

## ***Interactive comment on “Late Oligocene obliquity-paced contourite sedimentation in the Wilkes Land margin of East Antarctica: implications for paleoceanographic and ice sheet configurations” by Ariadna Salabarnada et al.***

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This is a review of the manuscript entitled “Evidence for Substantial Variations in Ice Volume During the middle Eocene ‘doubthouse’”, by A. Salabarnada and others for consideration in the journal called Climate of the Past.

This manuscript describes an exceptional sedimentary archive of Antarctic glacial history during the late Oligocene from IODP Site U1356. A great amount of data collection and thoughtful interpretations have gone into this manuscript and the authors should

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be commended for this.

I will have to admit that this manuscript review slipped through the cracks and I did not get a chance to start the review until the night before the deadline. Therefore, I will only bring up the most important points that I believe the authors need to address.

My first major concern with the manuscript was it stating about the lack of IRD in their studied interval is taken to indicate the relative absence of marine-terminating ice sheets at the nearby margin. I have to differ with this important result as in another study by D. Hauptvogel, identified IRD's in the same interval at Site U1356. He did this by counting grains larger than 150 microns in many samples within this interval. In approximately 25% of his samples within the same interval used in this manuscript contained significant numbers of >150 micron grains usually between 2 and 5%. In addition the sand percent for the Late Oligocene is not much less than what is seen in the early Oligocene from Site U1356. I remember that Dr. Hauptvogel spoke with the lead author back in 2016 and he sent her his sand percentage data as well as visually showed her the work he had done on the sand fraction. While there could be an argument that bottom currents could move fine sand size grains, medium size grain sized grains were also identified. So I am not sure if grains larger than 150 microns could easily be moved from the Mertz Shear Fracture (source of the grains based on Ar Ar dating) to Site U1356 only by bottom water currents. At the very least, the authors need to discuss and explain this point far better.

I also have some concerns with the age model, as there is only one good tie point for the late Oligocene, which is at 26.1 Ma. The spectral analysis looks good in figure 6 until 25.8 Ma but looks far more uncertain above, probably because the age model is not well resolved.

I think that the statement about ice in the lowlands versus the coast or versus the highlands is a bit speculative. Especially since there are no data that estimates ice volume in this manuscript as well as that there are grains larger than 150 microns that

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occur throughout the late Oligocene section at Site U1356.

The evidence of NCW to explain the glacial /interglacial changes seen here are a bit thin. The papers cited are explaining long term trends not at Milankovitch timescales. I would suggest that this be discussed in a better way.

I don't understand how precession suggests a dynamic ice sheet.

The last paragraph of the conclusions is speculative as there is little data to support it.

In conclusion, I believe that this manuscript needs to be and should be published as it has an excellent data set and has a number of new and exciting conclusions. I hope that my concerns are taken in a constructive manner in the hope of improving some of the weaker aspects of the manuscript so it can stand the test of time in the literature. Since it is obvious who I am based on my comments, I decided not to remain anonymous. Therefore, I invite the authors to contact me if they have any questions or would like to discuss any of my comments.

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