

Supplement of Atmos. Chem. Phys., 19, 11105–11121, 2019
<https://doi.org/10.5194/acp-19-11105-2019-supplement>
© Author(s) 2019. This work is distributed under
the Creative Commons Attribution 4.0 License.



Supplement of

New estimate of particulate emissions from Indonesian peat fires in 2015

Laura Kiely et al.

Correspondence to: Laura Kiely (eelk@leeds.ac.uk)

The copyright of individual parts of the supplement might differ from the CC BY 4.0 License.

Supporting Plots

Table S1: Chemistry and Physics options used in WRF-chem

Physics options		
Microphysics	Thompson	(Thompson et al., 2008)
Longwave/Shortwave radiation	RRTMG	(Iacono et al., 2008)
Land Surface Physics	NOAH	
Planetary Boundary layer	MYNN 2.5	(Nakanishi and Niino, 2006)
Cumulus parameterizations	GRELL 3D	(Grell, 2002)
Chemistry Options		
Gas-phase chemistry	MOZART	(Emmons et al., 2010)
Aerosols	MOSAIC	(Zaveri et al., 2008)
Anthropogenic Emissions	EDGAR-HTAP2	(Janssens-Maenhout et al., 2015) ²
Biogenic Emissions	MEGAN	(Guenther et al., 2006)

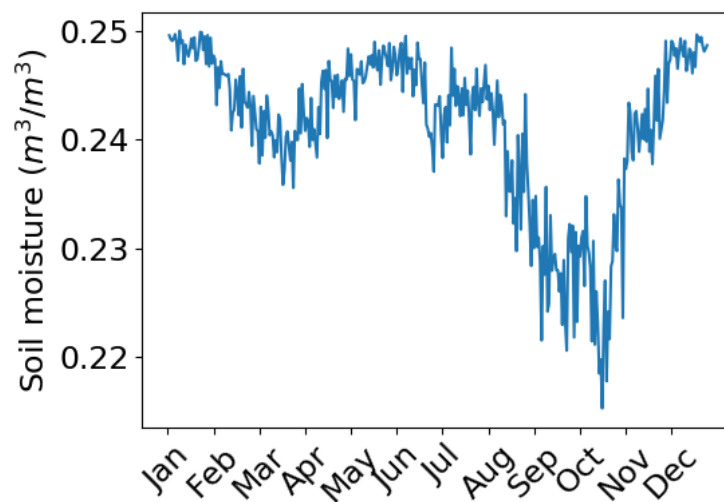


Figure S1: Daily average soil moisture for peat across the study area (95-120°E and 10°S-10°N) for 2015.

