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Hotspots of N2O and CH4 emissions in tropical ecosystems

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At global level, tropics represent the strongest biogenic source of N2O and CH4, with natural ecosystems having a comparable or even dominant role, in terms of source strength, respect to agro-ecosystems. The uncertainty related to both sources is very high, due to the paucity of data and small frequency of sampling in tropical studies. We present data of ongoing measurements of N2O and CH4 fluxes from tropical areas of the African continent spanning from savannas to humid forests and ephemeral wetlands. Natural and managed sites are also compared. A budget at African continental level is presented based on empirical relationships derived from a reanalysis of experimental published studies. Data show that humid tropical forests are the strongest N2O terrestrial source. Both spatial and temporal variability seem to be mainly driven by organic matter inputs. At Regional level annual N2O production follows a sigmoid distribution with rainfall, a key drivers of NPP. In presence of land conversion, agro-ecosystems are significant sources of N2O in the first year following deforestation, but after 10-15 years they strongly reduce their emissions compared with primary forests. Wetlands are the strongest source of CH4 but humid forests, when analysed at landscape level, present lowland hotspots of CH4 emissions which counterbalance the CH4 sink of upland areas. Also the CH4 sink from seasonally dry areas seems weaker than previous estimates.