

Interactive comment on “Accumulation reconstruction and water isotope analysis for 1735–1997 of an ice core from the Ushkovsky volcano, Kamchatka, and their relationships to North Pacific climate records” by T. Sato et al.

O. Solomina (Referee)

olgasolomina@yandex.ru

Received and published: 3 May 2013

In this paper the annual resolution reconstruction of accumulation in Ushkovsky ice core (Kamchatka) is extended back in time up to AD1735. The reconstruction of accumulation (mass balance) is based on the stable isotope stratigraphy and the two ice flow models. The correlations of the $\delta^{18}\text{O}$ and δD with local meteorological data is found to be generally weak, though the δD correlates with the North Pacific surface temperature and NP Gyre Oscillation. The reconstructed accumulation variations agree well with other proxies (e.g. age of moraines) and the recorded in 1970s peak of

C624

accumulation of Kamchatka's glaciers.

Very important new empirical data and some interpretation of these results are provided in this publication.

At the moment the discussion is virtually absent in this paper, but in my opinion it would be important to include it and discuss more deeply the following questions: 1. The results have to be discussed in the context of previous findings. For instance it was reported that the 11 years running mean net accumulation in Ushkovsky correlates with the local Kliuchy station winter ($r=0.75$) and hydrological year precipitation ($r=0.69$). It was also found that the accumulation in Ushkovsky ice core correlates with the PDO.(Shiraiwa et al., 2001). Are the shorter accumulation time series reported previously in Shiraiwa et al., 2001 the same as here or they are somehow modified? If they are the same, why the correlations established before were not found this time? 2. Please provide your assessment - which of the model you used is more reliable and why? 3. It would be important to add some discussion on the potential mechanisms governing the decadal variability identified in the records and the teleconnections.

The authors used for their analysis the records from Kliuchi met.station for the period 1961-1989. The Kliuchy met. station was open in 1920s and as far as I know it still operates since that time (see Solomina et al., 2007 published in CP), so it makes sense to take a longer records for this comparison. It is also possible to reconstruct a mass balance index basing on this meteorological data and compare it with the accumulation (in fact - mass balance) retrieved from the ice core records for almost entire 20th century. It is also possible to compare the accumulation records of Ushkovsky ice core with the mass balance reconstructions of Kozelsky glacier which is available for a century long period (Vinogradov, Muraviev, 1992). In Solomina et al., 2007 it was shown that the accumulation of Ushkovsky and the tree-ring summer temperature reconstruction (11-years running mean) are anti-correlated in 20th century, but have a positive correlation in 1830s-1880s. It would be interesting to extend the comparison back in time, while the new longer accumulation time series is available. I would also recomend to add

C625

some additional details on the dating of the ice core records based on known eruptions from Muraviev et al., 2007 (I guess the paper is published in Russian and therefore it is hardly available for the international public).

In my opinion the paper is scientifically sound and suitable for the publication in CP, but some extension of the interpretation of the results would be desirable.

Interactive comment on Clim. Past Discuss., 9, 2153, 2013.