

Line 15 *A numerical snow and sea ice model was applied to simulate the sensitivity of sea ice to snow density and snow precipitation during the period when snow was dry.*

I may be mistaken, but I could not find any other reference to “dry snow” in the manuscript. Please clarify this in the modelling section, as the condition under which the simulations were conducted is not entirely clear.

Lines 18–19 *The examined snow density schemes produced mean snow densities consistent with MOSAiC observations; however, none of the schemes adequately captured the observed temporal variability in snow density.*

From the manuscript, it is clear that the densification schemes you selected did not reproduce the temporal evolution of the snowpack. However, snow compaction schemes implemented in models such as SNOWPACK and CROCUS have demonstrated good agreement with in-situ data. Could you clarify why you did not apply those schemes in your study?

Lines 116–119, 115–140 *During MOSAiC, comprehensive sea ice and snow observations were carried out (Nicolaus et al., 2022). Snow pit measurements were taken at least weekly but often on several days per week, and occasionally more than once a day. Snow pits were dug at various locations on undeformed first-year ice, second-year ice, and places close to open leads and pressure ridges. Most measurements were taken within the central observatories in designated clean, undisturbed snowfields.*

In this section you describe the frequency and distribution of snow pit measurements. However, it remains unclear how many pits were dug at each type of location (undeformed first-year ice, second-year ice, ridges, leads, etc.). This information is crucial, as snow properties differ substantially between these environments. For example, repeated measurements near ridges could bias the calculated mean depth and density relative to undeformed first-year ice. I recommend specifying the number of pits at each location and, ideally, providing an estimate of the relative areal contribution of these representative sites to the total study region. This would help readers assess how representative the aggregated values truly are.