

## ***Interactive comment on “Weekly-gridded Aquarius L-band radiometer/scatterometer observations and salinity retrievals over the polar regions: applications for cryospheric studies” by L. Brucker et al.***

**Anonymous Referee #2**

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The manuscript presents a data set of polar gridded L-band radiometer and scatterometer observations from Aquarius and salinity retrievals. It fills a gap as until now these observations have been much more difficult to access. Thus, the contribution opens the door for more investigations of the geophysical content of Aquarius observations of sea ice, land ice and open ocean. Example observations of all these surface types are presented.

In order to facilitate the data use, also sea ice concentrations from NCEP GSF GDAS are given. The latter data set should be characterized in more detail, especially its

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differences to microwave based brightness temperatures which might be more familiar for the remote sensing community.

Some of the figures should be improved (see details below). In Figure 4 of time series of Tbs, also the surface temperature should be given in order to substantiate the discussion.

I suggest to accept the paper after minor revisions.

Minor comments:

Abstract Line 14: give also physical resolution, in addition to grid cell size Text:

Page 5923 Line 15/16: SMAP launch currently scheduled early 2016. Check again when revising.

P 5924 L 9 Aquarius has three L-band radiometers *for three incidence angles*, each providing. . .

L 13 ‘..using the same feed horns as the radiometers, and thus coincident with the radiometer’s observations’: This is not possible as radiometer and scatterometer observe at different times. On p 5926 L8 stated more plausible: observing at the same incidence angle.

P5929 L 8: weekly polar gridded products: give reason why not producing daily products: coverage? Variability of geophysical quantities of interest?

P 5926 L 4-7: Third Stokes also measured, but assumed null at surface: Put this assumption into the context of WindSat observations of 3rd Stokes over land (Narvekar et al. 2007), land ice (Narvekar et al. 2010) and sea ice (Narvekar et al. 2011): Over periodic structures it may take up to few K.

L10 night side of the sun-synchronous orbit: mention equator crossing time.

P5927 L 24 ‘in SH, L-band RFI are rare’: can you quantify this?

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P5928 L6 NCEP GSF GDAS sea ice product: which resolution of the model is used here?

L15 'L2B product calibrated against forward RTM': give reference. Which surface types used for calibration?

P5929 L 18: *In addition*, the distinction per beam. . . .

L 20: Mention that for each week, in total nine TB maps are given.

L 24: *Also* for NRCS, each beam and each orbit. . .

P 5930 L 22 interpolation: in space or in time? If in space: bilinear?

P5931 L 9: Data volume per week?

P5932 L1 ICEF\_STD\_SCA: inconsistent naming convention. In all other products, '\_STD' is at end of name string. Reason? Make it consistent?

L 14 . . .e.g. liquid water *content*, . . . .

P5934 L 2: 'almost similar': 'similar' or 'almost equal'

L 7-9: mark the two places of the time series Figure 4 in Figure 2 and Fig. 5.

L 10 'temperature profile': do you mean temperature time series of temperature vertical profile?

L 11 'impacted by snow melt': show this by adding surface temperature to time series Fig 4.

L 14 'later in the summer when snow grain size and density increase': where from known? In this form this is speculation. Give physical reason and reference.

P 5935 L 11 'eastern part of the continent': does not make sense for Antarctica. Do you mean East Antarctica?

Fig. 5:

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- Mark all places mentioned in text in one of the sub-figures: Vostok, Mary Byrd, Amery, Larsen C.

- lat/lon numbers too small to read.

P 5939 L 27: the correlation between A and D orbits will also be interesting for HH and VH polarizations, as well as the correlation between the polarizations. It seems that VV and HH are quite similar, but VH is different.

P 5941 L 22: Aquarius observations -> L-band observations

P 5942 L11-12 'SSS in the polar regions varies seasonally . . .': sentence currently unrelated to manuscript and Fig. 17 and 18: can this be seen in the figures? How strong is the expected effect (ref)? How will the data set of this manuscript be helpful in this context?

L 27 six continuous pixels: in time or space?

P 5943 L 13 'These products enhance the use.': are intended to enhance, or intended to facilitate.

L 16 impacted the L-band TB: increased 'with implications for surface mass balance monitoring': surface does not have a mass. Do you mean surface characteristics and mass balance monitoring?

L 17 shows -> show

L 18 0.3 - 0.4 dB

Figure 3: select lighter blue tone for easier distinguishing

F4: show also surface temperature of both places of that year. Which year shown?

F6 select lighter blue tone for easier distinguishing

F9, F10: lat/lon unreadable

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F16 bottom: symbols too small to recognize, rather use colors which differ strongly. Light grey curve almost invisible.

References: Narvekar, P.S. T. J. Jackson, R. Bindlish, L. Li, G. Heygster, P. Gaiser 2007: Observations of Land Surface Passive Polarimetry with the WindSat Instrument. IEEE Trans. Geosci. Remote Sensing 45(7), 2019-2028, doi:10.1109/TGRS.2006.886963.

Narvekar, P.S., G. Heygster, T.J. Jackson, R. Bindlish, G. Macelloni, J. Notholt 2010: Passive Polarimetric Microwave Signatures Observed Over Antarctica, IEEE Transactions on Geoscience and Remote Sensing 48(3), p. 1059-1075, doi:10.1109/TGRS.2009.2032295.).

Narvekar, P.S., G. Heygster, R. Tonboe, and T.J. Jackson 2011: Analysis of WindSat Third and Fourth Stokes Components Over Arctic Sea Ice IEEE Trans. on Geosci. and Remote Sensing, 49(5), p. 1627-1636, doi:10.1109/TGRS.2010.2089058.).

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