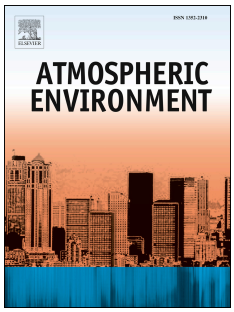
Accepted Manuscript



Emissions of volatile organic compounds from maize residue open burning in the northern region of Thailand

Duanpen Sirithian, Sarawut Thepanondh, Melanie L. Sattler, Wanna Laowagul

PII: S1352-2310(17)30879-8

DOI: 10.1016/j.atmosenv.2017.12.032

Reference: AEA 15751

To appear in: *Atmospheric Environment*

Received Date: 30 June 2017

Revised Date: 18 December 2017

Accepted Date: 21 December 2017

Please cite this article as: Sirithian, D., Thepanondh, S., Sattler, M.L., Laowagul, W., Emissions of volatile organic compounds from maize residue open burning in the northern region of Thailand, *Atmospheric Environment* (2018), doi: 10.1016/j.atmosenv.2017.12.032.

Emissions of volatile organic compounds from maize residue open burning in the northern region of Thailand

Duanpen Sirithian[1,2], Sarawut Thepanondh[1,2*], Melanie L Sattler[3], Wanna Laowagul[4]

[1] *Department of Sanitary Engineering, Faculty of Public Health, Mahidol University, 10400 Bangkok, Thailand*
[2] *Center of Excellence on Environmental Health and Toxicology (EHT), Bangkok, 10400, Thailand*
[3] *Department of Civil Engineering, The University of Texas at Arlington, Arlington, TX, 76019, USA*
[4] *Environmental Research and Training Center, Department of Environmental Quality Promotion, Ministry of Natural Resources and Environment, Pathumthani, 12120, Thailand*

[*] Corresponding author: Sarawut Thepanondh
Phone: +662-354-8540
Fax: +662-354-8540
E-mail: sarawut.the@mahidol.ac.th

Abstract

Emission factors for speciated volatile organic compounds (VOCs) from maize residue burning were determined in this study based on chamber experiments. Thirty-six VOC species were identified by Gas Chromatography/Mass Spectrometer (GC/MS). They were classified into six groups, including alkanes, alkenes, oxygenated VOCs, halogenated VOCs, aromatics and other. The emission factor for total VOCs was estimated as about 148 mg kg^{-1} dry mass burned. About 68.4% of the compounds were aromatics. Field samplings of maize residues were conducted to acquire the information of fuel characteristics including fuel loading, fraction of maize residues that were actually burned as well as proximate and elemental analysis of maize residues. The emission factors were then applied to estimate speciated VOC emissions from maize residue open burning at the provincial level in the upper-northern region of Thailand for the year 2014. Total burned area of maize covered an area of about 500,000 ha which was about 4.7% of the total area of upper-northern region of the country. It was found that total VOC emissions released during the burning season