10.1071/EN21070_AC

Environmental Chemistry

Supplementary material

Different characteristics and source contributions to aerosol aminiums over a coastal city and adjacent marginal seas

Zongjun Xu,[A,C] *Shengqian Zhou,*[A,C] *Yucheng Zhu*[A] *and Ying Chen*[A,B,D]

[A]Shanghai Key Laboratory of Atmospheric Particle Pollution Prevention, Department of Environmental Science & Engineering, Fudan University Jiangwan Campus, Shanghai 200438, China.

[B]Institute of Atmospheric Sciences, Fudan University Jiangwan Campus, Shanghai 200438, China.

[C]These authors contributed equally to this work.

[D]Corresponding author. Email: yingchen@fudan.edu.cn

Calculation of R_L and AEC

The retention ratio of the air mass over land (R_L) was calculated by equation (1).

$$R_L = \frac{\sum_{i=1}^{N_{land}} e^{-\frac{t_i}{72}}}{\sum_{i=1}^{N_{total}} e^{-\frac{t_i}{72}}} \qquad (1)$$

where N_{total} and N_{land} is the total number of trajectory endpoints and those located over land. t_i is the backward tracking time with the unit of hour and $e^{-\frac{t_i}{72}}$ is the weighting factor related to tracking time.

The AEC for each trajectory was calculated using the equation (2).

$$AEC = \frac{\sum_{i=0}^{72} Chla_i \cdot e^{-\frac{t_i}{72} \cdot \frac{600}{BLH}}}{n} \qquad (2)$$

This calculation is modified based on Park *et al.* (2018). Here $Chla_i$ represents the mean Chl *a* concentration within a radius of 20 km at a given endpoint from MODIS Chl *a* concentration

products (8-day composite). $Chla_i$ is set to zero if the endpoint locates on land or the air mass pressure is below 850 hPa. t_i is the tracking time of endpoint. n is the total number of endpoints with valid Chl *a* concentrations. If $n < 37$, the corresponding AEC is set to be invalid. The BLH below 50 m will be replaced by 50 m in calculation.

Reference

Park K-T, Lee K, Kim T-W, Yoon YJ, Jang E-H, Jang S, Lee B-Y, Hermansen O (2018) Atmospheric DMS in the Arctic Ocean and Its Relation to Phytoplankton Biomass. *Global Biogeochemical Cycles* 32 (3), 351-359. 10.1002/2017gb005805

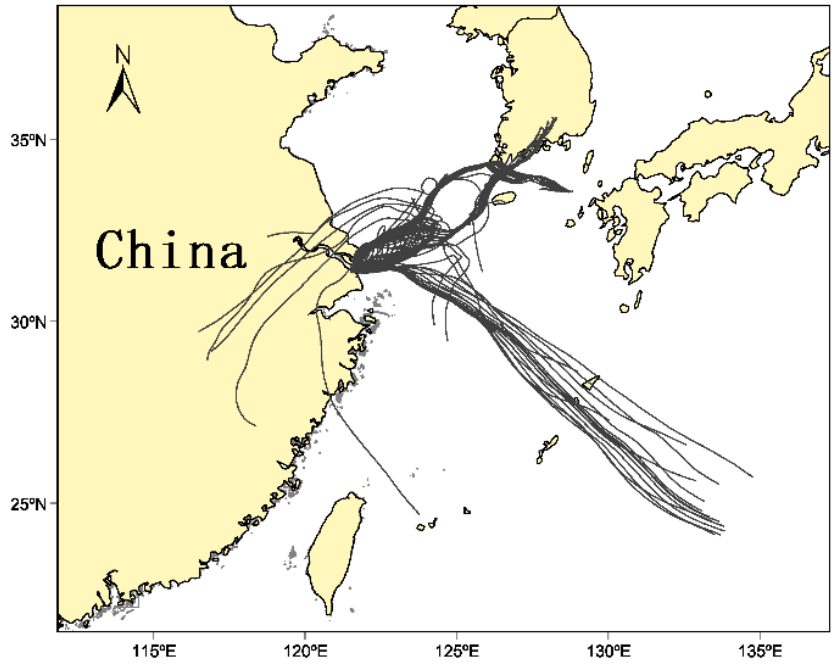

Figure S1. 3-day air mass back trajectories with starting height at 100 m for aerosol samples collected on 3-6 September 2019 in Shanghai

