

Interactive comment on “Evaluating local anthropogenic impact on remote Arctic monitoring stations: a case study at Summit, Greenland” by G. S. W. Hagler et al.

Anonymous Referee #1

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This paper evaluates contamination of air and snow-pit samples by activities at the research camp at Summit, Greenland. The main conclusions are: 1) 1-m snow pit elemental carbon (EC) concentrations 1 km south of the camp in the upwind (clean) sector are about 2 times higher than those at sites 10-20 km north or south of the camp; and 2) wind-sector control for air sampling appears to screen out contamination from the camp at the clean-sector site 1 km south of the camp.

Specific comments:

My first concern is the title. The paper only deals with contamination at Summit. Reference to “remote Arctic monitoring stations”; other than Summit should

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be removed from the title.

While it is clear that concern over contamination of both air and snow samples near the camp is warranted, it is unfortunate that this effect was not evaluated earlier. Both of the previous studies conducted by Hagler et al. (2007 a, b) reported carbon concentrations from snow collected near the camp (1 km south in the clean sector). The authors should discuss the potential impact of their current findings, i.e., factor-of-two contamination of EC in snow, on their previous results and conclusions.

With respect to sector-controlled air sampling, it would be informative for the authors to compare average Bap from PSAP measurements including and excluding sector-screened data. Averaging times should correspond to their previous atmospheric sampling durations, e.g., 4-7 days.

The PSAP is an excellent means of studying the temporal variation of Bap. However, in this paper, the authors attempted to estimate EC emissions from the camp based on PSAP measurements. They converted measured Bap to EC concentration using a factor (mass absorption efficiency) of 24 m²/g determined from PSAP and EC measurements in Hagler et al. (2007b). This could be internally consistent, despite biases in the measurements of Bap with the PSAP and EC with the NIOSH thermal/optical transmittance protocol (Virkkula et al., 2005, AS&T, 39, 68-83; Chow et al., 2001, AS&T, 34, 23-34), if background EC measured in the clean air sector had the same optical properties as EC from the nearby camp generator. This is probably not the case. Liousse and Cachier reported large variations (5-20 m²/g) in the mass absorption efficiency in diverse environments. Some discussion recognizing this potential inconsistency is warranted.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 1239, 2008.

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