Geophysical Research Abstracts
Vol. 12, EGU2010-4984, 2010
EGU General Assembly 2010

Seasonal Trends in Boundary Layer Concentrations of Halocarbons at Coastal and Forest Sites in Borneo

Andrew Robinson (1), Neil Harris (1), Bryan Gostlow (1), Louise O'Brien (1), Jeff Hawkes (1), Matt Ashfold (1), Xin Yang (1), Nicola Warwick (1), John Pyle (1), Shahrul Nadzir (2), and the Dirac_Malaysia Team

(1) Centre for Atmospheric Sciences, Department of Chemistry, University of Cambridge, UK, (2) Institute of Ocean and Earth Sciences, University of Malaya, Malaysia, (3) Global Satria S/B, Malaysia, (4) Malaysian Meteorological Department, Ketua Stesen GAW Lembah Danum, Malaysia

Halogen compounds are increasingly recognised as being important in atmospheric chemistry processes in the stratosphere and the troposphere. The sources of the halogens include natural (marine and terrestrial) and anthropogenic emissions of organic species. Long term measurements of halocarbons are currently made from various sites globally (e.g. by the AGAGE network and by NOAA-ESRL), however these sites are generally in background locations and have sparse coverage of the maritime continent which is anyway an understudied region.

From April 2008 until present we have been making measurements in Borneo from inland (forest) and coastal sites using two μDirac instruments. One instrument is based at the Bukit Atur Research Station, Danum Valley (5.0°N, 117.8°E) and the other is based at a coastal site in Borneo (Tawau, 4.2°N, 118.0°E). The instruments are gas chromatographs with electron capture detector (GC-ECD) and are capable of operating quasi-autonomously with a low level of local support. They were initially deployed as part of the OP3 project and thereafter through another NERC funded project. Here we present the results from the first two years of measurements of certain short-lived halocarbons (including CHCl3, CH2Br2/CHCl2Br, C2Cl4 and CHBr3).

High concentrations of some halocarbons have been observed at the coastal site. For 2-3 weeks in September 2008 the lowest observed values of CHBr3 were around 4 pptv, though there was no well defined background level and there were also significantly higher values (peaking at 50-150 pptv). Since then, lower background values (1-2 pptv) have been measured, with transient peaks present in all seasons except northern winter when the air comes predominantly from the northern hemisphere. The observed background concentrations at the inland site (about 85 km away) are around 1-2 pptv with relatively few of the transient peaks observed at the coast (occasional excursions to 5 pptv). These peaks are thus attributed to local marine production of CHBr3 (and similarly behaving species such as CH2Br2 and CHBr2Cl).

In contrast to bromoform, the anthropogenic tracer C2Cl4 shows much less variability with background values no higher than 3 pptv except for occasional spikes at the Tawau site (where local urban air has likely been sampled). C2Cl4 does however show a marked seasonality at both sites with a maximum in December to February ($\sim$3 pptv) and a minimum from May through to August (<1 pptv). This seasonality is shown to be largely due to the incursion of higher latitude northern hemisphere air (more polluted) in December to February. There could also be some seasonal influence on the C2Cl4 concentrations from the seasonal cycle in OH (reaction with OH being the primary loss mechanism).