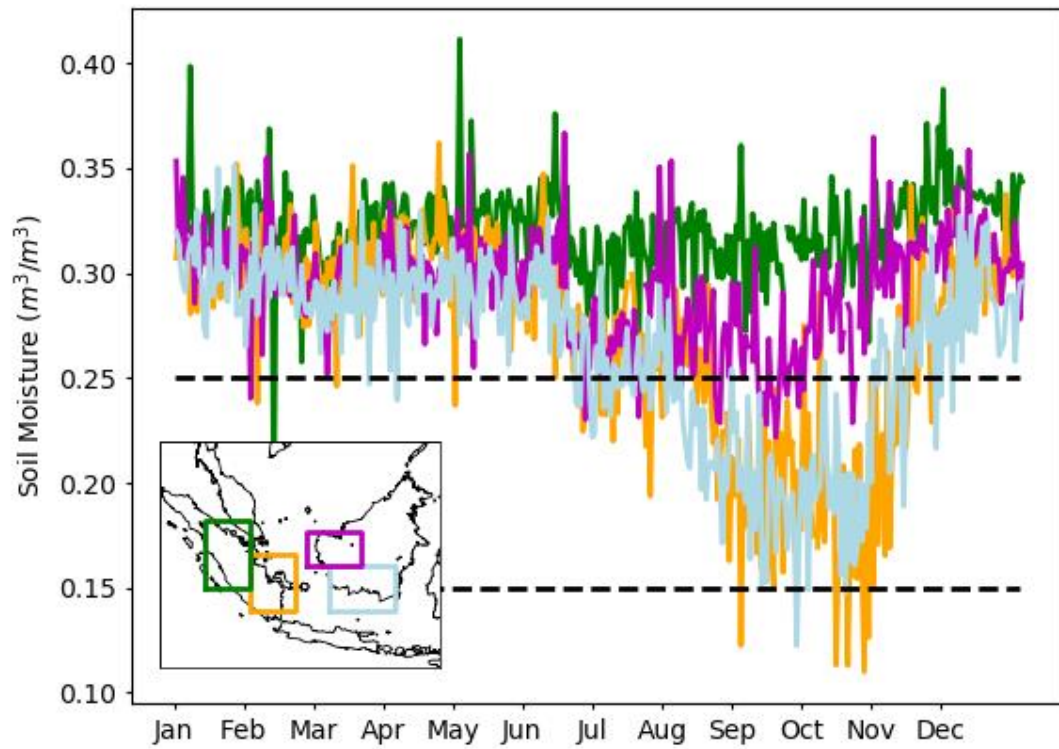


Figure S2: Soil moisture over high fire peatland regions (blue and orange) and low fire regions (green and purple). The regions are shown inset. The upper and lower soil moisture limits are shown by the dotted lines.

Equation S1

Fractional bias, FB, is defined by

$$FB = \frac{1}{N} \sum \frac{(M_i - O_i)}{(M_i + O_i)/2}$$

Where N is the number of pairs of modelled (M) and observed (O) values.

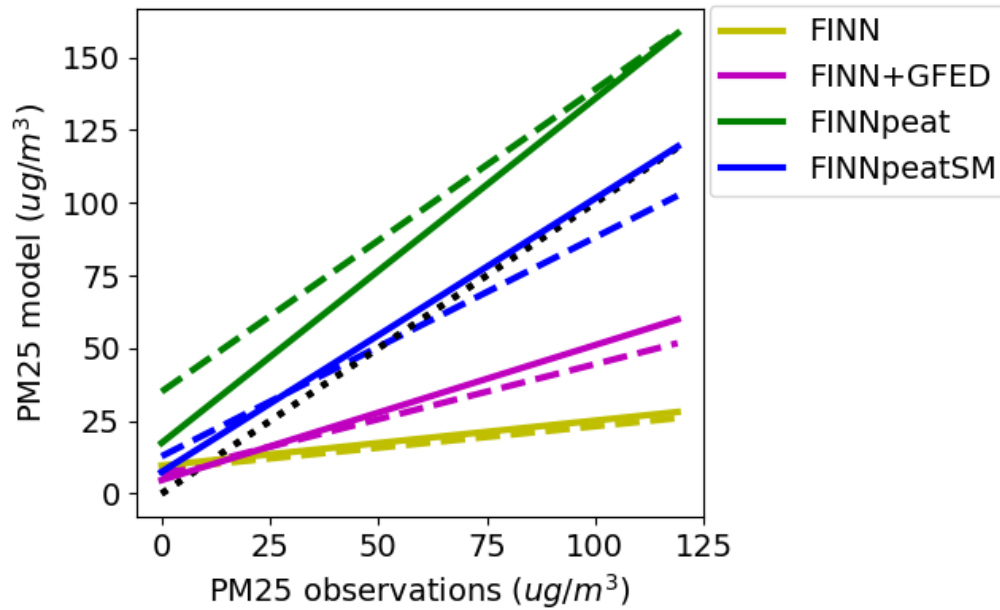


Figure S3: 24 hour mean PM_{2.5} from observations in Singapore and model simulations with different fire emissions datasets and injection options. Solid lines are simulations with surface injections, dashed lines and simulations with boundary layer injection. 1:1 relationship shown by black dotted line. The fractional bias for each comparison is (for model runs with surface injection and boundary layer injection respectively), -1.01 and -1.05 for FINN, -0.64 and -0.71 for FINN+GFED, 0.09 and 0.14 for FINNpeat, -0.17 and -0.26 for FINNpeatSM. The r correlation coefficient for each comparison (for model runs with surface injection and boundary layer injection respectively), is 0.48 and 0.64 for FINN, 0.73 and 0.69 for FINN+GFED, 0.56 and 0.38 for FINNpeat, and 0.60 and 0.53 for FINNpeat.

