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Halocarbon and alkyl nitrate measurements over the land mass of Borneo and its seas.

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Measurements of halocarbons and alkyl nitrates are presented from the Oxidant and Particle Photochemical Processes project (OP3) conducted in and above the tropical rainforest of Borneo. The data was collected from field campaigns in March/April and in June/July of 2008. A gas chromatograph mass spectrometer (GCMS) was run at the Global Atmospheric Watch (GAW) site of Bukit Atur in Danum Valley (4058'N, 117050'E, 426m asl). From this instrument data series were collected for the two ground campaigns. Whole air samples were collected on board the FAAM BAe-146 aircraft at various altitudes above the rainforest, oil palm plantations and ocean during the detachment in July. These were also analysed by GCMS.

The data will be discussed in terms of the origin of the sampled air and the influence of the emission sources associated with the vegetation types and the ocean. Correlations were observed in the ground measurements (R2 values 0.42-0.54) between some of the polybrominated halocarbons believed to be of oceanic source. Strong correlations were also observed in the aircraft samples (R2 values 0.66-0.88). Highest concentrations of bromoform (CHBr3) were seen off the south eastern coast of Sabah where mixing ratios of 2.5-3.5ppt CHBr3 were observed. Up to 2ppt of CHBr3 and dibromomethane (CH2Br2) were seen over Bukit Atur and the oil palm plantations (>50N).

Periods of elevated mixing ratios were seen simultaneously in the halocarbons and alkyl nitrates at the ground site. Clear anti-correlations between mixing ratios of CHBr3 and CH2Br2 and temperature were observed in the first campaign with concentrations peaking between 0000-0300 hours. This anti-correlation was also evident in the C3-C4 nitrates. However, this behavior was not observed in the second campaign. The time series of the second campaign shows a steady increase in mixing ratios in the first two weeks before a sudden downward trend in the final three days of measurement. The combination of ground data and aircraft data is used here to explore the influence of changing air masses, local mixing, sources and sinks in order to explain the variations observed in the mixing ratios.