Dear Nanna B. Karlsson,

Thank you for your review of our manuscript and for your additional suggestions for revisions. We have done our best to address each of your comments and the comments from our two reviewers. The result is a significantly improved work, with clearer text and figures, and the addition of cutting-edge results from the EGRIP ice core. You can find a discussion of our changes both here and in our response to reviewers (with our direct response to comments provided in blue).

Thank you once again for your constructive feedback, and we look forward to continuing the evaluation process.

Ellen and Nick

Comments from the editor:

I agree with referee #1 that it would be helpful to include some information on age. Consider if the maximum age of the ice core could simply be stated next to the ice core name or at the end of the black column for each ice core?

We have added a column to Supplementary Table 2 that includes the oldest continuous ice age for each core, the associated depth, and the associated references from the literature.

Please consider including the EGRIP site. Drilling is now complete, and while we do not have all the associated measurements, numerous studies have already been published based on the ice.

Thank you for suggesting the addition of EastGRIP to our analysis. Radargrams near the EastGRIP drill site, collected by the 2014 CReSIS MCoRDS system, have been added to Figures 4, 5, and S4. The associated radar metadata has been added to the radar dictionary (https://doi.org/10.7910/DVN/JAQJWZ) and Supplementary Table 1. Published fabric analysis (Stoll et al., 2024) as well as layering observations (Stoll et al., 2023; Westhoff, 2021; Weikusat, 2020) have been integrated into Figure 4. Deformational structures observed in EastGRIP linescan images have been integrated into the text of Section 3: Data and Methods (lines 142-143) as well as Figure 3 (Weikusat, 2020). Assessment of the continuity of the climate record has been added to Appendix A and is based on the GICC05-EGRIP-1 timescale (Mojtabavi et al., 2020) as well as Stoll's preliminary chronology for the remainder of the core (Stoll et al., 2024). A summary of the chemical and physical ice core observations used for these analyses has also been added to Supplementary Table 2.

Our discussion of the relationship between fabric observations and incoherent scattering has been added in lines 310 – 319: "At EastGRIP, rapid transitions between vertical girdle and multi-maximum fabrics are observed between 2417 and 2484 m, with a strong multi-maximum fabric established below 2500 m (Stoll et al., 2024). The depth range of the rapid fabric transitions coincides with a layer-conformal package of incoherent scattering. Banding within the package of incoherent scattering is not layer-conformal, and the bands are defined by laterally traceable, abrupt drops in power with depth (rather than laterally traceable, abrupt increases in returned power as we see in the coherent layering above). We describe these traceable lows in power as "nulls", likely the product of destructive interference in scattered energy returning to the radar from multiple directions. The expression of the nulls in the imagery is polarization dependent (Fig. S4; Nymand, 2024 Fig. 3.5) suggesting that this entire scattering package is a result of the fabric." We broadly categorize the quality of radar scattering between 2400-2500 m as laterally heterogeneous incoherent scattering (Figure 5b). However, due to the presence of observed power "nulls," we also include

EastGRIP—alongside EDC—as an example where banded but incoherent scattering does not necessarily indicate disturbed basal ice (lines 380–382).