

Tree-mediated methane emissions along a tropical peat dome

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Methane production and transport processes in peatlands are fairly well understood, but growing evidence for emission of methane through trees has highlighted the need to revisit methane transport processes. We examined methane emissions from all pathways including stem and leaf emissions in one of the last remaining pristine tropical peatlands in Southeast Asia: Belait peat swamp forests, Brunei Darussalam. Methane emissions along with a range of biotic and abiotic factors were measured within three 20 x 30 m plots along transects from the edge to the center of the peat dome which is dominated by *Shorea albida*. Tree-mediated methane emissions were the dominant means of methane emissions from all three plots, with soil emissions equating to less than 30% of the total ecosystem methane flux. Both tree and soil emissions varied between and within the three plots, with soil emissions decreasing from the edge to the center of the peat dome with increasing peat depth and decreasing water table depths and tree emissions following an opposite trend. Within each plot, tree-mediated methane emissions displayed large variability with fluxes ranging between 0.2 – 9.4 mg m⁻² hr⁻¹. Relationships between tree-mediated methane emissions and pore-water methane concentrations point towards the possibility of some of these trees transporting methane produced in the deeper layers of the peat profile to the atmosphere. Taken together, these observations highlight that methane emissions through tree stems play a more central role in methane cycling in tropical peatlands.