



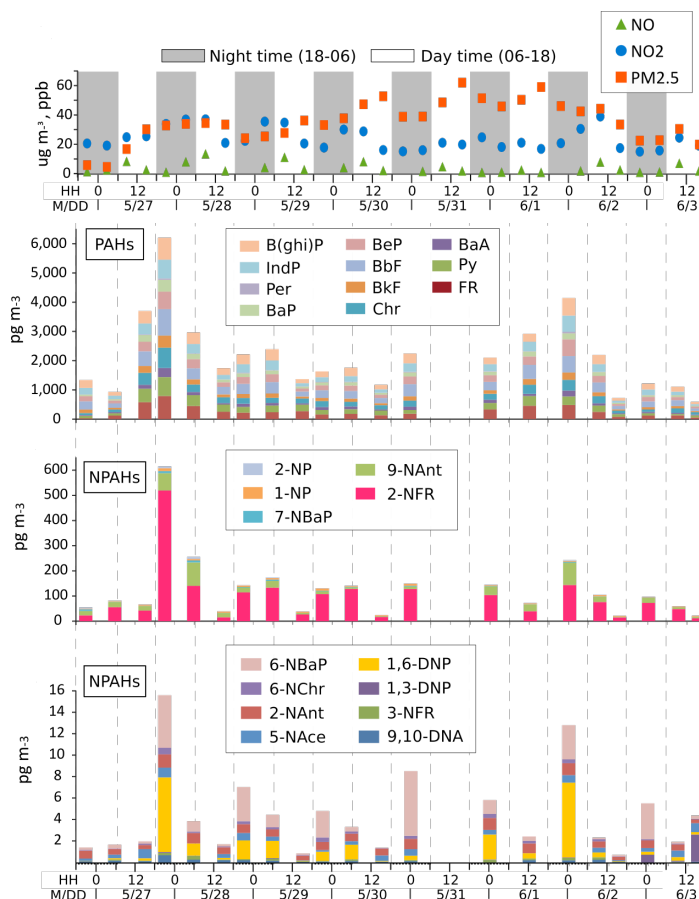




### 3) Diurnal concentrations of NPAHs and PAHs in Osaka city during transboundary air pollution

Summary of the concentrations of PM<sub>2.5</sub>, a sum of PAHs ( $\Sigma$ PAHs), and a sum of NPAHs ( $\Sigma$ NPAHs) are shown in Table 2. The concentrations of  $\Sigma$ NPAHs ranged within values previously observed by some researchers<sup>6</sup>. Maximum of  $\Sigma$ PAHs was higher in Autumn and Winter compared with Spring. In contrast, the relatively higher value of the maximum of  $\Sigma$ NPAHs was observed in Spring, suggesting the differences in concentrations of gas phase PAHs or in the formation rate of NPAHs with the season.

Figure 3 shows the temporal variations of concentrations of NPAHs, PAHs, PM<sub>2.5</sub>, NO, and NO<sub>2</sub> on May 26–June 3, 2014, at Osaka city. Preliminary analysis revealed that the increase in the concentrations of PM<sub>2.5</sub> during May 27–June 2 was the effect of transboundary air pollution from the Asian continent<sup>5</sup>. The relatively high concentrations of PAHs and the ratios of FR/Py (1.2) and BaP/BeP (0.57) during this period indicated that the PAHs were originated from coal combustion and transported long distance<sup>7,8</sup>. Interestingly, diurnal variations in the concentrations of NPAHs differed from those of PAHs. It appears that the concentrations of secondary NPAHs were increased at night time; this trend was pronounced after the remarkable increase in the concentrations of PAHs. Mean value of a ratio of 2-NFR/2-NP (47) indicated that NO<sub>3</sub> initiated pathway was dominant formation pathway of 2-NFR<sup>9</sup>. Our results suggested that portions of the PAHs originated from the transboundary air pollution were nitrated at night time mainly via the NO<sub>3</sub> initiated pathway.



**Fig. 3 Concentrations of PAHs, NPAHs, PM<sub>2.5</sub>, NO, and NO<sub>2</sub> in May 26–June 3, 2014 at Osaka, Japan.**

#### Acknowledgments:

This study was supported by Environment Research and Technology Development Fund (5-1602) of Environmental Restoration and Conservation Agency, Japan and Type II joint research of National Institute for Environmental Studies of Japan and environmental research institutes of local government (1315AH002, 1618AH003). The reference aerosol sample was kindly supplied by Dr. Fumikazu Ikemori of Nagoya City Environmental Science Research Institute.

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