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Interactive comment on "Black carbon concentrations from a Tibetan Plateau ice core spanning 1843–1982: recent increases due to emissions and glacier melt" *by* M. Jenkins et al.

Anonymous Referee #1

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This manuscript presents dust (via Fe proxy) and BC (via SP2 measurements) from a Tibetan Plateau ice core. Unfortunately, the quality of the BC measurements was greatly affected by very long (5 - 14 months) storage of the melted core before and during analysis. Although the authors ably defend the value of the relative concentrations of this primary data product of their investigations, the strength of their possible conclusions are weakened to the point that the paper reads much like a review article, in which other published works support various conjectures based narration of their results. This work does represent an early result from the Tibetian Plateau region, and may have value as a review article (it is well written and includes broad and relevant citations), but I do not recommend publication in its present form.

The manuscript has some contradictory conclusions (primarily conjecture). In the abstract (and the text) two separate points are made: 1) Post-1940 BC concentrations are elevated relative to the previous record, suggesting greater emissions and/or enrichment of BC from melt at the upper levels; 2) The uppermost layers are not substantially higher relative deeper in the ice core, which the authors suggest indicates that BC has been removed vial melt. How can these contrary conclusions can be resolved? The last main conclusion, that BC is more important than dust in causing recent glacier retreat is insufficiently supported.

General Comments:

The figures would be greatly improved if modified to more clearly show the features discussed in the manuscript. For example, in Figure 2, the gross trends are some of the most important results of the work, yet are very hard to decipher as shown. For example, an important conclusion from the paper would be in the relative significance of BC and dust in causing the glacier retreat, and Figure 2 is referenced to "display a close relationship" between Fe (dust proxy) and BC over some portion of the record. I do not see it; if it is there, a correlation plot could be a better approach to highlighting this result. Longer term averaging, showing time-averaged results on a right axis with a smaller range (to more clearly accentuate the trends) and in a 2x2 format to allow larger plots. In this plot, and in the manuscript, I suggest some information about natural sources of BC be included, as the anthropogenic influences on the ice cores can only be properly understood in the context of total BC emissions.

The glaciers retreated by 4.7 kmˆ2 in the early 70s; what fraction of of the total glacier area is this? How significant was the increase in retreat in the 80s/90s?

The point is made that BC's impact on albedo will be reduced by the presence of non-BC absorbers, Kaspari et al. 2011 is cited for this. What about the presumably larger impact of the non-BC absorbers on snow metamorphism? Is the glacier snow/ice subject to significant snow metamorphism effects below the surface?

TCD
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Interactive comment on The Cryosphere Discuss., 7, 4855, 2013.