

# Interactive comment on “Advection (non-climate) impact on the South Pole Ice Core” by Tyler J. Fudge et al.

## Anonymous Referee #1

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The paper describes the ice-flow impact on the South Pole Ice Core. It brings essential constraints for the interpretation of this recently drilled deep ice core. While it is not the most exciting/innovative paper I have read, it uses established state of the art methods, with new observations to quantify as well as possible the impact of ice flow on the SPICE core, so that this impact would not wrongly be interpreted as a climate signal. Good care is given to the assessment of uncertainties. Overall, this is a high quality study, and it deserves fast publication.

Thank you for your review. We address your comments/suggestions below:

My major comment concerns the clarity of the flow modeling method used. It is not described at all, and it deserves a bit of attention. I understand that this part of the work was done in Lilien et al. (2018), but it is central to the results presented here, and a short description of the model framework would be useful. It is difficult to understand where results come from without this information, and as a reviewer, I am not able to judge the results without it. I am expecting a paragraph with the general framework, including inputs and outputs, major hypothesis of your flow-band model (or other type of model, I could not figure out what you used).

We have more clearly described the methodology of Lilien et al. (2018). We also describe the assumptions underlying the velocity history more clearly, including using two scenarios to better understand the sensitivity of the advection impact to the velocity assumptions.

Line 231-238 : compare your assessment of the slope of  $0.008\text{‰} / \text{m}$  with the Masson-Delmotte et al. (2008) dataset.

We added: Our value for  $\delta^{18}\text{O}$  is in between the slope of  $-0.009 \text{‰} \text{m}^{-1}$  from the Masson-Delmotte et al. (2008) database and the slope of  $-0.007 \text{‰} \text{m}^{-1}$  in their multiple linear regression which includes latitude and distance from the coast.

Also, there are some copy-editing issues with the section titles : Introduction, Methods and Results don't have the same level of titles, but I presume that this will be fixed before publications. Numbering, would also be useful.

Thanks. We have numbered and formatted the section levels consistently.