



Comment on **essd-2021-245**

Anonymous Referee #1

Referee comment on "Water masses distribution offshore the Sabrina Coast (East Antarctica)" by Manuel Bensi et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-245-RC1>, 2021

Bensi et al show new and exciting oceanographic observations on the continental slope region off the Totten Glacier. The Totten Glacier is experiencing high rates of basal melting and therefore understanding the processes that allow warm waters from the Southern Ocean to reach the continental shelf and ultimately the glacier is critical to better predict future sea level rise. The results shown by the authors are interesting as they provide the best observational view of the slope processes on the Sabrina Coast to date. They show how warm water approaches the coast and how canyons dynamics is important for cross-shelf exchange and bottom water formation/properties. I have one main comment, that in my view requires more analysis to be addressed, and some minor comments.

Major Comment

- Line 219-250: I can see that changes in circulation are occurring within the canyons, but I am not sure if this is due to dense waters cascading down the shelf locally, or upstream, or if this is just a recirculation pathway of AABW due to the complex bathymetry. Also, Dense Shelf Water has never been observed on the Sabrina Coast continental shelf (neither in summer or winter).

What I suggest here is to "zoom" the TS plot to look at waters in the canyon. If you see some evidence of mixing with DSW (by simply inferring a mixing line between CDW and DSW), then this would suggest DSW formation.

Minor comments

- Line 13-14: These data are new and incredibly important. However, other CTD data were collected on the Sabrina Coast both on the continental shelf and on the slope before 2017. I would re-phrase this sentence here and elsewhere.
- Line 28: "Downwelling" is probably not correct here. Maybe you are referring to gravity currents?
- Line 48: a glacier to be susceptible to MISI needs not only to be marine based, but it also has to sit on a retrograde bedrock. The Totten Glacier at present is not clearly susceptible to MISI. I would just say that the Totten Glacier is susceptible to rapid ocean-driven melting.
- Line 50: Here I would refer to Rintoul et al (2016) as a reference for the water temperature reaching the Totten Ice Shelf.
- Line 57: Please check the basal melt rates of TIS and MUIS, as they seem too low here.
- Line 61: add a reference for the temperature on the shelf. Also these estimates are based on snapshots, so the word "usually" is probably not well suited here.
- Line 64: "in transporting ocean heat".
- Line 403: check the reference here.
- Line 104-106: I agree that this is the best survey of Sabrina Coast slope region, but it is not the first one (e.g. Bindoff et al., 2000).
- Line 147-151: are you referring to the Dalton Polynya? If so, its size is much larger than what you report.
- Line 171-172: in the study region I think AASW is fresh mostly because of sea ice melting not glacial (i.e. glacier) melting.
- Line 175: please use neutral density for AABW as it is found below 2000 m depth.
- line 202-207: The deepening of the WW layer near the shelf break is due to the Antarctic Slope Front (e.g. Thompson et al., 2018; Rev Geophys.).
- Line 235: "open sea area" -> "off shelf area" here and elsewhere.
- Line 241-245: also here you are describing the Antarctic Slope Front, a typical feature around Antarctica.
- Line 243: "°N" -> "°S" .
- Line 258-262: please highlight whether you are describing surface or bottom properties. Note that mCDW is not usually found at 15 m depth. Near the surface sea ice melting often dominates the pattern of T and S during summer.
- Line 274: "where the seafloor is deeper".
- Line 271-277: Note that the bottom depth changes between east and west (west is shallower). This can help explain the pattern of near bottom ocean properties you observe.
- Line 277: I would also cite Silvano et al (2019, jgr) where the authors describe MCDW intrusions onto the "Totten Trough".