

Tropical peat fire emissions: 2019 field measurements in Sumatra and Borneo and synthesis with previous studies

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Science Question

SE Asian peat fires are a major global source of greenhouse gases & aerosol. What are the regional average emission factors?

How do emission factors vary year to year, geographically, and with climate?

What is the best lab data for peat fires to supplement field measurements?

Analysis

Detailed field measurements of the trace gas and aerosol emissions from 35 fires in Borneo during the record high El Niño in 2015. Field measurements of 25 more fires across Borneo and Sumatra in 2019 during ENSO neutral conditions to survey spatial and temporal variability. Extended state-of-the-art emissions data measured from burning Indonesian peat in US labs.

Results

Large fire-to-fire variability is observed but converge on stable average emission factors and coefficients of variation at the regional level.

The range observed in field measurements allows straight forward selection of representative data from large-scale multi-PI lab experiments.

Significance

Large adjustments to IPCC-recommended emission factors are supported with high confidence (see table).

Smoke optical properties measured that impact remote sensing and climate.

Greatly expanded emissions data occurs when including vetted lab data.

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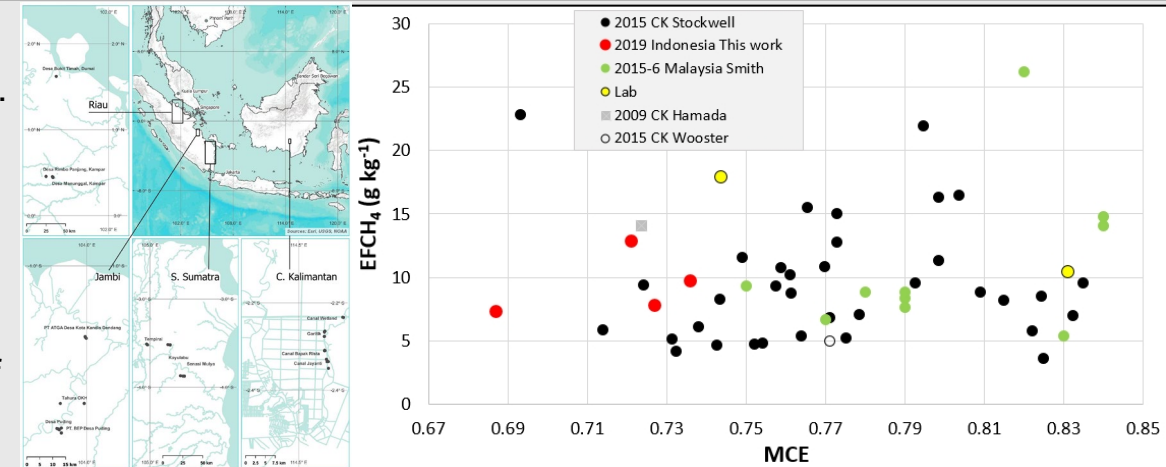


Figure 1. Field measurements of methane emission factors related to CO₂ and CO emissions (MCE) for burning tropical peat

Trace Gas	IPCC	This work	Change
	<i>g/kg</i>	<i>g/kg</i>	%
CO ₂	1703	1544 ± 66	-9
CO	210	315 ± 49	+50
CH ₄	20.8	9.8 ± 3.3	-53

Table 1. New recommended emissions for burning tropical peat