

## Response to Reviewer Feedback on Wild et al., 2025

### “Thwaites Eastern Ice Shelf Cavity Observations”

#### Reviewer 2:

RV2-1: The richness of the datasets and material presented in the Figures here is appreciated, however one easily loses track of the correlations in time between T, S, sea ice and current data, and of the bigger picture conclusions, especially if one is not familiar with the region. I suggest the following:

We thank the reviewer for the positive feedback and thoughtful comments. We have incorporated their suggestions to enhance the clarity of our big-picture conclusions and to better describe the correlations between environmental drivers and observed variability in the subshelf cavity.

RV2-2a: 1) the figures and their content could be introduced more properly (often times a relatively complex result is stated and then just "Fig.x" in brackets, and the reader has to go to the figure first, read the caption and then try to make sense of it)

We have revised the Results section to better introduce the figures and their content. Specifically, we now include introductory sentences that explain the interpretation and purpose of the continuous wavelet transforms,  $\Theta$ -SA diagrams, feather plots and cross-wavelet transforms. These additions clarify how each method is used to identify periods of changing oscillatory behavior, distinguish between water masses, and detect mixing processes.

RV2-2b: 2) introduce more subsections with goal of the subsection and make a "big-picture summary" at the end of each subsection.

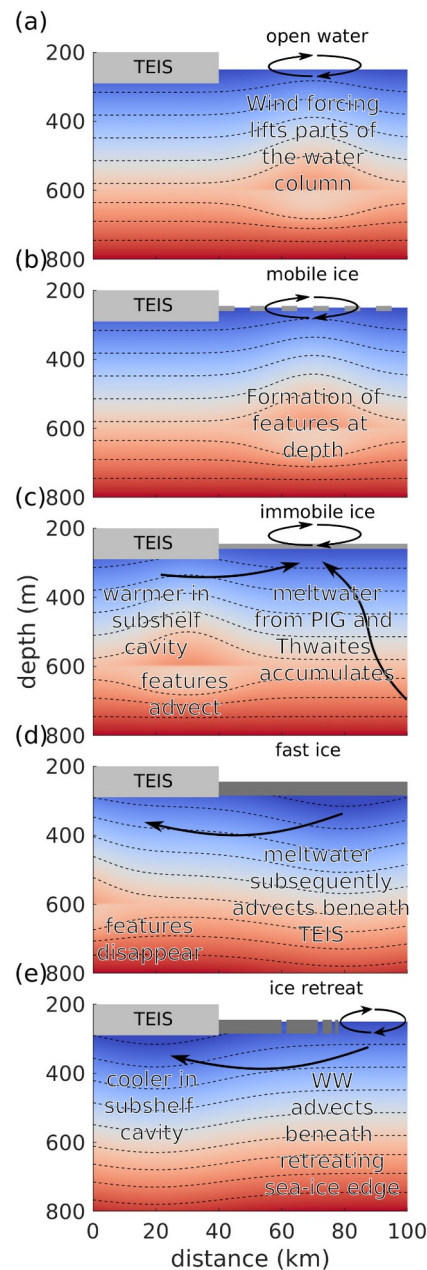
We added new subsections in the Results, each with a clear goal and a summary statement. These include:

- Linking subshelf cavity observations to PIB-sourced waters
- Tracing glacial meltwater and Winter Water mixing beneath TEIS
- Linking environmental drivers and density variations across depths
- Consistent thermal patterns observed during events

RV2-2c: 3) mark relevant times in the Fig. so one can keep better track of what is happening when in different variables

Periods of elevated current speeds are already indicated as grey background shading in Figures 2 and 6. Additionally, we have labeled the key events directly in Figure 3 to aid cross-referencing between figures and variables. Related RV1-5 and RV2-11.

RV2-2d: 4) a summary sketch at the end summarizing bigger picture events



Revised Fig. 11 with additional labels and more precise language.

RV2-2e: 5) a better and bigger map at the beginning to show what is relevant.

