

Supplementary Information for:

“Fire emissions and regional air quality impacts from fires in oil palm, timber, and logging concessions in Indonesia”

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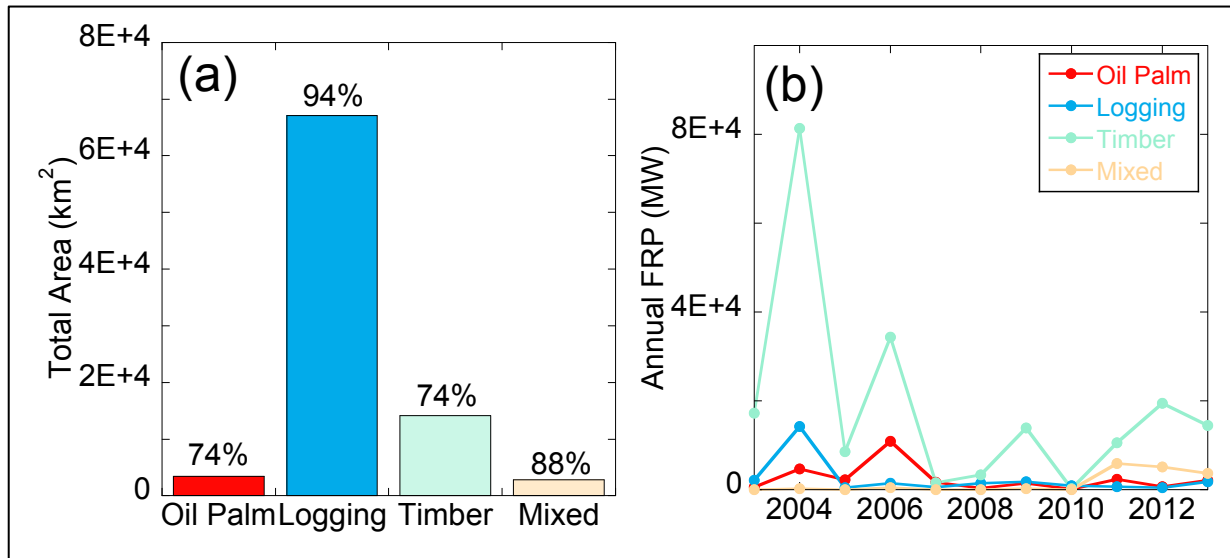


Figure S1. a) Total area (km²) within each concession type for Papua (World Resources Institute 2015b, 2015c, 2015a), with percentages giving remaining forest cover in 2012, based on land cover from Margono et al. (2014), and b) Annual MODIS FRP from 2003-2013 (in MW) for each concession type. Refer to Figures 2 and 3 in the main text for area and FRP totals for Sumatra and Kalimantan.

