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Principal determinants of N_2O emission in global forest soils

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Nitrous oxide (N_2O) contributes ∼6% of the radiative forcing by the long-lived greenhouse gases (LLGHGs). It is the 3rd most-important individual contributor to the combined forcing. Atmospheric N_2O concentrations have been growing for decades, yet large uncertainties remain on the magnitude, sources and controlling factors of emissions. Data of N_2O emissions in forest soils were extracted from peer-reviewed publications. These data were observed at global distributed 157 sites across 40 countries. Soils in evergreen broadleaf forest emitted higher N_2O (2.14±2.13 kg N ha^{-1} yr^{-1}; arithmetic mean±SD) than in evergreen coniferous forest (1.15±1.45 kg N ha^{-1} yr^{-1}) and deciduous broadleaf forest (0.95±1.19 kg N ha^{-1} yr^{-1}). Consistent with the distribution of forest types, tropical forest soils emitted higher N_2O than subtropical and temperate forest soils. Principal determinants of N_2O emission in global forest soils were soil texture, organic carbon and total nitrogen, annual precipitation and humidity index, as well as forest type. Annual rate of N_2O emission per unit area can be quantified by a combination of soil parameters, climates and forest types, but the predictors were different with regard to climate zones.