

## ***Interactive comment on “Seasonal variations and vertical features of aerosol particles in the Antarctic troposphere” by K. Hara et al.***

**A. Virkkula (Referee)**

aki.virkkula@helsinki.fi

Received and published: 28 April 2011

### GENERAL

This is a very interesting and important paper. There are quite a few ground-based long and short time series and some airborne campaigns in Antarctica. This work is unique in that it presents for the first time a long time series including seasonal variation of vertical distribution of aerosols in Antarctic. The analyses are sound and I have only some minor, mainly technical wishes for a revision.

### DETAILED COMMENTS

Syowa is a famous station but still I wish you would write some basic information on it: distance from the open, sea-ice free ocean in summer and winter. This information

C2407

would support discussion of transport of sea-related compounds. And altitude above sea level.

### Section 2 Measurements

P 7559, L 10. Mention the diameters of the OPC channels.

P 7559, L 17. You mention an impactor, also in table 1. But you show no data anywhere, why? If you don't use it, explain reasons. And if you do use the data, you should explain more about it: flow rates, pumps, subsequent analyses etc. And if you don't use the data at all, you could just as well not mention the impactor at all. But this is a minor thing.

P 7559 L18. You placed the instruments in an insulated box. Did you heat it in any way? This is important because according to the manual the TSI model 3007 CPC operating temperatures are +10 – +35°C and temperatures are lower than that even at ground level. Did you measure the box temperature during the flights? Another thing related to this: when the sonde ascends, it generally goes to lower temperatures and instruments cool down, if the instruments are not in a heated box. When the sonde then comes downwards, the instruments are still cold and water vapor may condense on optics and create erroneous counts. Did you see anything like this or were the concentrations the same both when ascending and descending?

How about flows? The sondes went quite high and pressure decreased. How does this affect the pumps of the OPC and the CPC? Did you make any STP corrections or are all the concentrations at ambient  $t$  &  $p$ ? What were the flow rates of the OPC and the CPC?

How many soundings did you make? How often? How long time did one full sounding take?

Did you compare the concentrations at the lowest altitudes with the ground-based measurements at Syowa – I suppose you have similar instruments there. How big or small

C2408

were the differences?

P7564 L11. Why did you calculate the Junge slope from the diameter range 0.3 – 5  $\mu\text{m}$  and not using also the CPC data? This is fine, I don't require using it, just explain why?

P7564 L11 - 13. The sentence "When the number concentration of coarse particles ..." is somehow awkward, I suggest rewriting it.

P7566, L5-7. "Indeed, aerosol enhancement after the storm conditions was observed occasionally at ground level (Hara et al., 2010)..." This is fine. You could mention here that a very similar phenomenon has been observed at Aboa for even smaller particles, see Virkkula et al. *Boreal Environ. Res.*, 12, 397–408, 2007.

P.7569 L6. You refer to Eisele et al. 2008, but it is not in the list of references. Cross-check all references.

About vertical transport of aerosols to ground level you could also mention our observation at Aboa in Virkkula et al. (2009) *Review of Aerosol Research at the Finnish Antarctic Research Station Aboa and its Surroundings in Queen Maud Land, Antarctica*, *Geophysica*, 45, 163-181.

Figure 2. Does each vertical bar represent trajectories calculated for one sounding or what? Write units for each subplot. Is the altitude on the left the arrival altitude above Syowa? You could mention that. I may see badly the colors but it seems that some trajectories that arrive at 1500 m have their highest altitude lower than that which is somehow contradictory. Check this.

Figure 3. Add units to all subplots.

---

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 11, 7555, 2011.