



Monash Weather and Climate seminar series

Next seminar: Friday 6th November

Post-frontal nanoparticles at Cape Grim

Salah. I. Jimi

(School of Geography and Environmental Science, Monash University)

Observations of nanoparticle concentrations (3 – 12 nm diameters) were made over the two year period 1999 and 2000, in clean post-frontal air at the Cape Grim Baseline Air Pollution Station (CGBAPS) in Tasmania, Australia. Concentrations were determined as the difference in concentration using a condensation particle counter (CPC) and an ultra-CPC, and required careful processing to allow for sampling difficulties. Enhanced nanoparticle concentration events were found to occur throughout the year following frontal passages. The events peak concentrations were 395 cm^{-3} in summer, 479 cm^{-3} in autumn, 332 cm^{-3} in winter and 489 cm^{-3} in spring. Typically, nanoparticle concentrations peaked about 9 – 11 hours after frontal passage and contained multiple peaks with peak-to-peak separation of 8 – 11 hours. The time offset from local noon determined for the two years show maximum nanoparticle concentrations do not always coincide with or around the local noon. For most of the time, broad enhancements are observed during late evening, overnight and early morning, possibly indicative of nanoparticle production away from the observation site. Correlations between the properties of nanoparticle enhancement events and meteorological factors were weak, although events tend to occur with drier air during post-frontal subsidence. Wind speeds are also elevated during these events, suggesting stronger mixing between the free troposphere and the boundary layer. The study has allowed the first extended examination of nanoparticle behaviour following cold fronts in the Southern Ocean region and has shown that nanoparticle enhancements were present following 94% of the 121 identified cold fronts that passed Cape Grim during 1999-2000. Typical concentration enhancements were much smaller than events typically associated with near-surface production in other regions.

In this talk, we will be discussing the main purpose of an atmospheric “Baseline” station using the example of Cape Grim. We will also explain the reason(s) for focusing on a small fraction of the whole aerosol spectrum, and the behaviour of this tiny fraction of particles following frontal passages. Finally, we will suggest hypotheses for the origin of observed aerosol nucleation events in the boundary layer over the remote Southern Ocean.

Seminars held in Room 345, Building 28, Fridays 1-2pm

All Welcome!

For more information, contact Laura Davies
(room 215, 9902 0110)