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Comment

***Interactive comment on “New particle formation and ultrafine charged aerosol climatology at a high altitude site in the Alps (Jungfraujoch, 3580 m a.s.l., Switzerland)” by J. Boulon et al.***

**Anonymous Referee #2**

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This manuscript deals with NAIS measurements in Jungfraujoch GAW-station at Alps in Switzerland during extensive EUCAARI measurement period. Data of 309 days is analysed and discussed. The theme is suitable for this to be published in ACP. However the analysis are quite thin and does not use any supporting data from station that has quite extensive measurement program, this leaves the analysis and conclusions quite shallow and speculative, which I think is the weakness of this paper. Some of the results have also been presented in Manninen et al. 2010 leaving this paper only little more new results. Also English is some points quite hard to understand, I also recommend checking it carefully.

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Specific comments:

Aerosol nucleation, new particle formation etc are used, I would stick just one term.

Ions are classified into 3 different size classes, there are different kind of limits throughout the paper, why is this, why not use one widely accepted size ranges

Page 11362: Line 5, also theoretical approaches are used as well experiments in nucleation chambers

Page 11363: I don't understand sentence from line 1 to 5

Page 11365: line 13, can you be more precise why limit is 2 nm, I have understood that the reason is slightly different.

Figure 1: I don't find this figure necessary

Section 2.2.4: What is the pressure level the trajectories are calculated, is there difference in height path of trajectories arriving at 0000 and 1200 hours.

Section 3.1: To me diurnal variation is not strong, it exist.

Page 11369: paragraph starting from line 19. Is there some support for this conclusion on nighttime FT and daytime advection, daytime advection should be seen also other parameters measured at Junfraujoch

Page 11370: 2nd paragraph. This would be quite easily demonstrated by calculations and analysis, it would make it much more convincing.

Section 3.2: Is the cloudiness condition only analysed based on RH, this is not enough, again there is quite extensive measurement program.

Page 11371: 2nd paragraph: In Lihavainen et al 2007 intermediate are lower in cloud that clear sky conditions on the contrary explained here.

Page 11371: 3rd paragraph: This should be rewritten, and needs more analysis, actually I did not get the leading thought in here.

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Page 11373: in GR analysis only 3 cases are in 1a. This is by no means enough to represent statistical meaning, I would combine 1a and 1b cases. The GRs for presented here differ clearly from analysis in Manninen et al, 2010. What is the reason for this?

Page 11374: line 13-14, this comment is speculative without more analysis

Page 11375: These values for  $J_{+/-}$  are different that presented in paper by Manninen et al. 2010. What is the reason for this ?

Page 11376: A figure would greatly help imaging the air mass origin

Page 11376: throughout the manuscript Junfraujoch is mentioned as low CS environment, there should be clear comparison to other sites.

Figure 5 is not clear, which is a and which b, what is the difference between a and b. . .

Page 11377: line 8: again conclusion are drawn without supporting data, what about wind directions etc., the updraft might be the reason but without any other evidence than earlier studies (measured times ago) it is still speculations.

Page 11377: line 11: The intermediate ions have different population depending air mass origin, what could be reason for this.

Page 11378, line 12; It is concluded “that nucleation occurs when condensable vapor concentration are high enough to activate cluster growth”. Again, why supporting data from the station is not used. Condensation sinks etc.

Page 11379: 1st line, on what bases the diurnal variation is related to updraft, there is no evidence, no supporting data etc. This might be the reason but the conclusion are drawn quite lightly.

H. E. Manninen et al., EUCAARI ion spectrometer measurements at 12 European sites, ACPD, 10, 11251–11313, 2010

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 11361, 2010.

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