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Discussions

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# Interactive comment on "Satellite Microwave Assessment of Northern Hemisphere Lake Ice Phenology from 2002 to 2015" by Jinyang Du et al.

## Anonymous Referee #2

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This manuscript presents a new methodology to apply the use of passive microwave imagery (AMSR-E/2) to create an automated daily ice phenology product utilized for monitoring freshwater lake ice. The daily temporal ability, unhindered by cloud and polar darkness allows for a global product at a resolution and accuracy that can of benefit climate modelling and global change studies. This manuscript is well written and a valuable contribution to the freshwater ice research field. The inclusion of cited literature is light in the introduction section and could use some strengthening; however overall, the manuscript is clear, concise and suitable for publication with only minor revision to the text and figures.

No particular scientific issues arise from this review. The validation of the new passive microwave based product is limited by the lack of existing observation data from lakes, however including the comparison to the CIS dataset and the IMS product strengthens

the validation sufficiently.

The following is a list of some minor typographical suggestions and some points to clarify the figures:

Line 11 : Previous studies have documented significantly earlier ice break-up between 1951 and 2000 for lakes in Canada (Duguay et al., 2006) and decreasing lake ice cover of Lake Ladoga in Europe during the last few decades (Karetnikov and Naumenko, 2008). – Consider adding more than 1 citation for each broad area of research

Line 16: various tendencies over specific lakes and . . . Such as?

Page 3 line 12: Recently, H-Polarized AMSR-E (Advanced Microwave Scanning Radiometer for EOS) Tb observations at 19 GHz were analyzed to determine ice phenology for GSL and Great Bear Lake (GBL), the two largest lakes in northern Canada (Kang et al., 2012). – again, consider using more than 1 citation for the work done here

Page 3 (line 30,31) - 4 (line 1) study domain – The explanation of the study purpose does not belong here.

Page 4, line 4 – arctic region "Global Warming" – consider a more scientific term. E.g. Arctic amplification effect? More extreme climate warming than lower latitudes?

Page 4, line 9 - Lake Superior is in Canada And USA.

Page 11 line 15 – ICDe? Was that defined previously? Why an e?

Figure 1 – needs more distinguishable blue colours for the trend analysis lakes. Lake Superior is listed as USA – Lake Superior is in Canada as well. Countries are listed for the GLRIPD lakes but not the other comparison lakes – why? Be consistent, either remove the countries for the GLRIPD lakes or add them for all lakes.

Figure 2 – clarify what the "dots" are – not clear initially what is going on this figure. Clearly indicated the "dots" represent ice cover vs. open water (?)

Figure 3 – This is a very unnatural projection for GBL, is there a specific reason to display this way? If so, it was unclear from the text. Consider reprojecting to a projection that is more realistic of the actual size/shape of the lake.

Figure 5 – ICDe? Again, why the e? b and c are too small to interpret the symbols / heights of the bars. Consider making all 3 the same size.

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