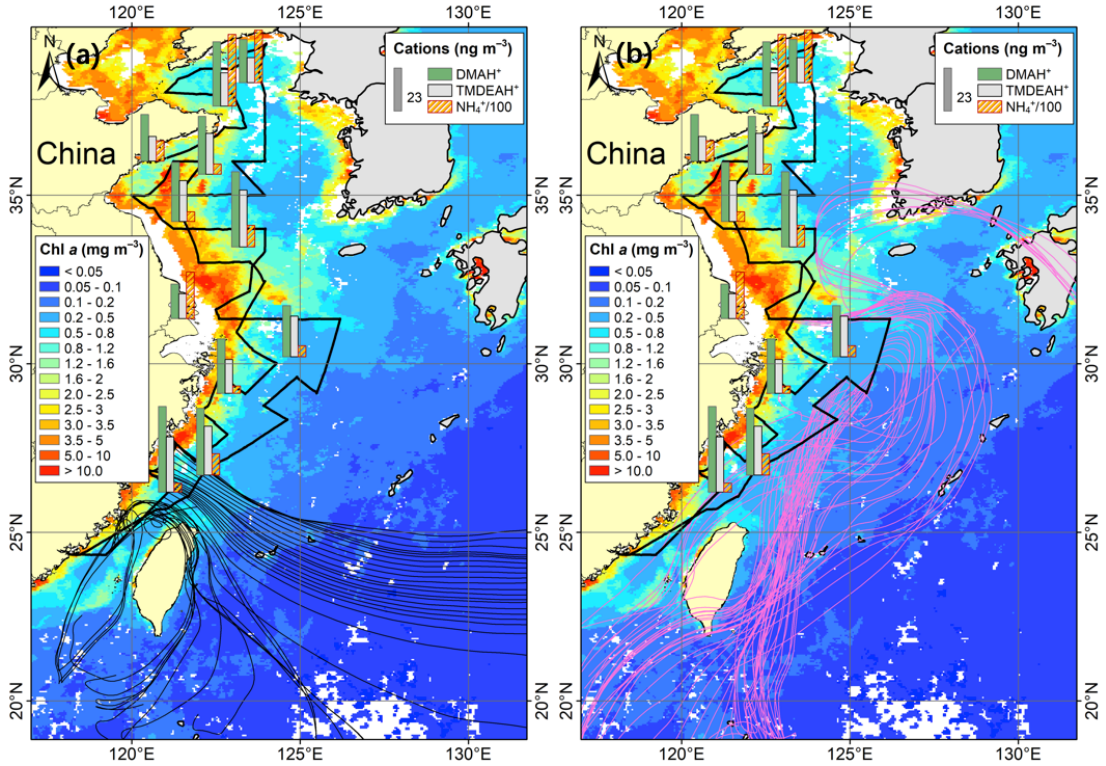

Figure S2. 3-day air mass back trajectories with starting height at 100 m for aerosol samples collected on 12-14 July 2018 (black) and 5-8 July 2018 (pink) over the YECS.

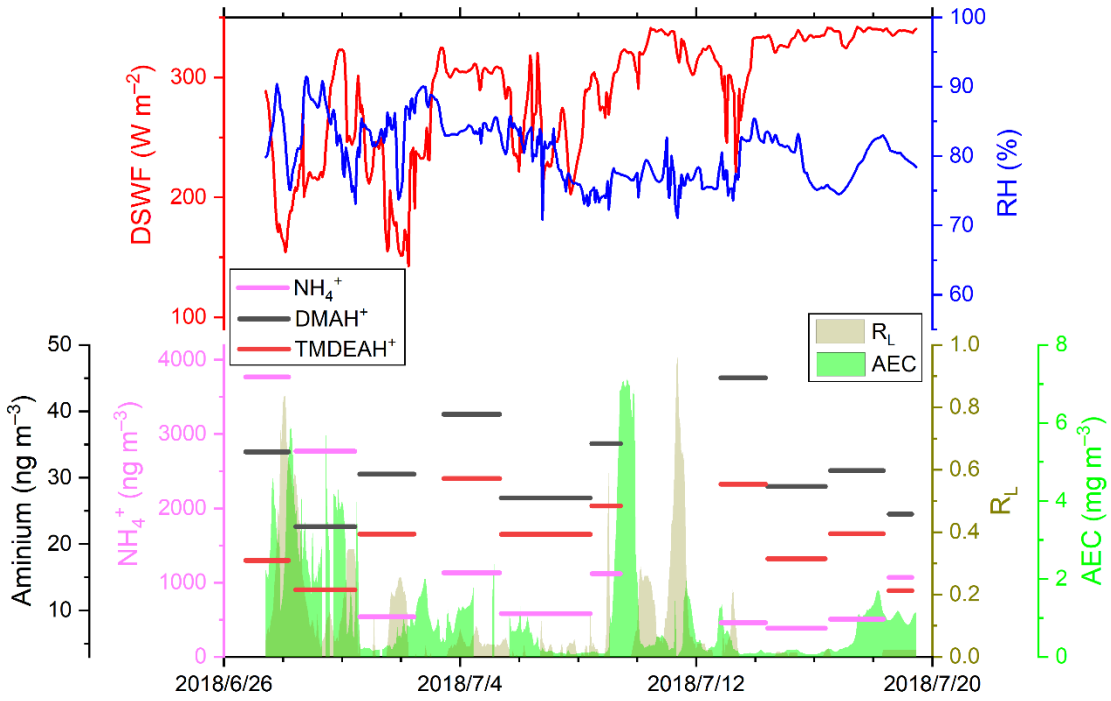

Figure S3. Time series of AEC, R_L, meteorological parameters along trajectories and concentrations of NH_4^+, $DMAH^+$ and $TMDEAH^+$ during the summer of 2018 in the YECS.

