

## **Supplemental materials**

Different transport behaviors between Asian dust and polycyclic aromatic hydrocarbons in urban areas: monitoring in Fukuoka and Kanazawa, Japan

### **Text S1. Sampling and transporting method.**

The high-volume air samplers were set at the rooftop of National Fukuoka Hospital (15 m from the ground) and the Graduate school of Medical Science of Kanazawa University (15 m from the ground) (Figure S1). The sampling time was set at 10:00 and 13:30 in Fukuoka and Kanazawa, respectively. TSP mass was measured based on filter weights before and after sampling. The weighting procedure was conducted at the sampling sites. Then, the filters were transported to the Kanazawa University to extract and analyze PAHs.

**Text S2.** The extraction and analysis of PAHs.

Roughly 50 cm<sup>2</sup> of filter was cut from the glass fiber filter and was thoroughly cut into small pieces (around 1×1 cm<sup>2</sup>) in a glass flask. An aliquot of the PAH internal standards (Pyr-*d*<sub>10</sub> and BaP-*d*<sub>12</sub>) was added into each flask. A total of 80 mL ethanol:benzene (v/v 1:4) was used to extract PAHs by sonication. The extract was cleaned with NaOH 5 %, H<sub>2</sub>SO<sub>4</sub> 20 % and ultra-pure water. The organic phase was evaporated under gentle nitrogen gas until 100 μL before reconstituting with 900 μL acetonitrile (ACN) and filtering into a vial.

High-performance liquid chromatography (HPLC) coupled with a fluorescent detector was utilized with an Inertsil ODS-P16 column (250×4.6 mm i.d., 5 μm) at 20°C, and a flow rate of 1 mL min<sup>-1</sup>. Gradient mobile phase (ACN and water) was followed: 0–10 min: 50 to 55 % ACN, 10–25 min: 70 to 75 % ACN, 25–50 min: 80 to 100 % ACN, 50–80 min: 100 % ACN. All organic solvents were guaranteed reagent and HPLC grade from Fuji Film Wako Pure Chemical Industries, Ltd., Japan. Standard PAH solutions were prepared by diluting SS EPA 610 PAH Mix (Supelco, U.S.A.) with ethanol.

The recovery test was conducted by spiking the internal standard mixture with known concentrations on blank and sample filters, then extracting and analyzing using the method described above. The recovery was 110–120%.

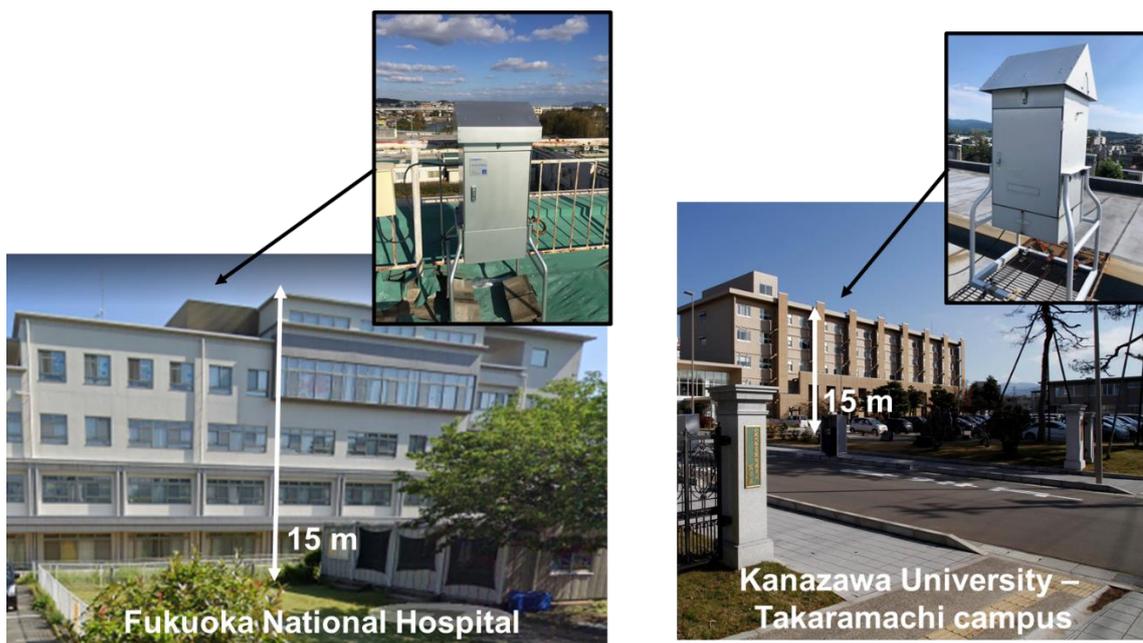
The reproductivity test was performed by analyzing the same samples using the same method at two facilities at Kanazawa University. The reproductivity range was 90–115%. Moreover, at each sequence of analysis, a standard mixture was run and compared with the previous analysis. The relative standard deviation (RSD) was within 15%.