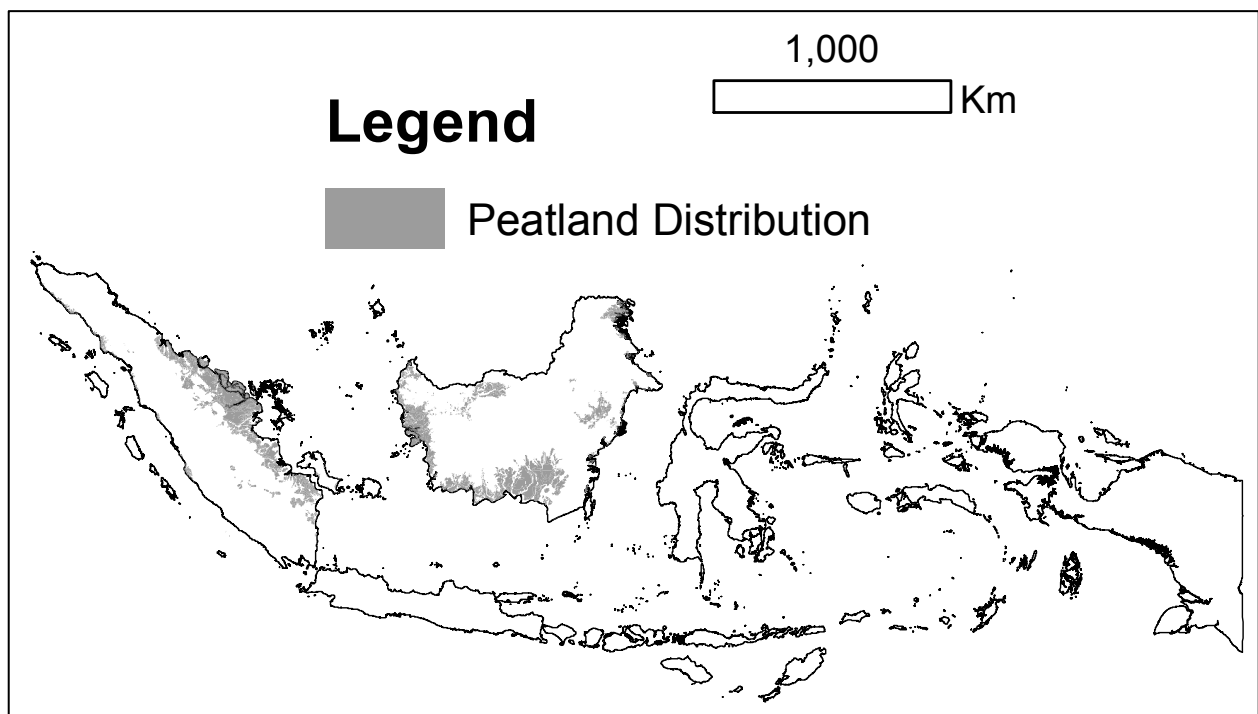


Figure S2. Peatland distribution for Sumatra and Kalimantan (Wahyunto *et al* 2004, 2003).

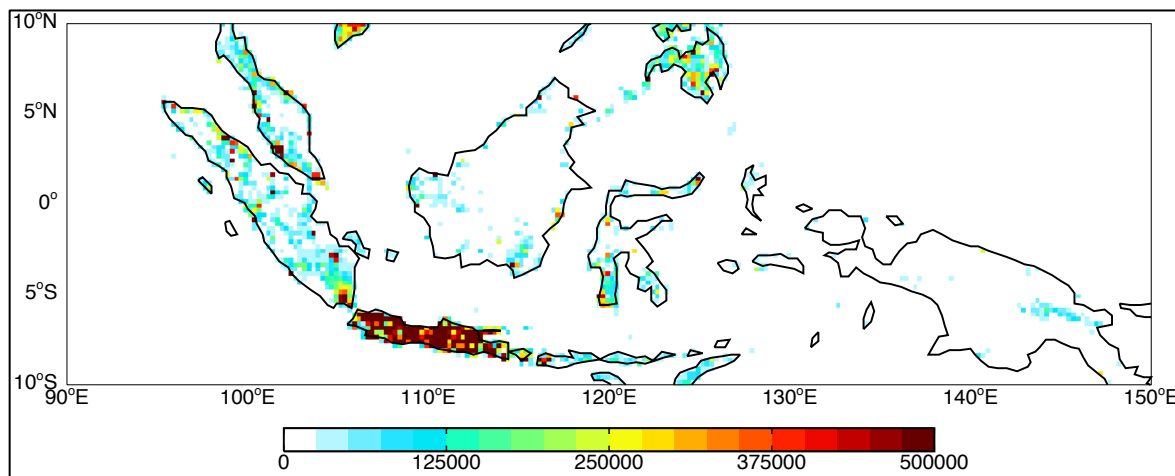


Figure S3. Population distribution (persons per 0.25° grid cell) used for the adjoint model calculations (from <http://web.ornl.gov/sci/landscan>).

