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## ***Interactive comment on “The growth of sublimation crystals and surface hoar on the Antarctic plateau” by J.-C. Gallet et al.***

### **Anonymous Referee #2**

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I would summarize the argument of this paper as follows: At latitude 75 S on the East Antarctic Plateau in summer, there is a large diurnal cycle in surface temperature and a somewhat smaller diurnal cycle in near-surface air temperature. The result is sublimation during the day and frost deposition (surface hoar) at night. But the daytime sublimation also results in growth of frost ("sublimation crystals") because of a centimeter-scale boundary layer just above the surface where the air can be supersaturated in the hours around noon. If the crystals growing in daytime have larger specific surface area (SSA) than the nighttime crystals (as is claimed in the paper), then they enhance the albedo during the hours when sunlight is most intense.

The paper is interesting but not convincing. Sublimation crystals and surface hoar crystals both form by deposition of frost, so it is not obvious that their SSAs should be

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different. The authors made measurements over only a 38-hour period, and the SSA did seem to be larger around noon. But the different SSAs were not explained on the basis of different crystal shapes, and no reason was given to expect the shapes to differ. Indeed, in the "discussion" section the authors say that crystals formed by the two mechanisms are difficult to distinguish in their appearance. I therefore question whether the variations of SSA observed during those 38 hours are due to a systematic difference in shape between sublimation crystals and surface hoar. However, I do think the paper is worth publishing.

Minor comments:

p 5973 line 23. Van As 2005 and Van den Broeke 2006 are not in the reference list.

p 5974 lines 9-10. ". . . rapid growth of snow crystals . . . These crystals grow slowly". These statements are contradictory; "slowly" is the opposite of "rapid".

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Interactive comment on The Cryosphere Discuss., 7, 5971, 2013.

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