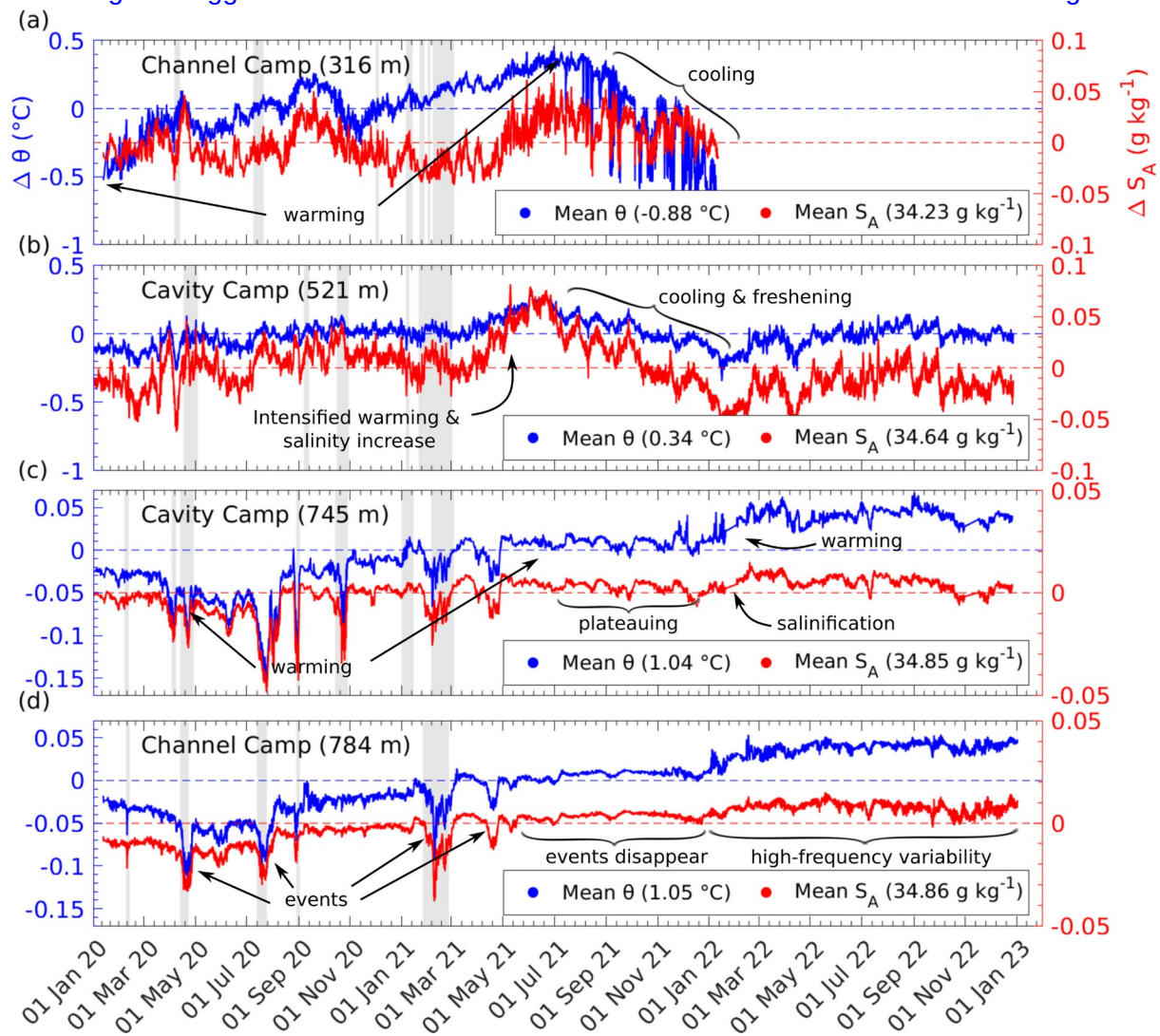
We have increased the map sizes in the panels of Figure 1 (related RV1-3).

