New Approach in Modelling Indonesian Peat Fire Emission

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Abstract

Peat fires are a serious problem for Indonesia, producing devastating environmental effects and making~~lead~~ the country ~~as~~ the 3rd largest emitter of CO_2. Extensive fires ravaged vast areas of peatlands in Sumatra, Kalimantan and Papua during the pronounced El-Nino of 2015, ~~attract~~causing international concern when the resultant haze blanketed Indonesia and neighboring countries, severely impacting the health of millions of people. Our recent unprecedented *in-situ* studies of aerosol and gas emissions from 35 peat fires of varying depths near Palangka Raya, Central Kalimantan have documented the range and variability of emissions from these major fires. We strongly suggest revisions to previously recommended IPPC's emission factors (EFs) from peat fires, notably: CO_2 (-8%), CH_4 (-55%), NH_3 (-86%), and CO (+39%). Our findings clearly showed that Indonesian carbon equivalent measurements (100 years) might have been 19% less than what current IPCC emission factors indicate. The results also demonstrate~~s~~ the ~~worst and~~ toxic air quality in the area with~~,~~ HCN, which is almost only emitted by biomass burning, ~~is~~ accounting for 0.28% and the carcinogenic compound ~~of~~ formaldehyde ~~found at~~ 0.04% of emissions. However, considerable variation in emissions may exist between peat fires of different Indonesian~~'s~~ peat formations, illustrating~~pointing~~ the need for ~~the~~ additional regional field emissions measurements for~~to~~ parameterizing~~e our~~ peatland emissions models for all of Indonesia's major peatland areas. T~~Here, t~~hrough the continuous mutual research collaboration between the Indonesian and USA scientists, we will implement our standardized field-based analyses of fuels, hydrology, peat burning characteristics and fire emissions to characterize the three major Indonesian peatland formations across ~~the~~ four study provinces (Central Kalimantan, Riau, Jambi and West Papua). We will provide spatial and temporal drivers of the modeled emissions and validate them~~it~~ at a national level using biomass burning emissions estimations derived from Visible/Infrared Imager and Radiometer Suite (VIIRS). Multiple LiDAR datasets (2014, 2011, 2007) for Kalimantan will be used to quantify model accuracy, and new work will be undertaken to quantify uncertainty in our most recent LiDAR-based digital terrain model (DTM), further improving assessments of modelling errors.

Keywords: Peatland, peat fire, emissions, modelling

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