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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.

The sentence has been changed to read:

The Bayesian statistical approach (Lemieux-Dudon et al., 2010; Veres et al., 2013; Bazin et al., 2013) allows the thinning function, accumulation rate, and lock-in depth to vary within a tolerance to better reconcile the age of tie points with the initial modeled timescale.

- p. 70, l. 2: 'interpolation' Did you mean 'thinning'? In this case this is not true, see previous remark. Sentence has been removed.

- p. 78, l. 17: 'EDML1', not 'EDML 1'  
Done

- 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. We thank the reviewer for pointing us to Appendix B. We had not appreciated that aspect of the EPICA timescales. We decided not to include a description in the text because we felt there were already lots of timescales to keep straight in this manuscript and the exact construction of the EDML1 timescale is not critical to main point of the section.

- 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. We agree with the reviewer's assessment of DATICE, but are unsure how this comment applies to our manuscript; p80, l. 4 is discussing the Law Dome timescale and the full paragraph discusses the dating approaches for Siple Dome and Byrd and not 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). This statement is not necessarily true. Please see our response to Tas van Ommen's review for more detail. The gist is that because multiple ice and gas timescales are affected by near-linear interpolation, there is no simple effect on the inferred lag.

- conclusion: The last remark could be emphasized in the conclusions, this is an important one (although I agree the paper should stay methodological). As the reviewer suggests, we have chosen to stay methodological and have not expanded the final point of the conclusion.

- 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.

We added this sentence:

We could also have followed the DATICE technique of reconstructing the logarithm of the accumulation rate, which is always positive.