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Supplement of

Chemical characteristics of submicron particles at the central Tibetan Plateau: insights from aerosol mass spectrometry

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Model description

The 3-D Regional chEmical trAnsport Model (REAM) has a horizontal resolution of 36 km. REAM features 30 vertical layers in the troposphere and 5 vertical layers in the stratosphere, with a model top at 10 hpa. Meteorological fields in REAM are from Weather Research and Forecast model (WRF) assimilations, and are updated every 5 minutes for convective transport related inputs and every 30 minutes for the others. The WRF model is constrained by National Centers for Environmental Prediction Climate Forecast System Reanalysis (NCEP CFSR, Saha et al., 2010) 6-hourly products. The initial and boundary conditions for chemical tracers in REAM are obtained from GEOS-Chem global simulations with a resolution of $2° \times 2.5°$ (Bey et al., 2001). REAM expands GEOS-Chem standard chemical mechanism (v9-02) with aromatic chemistry (Liu et al., 2010, 2012), including benzene and other reactive aromatics as chemical tracers (toluene, ethyl-benzene, and m/p/o-xylene). REAM implements the Intercontinental Chemical Transport Experiment-Phase B (INTEX-B) anthropogenic emissions inventory for South Asia (Zhang et al., 2009; Li et al., 2014) and a mosaic Asian anthropogenic emissions inventory (MIX, Li et al., 2015) for other regions in the model domain. For further model descriptions and evaluations, we refer readers to Zhang et al. (2017).

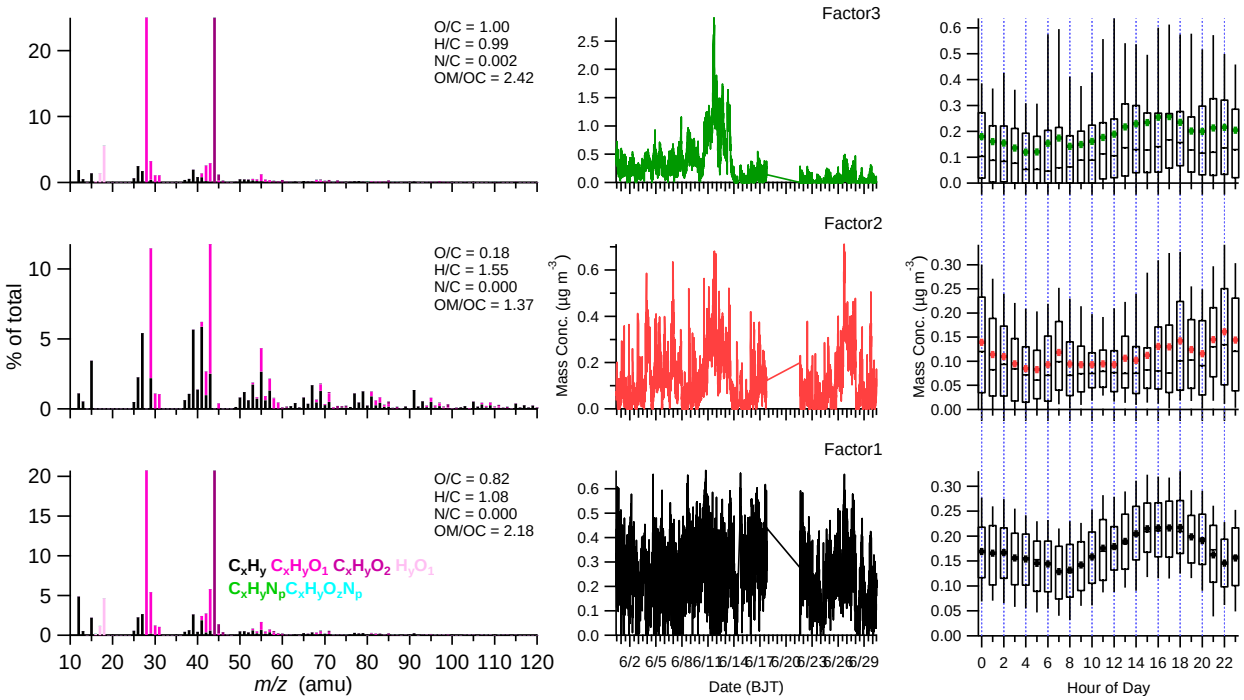

Figure S1 Three factor solutions.

