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Characterizing peat palm forest degradation in the Peruvian Amazon from space and on the ground

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Peru has the second largest area of peatlands in the Tropics however little is known on how the biogeochemical cycle of its peat forests can be affected through anthropogenic intervention. The most representative land cover on peat is a Mauritia flexuosa-dominated palm swamp forest which has been under human pressure over decades due the high demand for the M. flexuosa fruit often collected by cutting down the entire palm. Degradation of these carbon-dense forests can severely affect emissions of greenhouse gases and contribute to climate change. The objectives of this research were to assess the impacts on soil trace gas fluxes and biomass carbon stocks of peat palm swamp forest degradation and to explore the potential of remote sensing methods combined with field measurements to map the distribution of peat palm swamp forest according degradation levels. Results suggest a shift in forest composition from palm- to woody-tree dominated forest following degradation. We also found that human intervention in peat palm swamp forest can translate into substantial reductions in tree carbon stocks with a decrease in initial biomass (above and below-ground) stocks (118.3 $\pm$ 1.1 Mg C ha-1) by 26 and 44% following medium and high degradation. Preliminary results suggest high and low soil CH4 and CO_2 emission rates on average, as compared to Southeast Asian peat swamp forests whereas N2O emissions are of the same magnitude. Degradation seems to disrupt soil respiration mainly through micro-climatic changes induced by reduced canopy cover. The analysis indicates a good potential to discriminate areas of peat palm swamp forest with different levels of degradation from other land covers, suggesting the feasibility of monitoring peat palm swamp forest degradation using remote sensing analyses.