Geophysical Research Abstracts
Vol. 19, EGU2017-18822, 2017
EGU General Assembly 2017


# The effect of peat swamp forest degradation on greenhouse gas fluxes in the Peruvian Amazon

Jeffrey van Lent (1,2), Kristell Hergoualc'h (1), Louis Verchot (3), Jan Willem van Groeningen (2), and Oene Oenema (2)

(1) Center for International Forestry Research, Bogor, Indonesia (j.lent@cgiar.org), (2) Wageningen University & Research, Wageningen, The Netherlands, (3) International Center for Tropical Agriculture, Cali, Colombia

Carbon-dense peat swamp forests in Peru are recurrently harvested for *M. flexuosa* fruits, which is typically performed by cutting down entire palms. This research aimed to evaluate how biogeochemical cycles are affected by this type of forest degradation. Total soil respiration ($R_s$), heterotrophic respiration ($R_h$), $CH_4$ and $N_2O$ fluxes, litterfall and environmental parameters were monitored monthly for two years in an undisturbed (UD), a moderately disturbed (MD), and a highly degraded site (HD). The experimental setup entailed measurements in hollows and hummocks with standing live or dead palms. $R_h$ rates were higher in hummocks than in hollows (UD: 25.9±0.5 and 17.5±0.3, MD: 14.1±1.3 and 12.4±1.2, HD: 26.8±4.7 and 18.8±3.0 kg C-$CO_2$ $ha^{-1}$ $d^{-1}$, respectively). Unexpectedly, $CH_4$ fluxes did not vary significantly between hummocks and hollows, whereas $N_2O$ fluxes followed the same trend as $R_h$. GHG fluxes from hummocks with a standing live or a standing dead palm were similar. However, degradation did reduce the relative hummock area (relative areas: 18, 10 and 4% for UD, MD, and HD, respectively). As a result, the overall weighted average $R_h$ in the MD site (12.4±1.6 kg C-$CO_2$ $ha^{-1}$ $d^{-1}$) was lower than the UD one (18.4±1.0 kg C-$CO_2$ $ha^{-1}$ $d^{-1}$), while litter input was higher (12.2±0.3 and 9.3±0.4 kg d.w. $ha^{-1}$ $d^{-1}$in the MD and UD, respectively). The HD site exhibited $R_h$ (17.5±1.2 kg C-$CO_2$ $ha^{-1}$ $d^{-1}$) and litter input (9.4±0.2 kg d.w. $ha^{-1}$ $d^{-1}$) rates similar to those of the UD site. $CH_4$ fluxes were 0.75±0.10, 0.62±0.08, 0.89±0.05 kg C-$CH_4$ $ha^{-1}$ $d^{-1}$ and $N_2O$ fluxes 1.7±0.2, 1.2±0.1, 2.0±0.3 g N-$N_2O$ $ha^{-1}$ $d^{-1}$ in the UD, MD and HD site, respectively. These findings suggest that differentiating hummocks and hollows in GHG flux assessments and accounting for changes in relative hummock areas are essential for evaluating degradation impacts on peat C and N cycling in Amazonian peat swamp forests. These results contribute to building knowledge on emission factors for tropical peat regions outside of Southeast Asia and ultimately might be helpful for supporting conservation.