Atmos. Chem. Phys. Discuss., 11, C10825–C10826, 2011
www.atmos-chem-phys-discuss.net/11/C10825/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterization of the inter-annual, seasonal, and diurnal variations of condensation particle concentrations at Neumayer, Antarctica" *by* R. Weller et al.

Anonymous Referee #2

Received and published: 24 October 2011

Summary

The manuscript presents continuous observation of condensation particles conducted at Neumayer station, Antarctica from 1984 through 2009 and discusses their inter-annual, seasonal, and diurnal variations. Authors report that neither significant long term trends observed in condensation particle concentrations nor their inter-annual variation related to climatic indices. Authors also report that Pinatubo volcanic eruption and strong El Nino event had no effect on condensation particle concentrations at this station. Thermodenuder experiments at two different temperatures for volatility of particles showed that both the volatile and semi-volatile particles were associated with

biogenic sulfur aerosol in austral summer while non-volatile sea salt particles were maximum in winter. The frequency of occurrence of nuclei mode particles between particle diameter of 3 to 7 nm at this station was reported to be $\sim$20%. This study benefit from good long-term dataset of condensation particle concentrations to understand climate relevant changes to aerosol dynamics but as pointed out by authors, additional long-term record of particle number-size distributions are crucial for nucleation studies and role of these ultrafine particle to condensation nuclei activation. The manuscript is well written and fairly organized. I do not have major revision but below are the general/minor comments that should be addressed for successful publication of the manuscript in ACP.

General comments: There is no justification given for temperature difference methodology used to estimate the effect of vertical mixing within the planetary boundary layer on condensation particle concentrations. The question is, can we really use this methodology to see whether the PBL is well mixed or suppressed mixing? Need justification and more discussion for effects on condensation particle concentrations. Section 4.3, authors denote peaks of UCP3,7 as nucleation events. They also pointed out that according to Dal Maso et al. (2005) a particle formation event is only existent if a distinct nucleation mode appears followed by growth over couple of hours. However, this study lacks such a measurement capability to observe this kind of nucleation event (so-called banana shape). I would suggest to remove "nucleation event" word from section 4.3 title and everywhere in the manuscript and discuss variation of ultrafine particle concentrations where applicable.

Minor corrections: Page 20717, line 17: remove word 'particular' Page 20722, line 13: there is also long data gap during 1990? Page 20723, line 9: "artifact" misspelled as "artefact" Page 20727, line 7: use word "Katabatic" instead of "catabatic" Figure scale should be shown in full, for example fig. 7 and fig. 10.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 20713, 2011.