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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Microphysics of Clouds over the Antarctic Peninsula – Part 1: Observations" *by* Tom Lachlan-Cope et al.

A. Kirchgaessner

acrki@bas.ac.uk

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The authors present an interesting and relevant analysis in their manuscript.

1) Reference to Grosvenor et al 2012 is incomplete.

2) This comment refers to the ice crystal numbers presented in Fig 7, and the authors' interpretation. They attribute number peaks at about -5°C to the Hallet-Mossop process (H-M) (after Hallet and Mossop, 1974).

My question is, how sure are the authors that the observations are due to the H-M process and not due to one of the other secondary ice formation processes, such as collision fragmentation (splinters produced by ice-ice collision, eg. Vardiman 1978, Takahashi 1995), droplet shattering (splinters produced during freezing of large droplets,

Leisner et al. 2014) or sublimation fragmentation (separation of ice particles from a parent ice particle when the connecting ice bridge sublimates, Bacon et al. 1998). Do any of their other measurements and observations (for example droplet diameter) support their assumption of the H-M process in preference to other secondary ice production processes?

Bacon, N. J., B. D. Swanson, M. B. Baker, and E. J. Davis, 1998: Breakup of levitated frost particles, J. Geophys. Res., 103(D12), 13763–13775, doi:10.1029/98JD01162. Leisner, T., T. Pander, P. Handmann, and A. Kiselev, 2014: Secondary ice processes upon heterogeneous freezing of cloud droplets. 14th Conf. on Cloud Physics and Atmospheric Radiation, Boston, MA, Amer. Meteor. Soc., 2.3 Mossop, S. C., 1985: Secondary ice particle production during rime growth: the effect of drop size distribution and rimer velocity.Q. J. R. Meteorol. Soc.,111, 1113-1124. Takahashi, T., Y. Nagao, and Y. Kushiyama, 1995: Possible High Ice Particle Production during Graupel–Graupel Collisions. Journal of the Atmospheric Sciences, 52,4523-4527. Vardiman, L., 1978: The generation of secondary ice particles in clouds by crystal-crystal collision. J. Atmos. Science, 35, 2168-2180.

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