The new implementation of a computationally efficient modeling tool (STOPS v1.5) into CMAQ v5.0.2 and its application for a more accurate prediction of Asian dust

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15 **Supplements**

Table S1 is a supplement for the description of difference between the simulated friction velocity and threshold values in the in-line dust module in CMAQ in Sect. 3.1 in the manuscript.

Figure S1 is a supplement for the description of consistency between CMAQ- and STOPS-simulated results in Sect. 4.1 in the manuscript.

Figure S2 is a supplement for the description of difference between standard and alternative emissions used for STOPS simulation in Sect. 4.2.1 in the manuscript.

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Table S1. The averaged friction velocity (u_*) in three land cover categories and threshold friction velocity values ($u_{*ti,j}$) for each land cover category used in CMAQ_Dust simulation.

Land Cover Categories	u_*	$u_{*ti,j}$ (CMAQ_Dust)
Shrubland	0.23	1.54
Mixed Shrubland-Grassland	0.16	0.55
Barren or Sparsely vegetated	0.18	0.65

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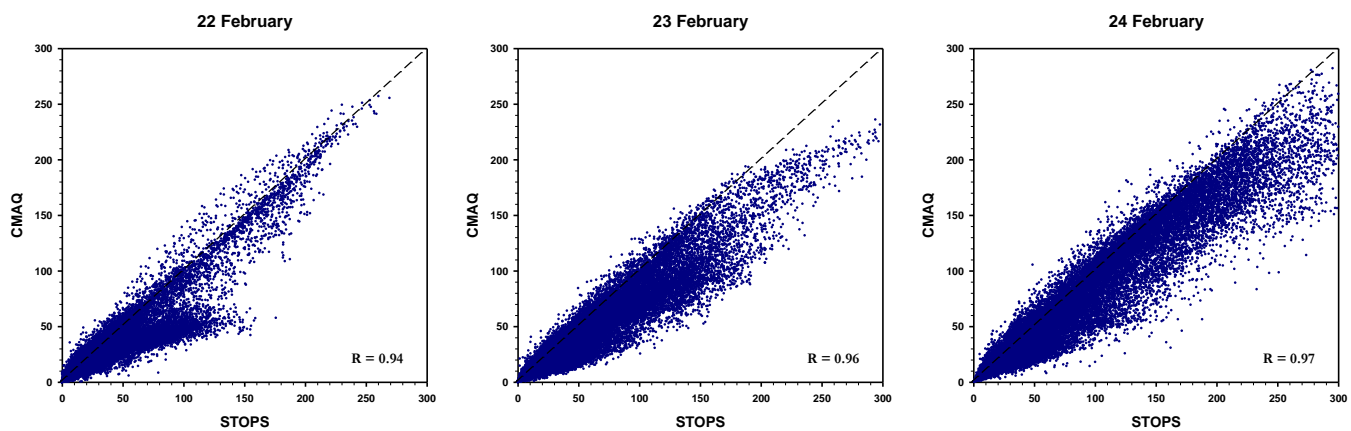
Figure S1. Scatter plots between STOPS- and CMAQ-simulated PM$_{10}$ concentrations during the Asian dust events. The correlation coefficients (R) appear in the bottom-right of each plot.

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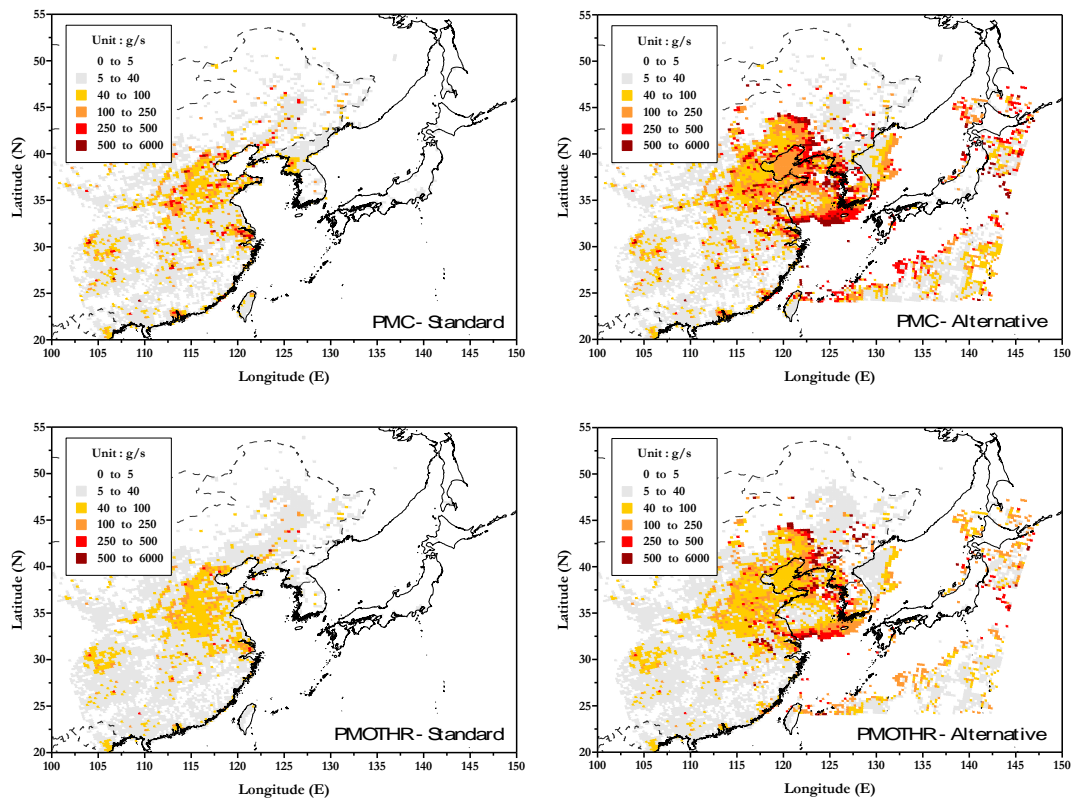
Figure S2. Difference between the emissions rates (grams second[-1]) of standard and alternative emissions (to represent enhanced GOCI AOD) data. The PMC and PMOTHR denote coarse and unspeciated fine particles, respectively.