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Estimating the segregation intensity of isoprene and OH over a South-East Asian tropical rainforest.

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Biogenic Volatile Organic Compounds (BVOCs) such as isoprene constitute a large proportion of the global oxidant sink, whilst their oxidation products contribute to processes such as ozone production and secondary organic aerosol formation. However, over the tropical rainforest, where 50% of the global emissions of BVOCs are believed to occur, atmospheric chemistry models have been unable to accurately simulate simultaneously the measured daytime concentration of isoprene and that of its principle oxidant, OH. It has previously been shown that inefficient mixing of isoprene within the convective boundary layer leads to a segregation of isoprene and OH. A reduction in the effective rate of reaction between these compounds is one way to capture this effect in models which cannot resolve such fine-scale segregation. Recent studies comparing atmospheric chemistry global/box models with field measurements have suggested that this effective rate reduction may be as large as 50%; which is at the upper limit of that calculated using large eddy simulation models. To date only one field campaign worldwide has co-located measurements of isoprene and OH at the necessary temporal resolution to calculate the segregation of these compounds. However many campaigns have recorded sufficiently high resolution isoprene measurements to capture the small-scale fluctuations in its concentration. Using a box model of atmospheric chemistry and an approach which discretises the boundary layer according to the spectrum of isoprene concentrations measured, we attempt to develop a method to estimate segregation intensity from high-frequency isoprene timeseries and hence calculate the segregation of isoprene and OH over a South-East Asian rainforest.