



N₂O emissions in tropical rainforest and rubber plantation, the indicator from landuse changing in Xishuangbanna, Southwest China

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To understand the effects of landuse on N₂O emissions and local climate change in the tropics, we measured N₂O fluxes from a primary tropical rainforest (TRF, with treatments of litter removal and control) and a fertilized rubber plantation (RP, with treatments of fertilization (75 kg N ha⁻¹ yr⁻¹) and unfertilization) at Xishuangbanna, southwest China since 2012. The results have shown: 1) Fertilized RP N₂O emission is bimodel, one peak after dry season fertilizer, another after rainy season fertilizer. Otherwise, the unfertilized RP and TRF have the similar seasonal dynamic with one peak in the middle of rainy season. 2) due to the fertilizer influence, the poaitive correlation between soil temperature/soil moisture and N₂O was more significantly in unfertilized RP than fertilized RP respectively litter input changed the dominated controller of N₂O emission in TRF: litter carbon input and soil DOC content for control treatment and, soil temperature and soil NO₃⁻ -N for litter removal treatment. 3) lab incubation indicated denitrification and nitrification as the main source for N₂O emission in TRF and RP, respectively. 4) The N₂O emissions from the fertilized and unfertilized plots in RP were 4.0 and 2.5 kg N ha⁻¹ yr⁻¹, respectively, from control and litter removal plots in TRF were 0.48 and 0.32 kg N ha⁻¹ yr⁻¹, respectively. 5) 100-year carbon dioxide equivalence of N₂O from fertilized RP offsets 5.8% and 31.5% of carbon sink of the rubber plantation and local TRF, respectively. Upscaling it to the whole Xishuangbanna, N₂O emissions from fertilized RP offset 17.1% of the tropical rainforest's carbon sink. When tropical rainforests are converted to fertilized rubber plantations, the N₂O emission seasonal dynamic and mechanisms changed, the global warming effect is enhanced.