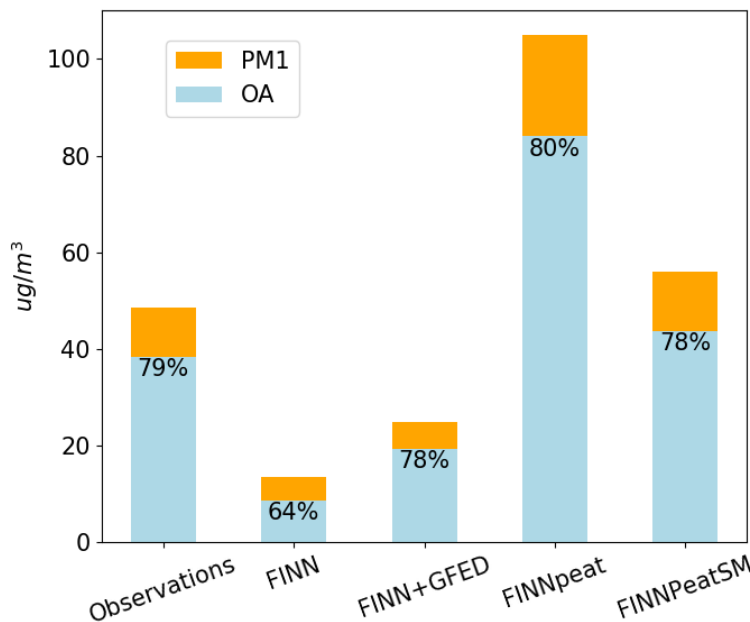


Figure S4: Average PM₁ and OA in Singapore for October 10th-31st, for observations and WRF-chem runs with the boundary layer injection option and different fire emissions datasets. The percentage contribution of OA to PM₁ is shown on each bar. PM₁ observations are made up of Cl, NH₄, NO₃, SO₄, OA. PM₁ from the model is NH₄, NO₃, SO₄, OA.

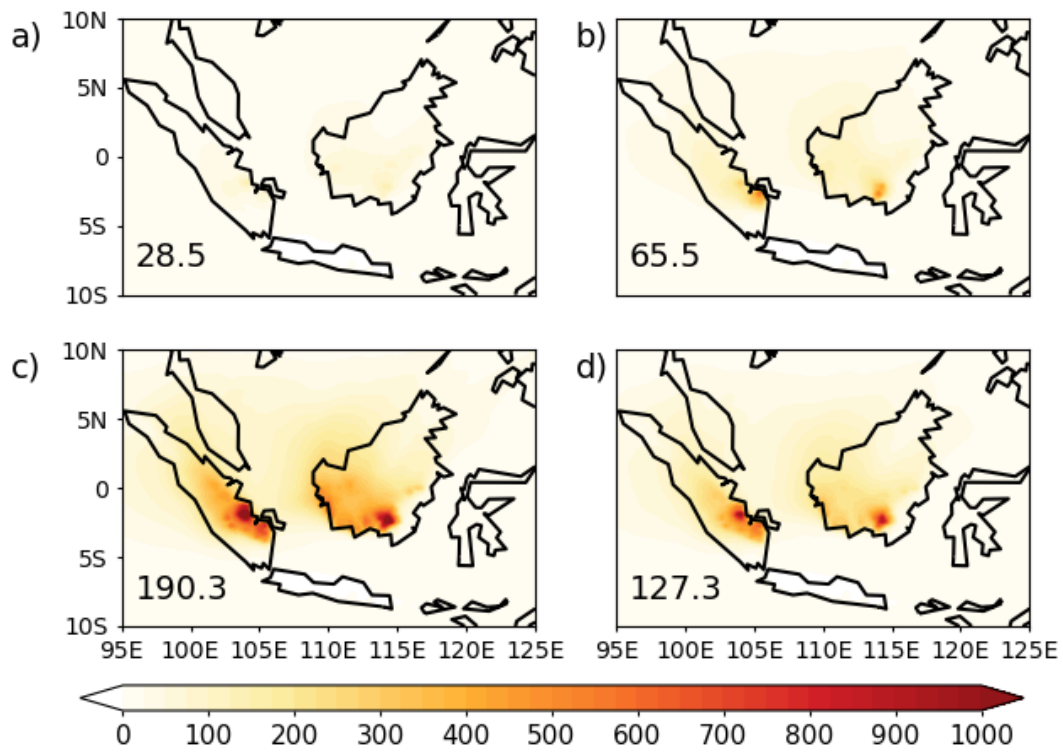


Figure S5: Mean model surface PM_{2.5} concentration (µg m⁻³) from fires for Sep-Oct 2015 with the boundary layer injection and (a) FINN emissions, (b) FINN+GFEDpeat, (c)FINNpeat and (d) FINNpeatSM . On each plot is the surface PM_{2.5} from fires averaged over Sumatra and Kalimantan for September and October

