

## ***Interactive comment on “Airborne measurements of new particle formation in the free troposphere above the Mediterranean Sea during the HYMEX campaign” by C. Rose et al.***

**Anonymous Referee #3**

Received and published: 29 May 2015

Rose et. al. analyze airborne measurements derived over the Mediterranean Sea during the HYMEX campaign. In their study they characterize the spatial as well as the vertical extent of NPF processes. Rose et al. find that nucleation is occurring over large areas above the Mediterranean Sea in all air mass types and that nucleation is favored at altitudes above 1000 m. The paper is well written and I have only some minor suggestions for improvement that should be considered before the paper is published in ACP.

P8152, I10: To analyze the vertical extent is also a purpose of this study. This

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should be mentioned in this line as well.

P8152, I16: Please be more precise. Which processes?

P8152, I17: How was the analyses of the vertical extent performed? It should be mentioned that vertical soundings have been used.

P8152, I18: “high altitude”, this term is used at several places in the text. For someone doing research in the boundary layer everything above 1000 m is “high”, but for someone doing research in the upper troposphere/lower stratosphere this is rather “low”. Therefore, I would suggest to write if possible above which altitude (e.g. above 100 m) or at “higher altitudes”.

P8152, I25: Why “could”?

P8153, I25: It should read “in” rather than “by”.

P8157, I6: what is SD? As far as I remember the abbreviation has not been introduced yet.

P8157, I14: I prefer trajectories six days backward in time. In my opinion three days are too short, but I know that it is common to use just three days.

P8158, I21: “high” altitudes. Better to write above 1000 m.

P8163, I28: “to be negative”..... Although there is nothing wrong with writing it this way, I would prefer that you write minus temperatures or temperature below zero.

P8165, I9-11: Something went wrong in this sentence. Please rephrase.

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P1865, I19-21: I have problems to follow how this suggest the speed of the particle growth. Could you be more precise and improve your explanations?

P1867, I9: "first" obsolete?

P8167: Do I understand it correctly that you discuss size distributions that have been measured at the same day during different times? If yes, please write this more clearly. I think the reason for the decreasing coagulation sink with increasing altitude is due to the total number of particles you find in this altitude regions. Usually, as higher the total number of particles (with nucleation mode radii, like e.g. after a nucleation burst, is) as faster the coagulation.

P8168, L7: Again I would suggest to write above 1000 m instead of high altitude.

Figure 2: In the caption it could be added that the color coding of the trajectories corresponds to the sectors as given by the text colors.

Figure 15: Which mode is shown here? Or all four modes represented by the size distribution?

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 8151, 2015.