Nonlinear Processes
in Geophysics

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Discussions

Interactive comment on "A sequential Bayesian approach for the estimation of the age–depth relationship of Dome Fuji ice core" *by* S. Nakano et al.

S. Nakano et al.

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We would like to thank the referee for the valuable comments and suggestions. In the following, the comments by the referee are listed in Italic, and our reply is provided for each comment in Roman.

Comment:
(1) P. 940, lines 22-23 Before this sentence, please put a brief explanation why the age-depth relationship is created because statistical scientists may not follow the present description.

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Reply: We will add a sentence saying, "In order to make use of the chronological records from each slice of an ice core, it is crutial to accurately determine the age for each slice."

Comment:
(2) P. 942, line 12 Units? Although I think the statistics does not need them, the authors put the physical image here. For example, z [cm], $A(z)$ [cm/year], $\Theta(z)$ (no unit), ξ [year]

Reply: We will add the information on units. We thank the referee for the suggestion.

Comment:
(3) P.944, line 17 The "denoted by by Az" should be replaced with "denoted by Az".
(4) P.946, line 16 The "the δ^{18}O data δ^{18}O are" should be replaced with "the δ^{18}O data are".

Reply: We will correct them. We thank the referee for the corrections.

Comment:
(5) P.954, lines 7-9 Is A0 here estimated purely by this model without any observational information of accumulation such as Kameda et al. (2008)? In this statistical model, do some conditions under the surface affect the estimation of the present surface accumulation, A0? While A(z) is estimated by this model, is it right that A0=A(0)?

Reply: We used only the δ^{18}O data and the age markers. No other data were used for the estimation of A_0.

In our method, $A(0)$ becomes A_0.

Comment:
(6) Figure 2 Each line is not distinguished in the figure because the difference between the 10th and the 90th percentile is too small, which is found in Fig.3. But I think it is better this situation is explained here.

Reply: Exactly, Figure 3 is added because it is difficult to discriminate between the 10th and 90th percentiles in Figure 2. But, according to the suggestion, we will add a comment on the situation happening in Figure 2.

Comment:
(7) P.955, lines 4-5 I think that the difference between 10th and 90th percentile should be zero at each tie point because the tie points indicate accurate date. But why do the differences not become zero?

Reply: The age at each tie point has some uncertainty. Therefore, the uncertainty can not be reduced to zero even at a tie point.

Comment:
(8) P.955, lines 6-10 As for Fig.4, what is the reason that the uncertainty gets smaller toward the bottom?

Reply: The uncertainty gets larger toward the bottom. At the surface, the effect of the ice sheet deformation (thinning) is negligible, and thus the thinning factor can be assumed to be 1 with no uncertainty. In the deeper core, the effect of the ice sheet deformation becomes significant but it is unknown. That is the reason why the uncertainty of the thinning factor gets larger toward the bottom.

Comment:
(9) P.956, line 15 The "pvovides" should be replaced with "provides".

Reply: We will correct it. We thank the referee for the correction.

Interactive comment on Nonlin. Processes Geophys. Discuss., 2, 939, 2015.

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