

Interactive comment on “Marked decrease of the near surface snow density retrieved by AMSR-E satellite at Dome C, Antarctica, between 2002 and 2011” by Nicolas Champollion et al.

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The authors present an interesting, and potentially promising, method of retrieving a time series of values of derived surface snow density from AMSR-E data, in combination with radiative transfer modeling through DMRT-ML. There are a few minor clarifications that are warranted in order to make some points clearer. Most notably, there are some seemingly contradictory statements about the trends of surface roughness features (see specific notes for Page 18). There are also several technical/grammatically errors to fix.

Page 4, Line 9: is it standard formatting for the data set title to be in italics? I don't think

C1

I've seen that before.

Page 4, Line 23: is this phrase, “full-polarization mode with nadir looking” correct? seems like something is missing? should it be “nadir-looking in full-polarization mode”?

Page 5, Line 1: again, why is the dataset name in italics, or is that standard formatting for TC?

Page 5, Line 8: Figure 1 shows measured snow density, measured SSA (assuming that) and modeled/derived snow radius, not snow temperature.

Page 5, Line 13: Should report the height the samples were taken here to be consistent and to be able to compare to the other measurements.

Page 5, Line 15: missing “The” in the front of the sentence

Page 5, Line 16: should be “contains the surface snow density measurements...”

Page 5, Line 18: should be, “The last dataset...”

Page 5, Line 23: datasets instead of dataset

Page 5, Line 23: should be “associated with” instead of associated to

Page 6, Line 4: should be “west”

Page 6, Line 9: is should be are after “measurements”

Page 6, Line 9: There are no measurements taken in the upper part of the snowpack towards the end of the data record, but there would be some in the beginning of the experiment, in 2006. Can this be clarified? And/or report the rate of burial maybe?

Page 7, Line 1: should be “measured in a snowpit”

Page 7, Line 5: to should be with after associated

Page 7, Line 10: need to define the acronym POSSSUM

C2

Page 7, Line 16: delete "allow to" as the sentence as written is not grammatically correct

Page 7, Line 16: POSSSUM and ASSSAP don't actually measure SSA directly, but they do allow for SSA to be determined from light reflectance measurement, so should not refer to a "measurement" of SSA from POSSSUM

Page 7, Line 16: to should be with after associated

Page 8, Line 14: should have "the" in front of "phi parameter"

Page 8, Line 24: should have "the" in front of Antarctica Plateau

Page 9, Line 14: I think that the authors mean that the snow properties also vary with time, instead of depth?

Page 9, Line 27: "the" should be in front of Sea Winds instrument

Page 11, Line 20: should have "the" in front of DMRT-ML

Page 11, Line 21: term should be terms

Page 13, Section 5.2 in general: I understand that this sensitivity analysis was done using the DMRT-ML model to simulate the PR variations, but this should be explained or added in the description.

Page 13, Line 15: delete "permit to"

Page 14, Line 4: delete "around" or should be "which corresponds to around the top 3 centimeters of the snowpack" (i.e. not grammatically correct as is)

Page 14, Line 14: this word is not used as frequently as "accumulated" when referencing snow since cumulated means gathered together or combined

Page 14, Line 15: Grain-Index should be defined

Page 14, Line 15: is there any possible physical/meteorological explanation for the lack

C3

of annual cycle?

Page 18, Line 23: Should be "It results in an estimation..."

Page 18, Line 26: This sentence seems counter to the sentence two paragraphs above that "We can conclude from the absence of trend in sigmav time series that surface roughness has not evolved much between 2002 and 2009."

Think that either the scale of the changes that are detectable, or more quantification of this trend is warranted. Or clarification of the contradiction.

Page 19, Line 10: should have "the" in front of "authors"

Page 20, Line 3: it is not clear what two faces are being referred to in this sentence, should be clarified.

Page 20, Line 18: should be "the azimuth angle would have no effect..."

Page 21, Line 3: should either be "passive microwaves are less sensitive" or "passive microwave is less sensitive"

Page 22, Line 3, delete "is" in front of "the frequency" and "the sensitivity"

Page 22, Line 8: should be written "the minor impact on satellite observations has been previously discussed."

Page 22, Line 10: "influence" should be "influences"

Page 22, Line 16: this sentence is very confusing. Is it "either the number of layers with different dielectric constants in the snow or the amplitude in density variations"?

Page 22, Line 24: is this an error, or do the authors intend to say that the figure is not shown or is it a typo from the editing program used? seems like you do not need to specify that you are not showing it.

Page 22, Line 27: remains should be remain

C4

Page 24, Line 9: should be "have highlighted"

Page 24, Line 14: should be "snow precipitation over the East Antarctic Plateau is" not "are"

Page 25, Line 5: should be "for making" instead of "to make"

Page 25, Line 9: should be "was supported"

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