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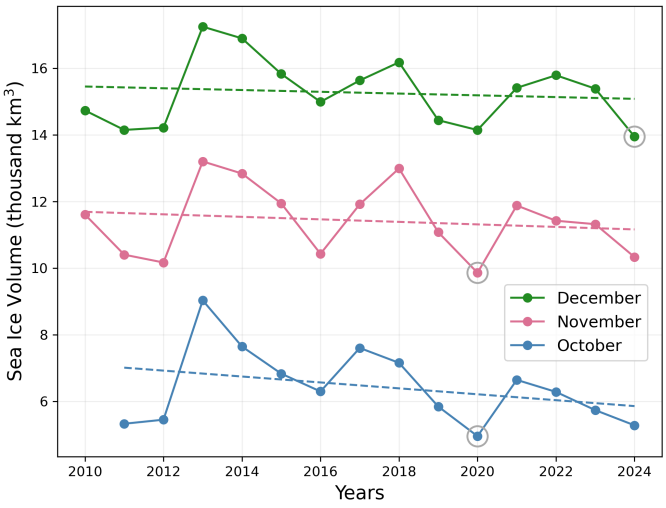
Sea Ice Volume

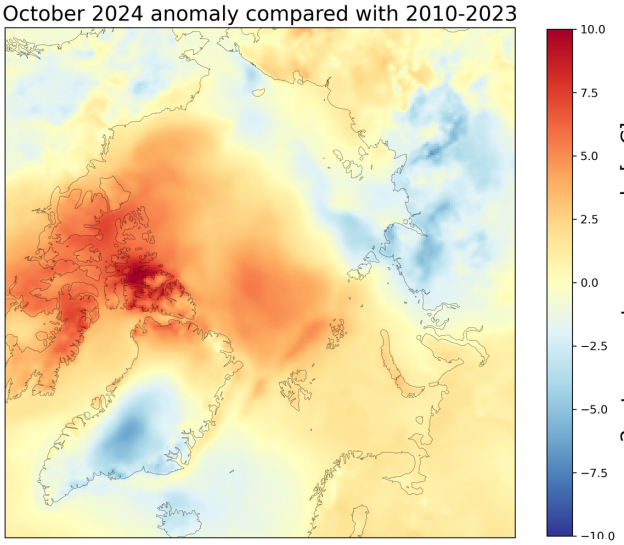
At the end of 2024, sea ice volume was below average in October, November, and December for the CryoSat-2 record (2010 – present). In particular, at 13.9 thousand km^3, December sea ice volume was the lowest on record, compared to the 2010-2023 average of 15.3 thousand km^3. November sea ice volume was the third lowest on record, and October the second lowest.

This was driven by a combination of extremely low sea ice extent and below average sea ice thickness. Sea ice extent in December was the lowest on record at 10.6 million km^2 compared to the 2010-2023 average of 11.3 million km^2. Average sea ice thickness was 1.3 m compared to the 1.4 m average for December.

Another factor in the low sea ice volume was record low volumes of first-year ice (FYI) throughout the quarter. FYI volume was the lowest on record in October, November, and December. This suggests there could have been a long melt season in 2024, delaying the winter freeze up and reducing the time for FYI to develop and thicken.

Much of the Arctic experienced above-average surface temperatures in the last quarter of 2024, which may have contributed to the slow growth of FYI during the period.





Sea Ice Thickness

Whilst record low average sea ice extent was observed in the final months of 2024, sea ice thicknesses were also below average for the time period.

In particular, average sea ice thickness for November was the fourth lowest of the CryoSat-2 record, at 1.18 m compared to the 2010 – 2023 record of 1.25 m. The below average sea ice thicknesses could be attributed to the extremely high surface temperature anomalies for much of the Arctic, particularly in the Central Arctic, Canadian Arctic Archipelago, and Beaufort Sea. Negative sea ice thickness anomalies were recorded north of Greenland and in the Canadian Arctic Archipelago in October, November, and December, which may therefore be attributable to the surface temperature highs in these regions.

The record low extents of FYI suggest that low sea ice thicknesses may persist for the rest of the winter season. As FYI is generally thinner than MYI, FYI experiences greater thermodynamic growth and therefore greater increases in thickness. It's anomalously low levels suggests the low overall volume of the sea ice pack may therefore persist.