

Interactive comment on “Variability in individual particle structure and mixing states between the glacier snowpack and atmosphere interface in the northeast Tibetan Plateau” by Zhiwen Dong et al.

Anonymous Referee #1

Received and published: 4 October 2018

General statement: This is an interesting study suitable for publication in TC. There are some important revisions required, but they should be easy for the authors to make.

Major comment:

The large radiative forcing shown in Figure 11 (and cited in the abstract) is caused by the huge amounts of impurities in these glaciers. The authors need to point out that these glaciers are much more polluted than is normal for Tibetan glaciers. Line 120 gives the average value of BC (for 10 glaciers) as 854 ppm, or 854,000 ppb, i.e. about a factor of 40,000 larger than the amounts reported for Tibetan glaciers by Ming et al 2008 (ACP 8, 1343-1352). Some discussion is required before we can believe the

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results of this paper. I am also surprised that [BC] is $\sim 10\times$ [MD]. Previous reports find more MD than BC in Tibet.

Minor Comments:

line 43. “various salts . . . cause enhanced surface heat absorption”. Which salts do you mean? Most salts are non-absorptive at UV, visible, and near-infrared wavelengths.

line 51. Delete “et al”

line 54. Anesio et al 2009 is missing from the reference list. Kaspari et al 2011 is also missing.

line 55. Xu et al. is missing from the reference list.

line 61. McConnell et al. 2007 is missing from the reference list.

line 74. Define TSP.

line 105. Semeniuk et al. 2014 is missing from the reference list.

line 120. Please give the values of MD, BC, OC for each individual glacier. Put them in Table 1.

line 169. “Previous work”. Give a reference.

Table 1. The altitude for DF is given as 390 m. Probably you mean 3900 m.

Table 1. Add three more columns, giving the concentrations of BC, OC, MD in the surface snow of each glacier.

line 398 (Figure 2 caption) “nitrates”. The legends in Figures 2 and 6 say nitrite not nitrate.

line 400 (Figure 3 caption). “snow and ice”. Which of the ten sites were snow; which sites were ice?

line 414 (Figure 8 caption) “mineral dust particles”. No particles in Figure 8 are labeled

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as mineral dust.

Figure 2. Labels on the scale bars are illegible. Increase the font size.

Figure 10. The vertical axes for the three graphs should all use the same scale, for easy comparison by the reader.

Figure 10 legend. change "Mixed" to "Mixed".

Figure 12. The listed values for broadband albedo have too many significant figures. For example change "0.29774863" to "0.30".

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-166>, 2018.