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Interactive comment on “Measuring the specific surface area of snow with X-ray tomography and gas adsorption: comparison and implications for surface smoothness” by M. Kerbrat et al.

Anonymous Referee #1

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General comment:

Overall, this paper is a nice demonstration of the comparability of measurements of SSA by tomography and methane adsorption for aged snow (>1day). The work appears to be careful and the paper is readable. However, the abstract and conclusions are written stronger than the main text and in a way that could lead a reader to conclude that tomography works for all snow and that all snow is molecularly flat on all timescales. Instead, the main text specifically states that fresh snow fails to be measured accurately by tomography due to small features that escape tomographic analysis. The abstract and conclusions should be brought into line with the main text of

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the paper. This point is important because short time evolution of snow may be important for gas fluxes from early metamorphism of snow following deposition. More importantly, snow that is forming or subliming during precipitation is likely to be not molecularly smooth or at least have very small features due to processes such as rapid growth or riming. The abstract and conclusions need modification.

Specific comments:

Abstract, line 10. The abstract says that "10 micrometers is sufficient to capture all structural features of natural snow". However, in the main text of the paper, they show that fresh precipitation falls off the 1:1 correlation line and argue that the problem is that "It indicates that precipitation particles still feature structures below about 30 micrometers". The authors should change their abstract to more precisely summarize their paper's findings. It appears that a reasonable statement would be "...10 micrometers is sufficient to capture all structural features of aged natural snow; however fresh precipitation appears to contain small (<30 micrometers) features that cause microCT to under-measure the SSA."

p10287 lines 5 and 6. tomography has 30 micron resolution, methane adsorption is molecular; respectively is used incorrectly here.

p10295 line 13 and Fig. 3. Consider showing the individual Gaussian distributions that underlie the distributions shown.

p10296 line 21. This sentence has a part written in plural, a part in singular. I think it should be "These specific types of errors were called...."

p10306, line 25. Same point as in the abstract. The conclusion now says snow is smooth "few hours after the precipitation.", while the main text is saying "a day after". This timescale should be clarified (and lengthened to a day).

p10307, line 10. Again the same overstatement point. Change "...geometry of snow is guaranteed." to "...geometry of aged snow is guaranteed.". Alternatively, one could

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use "snow pack" instead of "aged snow".

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 10287, 2007.

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