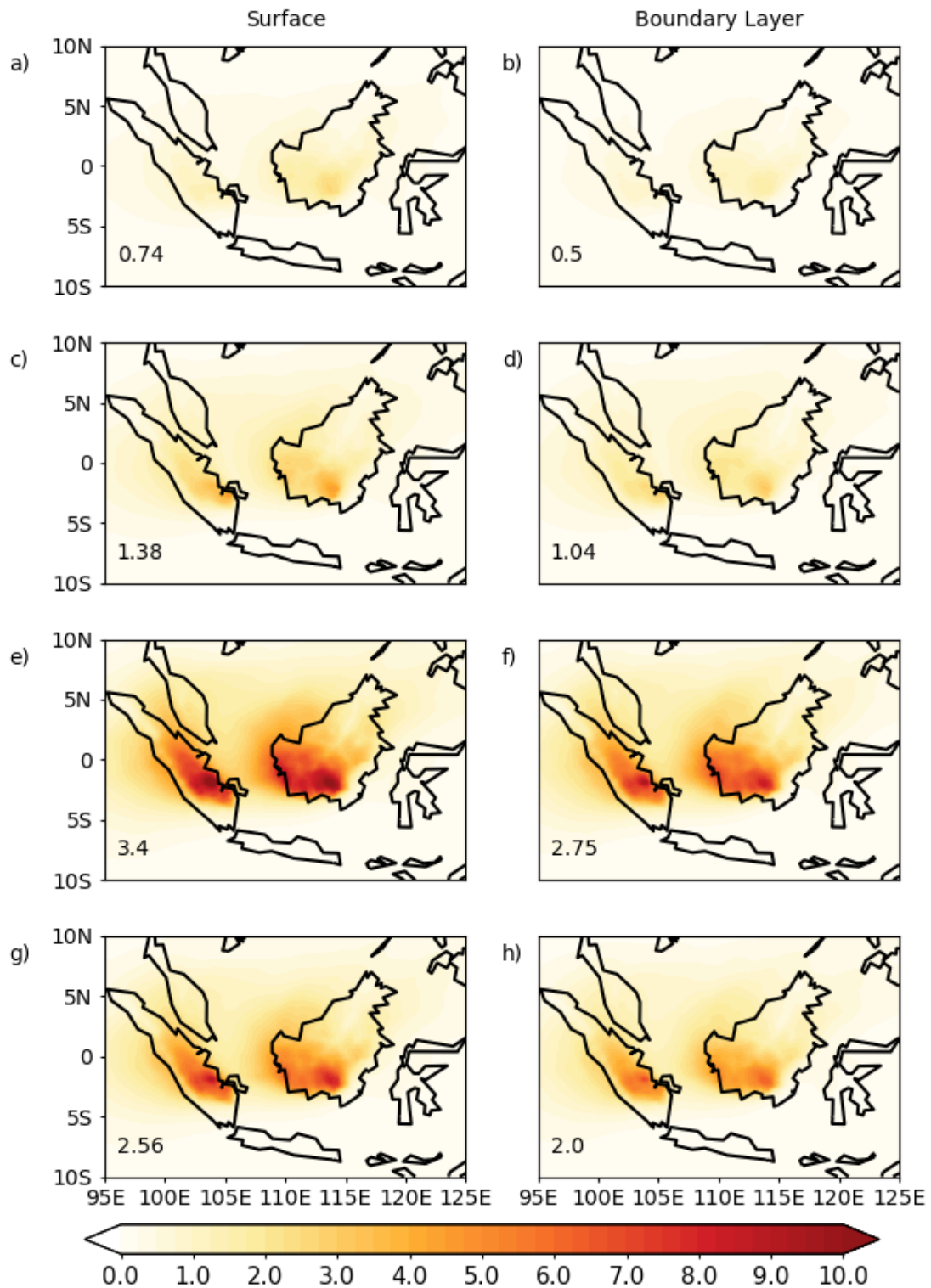


Figure S6: Mean AOD from fires for Sep-Oct 2015 with the surface (a,c,e,g) and boundary layer injection (b,d,f,h) and FINN emissions (a-b), FINN+GFEDpeat (c-d), FINNpeat (e-f) and FINNpeatSM (g-h). On each plot is the average AOD from fires for Sumatra and Kalimantan during September and October.