 by itself. It appears that data of 2009 could lead to different results. Could the authors comment on this?

In the caption of Figure 6 it is reported "obtained from Eq. (3) and (4)...". This should likely be "obtained from Eq. (4) and (5)..."

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/10/C10398/2010/acpd-10-C10398-2010-supplement.pdf

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 25759, 2010.