Conference or Workshop Item (Poster)

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Title of poster: Greenhouse gas emissions in SE Asia: contrasts between an oil palm plantation and a primary forest.

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Abstract:

The South-East Asian landscape is changing fast as tropical forests are being logged, not only for timber, but also to make place for oil palm plantations. In Malaysia, oil palm represents ~13% of the total land cover compared to just 1% in the early 1970's. Such changes in land use have not only dire consequences on the local wildlife due to loss of habitat, but also impact the distribution and strength of local sources and sinks of greenhouse gases. In May 2008, an intensive measurement campaign was undertaken at the Sabahmas oil palm plantation (Sabah, Malaysian Borneo) in order to assess land-atmosphere exchanges of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Half-hourly fluxes of CO_2 were measured by eddy-covariance from a 15 m mast above the 12 m high canopy, whilst soil emissions of CH_4 and N_2O were assessed by a manual static chamber technique. Similar measurements were carried out in the Danum Valley Conservation Area, where primary forest meets selectively logged diptocarp forest. Fluxes of heat and CO_2 were measured during two periods (April and June/July 2008) at the Bukit Atur Global Atmospheric Watch (GAW); this tower stands 100 m tall and is situated on a hill, leading to an effective measurement height of 200 m above the rainforest canopy. CH_4 and N_2O were measured at different forest plots using manual chambers. In both environments, night time wind speeds were low, causing CO_2 measurements to be unreliable. Daytime fluxes revealed however that both sites were net sinks of CO_2 of mean peak amplitude -15 and -40 ?mol.m^{-2}.s^{-1} for the forest site and for the plantation, respectively. The forest site was found to be a sink of CH_4 (ca. 0.2 kg.ha^{-1}.yr^{-1}), and the plantation a net source (0.4 kg.ha^{-1}.yr^{-1}); both sites were net sources of nitrous oxide (3.2 and 4.4 kg.ha^{-1}.yr^{-1}, respectively). Both sites had overall negative global warming potentials (GWP ~ -30 tons CO_2.ha^{-1}.yr^{-1} equiv.) and were largely dependent on CO_2 exchange.
