

Interactive comment on “Influence of meter-scale wind-formed features on the variability of the microwave brightness temperature around Dome C in Antarctica” by G. Picard et al.

G. Picard et al.

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Authors (Aut): We would like to thank Ted Scambos for his critical reading, constructive remarks and corrections. The challenge to reduce the paper is completed, hoping this allows a smoother reading.

Ted Scambos (TS): The study uses field data collected by a meter-scale radiometer to characterize passive microwave emission of a complex snowpack near Dome C. The authors interpret the field data based on physical properties of the snow (density and packing) and conclude that emission from the Antarctic snowpack is complex, and that interpretation of passive microwave data at kilometer scales (e.g., 12.5 km for AMSR-

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2) must be done carefully. They further use the data to validate models of snowpack microwave emission, and demonstrate that the models appear to be generally accurate. They conclude that while average characteristics of the snowpack in the Dome C area are similar to the satellite passive microwave measurements, the satellite results must be interpreted as a mixture of surface types at meter scales. The study is an accurate cal/val measurement that will potentially be used by others in citation to support the validity of satellite passive microwave measurements over ice sheets, and the factors affecting brightness temperatures in ice sheet dry snowpack. However, the study could go further to try to physically characterize the undulations they have identified in the firn. Dome C is thought to be an extremely uniform snow and firn region, and the identification of wind-driven (?) variations in the snow could be important.

Aut: The presence of hard snow areas and dune-like features at Dome C and along the logistical traverse from Dome C to Dumont D’Urville has been well known for a long time, especially by people using heavy vehicles. Nevertheless, little characterization has been done up to now except the information provided in the paper (approximate size and thickness, typical density value and % of occurrence). A cartographic survey needs to be conducted but may be time consuming because these features are not clearly visible by eye, they must be detected by using hardness test. Unfortunately, we can not provide more information here.

TS: The paper has a somewhat elaborate style in the writing, and could be significantly shorter. That said, there is no real problem with readability or language use. I recommend publication. As a supportive suggestion, I would challenge the authors to say the same things in 2 fewer pages.

Aut: We have reduced the text by 2 pages by removing unnecessary remarks and simplifying some sentences.

TS: p3678 L5-6 - remove 'It results that..', begin sentence with 'Snow properties..'

Aut: done

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TS: p3679 L12 - Haran et al., 2005 is a data citation for the MOA 2004 data set - in this case, you are citing what features have been described within the MOA mosaic - The proper citation would then be Scambos et al., 2007 Remote Sensing of Environment.

Aut: done

TS: p3685 L3 - 'during this period under these conditions.'

Aut: done

TS: p3685, L13 - '. . .B11 hereafter)'

Aut: done

TS: p3686 L28 Remove 'At last, '

Aut: done

TS: p3687 L2 Remove 'then'

Aut: done

TS: p3692 L10-11 '. . .in order to investigate the undulations in the local region, and to investigate the long wave...'

Aut: done

TS: p3692 L20 remove 'Shannon's limit', and just refer to the limiting relationship.

Aut: done

TS: p3693 L13 I believe you mean 'peak-to-trough' here - better to say '. . .variations of 5K amplitude (peak to trough) at 37 GHz. . ."

Aut: done

TS: p3693 L14-15 change 'seem visible' to 'may also be present'

Aut: done

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TS: p3694 L222 change to 'This was also consistent with our experience in drilling SP2.'

Aut: done

TS: p3696 L6 Barchan dunes

Aut: done

TS: Figure 1 - add a small inset map of the Antarctic continent with a location for Dome Concordia. Replace the grid pattern with a lat-long grid, or, assign UTM coordinates to the grid.

Aut: done

TS: Can you place a MODIS or ASTER image beneath the line map? This could add significantly to your study, since you infer that the undulations are formed by wind-packing. Can you see any wind-related features in the visible-band imagery? Can you pick out the features causing the undulations you describe?

Aut: Unfortunately optical images provide little information in the area and the undulations seen in the field are not visible at all on the images. It is the same with radar images (ASAR PRI). Figure 1 below show an example with an ASTER image (27 February 2013, GLIMPS project). Note the registration is not accurate.

Interactive comment on The Cryosphere Discuss., 7, 3675, 2013.

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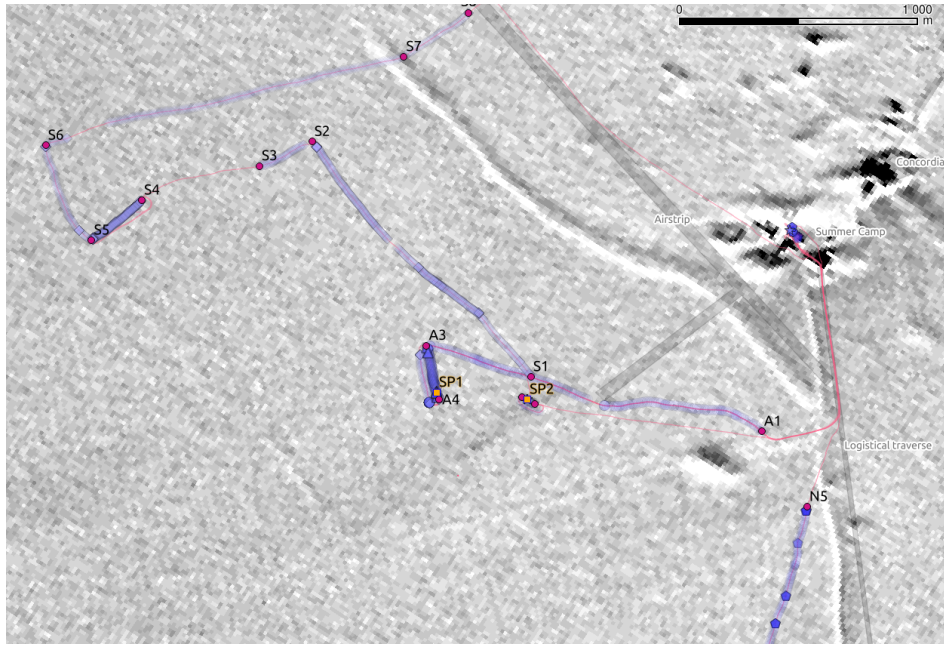


Fig. 1.

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