Geophysical Research Abstracts,
Vol. 11, EGU2009-8924, 2009
EGU General Assembly 2009

Box and Global Modelling for the OP3 field campaign

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The OP3 project aims to quantify the emissions of trace gases from tropical forest and study their contribution to the formation of oxidants in SE Asia. Tropical ecosystems account for almost half of global emissions of biogenic volatile organic compounds (VOCs) that play an important role in tropospheric chemistry. The main aims of OP3 are to understand how emissions of reactive VOCs from Borneo rainforest affect regional-scale production and processing of oxidants and particles in the troposphere and to understand the impact of local, regional and global scales. The field campaign phase consisted of 2 separate ground-based measurement periods at the Danum Valley Research Centre: 7th April to 4th May and 21st June to 27th July 2008.

We are using a combination of models to compare directly with measurements and study the chemical budgets and impact of the Borneo emissions on regional and global scales. We use both a detailed chemical box model and a global 3D chemical transport model, p-TOMCAT, running at very high horizontal resolution. The box model has been used to determine whether a chemical mechanism of the kind commonly used in global models can reproduce NO, NO2 and O3 observations. We have carried out a number of scenarios in order to determine the sensitivity of our results to various chemical and physical parameters. We have also carried out some preliminary studies using p-TOMCAT at very high horizontal resolution to compare NO, NO2, O3 and isoprene with measurements. We find that the model can reproduce diurnal variation reasonably well but emission estimates need to be revised for a more quantitative comparison and dry deposition plays an important role for comparing with surface measurements.