Modelling the fate of biogenic emissions from tropical rainforest

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It is well known that biogenic volatile organic compounds (BVOCs) have a highly significant impact on photochemical ozone production and particle formation, particularly in remote areas where the influence of anthropogenic emissions is small (Fuentes et al., 2000). However the fate of these compounds in the atmosphere is still poorly understood. In order to improve our understanding of how a South-East Asian rainforest contributes to these phenomena, measurements of atmospheric composition and surface fluxes of trace gases and particles are being carried out over Danum, Borneo, as part of the OP3 field campaigns. This studentship uses the Lagrangian chemistry and transport model, CiTTyCAT (Emmerson et al., 2004), in tandem with data from these campaigns, to study the behaviour of BVOCs and their oxidation products. Emission fluxes will be used to constrain the model, as BVOC emissions over South-East Asia are a largely unknown quantity, whilst measured concentrations of trace atmospheric constituents will be used to validate the output. CiTTyCAT includes detailed chemical schemes for isoprene, α-pinene and d-limonene, along with a basic consideration of the effect of sesquiterpenes on ozone and NO_x. The MEGAN biogenic emissions model (Guenther et al., 2006) has been incorporated as a on-line component to provide emissions estimates appropriate for the ambient conditions. Initial results are that concentrations of ozone, isoprene and OH can be simulated with reasonable accuracy, however some caveats apply. Future work is dependent upon the outcome of the field campaign but may include a revamped organic aerosol module, an improved wet deposition scheme and expansions of the chemical scheme to include more monoterpenes.

References

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