**The Cryosphere
Discussions**

Interactive comment on "An algorithm to detect sea ice leads using AMSR-E passive microwave imagery" *by* J. Röhrs and L. Kaleschke

Anonymous Referee #1

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The MS describes a method to detect and map leads in the near 100% Arctic Ocean ice cover during winter using satellite AMSR data. The lead detection algorithm uses the Tb ratio between the high resolution 89 GHz channel and the low resolution 18 GHz channel. Subsequently a high pass filter is used to separate leads from regions where the Tb89/Tb18 ratio is high over extended areas for other reasons.

Scientifically the topic is important and the advantages of AMSR data for mapping leads compared to other methods using SAR or MODIS data are described in the MS. However, the selection of the different processing steps in the algorithm seems a bit arbitrary and a proper analysis of the algorithm vs. other possibilities using the same data is lacking.

I have two major concerns:

1) I am not convinced when reading the MS that the leads are actually detected using the model outlined in figure 1, i.e. that the leads are detected because there is a signature difference between the Tb18 and the Tb89. Alternatively the leads are detected because of the uneven size of the footprints at 18 and 89 GHz or the leads are detected by the high pass filter alone? It would be good to check the validity of this model and if leads can be detected using the high pass filter alone on the Tb89 or the Tb89 polarisation ratio.

2) The validation of the method is superficial. A comparison to the RGPS data set must be an option.

Specific comments:

p. 184, l. 26: write out SAT (surface air temperature?).

p. 185, l. 8: Andersen et al. 2007 is not a good reference here.

p. 185, l. 29: '...sparse ground resolution.' what is meant?

p. 186, l. 14-16: I suppose it depends on the size of openings. Please reformulate.

p. 186, l. 17:'...a method to reveal thin ice...'? I thought it was a lead detection method.

p. 187, l. 9: add '...the launch of the satellite...' after 'since'.

p. 188, l. 8: add '...and the snow.' after 'atmosphere'.

p. 188, eq. 2: Ts is not a surface temperature but an effective temperature. It is by the way not the same for 18 and 89 GHz.

p. 188, l. 19: When the measured r ratio fails to exceed one over new ice in figure 2 is it then because of the effective temperature difference between 18 and 89 GHz? or is it because of the relatively coarse resolution of the 89 GHz channel for lead detection as you claim?. The model outlined in figure 1 would only work over extended areas of new-ice or older ice and I think the high pass filter would also work on Tb89 or Tb89

polarisation ratio.

p. 188, l. 22: The high r values in figure 2a do not always seem to be associated with new-ice. Please explain the reason for high r ratios when it is not new-ice.

p. 193, l.21: Replace 'remarked' with 'noted'.

p. 194, 11: replace 'product' with 'ratio', please reformulate this section. If it is not 'the real microwave characteristics of sea ice.' what is it then?

p. 196, l. 24: Andersen et al. 2007 is not a good reference here.

Interactive comment on The Cryosphere Discuss., 4, 183, 2010.