

Interactive comment on “Airborne measurements of nucleation mode particles I: coastal nucleation and growth rates” by C. D. O’Dowd et al.

C. D. O’Dowd et al.

Received and published: 30 December 2006

We would like to thank the referee for useful comments.

General comment: The expression ‘aerosol’ formation is replaced by ‘particle formation’ in the revised manuscript. Some parts of the manuscript are clarified as is recommended by the referee and figures are enlarged.

Specific comment: Page 8099, line 21: the sentence ‘although sulphuric — events’ is removed in the revised version.

Page 8101, line2: removed ‘the’ as is suggested.

Page 8101, line 22: ‘flow velocity’ is the right word and changed.

Page 8102, line 14: changed the section of the sentence as ‘we got an estimate of the

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—’.

Page 8103, section 2.3: We decided to keep this section, because the description of the gas measurements in an air born platform is useful, and the following QUEST 2 airborne measurement paper will more or less omit this technical description.

Page 8104, line 23: changed to ‘the aircraft’.

Page 8105, line 25 to Page 8106, line 9: These texts refer to the figure 4 and referencing was added. We removed ‘level’ to make the sentence clearer. The frequency and intensity of the nucleation events during the campaign period were low and weak compared with events at the same time of year.

Page 8106, section 3.2.1: Referee suggested that authors should comment on the bimodality of SD1 and the disappearing of the second mode. We added the following sentence, “A bimodal size distribution was observed from SD1 scan. The second size mode around 7 nm was not considered in the growth rate calculation, which is believed to grow into the larger sizes out of the SMPS scanning rage”.

Page 8107, section 3.2.3: The second modes from the long-range Lagrangian runs were not considered in this section because these second modes were not as clear as the first modes for 4 SMPS scans. Probably these 2nd modes are results of growth of newly formed particles but we are not sure these particles are formed from the same source as the first modes. We changed the whole sentence to make the meaning clearer as: “Growth rates derived during the two types of Lagrangian run showed a decreasing pattern as the air mass age. The change of growth rate as a function of time and modal diameter in an air mass are shown in Fig. 7. The increasing 2nd modal diameters obtained during the long-range Lagrangian run were not taken into account because the source region of these modes cannot be defined as clearly as the first modes. It was found that growth rate of freshly formed particles decrease dramatically as the air mass ages. The growth rate of freshly formed particles was higher than 100 nm h⁻¹, and this rate decrease rapidly until the saturation point achieved in 12 minutes

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showing the rage of 20 nm h⁻¹ - 40 nm h⁻¹ which is equivalent to 7 nm diameter.”

Page 8108, line10: changed to ‘due to reduced coagulation’ to make the sentence clearer.

Page 8108, line11: changed to ‘due to reduced condensation’ to make the sentence clearer.

Page 8108, line 26: We rewrote the whole sentence as “Our Lagrangian study showed that freshly formed particles in a same air mass can grow rapidly when 3-4 nm particles occupy majority of number concentrations. This rapid growth is hindered by the consumption of condensing or nucleating vapours, due to increasing particle surface area. Nevertheless, the growth rates for 7-8 nm diameter particles are still around 20 - 40 nm h⁻¹, showing significantly larger value than those observed in continental particle production event.”.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 8097, 2006.

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