Author response: We thank the reviewer for their constructive review of the manuscript. All the suggestions from the reviewer will be addressed (detailed below). Further to this, and in response to the review from Matthieu Casado, we propose to make several key changes to the manuscript that will improve the final version while still retaining much of the work already presented here:

1. We will streamline the analyses included in sections 3.1-3.5 to ensure that:
    a. A single model output is utilized for all calculations (ERA-5);
    b. We will remove the discussion around condensation temperature and focus on the combined effects of precipitation intermittency and surface temperature;
2. We will expand on section 3.6 (Mount Brown South water isotope record) in order to dig more deeply into the impacts of precipitation intermittency on the isotope record at this site
    a. We will remove a discussion around d_{ln}, as this does not enhance the text or help to understand the impacts of precipitation intermittency on the stable isotope record;
    b. We will include a discussion on stratigraphic noise, including estimations of the impact of stratigraphic noise at this location based on the two water isotope records available (MBS-Main and MBS-Charlie);
    c. We will better interrogate the relationship between precipitation intermittency and $\delta^{18}O$ using the methods suggested by the reviewer (compare the temperature record to the temperature record with precipitation intermittency, and also with precipitation intermittency but excluding the EPE events);
    d. If possible, we will support the results with an investigation into modelled results where precipitation intermittency is both included and excluded from modelled isotopic values.

While many of these proposed changes are not required by this reviewer, we feel that these changes will address the primary concerns of the other reviewer and result in a much stronger final study.

Review of Climatology of the Mount Brown South ice core site in East Antarctica: implications for the interpretation of a water isotope record

It was a pleasure to read Jackson et al. (egusphere-2022-1171). Jackson et al. provide a comprehensive investigation of extreme conditions (snow accumulation rate and temperature) at Mt Brown South in East Antarctica and associated impact on water isotopes. Understanding the relationships between ice core water isotopes and climate over the re-analysis period is critical to interpret the ice core record from the Mount Brown South site. The age model for the sections of core used in this manuscript have previously been published (Crockart et al., 2021). This manuscript is particularly timely as the community is realising the importance of extremes on climate and thus the implications for paleoclimate records. The manuscript is engaging, well written and follows a logical structure. I recommend publication and hope the minor comments below are helpful in improving the manuscript.

Minor suggestions

- Why were 5-day back trajectories run and not 10 or 14-day back trajectories? Please justify and consider expanding to 10–14-day trajectories.

Author response: *Several studies have investigated uncertainties associated with HySPLIT trajectory modelling, and estimate errors of 15-30% on 5-day trajectories (e.g. Scarchilli et al., 2011). Increasing the trajectory length further increases the associated error. While 5-day trajectories likely do not capture the full*

range of moisture sources, we chose to use 5-day back-trajectories to balance estimations of moisture source with minimisation of error. As such, we believe that 5-day back-trajectories are still the most appropriate choice for this study, but we will provide a detailed explanation for this reasoning in the text.

- Confusion over the relationship between blocking and winter EPE: L429-430 states no correlation between winter EPE and blocking while L746 states there is a weaker association between winter EPE and blocking. Which is it? It is interesting that the authors find a greater occurrence of extreme accumulation events during the winter but no/weak correlation between EPE accumulation and atmospheric blocking in winter. Please clarify the winter relationship and further explore the causes of the high occurrence of winter EPE.

Author response: *We find that there is a positive correlation between total accumulation and winter blocking, but not EPE accumulation. The wording in L746 is misleading, and should read that there is no association between winter EPE and blocking. We will update this, as well as further investigating the drivers of the winter extreme events.*

- Please include the identification of atmospheric rivers in the methods section. Is MBS located in a region that typically experiences atmospheric rivers?

Author response: *We will include this in the methods section, and expand on the discussion around the occurrence of atmospheric rivers in this region of Antarctica.*

- Please discuss the variability of the MBS-C and MBS-main d18O records (Fig. 7a).

Author response: *In response to comments from the second reviewer, we intent to expand upon the section discussing d18O records, which will include more detailed discussion around the variability of MBS-C and MBS-Main. See response to the review from Matthieu Casado for more details.*

Specific comments

L45-48 Please add reference.

Author response: *This will be added.*

L52 and throughout Consider using the terminology enriched/depleted rather than heavy/light.

Author response: *When referring to a single isotopologue (i.e. $H_2{}^{18}O$) then the terms 'heavy' and 'light' will continue to be used, however we will update the terminology throughout to use 'enriched' and 'depleted' when discussing variations in d18O.*

L64-65 Is this the same definition as EPE in Turner et al. (2019). Please clarify and add reference.

Author response: *This is the same definition and we will update the text to reflect this.*

L83, L107 and throughout "Wille et al. (2021)" "Vance et al. (2016)"

Author response: *This will be updated throughout.*

L107 Please add location of this core.

Author response: *The will be added.*

L112 Note that the age model for the full core is still in development. Please update with a reference if this is now published.

Author response: *This manuscript is still in preparation, and will likely not be published prior to submission of revisions to this manuscript.*

L124 "...isotope record."

Author response: *The will be updated.*

L153 Delete "Only". This is a substantial amount of work and criterial for the interpretation of the longer record.

Author response: *We thank the reviewer for this acknowledgement, and will remove "only" from the text.*

L156-157 Please add the time resolution each sample covers.

Author response: *The will be added.*

L177 Please state what seasons these markers are assumed or known to occur in.
L182-184 Move last sentence in paragraph to first sentence in paragraph and then you can briefly state how the cores were dated by Crockart et al. (2021). Please add the dating uncertainty at the base of each core.
Author response: *This sentence will be moved, and we will expand on the text to identify the seasonality of each of the chemical species used for dating (and reasoning behind this). We will still keep the section on dating brief as it is discussed in detail in Crockart et al. (2021).*

L259 Why 5-day back trajectories and not 10 or 14 day back trajectories?
Author response: *See above.*

L290-291 Please check significant figures here and throughout.
Author response: *These will be checked and updated.*

L293 RACMO2 slightly underestimates accumulation rates derived from the MBS core. How does this underestimation compare to other ice cores? e.g. Thomas et al. (2017)
Author response: *We will include a reference to this, as well as a discussion around how this compares to other sites from Thomas et al. (2017).*

Thomas, E. R., van Wessem, J. M., Roberts, J., Isaksson, E., Schlosser, E., Fudge, T. J., Vallelonga, P., Medley, B., Lenaerts, J., Bertler, N., van den Broeke, M. R., Dixon, D. A., Frezzotti, M., Stenni, B., Curran, M., and Ekaykin, A. A.: Regional Antarctic snow accumulation over the past 1000 years, Clim. Past, 13, 1491–1513, https://doi.org/10.5194/cp-13-1491-2017, 2017.

Scarchilli, C., M. Frezzotti, and P. M. Ruti, 2011: Snow precipitation at four ice core sites in East Antarctica: Provenance, seasonality and blocking factors. *Climate Dyn.*, **37**, 2107–2125, doi:10.1007/s00382-010-0946-4.

Figure 1 Please add insert to map showing the location of the cores.