

Clim. Past Discuss., referee comment RC1
<https://doi.org/10.5194/cp-2021-7-RC1>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Review of Yan et al.

Frédéric Parrenin (Referee)

Referee comment on "Enhanced moisture delivery into Victoria Land, East Antarctica, during the early Last Interglacial: implications for West Antarctic Ice Sheet stability" by Yuzhen Yan et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-7-RC1>, 2021

This manuscript presents a reconstruction of the accumulation rate at site S27 in the Allan Hills Blue Ice Area in Antarctica during the last interglacial period. The method is based on the inference of the ice-air age difference (Delta-age) in the ice samples, which is reconstructed by an ice-air cross synchronization onto the EDC ice core. It is found that Delta-age almost vanishes at ~ 128 ka BP during the peak of the interglacial. By using an Herron-Langway firn model in an inverse mode, the authors infer the accumulation rate and found that it should have been very high compared to background level, with an increase of more than an order of magnitude. Then they discuss some possible explanations of this increased accumulation rate, due to local changes in sea ice, the Ross ice shelf and the West Antarctic Ice Sheet.

This is an interesting manuscript and I enjoyed reading it. The subject is an important one. The manuscript is well written.

The main comment I have is regarding the treatment of the uncertainty of the EDC chronology. In the supplement, it is written: "The Δ age uncertainty in the EDC timescale is not reported explicitly. Instead, the reported uncertainty in the final AICC2012 chronology for each depth is the maximum of the gas and ice uncertainty (Bazin et al, 2013). Because there is no feasible way to evaluate the EDC Δ age uncertainty, our focus here becomes the relative errors of S27 to the EDC chronologies." AICC2012 was built using the probabilistic model Datice. I then developed a new tool with the same basic principles, called IceChrono, and tested it with the AICC2012 dating experiment (Parrenin et al., GMD, 2015). IceChrono outputs the Delta-age uncertainty, so I can provide that easily. Better than that, IceChrono could provide the relative uncertainty of a pair of gas depth / ice depth (with different depths). This would require a little extra work because it is not something which is currently outputted, but this should not be too difficult. I think it would strengthen the manuscript to account for the true AICC2012 uncertainty.

Other minor comments:

- l. 25 : "the peak in S27..."

- l. 428-429 : Are you sure 3 ka is enough to re-form the WAIS and/or Ross ice shelf? This could be discussed.