

Interactive comment on “Community change of microorganisms in the Muztagata and Dunde glacier and climatic and environmental implications” by Yong Chen et al.

Anonymous Referee #1

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The paper “Community change of microorganisms in the Muztagata and Dunde glacier and climatic and environmental implications” by Chen et al. describes the microbial abundance and community structure in two short ice cores, collected from two Tibetan ice caps/glaciers, using flow cytometry and sequencing analysis of 16S rDNA clone libraries. The microbial data are related to dust concentrations and temperature record inferred from oxygen isotope analysis. The authors show a correlation between dust and microbial cells and conclude that wind deposition combined with post-depositional processes controls the microbial community structures in glacier ice in the region.

The paper is interesting and brings data from very remote (and high!) locations in central Asia; however, it suffers from several weaknesses that preclude publication in

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the present form. My main concerns are the following:

First, what hypothesis/es is/are being tested in the paper? This/these should be clearly stated in the introduction, and addressed in the results and/or discussion sections. What are the novel aspects of this ms compared with previous papers such as Yao et al. 2008 GBC, Zhang et al. 2008 BG, An et al. 2010 BG, Liu et al. 2013 Quat Sci, some of which were conducted at the same sites? The authors claim that “the current data have presented a change of the dominant endemic community composition, indicating an association of the microbial spatial patterning with the presence/absence of the dominant species within the specific glaciers” (line 206-8), which is rather unclear. Could this be elaborated on/clarified? Did the authors find this phenomenon for the first time? This is not likely (see the above mentioned papers). The authors also claim that “the new data have also presented seasonal response patterns of cell density in the Muztagata ice core” (208-9); however, one of the conclusions in Yao et al. 2008 is that “bacterial genetic diversity also changes seasonally” so this is hardly novel.

Second, the authors say that “there was a strong influence of aeolian activities on the physical and biological records along the ice core” (141-2) but this is not quite supported by the data. A significant correlation is claimed to have been found between dust and microbial abundance (151-3). This is potentially important as concurrent analysis of cells and dust particles in ice cores is scarce. The authors should show this correlation explicitly, e.g. as an additional panel of Fig. 3. But it is still not an unequivocal proof of aeolian control, as post-depositional processes may have occurred (e.g. nutrient leaching). In addition, no statistically significant relationship between microbial abundance and the oxygen isotope signal is presented to support the seasonal temperature effect (though of course it makes sense).

Third, no blanks or controls are mentioned in the methods. How did the authors account for possible contamination? In such low-abundance samples this is not negligible, and for example *Herbaspirillum* sequences, also found in this study, have previously been identified as potential contaminants in glacier ice samples (Cameron et al.

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Why did the authors use clone libraries? If it was to compare their data to older datasets then it should be stated explicitly and the direct comparisons shown.

Also, data from other parts of the world are largely ignored. For example, a recent paper from the Greenland ice sheet (Stibal et al. 2015 Front Microbiol) addresses the relationship between microbial abundance and dust and other environmental factors and their possible causes.

The ms would also benefit from a language correction.

Specific comments:

1-2 The title should be changed. The ms does not show any climatic and environmental implications.

25, 305 dust-borne what?

43-5, 241-2 snow algae are not quite relevant to this

54 biogeography is by definition spatial

75 Himalaya

76 Taklimakan

158-9 this is unclear, please rephrase

198 opportunistic?

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