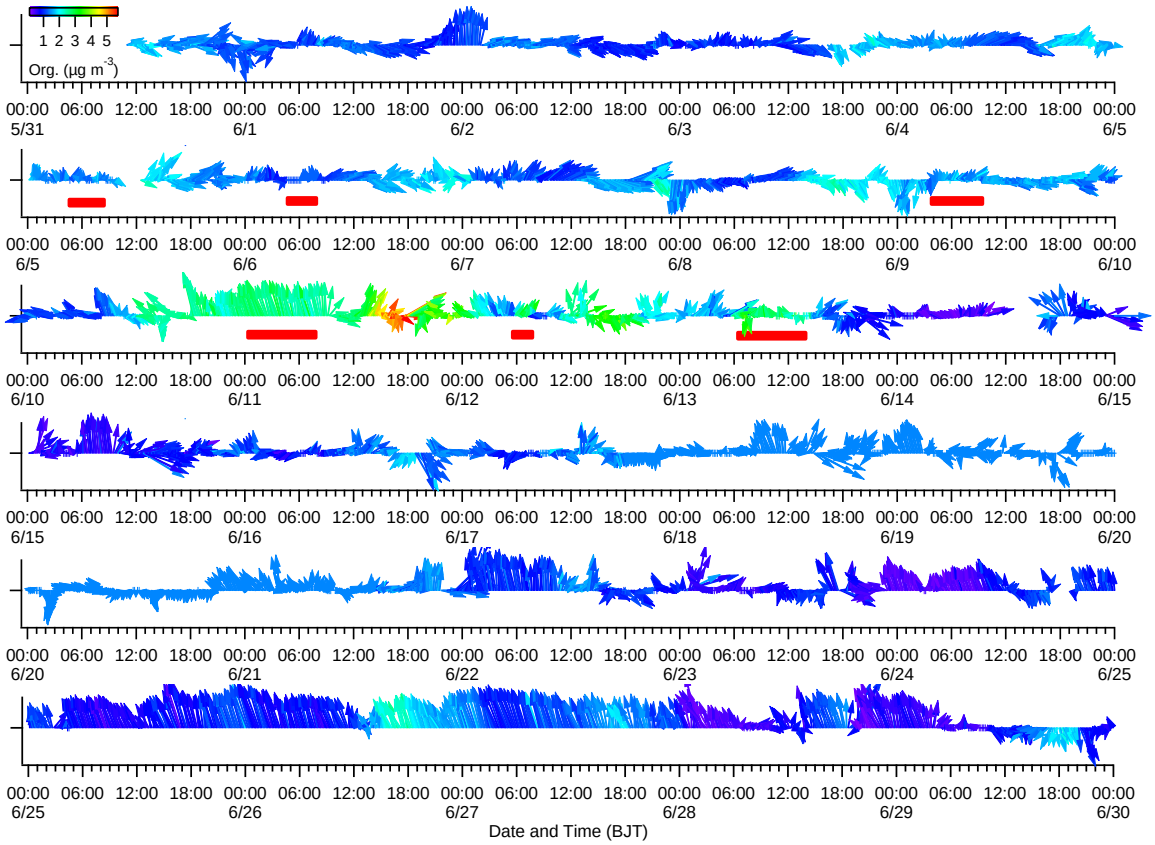

Figure S2. The wind dataset during field study. The red marker along the wind represent the high nitrate periods.

