

The impact of local surface changes in Borneo on atmospheric composition at wider spatial scales: Coastal processes, land-use change and air quality

Abstract

We present results from the OP3 campaign in Sabah during 2008 that allow us to study the impact of local emission changes over Borneo on atmospheric composition at the regional and wider scale. OP3 constituent data provide an important constraint on model performance. Treatment of boundary layer processes is highlighted as an important area of model uncertainty. Model studies of land-use change confirm earlier work, indicating that further changes to intensive oil palm agriculture in South East Asia, and the tropics in general, could have important impacts on air quality, with the biggest factor being the concomitant changes in NO_x emissions. With the model scenarios used here, local increases in ozone of around 50 per cent could occur. We also report measurements of short-lived brominated compounds around Sabah suggesting that oceanic (and, especially, coastal) emission sources dominate locally. The concentration of bromine in short-lived halocarbons measured at the surface during OP3 amounted to about 7 ppt, setting an upper limit on the amount of these species that can reach the lower stratosphere.