RV2-3: In the introduction, can you specify more clearly what is different from previous work and which additional information you will analyze here.

We revised the penultimate paragraph of the introduction to more clearly distinguish our study from previous work. The updated text emphasizes the extended observational period, the improved vertical and temporal resolution of our dataset, and our focus on the role of different upstream sea ice types in modulating ocean conditions beneath TEIS.

RV2-4: mark in Fig.2 relevant time periods that are emphasized in the text to be able to keep track

This is a good suggestion and we have marked these as shown below in the revised Figure 2.



RV2-5: solid line is not the mean

We agree and clarify that the figure shows only anomalies of temperature (blue) and salinity (red), not mean values. Although the existing caption already states this clearly, we also changed how the colors are represented in the legend.

RV2-6: line 228: at depth, the warming trend starts more like in August 2020, before that there is a cooling trend?

At depth, warming begins around April 2020, though superimposed events can obscure this. We clarified this in Section 3.1. and adjusted Fig. 2 with additional labels.

RV2-7: line 240 : I don't really see the warming trend at depth from April on, more from August 2020 on?

We agree that temperatures at both deep layers decrease from January to April 2020. After this period, a clear warming trend is evident in both records, though temporarily obscured by superimposed event-related cooling anomalies (Fig. 2c/d).

RV2-8: line 262: from Fig. 3 it is not so clear that co-variation happens at all periods. Even though the arrows show co-variation the significance clearly drops sharply with small periods.

We revised the figure to show continuous wavelet transforms of density instead of cross-wavelet transforms between temperature and salinity (related RV1-5). We agree that statistical significance decreases sharply for periods shorter than 0.5 days. The reworded text now emphasizes density variability and highlights the clear tidal signals visible as fortnightly power bands around 0.5 and 1 day periods.

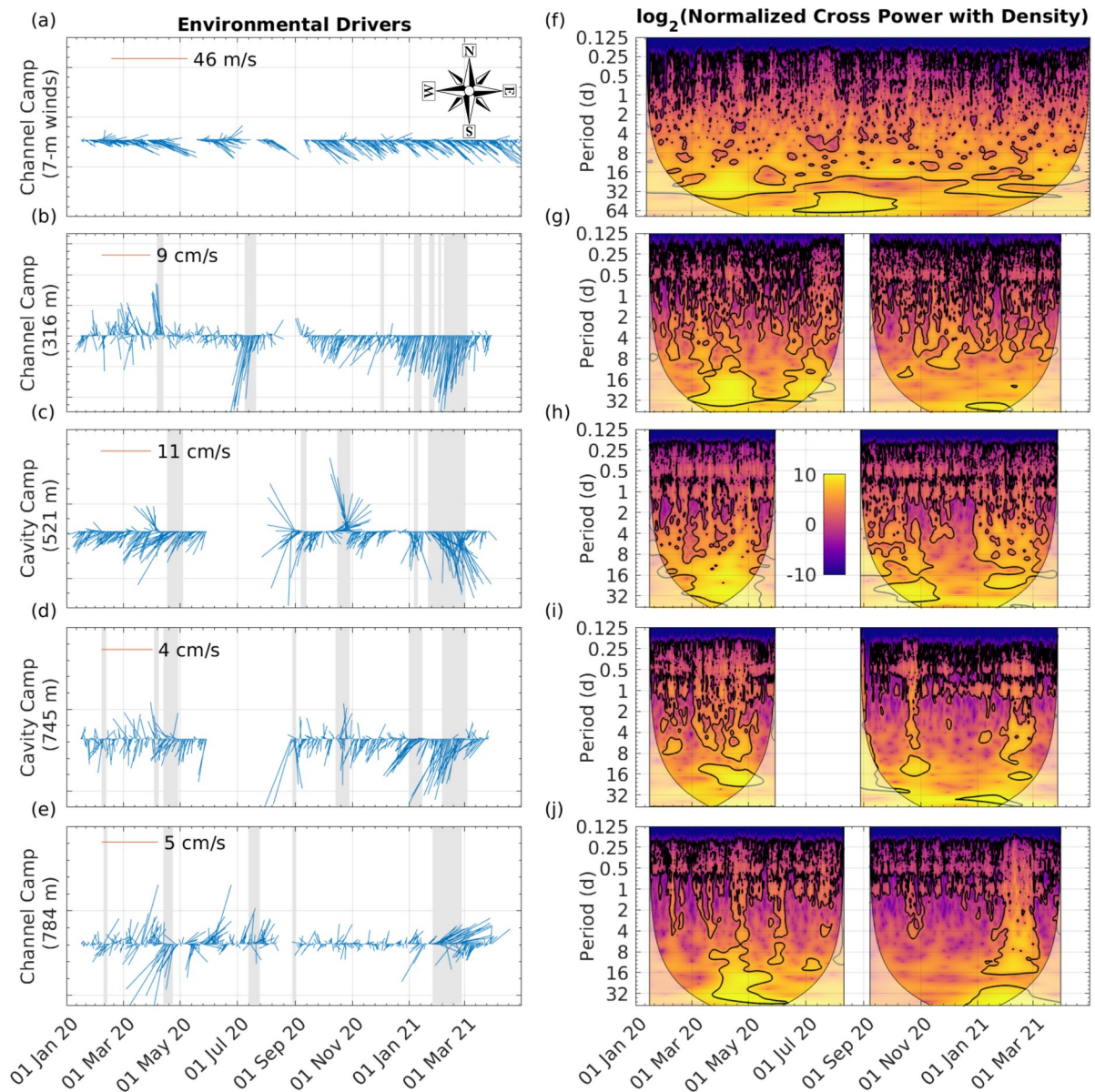
RV2-9: just visually from Fig. 2, co-variance at long time scales is not evident for the Channel Camp 316m, there is a clear warming but no freshening trend.

