

Interactive comment on “Atmospheric particle formation events at Värriö measurement station in Finnish Lapland 1998–2002” by H. Vehkamäki et al.

Anonymous Referee #2

Received and published: 6 August 2004

General comments:

The manuscript provides an thorough analysis of new particle formation events observed in one measurement station over four years in time. While the approach used in the paper is not entirely new, the paper clearly provide new data set that adds to our current knowledge concerning the atmospheric particle formation. After some revisions along the points mentioned below, the manuscript is worth to be published in Atmospheric Chemistry and Physics.

Specific comments:

1. The detection limit and measurement uncertainty of at least the SO₂ monitor should be given. This is because of the relatively low SO₂ concentrations frequently measured at the remote site, as well as because the degree of pollution is classified according to

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SO₂ concentrations (section 2, last paragraph).

2. On page 3541 (lines 5-12) it has been speculated that one reason for the night time events might be the sulfuric acid originating from aged pollution in which practically all SO₂ has already converted into sulfuric acid. In the atmospheric boundary layer, the time scale for condensation of sulfuric acid from gas phase to pre-existing particles is always considerably shorter than the time scale over which SO₂ is oxidized into gaseous sulfuric acid. As a result, sulfuric acid concentrations cannot be very high if SO₂ concentrations are low (regardless of the pre-existing aerosol concentration or condensation sink). The only way we would reach high gaseous sulfuric acid concentrations is SO₂ depleted air would be evaporation of sulfuric acid from the particles. This is possible but not very likely. The authors should correct this point in their manuscript.

3. "2 m or 2.2 m height". What does this mean? Are there two height separated vertically by 20 cm?

4. It is stated that "higher water vapour concentrations in the air seemed to prevent particle formation" (page 3542, line 12). The authors should be more careful about the cause-effect relation. There is clearly an association (anti-correlation) between these water vapour concentrations and particles formation events, yet I doubt it can be said that the high water vapour concentrations prevent particle formation.

5. In "Conclusions" it is stated that "most of the event occurred during the spring months between March and May" (page 3544, lines ,16-17). This is not true when looking at Figure 1. The number of events between March and May was approximately 70 which is less than a half of the total number of events (147).

6. A comparison to other studies concerning the frequency of observed events, their seasonal variation and the associated particle formation and growth rates should be made beyond the extremely short comparison performed in section 3 (second paragraph; pages 3538-3539). At the very least, the comparison should cover observa-

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tions made at approximately similar latitudes in Northern Europe (mainly Finland and Northern Scandinavia) and North America.

7. Finally, although the manuscript is relatively well written, there are still a number of grammatical errors that should be corrected before publication.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 3535, 2004.

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