Qian et al provide a detailed records of the ephemeral grounding events of a pining point on Pine Island Ice Shelf using Sentinel-1 SAR images and differential range offset tracking (DROT) method between 2014 and 2023. They claimed that ephemeral grounding is caused by basal melting, which is influenced by ice shelf calving and atmospheric forcing such as El Niño and La Niña. Although this is an interesting record, there is a lack of evidence to support the claims made by the authors, especially the results regarding basal melting are largely unconvincing and lacks care in overall logic and explanation. The claim in the abstract that the ephemeral grounding site may evolve into a final pining point and may influence future ice shelf is rather speculative and has not been discussed anywhere in the paper. Overall I think this study requires substantial revision and its current form is not suitable for publication in the Cryosphere.

Major Comments

The current results especially Figure 4 fail to establish the link between different tidal phases and intermittent grounding events of the Pine Island pinning point, because the double differential vertical displacement from DROT method and the double differential tidal heights do not provide information on tidal phases or tidal heights at specific timestamps. Therefore, it is not possible to identity whether a grounding event is associated with low tide or vice versa just based on these the current results.

Line 57-60: 'DROT-derived grounding line position were 2 km seaward of DInSAR and 2 km landward of H positions', is this 2 km bias applies to everywhere around Antarctica or just for specific locations? This statement also implies that DROT can only locate the middle location of the true grounding zone as a proxy grounding line, so if there is a 2 km bias, can we still trust DROT in identify the grounding line for Pine Island ice rumple? What if its maximum length is less than 4 km? There isn't any scale bar to measure this directly in the figures.

Section 3.1:

- Line 197-199 'Our results are consistent with Friedl et al (2020)….', first there is no scale bar in the Figure 4 making it impossible to measure the distance between DROT-derived GL and the 2011 DInSAR GL; second, the thinning and thickening of the ice shelf can cause the shrinking and growing of the pining point, this will change grounding line extent of the ice rumple, how to rule out this possibility?
- The authors claimed that pining point reappeared on 21 October 2021 in Line 199, but why this pining point locates upstream of the ice rumple L in Figure 4?
- The authors concluded that there are several possible factors causing this ephemeral grounding including atmospheric forcings such as La Nina and AO by including the analysis of ONI and AAO index. This conclusion is merely based on qualitative analysis just by roughly aligning the timeline of the empheral grounding with ONI and AAO phases, instead of providing a quantitative analysis or direct

observation or modelling results of basal melting in Pine Island Ice Shelf. This makes the conclusion rather speculative and not convincing.

Section 3.2

- The selected ice ridge is difficult to identify in Figure 5 given the small figure size, it is actually more visible from the elevation map in Figure 6, I suggest putting Figure 6 before Figure 5 to explain the choice of this ice ridge.
- Without labeling ice rumple L in Figure 5 and ice ridge in Figure 6, it is difficult to link the movement of ice ridge passing through the pining point, making it hard to follow the logic.

Discussion

- Line 249, the authors claimed that deep keels no long contacted the submarine ridge in 2020, this does not seem to be the case from Figure 7b where the orange line (2020) is in contact with the bedmachine bed topography.
- Line 259: can you label the basal channels in Figure 4?
- Line 263-264: yes the W shaped troughs can allow thicker ice to be advected downstream and form surface ridge, but this depends on the bed topography, and again does this matter to ice rumple L discussed in this paper?
- The discussions on possible factors influencing basal melt rates are mainly build on qualitative analysis of El Niño and La Niña events and iceberg calving events, without providing detailed records on ocean temperature and time evolving basal melt rates, making the arguments largely unconvincing.

Specific Comments

Abstract:

1) The entire abstract needs to be rewritten. The first sentence 'Ephemeral grounding sites form when ice shelves thin or relative sea level rises…' is difficult to understand, need rephrase. I suggest first explaining on what condition ice rumple can be formed – for example the bottom of the ice shelf gets grounded on a bathymetric high, then mentioning that the thinning of ice shelf or vertical movements of ice shelf caused by tides can cause 'ephemeral grounding'.
2) Please remove line numbers from the abstract

Line 31: 'Over time, some pinning points have disappeared entirely, particularly since 1973' this statement is unexpected here and doesn't seem to be linked to the following statement on ephemeral grounding, I suggest rephrasing or deleting it.

Line 32: should be (Miles and Bingham, 2024), not 'Milles'. Please change this reference throughout the manuscript.

Line 38: what do you mean by ‘it is believed’? How reliable was this ungrounding event in 1973-1989?

Line 43: rephrase ‘is now understood to result’

Lie 44-46: ‘After four calving events….remain unclear’ I am not sure why mentioning calving events here, why does calving have anything to do with ephemeral grounding and the changes of ice rumple L?

Line 88: what is NCC?

Line 168-175: this part reads repetitive and needs rewriting, no need to repeat everything listed in the table

Line 174: how is this 3 m uncertainty derived?

Figure 5:

1) Please label the location of ice rumple L in all subplots
2) Please provide a large zoomed-in map of the ice ridge, the current figure size makes it very difficult to distinguish this surface feature from neighboring surface undulations