The Cryosphere Discussions

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2020-342

Anonymous Referee #2

Referee comment on "Reconstruction of annual accumulation rate on firn, synchronising H_2O_2 concentration data with an estimated temperature record" by Jandyr M. Travassos et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2020-342-RC2, 2021

This study reports an ice-core dating method, based on a non-linear pairing transformation of H_2O_2 concentration data and a time series of estimated temperature, for the chronology of 113m deep borehole from Detroit Plateau at the Antarctic Peninsula. The thinning of annual firn layers is considered in this method. According to the chronology, combining with snow density, snow accumulation rate is determined during 1980-2010.

Ice core dating is a primary prerequisite for recovering climatic and environmental information using ice core records. The dating method presented here is new and important. The manuscript is well organized and well written. The figures are interesting. In my opinion, the manuscript should be accepted after addressing the following comments.

Main comments

- Despite the importance of the presented dating method, I think it is difficult to be widely used for other ice core dating over Antarctica, because the long-term temperature observations are too sparse. Therefore, its potential applications should be carefully clarified to add the value of this study.
- The authors make so many efforts on the chronology, and seem to only obtain the important accumulation rate results, which are easily determined by layer counting. This greatly reduce the scientific value of the present manuscript. So it is necessary to

clarify the priority of your method relative to layer counting after a comparison.

- To further add the scientific values, interpretation of cause of the resulting snow accumulation rate changes since 1980 is required. I also would like to see further comparison of this time series with other previously published ice core snow accumulation over the Antarctic Peninsula.
- This manuscript gives results, but not discuss them.

Minor comments

Line 1 Change "peroxide, H_2O_2," to "peroxide (H_2O_2)"

Line 11 "e.g. Masson-Delmotte et al. (2006)." should be "(e.g., Masson-Delmotte et al., 2006)"

Line 29 Change "Plateau Detroit" to "Detroit Plateau", and check throughout the text.

Line 93-97 Please give some discussion on the uncertainty of the interpolation.

Line 215-218, The determined snow accumulation time series is only 28 year, and 11-year moving average is statistical significance? Please explain this.

Figure 4, suggest to use full lines and dotted line to discriminate H_2O_2 and temperature more clearly.

Figure 5, the horizontal ordinate is vague.