

Annual variation of solvent-extractable organic compounds in PM_{2.5} in Malaysia – Influence of Indonesian peatland fires –

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Keywords: PM_{2.5}, Levoglucosan, *n*-alkane.

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Transboundary haze from Indonesian peatland fires is a serious problem in Malaysia during the burning season from June to October. Short-term field studies have been conducted to characterize the haze focusing on biomarkers (organic compounds derived from biomass burning) during a few haze days in Malaysia (e.g., Abas *et al.*, 2004; Fang *et al.*, 1999). However, the biomarker data from long-term observations are not available to specify the signature of the peatland fire in Malaysia. In this study, the carbonaceous species of PM_{2.5} during haze periods were characterized based on annual observations.

PM_{2.5} samples were taken at a location in Petaling Jaya, Malaysia from August 2011 to July 2012. PM_{2.5} samplings (sampling number: 81) were conducted at the roof of the Malaysian Meteorological Department main building (~100 m above ground level, Latitude, Longitude: 3° 06' N, 101° 39' E). A Tisch high volume air sampler (Model TE-3070V-2.5-BL) was utilized to continuously collect PM_{2.5} on a quartz fiber filter for 24 hours at a flow rate of 1.13 m³ min⁻¹. After sampling, solvent-extractable organic compounds were quantified by gas chromatography/mass spectrometry. We determined biomarkers such as levoglucosan and mannosan, and *n*-alkanes (C20–33).

Figure 1 shows the monthly average concentrations of levoglucosan in PM_{2.5} and total hotspot counts in Sumatra Island, Indonesia detected by NOAA-18 (Indofire). Monthly average concentrations of levoglucosan ranged from 34.4 to 226 ng m⁻³, which showed the highest concentration of 226 ng m⁻³ on June 2012, followed by September 2011 (212 ng m⁻³). These two months were haze periods and many hotspots were detected in Sumatra as shown in Fig. 1. Then, the ambient air quality was considered to be affected by Indonesian wildfires in Sumatra. The monthly variations of mannosan, galactosan, *p*-hydroxybenzoic acid, vanillic acid and C25–33 of *n*-alkanes showed similar trends as those of levoglucosan. In contrast, no significant differences in the concentrations of cholesterol (source indicator for meat cooking) were found at 1.23 ± 0.582 ng m⁻³ throughout the sampling period.

Chain-length distributions of particulate *n*-alkanes during haze (September 2011 and June 2012) and non-haze periods are shown in Fig. 2. Although there were no significant differences in C20–24 concentrations through the annual observations, remarkable differences in C25–33 concentrations between the haze and non-haze

periods were observed. Interestingly, there were no significant differences in the carbon preference indexes (CPIs) calculated from C20–33 concentrations through the annual observations at 1.13 ± 0.194. This result indicates that CPIs cannot be used as a source indicator for Indonesian peatland fires in Malaysia.

References

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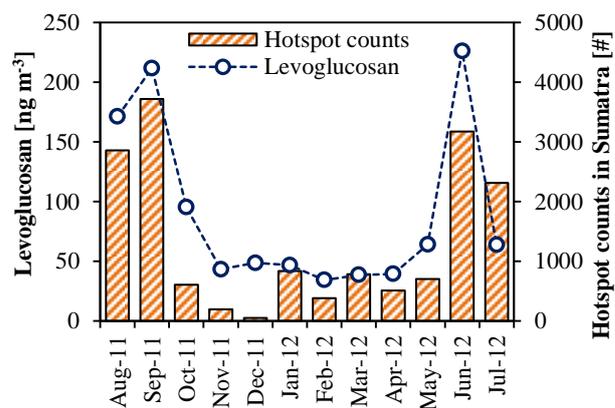


Figure 1 Monthly concentrations of levoglucosan in PM_{2.5} and total hotspot counts in Sumatra Island detected by NOAA-18.

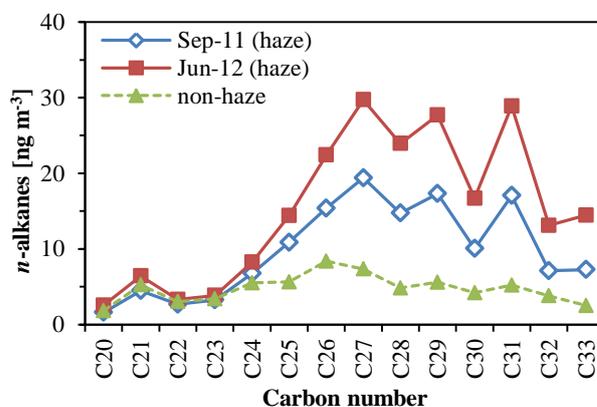


Figure 2 Chain-length distributions of particulate *n*-alkanes during haze and non-haze periods.