

Interactive comment on “A sea ice thickness retrieval model for 1.4 GHz radiometry and application to airborne measurements over low salinity sea ice” by L. Kaleschke et al.

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Dear anonymous reviewer,

thank you very much for the constructive comments that will improve the quality of the revised version.

The main comment is on the assumptions and uncertainties in the method. They are discussed, but some implications seem glossed over. For example, passive microwave data is employed to provide sea ice concentrations. It is stated that uncertainty in PM concentrations is 5% for central Arctic conditions (pg. 1006, ln. 18-19) and that a 5% concentration error results in a 0.1 m uncertainty for a thickness of 0.5 m. But that

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is actually a 20% uncertainty, which seems quite high. We totally agree, the relative errors are expected to be in the order of 20% and more. Fig. 8. shows that a 20% error is the minimum. We will provide the uncertainties in a more prominent place, i.e. the abstract. The uncertainties will be further investigated with real SMOS and validation data in follow-on studies.

And under melt conditions like in the study, the PM concentration uncertainties may even be higher than 20%. We don't expect that the SMOS ice thickness will be very useful under melt conditions. It will have the advantage in the freezing period for measuring new and thin ice.

I would like to see a plot for sensitivity for ice concentration uncertainties like is done for temperature in Figure 3

Figure 3 shows the sensitivity for radiometric errors. We have written that errors in the prescribed ice concentration propagate in the same way as errors in the radiometric accuracy do. So one can read Figure 3 as a sensitivity plot for ice concentration uncertainties because of the linearity of Eq. 1. We will indicate this in the caption.

I also think it is worth briefly mentioning somewhere, perhaps in the introduction, some of the basic parameters of SMOS and the platform - spatial resolution, spatial coverage (full Arctic coverage - i.e., polar-orbiting satellite)? What is the IFOV of the SMOS instrument? This is already stated in the introduction: “Moreover, they would provide near real time data with an almost global coverage every second day”, “The inversion of the spectrum leads to a field of view with hexagon-like shape and a nadir resolution of about 35 km. The MIRAS swath width is about 1000 km.”

pg. 1004, ln 11: units for salinity? Oceanographers redefined salinity as the conductivity ratio of a sea water sample to a standard solution. Ratios have no units

Interactive comment on The Cryosphere Discuss., 3, 995, 2009.