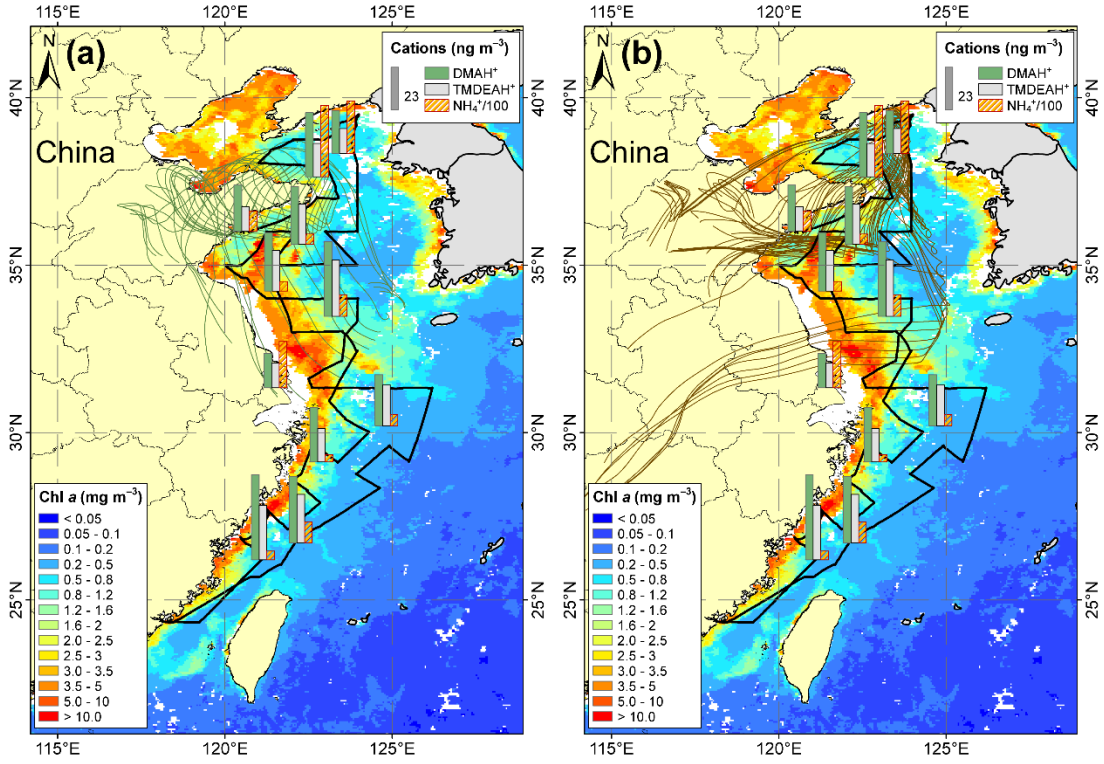

Figure S4. 3-day air mass back trajectories with starting height at 100 m for aerosol samples collected on 26-28 June 2018 (green) and 28-30 June 2018 (umber) over the YECS.

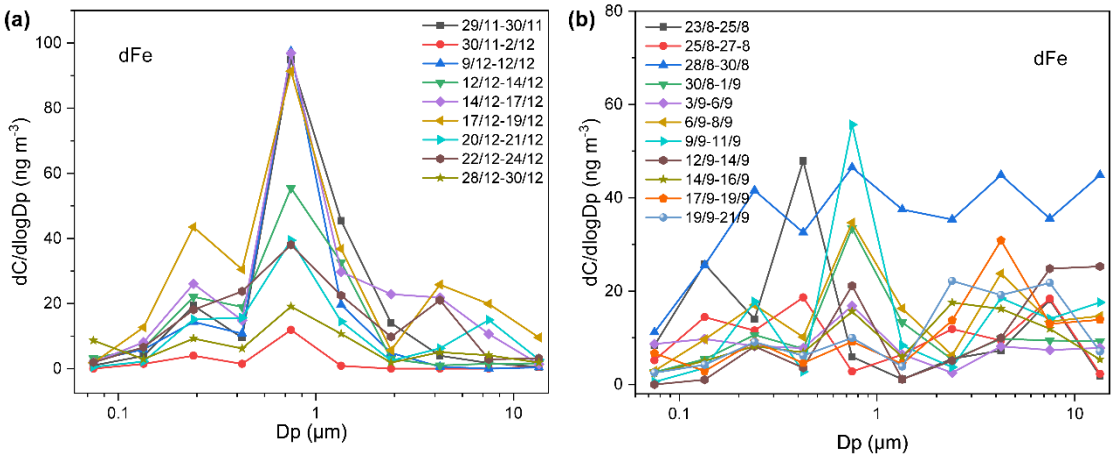

Figure S5. Size distributions of the mass concentration of water-soluble Fe (dFe) in the winter of 2018 **(a)** and in the summer of 2019 **(b)** over Shanghai.