General Comments

The manuscript "Last Glacial Maximum extent and subsequent retreat of the East Antarctic Ice Sheet from the Mac. Robertson Shelf" provides significant new constraints on the deglacial history of a relatively understudied sector of the East Antarctic Ice Sheet. By integrating high-resolution multibeam bathymetry with a suite of sedimentological proxies and foraminiferal radiocarbon dates, the authors challenge the timing of similar previously identified grounding-zone wedges (GZWs), by providing evidence that the investigated ice-shelf reached the shelf break and retreated in post-LGM time.

The study's primary strengths lie in; 1) high-resolution geomorphological mapping of bedforms, and 2) its multi-proxy approach to overcoming the notorious difficulty of dating Antarctic shelf sediments. The conclusion that the grounding line (GL) remained at or near the shelf break until approximately 12.5 cal. ka BP has very important implications for our understanding of past Antarctic Bottom Water (AABW) production. The paper is well-organized, well written and the figures, particularly the conceptual model in Figure 6, are highly informative and of pedagogical value.

Specific Comments

Chronology and Interpretation of Radiocarbon Ages

The core of the paper's argument rests on the shift from older Acid Insoluble Organic (AIO) chronologies (~14 cal. ka BP) to the new foraminiferal-based radiocarbon ages (~12.5 cal. ka BP). The authors justify this by citing potential contamination in AIO dates. I recommend providing a more robust sensitivity analysis or a deeper discussion on why the foraminiferal ages are more representative of the GL retreat rather than a change in environmental conditions. Moreover, the ages derived from sparse specimens in subglacial till (~28.7 to 34.5 cal. ka BP) are interpreted as "maximum glaciation" ages. The authors should clarify the degree to which these specimens might be reworked and how this affects the "prior to ~12.5 ka BP" advance claim.

Oceanographic Forcing and the "Dense Shelf" Regime

The manuscript attributes the post-LGM retreat of the GL to the intrusion of modified Circumpolar Deep Water (mCDW) onto the shelf. However, the authors also identify this region as a "dense shelf regime" characterized by strong fronts and the Antarctic Slope Current (ASC), which typically act as a dynamical barrier to such intrusions. To my understanding, in current dense shelf regimes, cross-slope water exchange is generally inhibited by the density of the shelf water and the strength of the slope front. For mCDW to reach the GL at ~12.5 cal. ka BP, a breaching mechanism would have been required. I'm not an oceanographer and could be mistaken, but I suggest the authors expand their discussion (Section 6.2) to address which of the following processes likely dominated during the deglacial period:

1. Wind-Driven Shoaling? Did a shift in the westerly wind belt or local katabatic wind stress reduce the ASC barrier, allowing the thermocline to shoal?
2. DSW "Buffer" Weakening? Did an initial freshening of the shelf (perhaps from increased ice-shelf meltwater) reduce the volume of Dense Shelf Water (DSW), thereby weakening the physical buffer that separates the ice front from offshore heat sources?
3. Topographic Steering? Given the complex bathymetry of the Nielsen Basin and Iceberg Alley, did specific sills or troughs provide geostrophic pathways for mCDW to bypass the slope front even under a cold shelf regime?

Explicity discussing these ocean-ice interactions would strengthen the study's conclusions regarding the "resilience" and subsequent "accelerated retreat" of the East Antarctic Ice Sheet in this sector. The authors are surely aware of the following papers, but I think they might aid in this discussion.

https://doi.org/10.1029/2021ms002468

https://doi.org/10.1175/jpo-d-21-0143.1

https://doi.org/10.5194/tc-19-1873-2025

https://doi.org/10.1175/jcli-d-15-0808.1

https://doi.org/10.1029/2018jc014907

https://doi.org/10.1175/jpo-d-12-0205.1

GZW Dynamics and Stabilization

The study identifies several small GZWs on the mid-shelf, suggesting episodic retreat and short re-advance/stabilization phases. It would be beneficial to include a brief calculation or discussion on the sediment flux required to build these features within the proposed post-12.5 ka BP timeframe to ensure the geomorphology is physically consistent with the rapid retreat chronology.

Technical Corrections

Acronym and Nomenclature

- **AABW/CDBW Transition:** On page 3, the authors introduce "CDBW" (Cape Darnley Bottom Water). In the discussion (Section 6.2), they shift to "AABW" (Antarctic Bottom Water). It should be explicitly stated that CDBW is a specific local variety of AABW to prevent confusion for readers unfamiliar with the Cape Darnley polynya.
- **CDW vs. mCDW:** It seems to me the authors uses "CDW" and "mCDW" (modified Circumpolar Deep Water) somewhat interchangeably. Given that pure

CDW rarely reaches the inner shelf without modification, the authors should standardize this to "mCDW" when discussing shelf-based triggers.

- **"cal. ka BP" vs "cal. ka before present":** In line 30, page 1, the authors write "12,5 calibrated kiloyears before the present (i.e., 1950 CE, cal. ka BP)". This is redundant.

Potential Typos and Unclear Wording

- **Page 3, Line 77:** "As part of the East Antarctic craton, the prominent found on the Mac. Robertson Land...". A noun is missing here (likely "prominent **lithologies**" or "**rocks**").
- **Page 9, Line 229:** "PS128_46-1 and 47-1 are heavily bioturbated... likewise abundant in calcareous microfossils...". This sentence is a bit of a dangling descriptor; it would be clearer as: "The upper units of PS128_46-1 and 47-1 are heavily bioturbated...".
- **Page 11, Table 2:** Some cells in the table appear untidy or have line break issues; it is hard to figure out some of the individual cells. This should be checked in the final typesetting.
- **Page 18, Line 400:** "Borchers et al. (2016) propose a similar AIO deglaciation age... for the mid-shelf of the East from Nielsen Basin situated Burton Basin". This phrasing "East from Nielsen Basin situated" is hard to read. A clearer version couold be: "...situated in the Burton Basin, east of the Nielsen Basin."