

Interactive comment on “Frequency and distribution of winter melt events from passive microwave satellite data in the pan-Arctic, 1988–2013” by L. Wang et al.

Anonymous Referee #2

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The manuscript describes a climatology of snow melt days across the Arctic or land regions poleward of 50N using passive microwave observations. They also validate their results against reanalysis datasets and from station data/snowpit surveys. They find that snowmelt days are relatively rare (a week or less) over the winter period. They do find that snowmelt days are positively correlated with length of the winter season (defined as the period of a stable snowpack) and that there are only weak trends in snowmelt days.

This is a strong team of topic experts, a well-written manuscript and the analysis was expertly executed. The topic is of interest and the manuscript a worthy contribution to the cryosphere community and has relevance to climate change as well. I have very

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few comments to add to improve the manuscript. My few minor comments are listed below.

I did see that another reviewer found inconsistencies in the definition of melt events. I was not bothered by potential inconsistencies though it is probably best for the authors to clarify their definitions.

I recommended that the manuscript be accepted pending minor revisions.

Minor comments: 1. Line 110 – the authors state that they filled data gaps through linear interpolation from adjacent days. However the authors mentioned above the technique for detecting water is robust because there are large variations in TB depending on the presence of water. Therefore simply linear interpolating would be problematic near dates of snowmelt?

2. Figure 5 – in panels 5a and 5b why not show MSOD and NMOD as day of year rather than as month?

3. Is it possible that the reanalysis products (especially ERA-Interim) in general have more snowmelt days because they are sampled four times daily and the PMW only once a day? This should be checked.

4. Figure 8 – why use a temperature climatology of 1961-1990 which is colder than the period of the passive microwave data set of 1988-2013? Preferably an overlapping period should be used for the temperature climatology or even 1981-2010.

5. Figure 12 – the results presented in the figure where temperatures are warming in the fall and spring but not winter across the Northern Hemisphere landmasses is not a new result but is very similar to seasonal temperature trends shown in Cohen et al. 2012.

Reference: Cohen, J., J. Furtado, M. Barlow, V. Alexeev and J. Cherry 2012: Asymmetric seasonal temperature trends. *Geophys. Res. Lett.*, 39, L04705, doi:10.1029/2011GL050582.

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