Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08609, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08609
EGU General Assembly 2008

The effect of tropical convection on the aerosol population in the tropical tropopause layer

D.A. Waddicor, T. Choularton, G. Vaughan

Centre for Atmospheric Science, The School of Earth, Atmospheric and Environmental Sciences (SEAES), The University of Manchester, UK
(david.waddicor@postgrad.manchester.ac.uk / Phone: +44 (0)161 306 3911)

This study uses aerosol data from the 'Aerosol and Chemical Transport in tropIcal conVEction' (ACTIVE) campaign. The ACTIVE Campaign was based in the tropics of the northern Australia - the science centre and sampling aircraft were based in Darwin, Northern Territory. The focus of the campaign was the Tiwi Islands, 150 km northwards. The Tiwi Islands produced regular convective storms (Hectors) during the pre-monsoon period; the first of the two campaigns took place at this time (October – December 2005). During the Monsoon phase (the second campaign – January – March 2006), less organized and more widespread monsoon coastal storms were seen; a large mesoscale system also developed in this period. Data, obtained via airborne measurements, have been used to find the number concentrations and extent of aerosols in the upper troposphere, due to convective uplift. There was a difference in Planetary Boundary Layer (PBL) aerosol and chemistry between the two phases: there was a biomass burning phase in early November that produced higher CO values and organic aerosol in the pre-monsoon compared to the monsoon phase. The monsoon winds produced a cleaner PBL that was dominated by sulphate aerosol – typically from maritime origin.

The TTL data showed a reduction of aerosol in fresh anvil cases, compared to PBL concentrations. This was a clear indication that aerosol scavenging was occurring in cloud conditions. Once cloud evaporated, there were significant signs of aerosol nucleation. The release of precursor gas and water vapour from cloud is believed to promote the production of new aerosol particles. The values produced, in the size range 10 –

100 nm, were typically greater than 10,000 /cc (STP); there were extreme cases during the large mesoscale system of 24,000 /cc (STP) – always in excess of anything found in the PBL. The accumulation mode ($\sim$ 100 – 1000 nm) showed more variability during the two ACTIVE campaigns, with an apparent trend to higher concentrations in the pre-monsoon and the monsoon break. These were periods with an increased CO level and associated accumulation mode in the PBL (measured by the AMS). Possible links between the PBL loading and the effect on nucleation, in the TTL, are being sought.