

## ***Interactive comment on “Regional effect on urban atmospheric nucleation” by Imre Salma et al.***

### **Anonymous Referee #2**

Received and published: 3 May 2016

This is a very thorough study on the new particle formation (NPF) process taking place in a large but limited basin area of Hungarian puszta. The authors have carried out fine particle measurements along with gas and meteorological data, and when evaluating the results, they have scanned through many relevant parameters that are considered to affect NPF. The regional scales with local characteristics are considered. It seems to be that in many cases both sites are within the same NPF process.

There is also indication of distinct differences between urban (Budapest) and rural (K-puszta) sites: Budapest is urban, condensation sink is (on the average) higher than in rural, the NPFs start later (Fig 4) and they are also fewer than in rural. But, when the NPF does take place, then the values of both  $J_6$  and GR are systematically higher (Table 3), so it requires a higher threshold for everything to happen.

My critique here concerns why only the condensation sink is taken into consideration. What about all the other conventional air pollution parameters usually considered in

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the atmospheric chemistry to be involved in the NPF. Like VOCs, NO<sub>x</sub> or ammonia? ELVOCs and mentioned but there is no data. There are some values such as O<sub>3</sub> and SO<sub>2</sub> given in Table 4 but I don't seem to get a clear complete picture on O<sub>3</sub>, SO<sub>2</sub> from it. It is stated that SO<sub>2</sub> does not count, or that NPF is not sensitive on SO<sub>2</sub>. It is finally concluded that CS and H<sub>2</sub>SO<sub>4</sub> are the relevant parameters. And H<sub>2</sub>SO<sub>4</sub> being a relevant parameter requires explaining part of the H<sub>2</sub>SO<sub>4</sub> by introducing Criegee intermediate. But that, to my understanding, is not however explained by at least the O<sub>3</sub> levels. The O<sub>3</sub> levels seem to be, on the whole, apparently systematically higher in K-puszta. Please comment on this.

Also, according to Table 4, when there is NPF in Budapest but not in K-Puszta, still on the average/median the CS seems to be lower on K-puszta (6.8) than in Budapest (8.8). Please comment also on this.

To my opinion this is a good study, and the paper could be published, but prior to that the whole text within Chapters 3.2. and 3.3. should be clarified in what is actually claimed here.

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Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-115, 2016.

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