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Using N₂O to detect if a tipping point has been crossed in tropical soils after droughts

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The western Amazon is particularly sensitive to drought since precipitation is common even during "dry season". The combination of increasing land use pressure and droughts due to climate change makes the scenario of this ecosystem likely to cross or having crossed tipping points. We argue that nitrous oxide (N₂O) emissions can be used to identify the crossing of tipping points in soils, particularly those related to N-cycling. This hypothesis is being tested within the BMBF funded Project PRODIGY, which will show that under stress microbial functional diversity in soils are a safety-net for ecosystems. The survey area (MAP) spreads across three countries (Peru, Brazil and Bolivia). Lab and field experiments are used to test our hypothesis based on the observations that N₂O emission under tropical pasture shift after 10 years in use. Pre-measurement modeling is used to optimize measurement designs. Replicated above-ground biodiversity levels (n=4) will be sampled in each country. The soil will also be used for lab drought manipulation experiments to unravel underlying mechanisms. Measured values have shown to be lower than expected and simulated rates. Maybe because tipping points at different spacial and temporal scales are crossed faster than in temperate regions and biogeochemistry is less understood? Results from this investigation will allow the improvement of N₂O models for tropical soils.