**Table S1.** Dates of AD events and their TSP and PAH concentrations in Fukuoka and Kanazawa in 2020 and 2021.

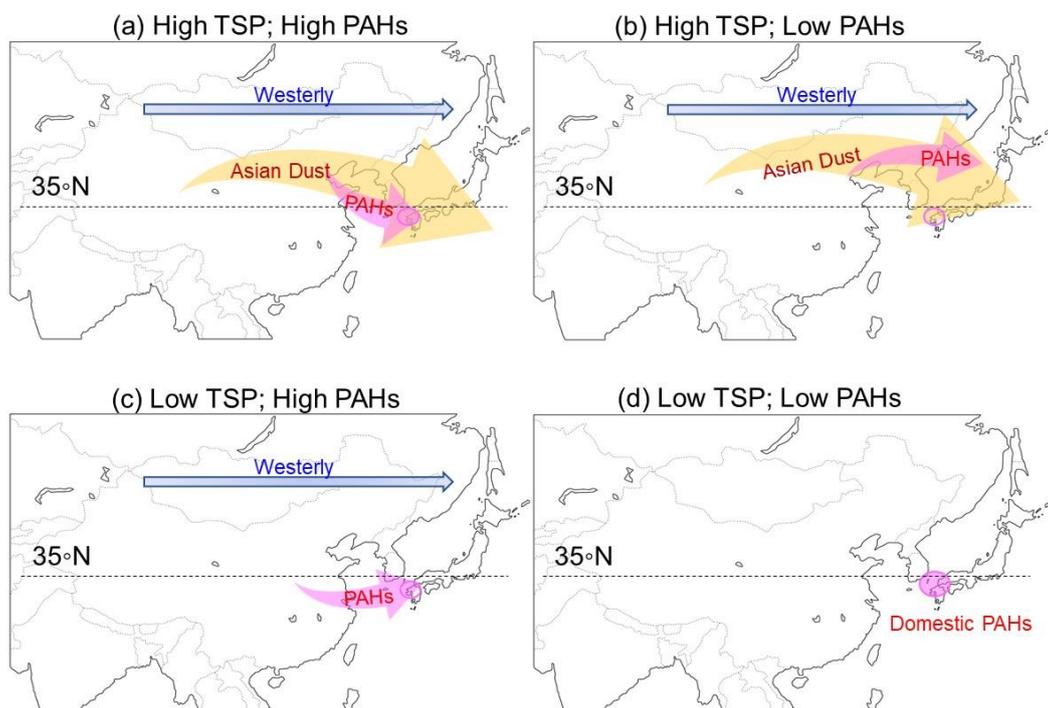
<b>Fukuoka</b>			<b>Kanazawa</b>		
<b>Date</b>	<b>Total PAHs (ng m<sup>-3</sup>)</b>	<b>TSP (μg m<sup>-3</sup>)</b>	<b>Date</b>	<b>Total PAHs (ng m<sup>-3</sup>)</b>	<b>TSP (μg m<sup>-3</sup>)</b>
2020/03/2 1	0.39	18.8	2020/03/2 1	0.77	54.0
2020/03/2 3	0.57	21.4			
2020/03/2 4	1.01	26.9			
2020/04/0 4	0.53	30.4	2020/04/0 4	0.31	27.5
2020/04/0 5	0.90	7.2	2020/04/0 5	0.39	24.3
2020/04/0 7	0.78	27.0			
			2020/04/0 8	0.52	39.6
2020/04/2 1	0.30	21.4			
2020/04/2 2	0.31	34.8			
2020/04/2 3	0.33	22.1			
2020/04/2 4	0.43	15.8			
2020/04/2 5	0.46	19.0			
2020/04/2 6	0.64	18.9	2020/04/2 6	0.65	25.9
			2020/05/0 2	0.44	50.6
2020/05/0 8	1.10	26.2			
2020/05/1 1	0.48	22.4			
			2020/05/1 2	0.35	63.2
2020/05/1 3	0.43	17.1	2020/05/1 3	0.21	37.1
			2020/05/1 4	0.26	45.6

2020/05/15	0.23	10.8	2020/05/15	0.44	34.1
2020/05/19	0.20	19.7			
2021/03/16	0.21	10.4	2021/03/16	0.58	92.3
2021/03/17	1.21	20.3	2021/03/17	0.51	50.8
2021/03/18	4.18	20.9	2021/03/18	0.59	34.8
2021/03/19	4.24	19.8			
2021/03/23	1.41	59.7			
2021/03/24	0.39	36.1	2021/03/24	0.55	27.3
			2021/03/25	0.40	39.4
2021/03/29	0.67	47.6	2021/03/29	0.74	282.7
2021/03/30	1.22	153.8	2021/03/30	0.59	173.5
2021/03/31	2.25	29.4	2021/03/31	0.39	54.6
2021/04/01	1.74	35.2	2021/04/01	0.37	26.8
2021/04/02	0.27	21.0	2021/04/02	0.44	42.9
			2021/04/03	0.50	23.9
2021/04/17	0.33	41.0	2021/04/17	0.17	30.2
2021/04/18	0.45	12.4	2021/04/18	0.56	79.8
			2021/04/19	0.53	44.9
			2021/04/20	0.65	72.1
2021/04/29	0.38	21.8			
2021/04/30	0.69	32.2	2021/04/30	0.41	52.8
2021/05/05	0.32	30.0			
2021/05/06	0.43	18.4	2021/05/06	0.23	24.9

2021/05/08	0.40	61.6	2021/05/08	0.65	105.5
2021/05/09	0.48	36.2	2021/05/09	0.24	40.3
2021/05/10	0.63	24.9	2021/05/10	0.14	23.5
2021/05/25	0.28	35.3	2021/05/25	0.21	43.6
2021/05/26	0.29	13.2	2021/05/26	0.18	17.7
2021/05/30	1.13	17.3			
2021/05/31	2.25	24.8			



**Figure S1.** High-volume air samplers at Fukuoka and Kanazawa.



**Figure S2.** Illustration of possible LRT-PAH sources and routes from China to Japan from March to May. The black dotted line was 35°N latitude. **(a)** AD days with high PAH concentration, **(b)** AD days low PAH concentration, **(c)** non-AD with high PAH concentration, and **(d)** non-AD days with low PAH concentrations.