

## Using small compact PM<sub>2.5</sub> sensors, long term and multipoint measurements in Hanoi, Vietnam

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A year round observation of PM<sub>2.5</sub> mass concentrations was conducted in Hanoi University of Science and Technology (HUST) from July 2016 to now using newly developed highly sensitive sensors. And also from October 2017 to now, we have installed the PM<sub>2.5</sub> sensors in Thai Nguyen University of Technology (TNUT) and Vietnam National University of Agriculture (VNUA). Hourly PM<sub>2.5</sub> concentration data in HUST agreed well with corresponding data obtained with a beta attenuation monitor, located 3 km away. The monthly variation showed that PM<sub>2.5</sub> levels were high in the dry season, particularly in December (median = 62 mg m<sup>-3</sup>) and low in the rainy season, particularly in June and July (medians = 19 mg m<sup>-3</sup>). PM<sub>2.5</sub> haze episodes with levels higher than 100 mg m<sup>-3</sup> were observed 13 times during the dry season (October 2016–March 2017). These episodes may link to meteorological conditions, because the daily PM<sub>2.5</sub> and CO levels increased several days after a cold surge for most of the PM<sub>2.5</sub> haze episodes. Two episode events were investigated further in higher temporal resolution. For both events, PM<sub>2.5</sub> peaks appeared at midnight for some days after a cold surge, while CO levels often increased at rush hours. For first event, short peaks of PM<sub>2.5</sub> (duration of about 1 h) with fast rates of increase of ~5 mg m<sup>-3</sup> min<sup>-1</sup> were observed. This highlights the importance of high temporal resolution of PM<sub>2.5</sub> sensors in assessing of health effect. For second event, a broad peak (duration of one and half days) of PM<sub>2.5</sub> with gradual increase was observed together with high CO levels. This research reveals for first time characteristics of PM<sub>2.5</sub> haze episode in Hanoi that should be studied further to develop an effective air pollution management in this city. This study is supported by JSPS Kakenhi (17H04483).

Keywords: PM<sub>2.5</sub> measurement, compact sensor, air quality, Mega city, Southeast Asia

