Review of Arndt et al., 2024

This study aimed to try to understand some of the complex snow processes that occur on Antarctic sea ice such as snow-ice formation and super imposed ice in order to improve snow models and also satellite measurements of sea ice volume. They used multiple Snow Buoys and insitu core data from multiple ship campaigns over the years in the Weddell Sea. The snow buoys tell the amount of snow accumulations and melting that occurs throughout the year, and the cores give the amount of snow ice and super imposed ice. A 1-d sea ice model and a more sophisticated snow model (SNOWPAK) are used to model the amount of snow, and super imposed ice and ice formation that is taking place at the buoy locations as they drift throughout th4e Weddell Sea. They found that the snow models were not the best at producing the amount of snow and ice compared to observations, which is likely caused by missing processes that are taking place within the ice. They also determined that more snow/ice formation is occurring in the western weddell sea and at lower latitudes.

While this paper was well written and easy to follow, I wish there were more details on the individual models and processes there in. What ways could the models improve to improve the snow-ice and super imposed ice estimates? How do the models produce the snow-ice? More details like this could improve the paper. What would happen if you change the densities and salinities of the snow and ice in the models, will the snow depth be more similar to the buoy snow depths? More details like this would help.

Otherwise, I really enjoyed this study, and I think It makes a great addition to our understanding of the Antarctic snowpack.