This comment is now obsolete due to the shift from temperature/salinity co-variance analysis to density variability alone, which better fits to the narrative and aligns with the subsequent comparison to environmental drivers, as suggested by RV1-5. Additionally, the April 2020 event is now clearly visible at Channel Camp (see revised Fig. 3a).

RV2-10: Fig.3, Fig.6 add colorbar

Added colourbars and descriptive text to the methods (related RV1-5).





Revised Figure 6 with colourbar and perceptually uniform colourmap.

RV2-11: line 277: to be able to keep better track of the distinct events, somehow marking them in Fig.3 would be good, and relate them back to the events/trends evident from Fig.2

The grey shading in the background of Figs. 2 and 6 was already included to indicate time periods of elevated current speeds and facilitate cross-referencing of events across figures. To further improve clarity and help track distinct events, we now explicitly label the events and key findings in Fig. 3, linking them more clearly to trends evident in Figs. 2 and 6.

RV2-12: line 289: it seems that something new is discussed now, so a new subsection would help, together with a brief intro on what Fig.4 shows to help the reader digest the information.

We have introduced several new subsections in the Results section, including brief introductions to the Figures (related RV2-2b)

RV2-13: line 308: was the "Gade line" introduced before?

The Gade line is introduced here. We have now added an introductory sentence that links the T/S diagrams to mixing lines.

RV2-14: line 353: something important and new is starting here, so a subsection would be good. I like the introductory sentence as motivation, something like this should appear at the beginning of each new subsection.

