Reply to comments of reviewer #2 for manuscript egusphere-2025-5222. Comments of the reviewer are in italic font; responses are given in regular font.

This manuscript investigates two sea ice concentration data sets based on observations of ESMR, the first microwave radiometer in space. As the ESMR data set (1972 – 1977) expands our sea ice data record by 6 years into the past, this quality assessment and comparison is a substantial contribution to our knowledge about features and quality of those data sets.

Thank you for your positive perception of this manuscript and the results therein. Thank you also for reading the manuscript and providing support to improve the manuscript.

It is a pity that the comparison with Landsat imagery could not be performed in the Antarctic. It would add more weight to the comparison covering both hemispheres. However, the data at hand in themselves already are worth being published. At least, in the conclusions the extension to the Southern Hemisphere should be mentioned among the useful next steps.

Thank you, yes, I completely agree that it is a pity that I could not expand the evaluation towards Antarctic sea ice. I thought that with the sentence in Line 178/179: "Future efforts should include revisiting the Landsat-1 MSS image archive to check whether there are not more images that can be used, and making use of the existing cloud-free parts of the few existing images as much as possible." I stressed the need to focus on these activities well enough. But I can change this accordingly, by e.g. adding "with a focus on the Antarctic" in the last sentence of the respective paragraph.

The whole manuscript is written in the first-person style. To the reviewer's impression, this overly emphasizes the role of the author. It appears less appropriate to the reviewer at the many places, where just scientifically agreed standard work is described.

Indeed I once learned that using "active voice", i.e. using "we" or "I" makes a manuscript more easy to read, enhances the flow, and allows to discriminate better between work that has been done elsewhere and work that has been done in the context of this manuscript. I went through the manuscript, and replaced active voice with passive voice so that the reader's impression improves.

I suggest accepting the manuscript after minor revisions.

General: ‚sqkm' for square km is an unconventional notation, better adhere the SI system with km².

Thank you, I changed "sqkm" to "km² throughout the manuscript.

L(ine) 40 ‚I did not compute monthly means for months with daily data from 12 or fewer days.': Mention that ESMR only gave data each second day.

Actually, ESMR indeed gave data every day while SMMR onboard NIMBUS-7 gave data every other day. I hence do not change or add anything here.

L45 ‘’I observe differences between the monthly SIE values of up to 2 million sqkm in the Northern Hemisphere and of up to almost 4 million sqkm in the Southern Hemisphere.’: Do you mean between the 10% and 30% threshold values? In that case, the explanation 2 lines later would not hold: it would simply represent the area of SIC between 10% and 30%. Otherwise, specify differences between which quantitites.

The respective part reads now: “Comparing the monthly SIE values obtained using the two different SIC thresholds, I find differences between 1 and 1.5 million km² in the Northern Hemisphere and between 1 and 3 million km² in the Southern Hemisphere. Only a part of this difference in SIE naturally results from using the two different thresholds specified. A circum-Antarctic band of 25 x 25 km² grid cells located at 60 degrees latitude with SIC values between 15% and 30% would result in a SIE contribution of only about 500 000 km². At least half of the differences in the SIE computed here using a SIC threshold of 15% of 30% is caused by the relatively large retrieval noise over open water, resulting from a less reliable correction of the atmospheric influence, and a larger uncertainty of the tie points used (Kolbe et al., 2024; Tonboe et al., 2025).”

L 157 equalling -> equaling

Changed accordingly.

L 164 ‚The second one‘ -> The second deficiency

Changed accordingly.