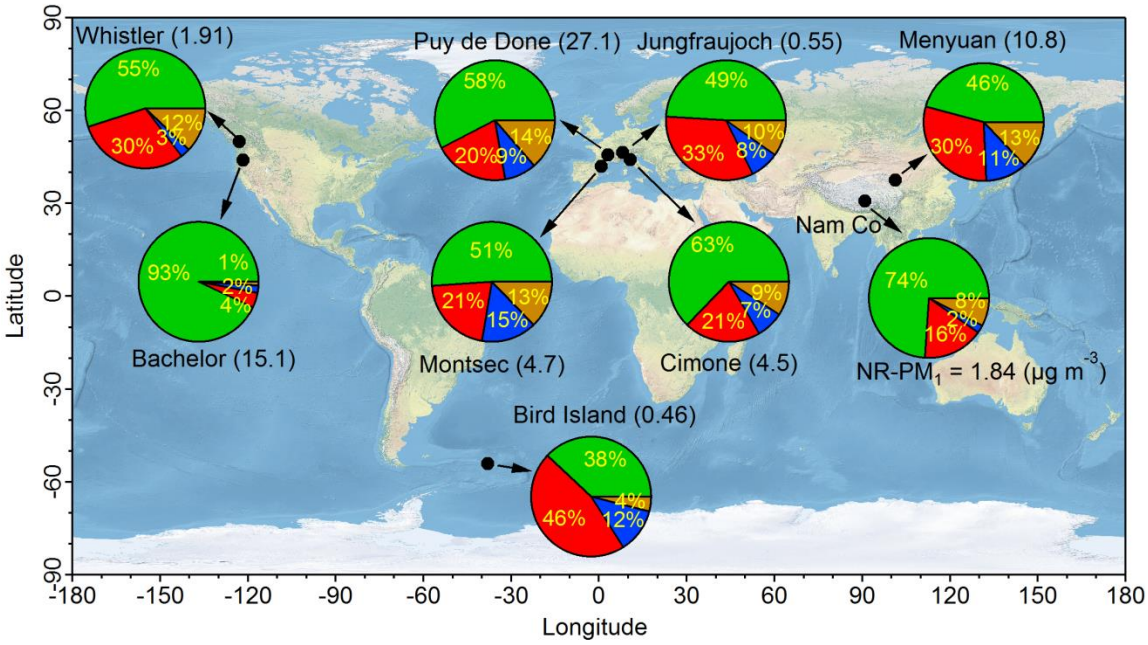

Figure S3. The field studies conducted at high elevation sites using AMS. The mass concentration of NR-PM_1 and the mass contribution of each species (pie chart) are including in each site.

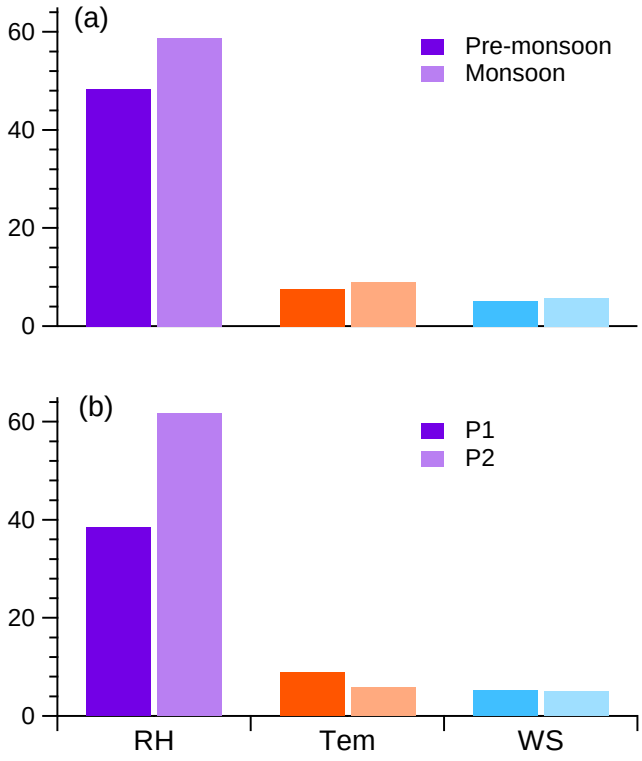

Figure S4. The comparisons of meteorological conditions between (a) pre-monsoon and monsoon and (b) P1 and P2.