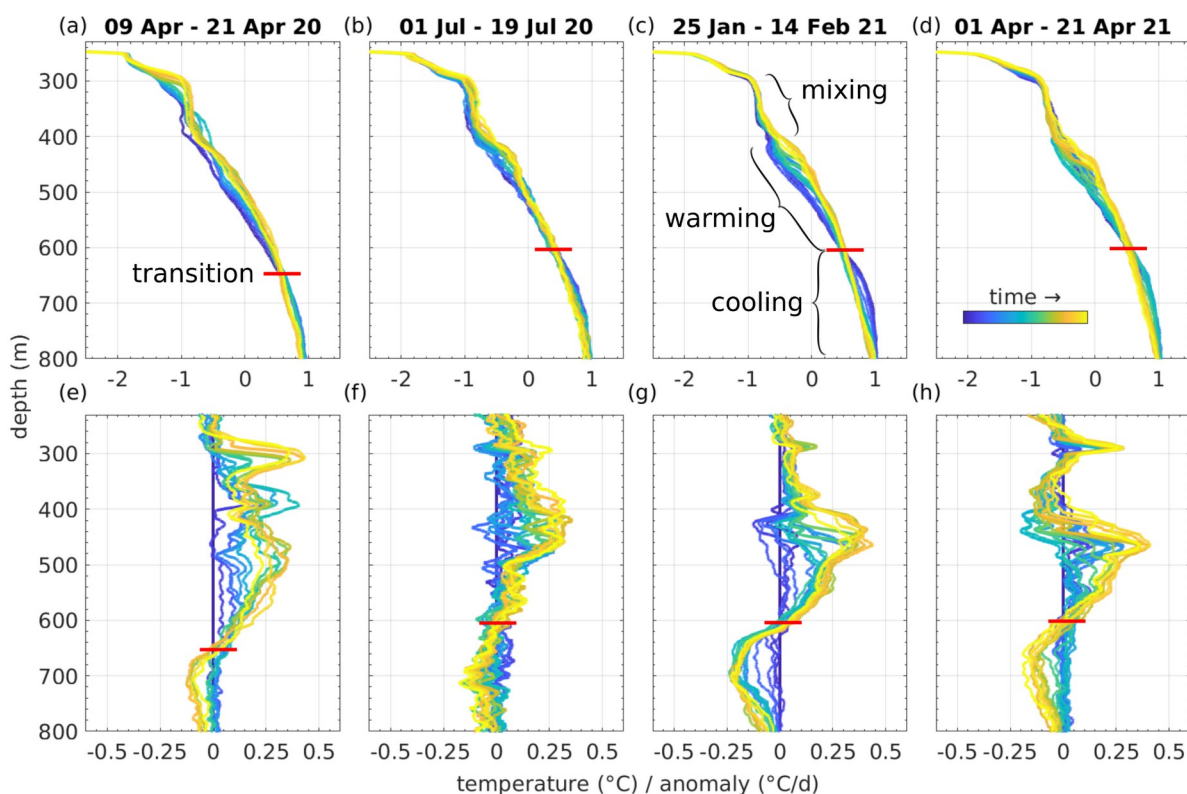
We have added the subsection titled 'Linking environmental drivers and density variations across depths'

RV2-15: line 367: something new starts again

We have added the subsection titled 'Consistent thermal patterns observed during events'

RV2-16: Fig.7 would it make sense to somehow plot differences in time or wrt the mean to emphasize trends, the lines are all very close together, mark relevant depth intervals mentioned in the text?

In addition to temperature values in Fig. 7, we also plot the anomalies relative to the first profile in each event, which are later used to determine the horizontal length scale as presented in Fig. 8. To improve clarity, we have added markers for the relevant depth intervals discussed in the text, including the transition depth between warming and cooling layers.



Revised Figure 7 with depth intervals, transition point and labels. Bottom row shows anomalies from the first profile in the time span.

RV2-17: is Fig.10 i,j,k discussed?

Thank you for noting this. We corrected the typos in the figure references within the section 'Sea ice conditions in PIB: formation and breakup of fast ice'.

