



## **Methane emissions and uptake in temperate and tropical forest trees on free-draining soils.**

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Forests play an important role in the exchange of radiatively important gases with the atmosphere. Previous studies have shown that in both temperate and tropical wetland forests tree stems are significant sources of methane (CH<sub>4</sub>), yet little is known about trace greenhouse gas dynamics in free-draining soils that dominate global forested areas.

We examined trace gas (CH<sub>4</sub> and N<sub>2</sub>O) fluxes from both soils and tree stems in a lowland tropical forest on free-draining soils in Panama, Central America and from a deciduous woodland in the United Kingdom. The tropical field site was a long-term experimental litter manipulation experiment in the Barro Colorado Nature Monument within the Panama Canal Zone, fluxes were sampled over the dry to wet season transition (March-August) in 2014 and November 2015. Temperate fluxes were sampled at Wytham Woods, Oxfordshire, over 12 months from February 2015 to January 2016. Tree stem samples were collected via syringe from temporary chambers strapped to the trees (as per Siegenthaler et al. (2015)) and the soil fluxes were sampled from permanently installed collars inserted to a 3cm depth.

We found that seasonality (precipitation) is a significant driver of changing soil exchange from methane uptake to emission at the Panama sites. Experimental changes to litter quantity only become significant when coupled with seasonal change. Seasonal variability is an important control of the fluxes at our temperate forest site with changes in temperature and soil water content leading to changes in soil and tree stem trace gas fluxes from Wytham Woods.

Siegenthaler, A., Welch, B., Pangala, S. R., Peacock, M., and Gauci, V.: Technical Note: Semi-rigid chambers for methane gas flux measurements on tree-stems, *Biogeosciences Discuss.*, 12, 16019-16048, doi:10.5194/bgd-12-16019-2015, 2015.