The paper introduces an approach for extrapolating sea ice freeboard provided by ICESat-2 altimeter laser data to the larger area covered by a nearly coincident Sentinel-1 SAR scene at a high 100 m resolution. The algorithm arises from a relatively high correlation between HV backscatter and the ICESat-2 freeboard. The accuracy of the approach was assessed from a comparison against independent ICESat-2 data acquired within 10 minutes of SAR acquisitions. The paper can be considered for publication after the following comments are fully addressed.

Major comments:

1. The paper lacks a comparison of the algorithm against a completely independent (of ICESat-2) in-situ source of ice freeboard data. One possible in-situ data source could be long-term time-series records of upper looking sonar data in the Beaufort Sea, in particular Mooring B, that is located above 78 degree north. The authors may suggest an alternative in-situ source of ice freeboard data, but I believe that an assessment against independent in-situ data is absolutely necessary to demonstrate the usefulness of the proposed approach.

2. The algorithm is based on HV backscatter, that is much lower than HH, so HV is substantially affected by the thermal noise. Noise floor in Sentinel-1 EW data is very high (e.g., compared to the noise floor in RCM data); additionally, the noise exhibits a scalloping pattern in the image azimuth direction. The authors applied a noise correction routine in SNAP, but while this correction makes the HV image look nicer (less affected by noise), it does not really make HV signal more informative (i.e., it does not increase the HV signal dynamic range over darker targets like first-year sea ice). The different noise floor levels in different SAR instruments could substantially affect the correlations/relationships between HV and the freeboard/roughness. Therefore, the authors should investigate how the relatively high noise floor in Sentinel-1 affects their freeboard/roughness retrievals. This is especially important for thinner first-year ice where the HV signal could be very low reaching the noise floor level. I also wonder if it is feasible to build and assess the algorithm without the noise correction, but with using noise floor information as auxiliary input piece of information.

3. HV backscatter is sensitive to the incidence angle. The authors should discuss how the incidence angle variation in the image (20-50 degrees) affects the accuracy of the freeboard retrieval.

Minor comments:

Overall, the manuscript contains a lot of typos and inaccuracies, and some of them, yet not all, are outlined below. It feels that the manuscript preparation was rushed. The authors should carefully correct all inconsistencies and typos.

Line 72. “Thermal noise, scalloping and calibration to σ0 is done …”. It is not clear what it exactly means. Does this mean that thermal noise and scalloping effect reductions were applied? Please rephrase.

Line 75. “100 x 100 metre” -> “100 m x 100 m”

Lines 76, 119, 163, 181 and throughout the text where appropriate. “figure” -> “Fig.”

Figure 2. The quality of the figure should be improved. Add the single color bar for all the panels. Add space between roughness and [m] in x-axis. All panels show rather backscatter vs freeboard/roughness and not vice versa. Add letters to each panel.

Line 93. “be distinguished” -> “distinguished”

Line 100. “5m” -> “5 m”

Line 122. “table 1” -> “Table 1”.

Line 131. “C-Band” -> “C-band”.

Line 150. “Macdonald”->“Macdonald et al. (2024)”

Line 167. “penetration of the radar measurement” does not sound correct

Line 170. “freeboard. I.e.” -> “freeboard, i.e.,”

Line 174. “becaise” -> “because”

Figure 5. Color bar should be added.

Line 204. Spacing is missing in “.Occasionally”.

Line 228. “ellpsoid” -> “ellipsoid”

Line 255. “400km” -> “400 km”

Line 276. “Requencies” -> “Frequencies”