RV2-18: Fig.11: I appreciate it, since it shows a big-picture schematic summary, but please properly take the reader through Fig.11

We added several more precise labels to this summary sketch (see RV2-2d)

RV2-19: it would be great if at the end there could be a summary sketch, summarizing the major findings and conclusions that were evident in all the figures thereby bringing them together

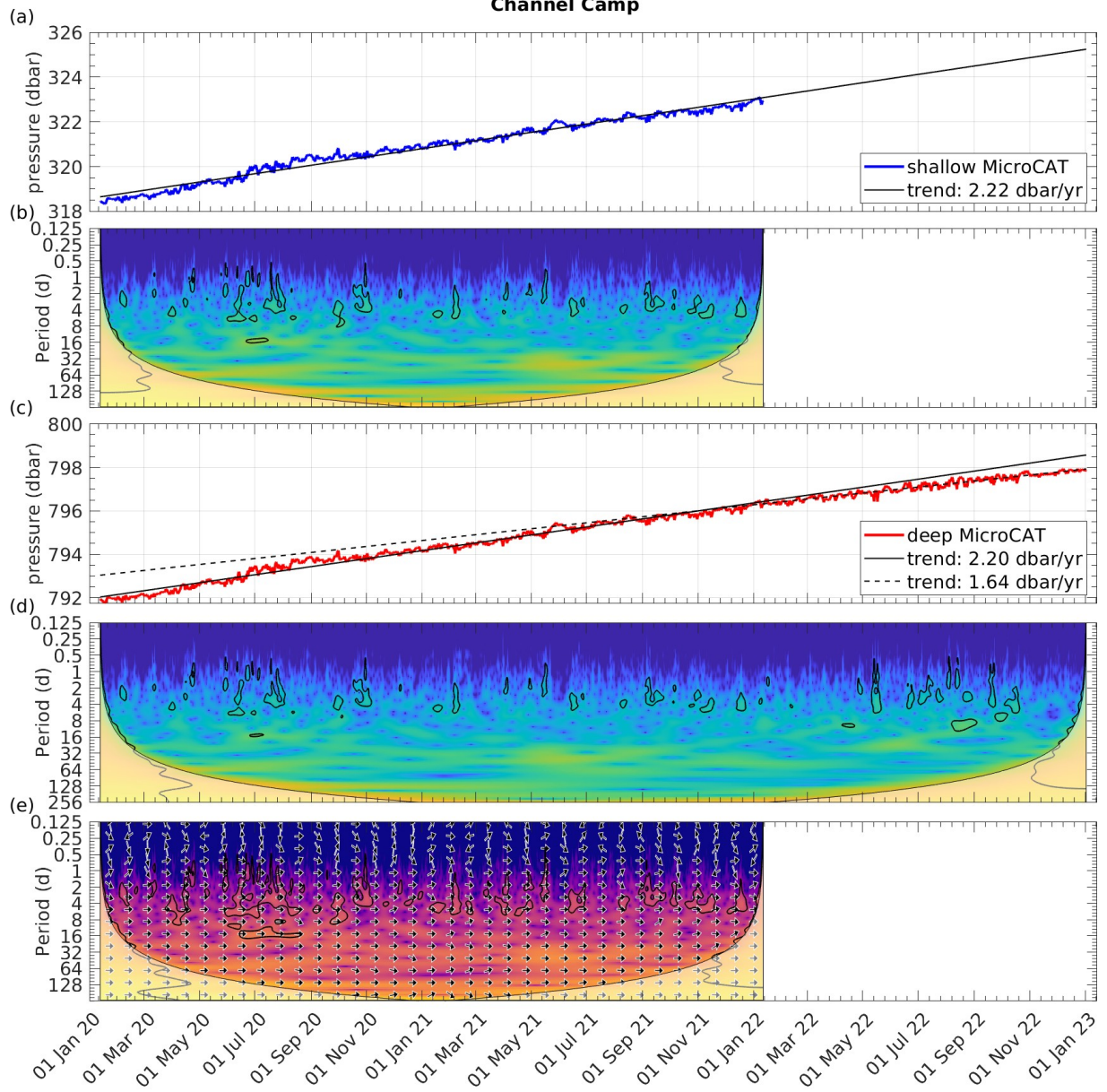
