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Climate of the Past Discussions

Interactive comment on "Interpolation methods for Antarctic ice-core timescales: application to Byrd, Siple Dome and Law Dome ice cores" *by* T. J. Fudge et al.

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This is a simple yet useful methodological paper which will, I hope, prevent ice core people to use linear interpolation of age markers, as it is too often done. This is mostly an illustration of interpolation methods proposed by Waddington et al. (2003). The paper is clearly written, with one clear main message and I do recommend its publication after minor revisions.

Comments: - p. 69, l. 27: the Bayesian approach of DATICE (Lemieux-Dudon et al., 2010; Bazin et al., 2013; Veres et al., 2013) does not only allow the thinning function to vary, but also the accumulation rate and the Lock-In Depth. - p. 70, l. 2: 'interpolation'

Did you mean 'thinning'? In this case this is not true, see previous remark. - p. 78, l. 17: 'EDML1', not 'EDML 1' - p. 78: note that EDML1 was produced using an approach similar to your ALT approach but using splines instead of a general least-squares formulation. This approach is described in Parrenin et al. (CP, 2007a, Appendix B). It might be worth saying a few words about this even simpler method in your article. - p. 80, l. 4: Note that one of the strengths of DATICE, is that it optimizes the ice and gas ages at the same time. This way, if the thinning function is modified, the Delta-depth and gas ages are modified consequently in a consistent way. If I understand correctly, this is not the case for the ALT method. - p. 81, last line: It is worth pointing out that this will reduce the AT-CO2 phase lag inferred by Pedro et al. (2011), and make it in better agreement with the near-zero phase lag inferred by Parrenin et al. (2013). - conclusion: The last remark could be emphazised in the conclusions, this is an important one (although I agree the paper should stay methodological). - p. 84, last paragraph: In DATICE, we do not reconstruct the accumulation, but its logarithm. This way, we ensure the accumulation is always positive. Probabilities on always-positive variables are anyway usually better described by log-normal than by normal distributions.

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