

Interactive comment on “Unexpected increase in elemental carbon values over the last 30 years observed in a Svalbard ice core” by M. M. Ruppel et al.

Anonymous Referee #1

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This paper gives a thorough discussion of possible influences on EC concentrations and deposition at the ice core site. I have a few comments.

(1) The authors need to clarify whether all the meltwater percolates and refreezes in the current year's layer, or whether some exits the glacier. If there is significant runoff, then the snow accumulation on Figure 3c does not accurately represent the snowfall. The snowfall rate in the latest years could be larger than shown, because of the trend to increased melt (and maybe increased runoff). An increasing snowfall rate would lead to increased EC deposition (Figure 3b) by wet deposition even with no change in scavenging efficiency.

C3350

(2) To test for the combined effects of increased melt-consolidation and increased runoff, the authors might correlate the BC concentration for individual years with summer temperature at Ny-Alesund as a proxy for the amount of melt at Høltedahlfonna.

(3) The citation to Jenkins et al. (2013) should be dropped. That draft paper, submitted to TC, was rejected. Unfortunately the editors of TC are not being forthright about their decision; the TCD version simply lists “Review Status” with the euphemism “A final paper in TC is not foreseen.”

Minor comments on terminology: (4) Section 3.2 paragraph 2. “We chose to calculate deposition rather than fluxes” In normal usage, these two terms are synonyms, with the same units ($\text{mg m}^{-2} \text{ yr}^{-1}$). Some explanation is needed (for example giving the units of each), or else a change in terminology.

(5) page 13209 lines 18–20. “. . . northern Eurasia . . . regional sources . . .” Does “regional” here refer to the northern Eurasia region, or is “northern Eurasia” instead being contrasted to a more restricted region?

Technical corrections: (6) p 13208 line 16. “McConnell et al. 2010”. The citation in the reference list has a single author.

(7) p 13222 line 15. Change “Salzman” to “Saltzman”.

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C3351