REV 1

Title: Genesis of diamond dust, ice fog, and thick cloud……..

Submitted by Ricaud et al

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Decision: Rejection/Resubmit

General Comments:

I am still not happy with content of this work, it is not much improved. I feel authors should focus on what they like to show and they should stick with their goals. Even the objectives are not clear in this work, and figures are not represented properly. Organizing of the text is also poor. How can someone use the results of this work for studying Arctic clouds/fog? I will not go details here but important issues are provided below randomly.

Issues:

Genesis means what? Even they do not summarize the cases properly and talking about genesis????; what these numbers mean? Abstract is too long. Look at page 7; LN131-136; I see they are not focused and clear. LN132 episode 1 talks about DD, IF episodes, and LN135-136 genesis of DD, IF, Thick cloud…….

These clearly show this paper doesn't analyze the cases properly, and objectives are not given in the end of introduction but in the middle of the text (page 6). This is very awkward writing style.

Ice Camera; hourly particles are analyzed, if heavy snow happens, crystals will cover the glass in a few seconds, if ice fog/DD will be covered in a few seconds also. What does really mean analyze the data hourly? To me nothing important having this data set, except some selected ice crystals. You say 5 micron resolution, are you sure? Fig. R1 and R2 have scale of 1000 micron. I cant see particles less than 100-200 micron. What is going on here?.

Looking at the data you have, I don't see fog particles?

Fig. 9; a) IWC and b) PF (precip flux); when I see highest IWC, there is no precip? How can I trust this image/fig?

Also; 0.015 mm/day PF=0.0015 mm/day; this means no precipitation basically. How do you explain this?

Fig. 8; integrated over 1 hr? you have 1000/hr=(1000/3600) /(Lsec)~0.3/(sec), to me this is a very low number (certainly do not represent ice fog). What is the sampling area (page 10)? If I assume 10x10cm2, and 10 cm/sec fall speed, this makes about 0.2/L which is very low number, do you call this ice fog, DD, or snow crystals? I see no clear comparison or calculations of ice microphysical properties with other studies.

Fig. 6; this is what? Absolute humidity? Or cloud water content? Please show IWC and RH for the same case from MWR and lidar, and then model simulations.

I feel that authors are pushing their results desperately to be published; in fact, publishing these kinds of work should be careful performed. This manuscript should be rejected and resubmitted with more focused way and it should be designed properly.

I suggest authors should follow up the structure below

1) Set up clear goals
2) Better description of observations
3) Better comparisons of the results with others
4) Focus on only DD/Snow or IF, and present results that comparable with others, if not, explain why? Their characteristics are not the same
5) Provide insight to figures, IWC, Ni, precip flux etc.
6) Show simulation of model matching observed quantities.
7) Clear conclusions;
    a) Found that Ni is comparable …..
    b) DD Ni was ……
    c) NWP results were …..
    d) …….
    e) New sensor showed that…….