

Interactive comment on “Reconstruction of recent climate change in Alaska from the Aurora Peak ice core, central Alaska” by A. Tsushima et al.

Anonymous Referee #2

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The paper concerns climate variability in Alaska between 1912–2008, relating temporal variations in $\delta^{18}O$ and accumulation from an ice core from Alaska Range to Pacific Decadal Oscillation index (PDOI). There is a lack of climate records from this area and thus is a potentially very valuable data that deserves to be published. The paper is rather short and too general in many respects and therefore it is difficult to fully evaluate the presented results. However, I feel that one very important aspect; the ice core chronology is convincingly presented. The fact the paper only concerns the part between 1912–2008, where there are reliable dating reference horizons available makes me believe that the data is of good quality. Maybe the most serious discussion I miss is about the effect of high summer temperatures on the glacio-chemistry. This is specifically mentioned in the abstract but is not really followed up in the paper. If the authors want to be convincing using the ice core data for climate reconstruction the

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melt issue has to be thoroughly discussed in its own section of the paper.

Available weather station data from Alaska are also used in the evaluation of influence of PDO and this part of the paper is less convincing to me. Many fundamental data about the weather stations are lacking.

In summary both the presentation of the data and discussion have to be improved. I have summarized some suggestions and concerns below (many of them the same as Ref 1). In addition, the language has to be improved. I have full understanding for the fact that none of the authors are English native speakers but many of the language items that I spot should be easily detected with the ordinary spelling/grammar checker.

Introduction I think that the paper would have benefitted from a more thorough presentation of previous work and findings from this area. For the reader not familiar with region this is crucial information. Please include information about dominating weather systems and general climate history from the area.

Sampling site. . . Also in this section I miss some of the fundamental information such as various local meteorological influences. Was there any snow pits sampled at the drill site? Do you have any idea of the distribution of precipitation over the year at the drill site? That would affect the interpretation of the $\delta^{18}O$ in terms of temperature. . .

Results In the abstract the authors are pointing out that this is a location with summer high temperatures producing many melt layers so a section about “impact of post-depositional processes on glacio-chemistry” is absolutely necessary. Much of the presentations of the results in Tables and Figures have to be improved (see below).

Discussion For the discussion things like distribution of precipitation over the year at the drill site are very important i.e. are the stable isotope records biased towards one special season? There is no information about the elevation of the weather stations. This will strongly affect both the precipitation and temperature and therefore the results from the correlation analysis presented in Fig 5 are not very useful. PDOI is suddenly

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introduced here- it needs to be explained for the reader not familiar with this. Much of the discussion and statistics involving PDOI is weak and not easy to understand. I am not convinced that of these results. . . .

Table 1 Contains useful information but should be “cleaned up” ; Since all records are of the same type, i.e. ice cores that could already be stated in the Table head (“North Pacific ice core records”) and use the last column for the reference instead. Please think about the number of decimals presented and be consistent- for instance one of the drill depth numbers has up to 3 decimals presented. Please be consistent with presenting the time from older to younger (i.e. 1992-2003) and don’t mix as it is now is the Accum- rate column.

Table 2 and 3 First of all these two table should be combined. I don’t quite see the logic behind the columns. . . Important information for the reader would be elevation, length of record, annual mean data. Why is a 6th year averaged chosen?

Table 4 I don’t think it is necessary to present these values in a Table. Why are these particular time intervals chosen?

Table 5 I do not see the point with this.

Fig. 1. I assume that the black triangles are the other ice cores sites listed in Table 1? Please include that in the figure captions. Fig 2. Some language issues in the figure caption that makes it hard to understand. “compartmental depth of annual layers” – maybe instead “division of annual layers” ? “We shows”- should be “we show” In this case a more correct expression for “snow depth” is “drill depth”

Fig. 3. For the reader not familiar with the geography it might be good to include the locations of Katmai and Mt Spurr on the map. Why did not Katmai not leave a nssS04 trace behind?

Fig 7. This figure does not add anything so please remove.

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