

# Updated Air Pollution Exposure Estimate for Central Kalimantan, Indonesia using Network of Purple Air PM<sub>2.5</sub> sensors

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## Abstract

Air pollutant emissions from wildfires on Indonesian peatlands lead to poor regional air quality across south-east Asia. Fine particulate matter (PM<sub>2.5</sub>) emissions are particularly high for peat fires leading to substantial population exposure to PM<sub>2.5</sub>. Despite this, air quality monitoring is limited in regions close to peat fires meaning the impacts of peatland fires on both outdoor and indoor air quality is poorly understood. To address this, we deployed a network of low-cost (Purple Air) PM<sub>2.5</sub> sensors at 8 locations across Central Kalimantan, where peat fires are frequent. The sensors measured indoor and outdoor PM<sub>2.5</sub> concentrations in urban and rural locations during August to December 2023. During the peak dry season (September 1<sup>st</sup> - October 31<sup>st</sup>), outdoor PM<sub>2.5</sub> concentrations were 136  $\mu\text{g m}^{-3}$  and indoor PM<sub>2.5</sub> concentrations were 133  $\mu\text{g m}^{-3}$ . Accounting for variability in other sources, we estimate fires contribute  $\sim 90 \mu\text{g m}^{-3}$  to both outdoor and indoor PM<sub>2.5</sub> concentrations. We use indoor/outdoor (I/O) ratios to examine the importance of indoor and outdoor air pollution sources. The peak dry season median I/O ratio for fire-derived PM<sub>2.5</sub> was 0.9 at urban sites and 0.86 at rural sites, substantially greater than I/O ratios reported in North America. This indicates that housing stock in Kalimantan provides little protection from outdoor PM<sub>2.5</sub> and it is difficult for the local population to reduce their exposure during haze episodes. I/O ratios also indicated that outside of the dry season, when there are no fires, there may be important sources of indoor air pollution in urban and rural areas. A further 100 Purple Air sensors will be deployed around Central Kalimantan in June 2024 in homes, offices and educational settings. The sensors will measure indoor and outdoor PM<sub>2.5</sub> concentrations between June and November 2024. We hope to present some initial results of this work too.

## Early Career Scientist

NO, I am not an early career scientist.

## IGAC Activities

BBURNED: Biomass Burning Uncertainty: ReactionNs, Emissions and Dynamics, Allin-Wayra: Small Sensors for Atmospheric Science, MAP-AQ: Monitoring, Analysis and Prediction of Air Quality