Redundant. See reply to RV2-18

**Editor:**

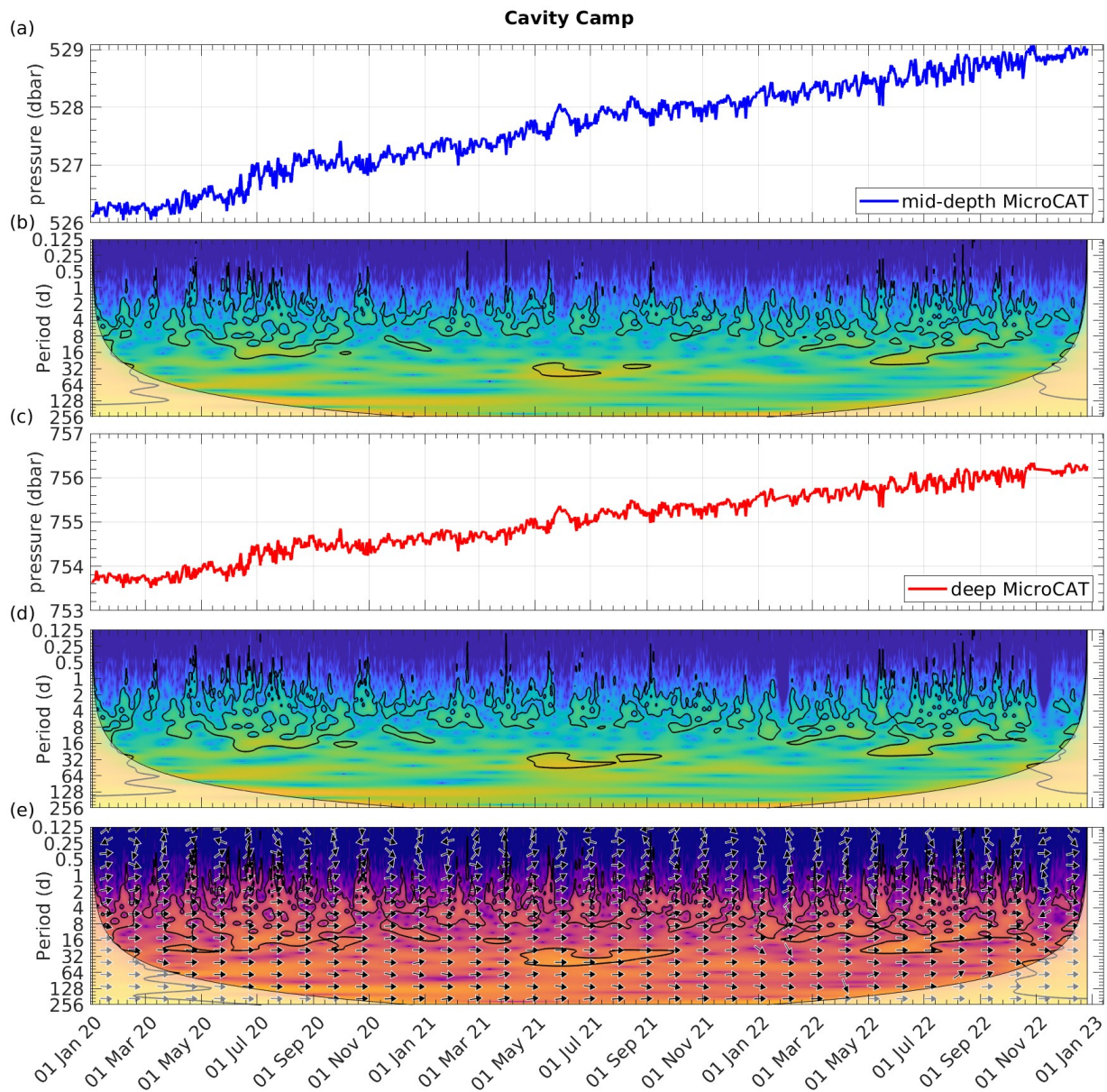
E-1: consider swapping out the rainbow/jet colour scheme for something else in due course

Changed all cross-wavelet transforms to a perceptually uniform colourmap (related RV2-10).

# Channel Camp







E-2: data statement to update

We updated the data availability statement.

E-3: update acknowledgements

We added a sentence acknowledging the editors and referees.