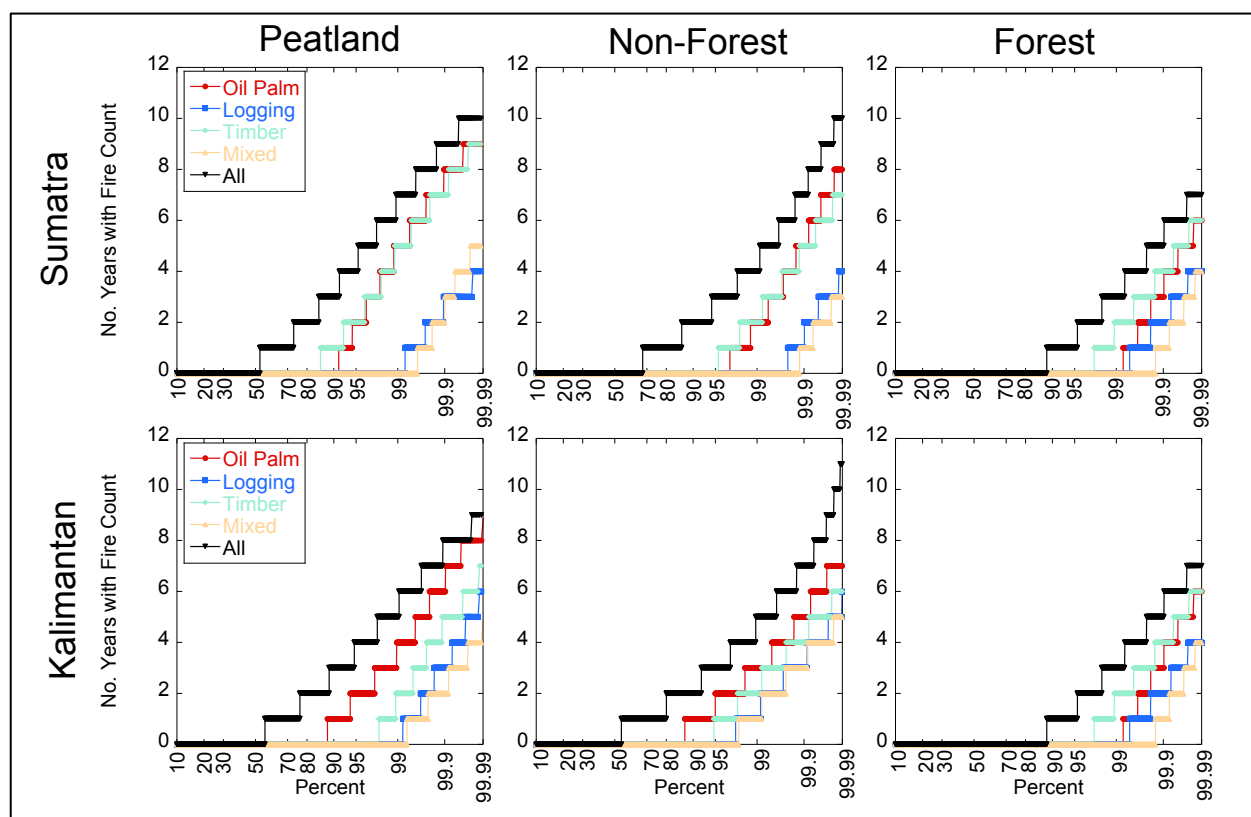


Figure S4. Number of years with fire observations from 2003-2013, calculated for all 1-km² pixels in Sumatra (top row) and Kalimantan (bottom row) with respect to individual concession types (colored lines) and all land area both within and outside of concessions (“All,” black lines). An observation of 11 indicates that a pixel burned every year from 2003-2013. Columns indicate observations for: 1) peatlands only, 2) non-forest, and 3) intact + degraded forest.

Fire Source	Sumatra (25 Tg DM total)			Kalimantan (48 Tg DM total)		
	DEF	PET	NF	DEF	PET	NF
Oil Palm	1%	10%	2%	8%	38%	22%
Timber	0%	0%	0%	1%	1%	2%
Logging	2%	28%	55%	2%	2%	19%
Mixed	0%	0%	1%	1%	0%	5%

Table S1. Contribution of individual concession types to fire emissions estimates for July to November 2009 (in % of emissions from all concessions, by island). Total concession emissions from Sumatra and Kalimantan were 25 Tg and 48 Tg dry matter (DM), respectively. DEF=deforestation, PET=peatland, and NF=non-forest fires. Mixed concessions are due to overlapping boundaries of oil palm, timber, and/or logging concessions.

References:

- Margono B A, Potapov P V, Turubanova S, Stolle F and Hansen M C 2014 Primary forest cover loss in Indonesia over 2000–2012 *Nature Clim. Change* **4** 730–5
- Wahyunto S, Rintung and Subagjo H 2004 *Peta Luas Sebaran Lahan Gambut dan Kandungan Karbon di Pulau Kalimantan / Maps of Area of Peatland Distribution and Carbon Content in Kalimantan, 2000-2002*. (Bogor, Indonesia: Wetlands International - Indonesia Programme & Wildlife Habitat Canada (WHC))
- Wahyunto S, Rintung and Subagjo H 2003 *Peta Luas Sebaran Lahan Gambut dan Kandungan Karbon di Pulau Sumatera / Maps of Area of Peatland Distribution and Carbon Content in Sumatera, 1990-2002*. (Bogor, Indonesia: Wetlands International - Indonesia Programme & Wildlife Habitat Canada (WHC))
- World Resources Institute 2015a *Logging* Online: <http://www.globalforestwatch.org>
- World Resources Institute 2015b *Oil Palm* Online: <http://www.globalforestwatch.org>
- World Resources Institute 2015c *Wood Fiber* Online: <http://www.globalforestwatch.org>