

Interactive comment on “Unmanned aircraft system measurements of the atmospheric boundary layer over Terra Nova Bay, Antarctica” by S. L. Knuth et al.

Anonymous Referee #2

Received and published: 2 January 2013

The manuscript presents an interesting data set: unmanned aircraft system measurements in the Antarctic in winter. According to my knowledge, there are very few such data available, if any. Hence, a publication on the data would be welcome. The manuscript includes, however, weaknesses, and a major revision is necessary. Below are my detailed comments.

1. The presentation is very technical, but it would be important to provide better evaluation on how suitable the data are to study the issues described in the first paragraph of the Introduction. In the journal homepage it is stated that “Any interpretation of data is outside the scope of regular articles.”, but I guess that the authors should evaluate if

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the data are useful and adequate. The main question include:

a) Are all the essential variables measured by the UAS system? It seems that at least the observations on turbulent fluxes of heat, moisture and momentum are not obtained by the UAS.

b) Are there any means to distinguish between spatial and temporal variations in the data?

c) Under stable background stratification, heat and moisture fluxes from a polynya do not necessarily reach high altitudes. Are the data useful, if the lowermost measurement height is 150 m? This naturally depends on the width of the polynya, but it is not mentioned in the manuscript.

2. The measurement accuracies of meteorological variables are not at all addressed. This is a major deficiency. I am particularly concerned about the accuracy of air humidity measurements in temperatures as low as -35 deg C. Further, it is not just the absolute accuracy, but also the response time of the sensor is important. In low temperatures, most humidity sensors are slow. When the aircraft is flying fast, are the vertical profiles of humidity reliable (Figure 4)? In Table 4 the 0.01% resolution given for the relative humidity is certainly not any true measurement accuracy, and the same is probably true for the air temperature.

3. Is 0.01 degrees in latitude a sufficient accuracy in the data archive (Table 4)? There may be smaller-scale horizontal variations especially close to the polynya edge. Figure 4 suggests this for the wind.

Interactive comment on Earth Syst. Sci. Data Discuss., 5, 1035, 2012.

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