Monoterpenes from tropical forest and oil palm plantation floor in Malaysian Borneo/Sabah: Emission and composition

ABSTRACT

Regional estimates of VOC fluxes focus largely on emissions from the canopy and omit potential contributions from the forest floor including soil, litter and understorey vegetation. Here, we measured monoterpene emissions every 2 months over 2 years from logged tropical forest and oil palm plantation floor in Malaysian Borneo using static flux chambers. The main emitted monoterpenes were α-pinene, β-pinene and d-limonene. The amount of litter present was the strongest indicator for higher monoterpene fluxes. Mean α-pinene fluxes were around 2.5–3.5 μg C m^{-2} h^{-1} from the forest floor with occasional fluxes exceeding 100 μg C m^{-2} h^{-1}. Fluxes from the oil palm plantation, where hardly any litter was present, were lower (on average 0.5–2.9 μg C m^{-2} h^{-1}) and only higher when litter was present. All other measured monoterpenes were emitted at lower rates. No seasonal trends could be identified for all monoterpenes and mean fluxes from both forest and plantation floor were ~ 100 times smaller than canopy emission rates reported in the literature. Occasional spikes of higher emissions from the forest floor, however, warrant further investigation in terms of underlying processes and their contribution to regional scale atmospheric fluxes.