

Interactive comment on “Frequency of new particle formation events in the urban Mediterranean climate” by M. Brines et al.

Anonymous Referee #3

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This manuscript focuses on the analysis of SMPS data collected in five measurement sites (4 urban and 1 rural) during different measurement campaigns separately presented in already published works. Particle number size distributions were categorized in four different classes using the k-mean clustering analysis. The authors conclude that nucleation events accounted on average for 18 % of the observations. Even if the idea of aggregating SMPS data from different cities with the aim of statistically analyse nucleation events is interesting, the approach followed by the authors does not appear adequate to draw the strong conclusions presented in the manuscript. Recognizing the effort in answering to Referee #1 comments, the following specific issues still have to be properly addressed before the manuscript can be re-evaluated for publication in ACP.

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1. The cities taken in consideration in the manuscript are not uniform in terms of climate, solar irradiation, humidity, aerosol (and aerosol precursors) concentration, aerosol sources and formation mechanisms. Differences of these parameters and mechanisms, their impact on NPF events (and conclusions) should be discussed for each location.
2. Given the limited number and the different climatic characteristics of the cities analysed, the stated aim of “obtaining general conclusions on nucleation events in urban Mediterranean climate environments” results too ambitious and should be soften. For the same reason also the sentence at page 26478 lines 17-20 should be revised.
3. The choice of the time resolution of SMPS data have to be better discussed and justified. One-hour resolution could be poor to spot nucleation events, and certainly an isolated single hour of nucleation-like size distribution is not indicative of a NPF event.
4. Following the discussion at point 3, the authors should better explain the meaning of the proposed definition of frequency of nucleation events. As highlighted by Referee #1, since normally a single nucleation event occurs per day, the frequency of NPF events is generally defined as the ratio between the days showing a NPF event and the total number of days of measurement. In new Table 4: Defining “days with nucleation events” the ones with a single one hour long SMPS spectrum results in misleading figures, at least the first column of new Table 4 should be removed.
5. Page 26478, line 12: The variability of PN concentration ($9970 \pm 100 \text{ cm}^{-3}$) seems to small and should be cross checked.
6. Page 26479, lines 7-11: The diversification of the two types of NPF events derive solely from another work, is not relevant for the discussion, and hence should be removed or better discussed.
7. Page 26480, lines 5-8: The anthropogenic origin of the nucleation events is a speculation not supported by evidence. A single measurement site cannot provide infor-

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mation about where the NPF event initiated. The sentence is a conclusion of another work, is not strictly relevant for the discussion and hence should be removed or better justified and discussed.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 26463, 2014.

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