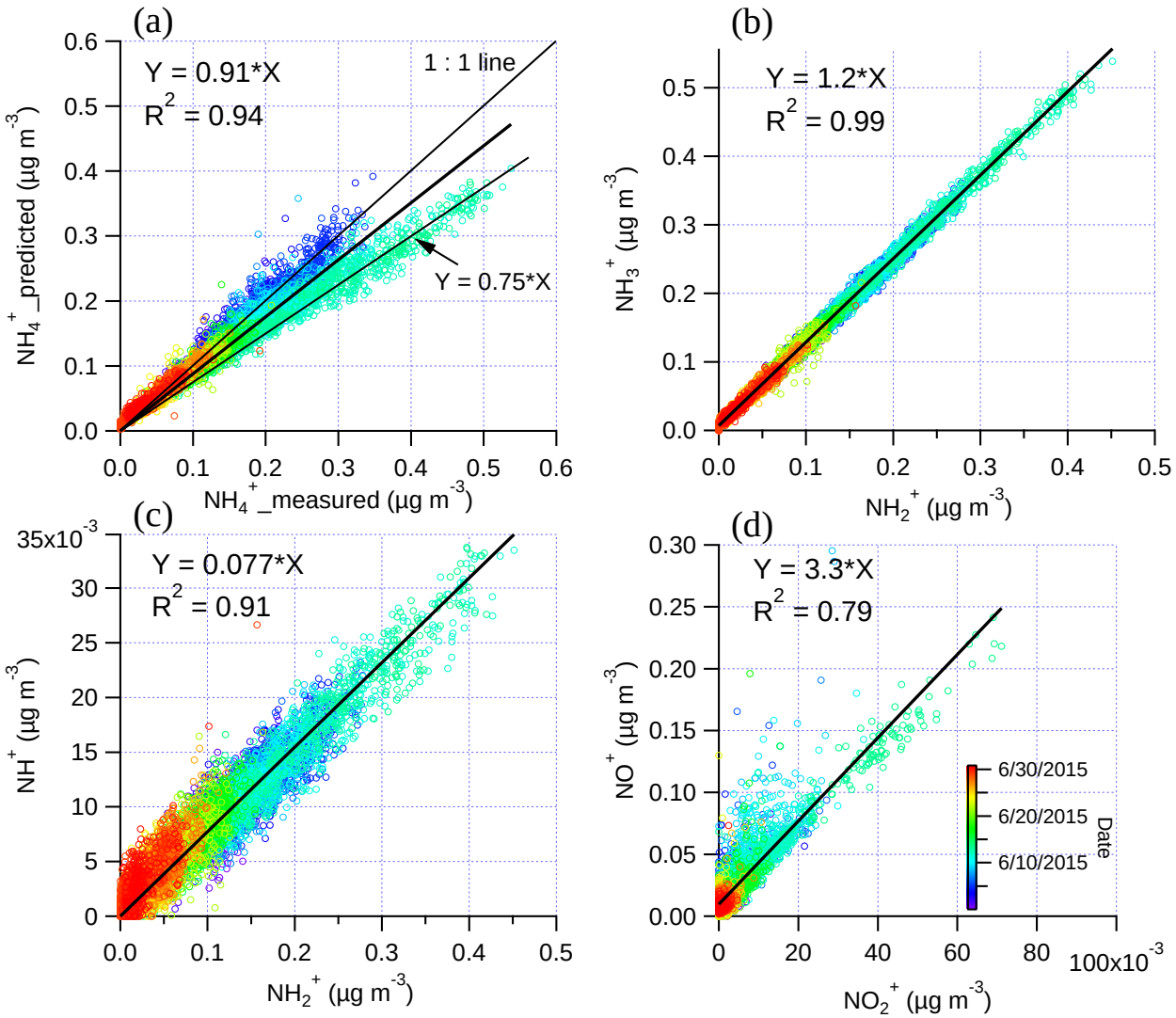

Figure S5. Scatter plots of (a) predicted ammonium (NH_4^+_predicted) calculated from the stoichiometry of sulfate, nitrate, and chloride vs. measured ammonium (NH_4^+_measured), (b) NH_3^+ vs. NH_2^+, (c) NH^+ vs. NH_2^+, and (d) NO^+ vs. NO_2^+.

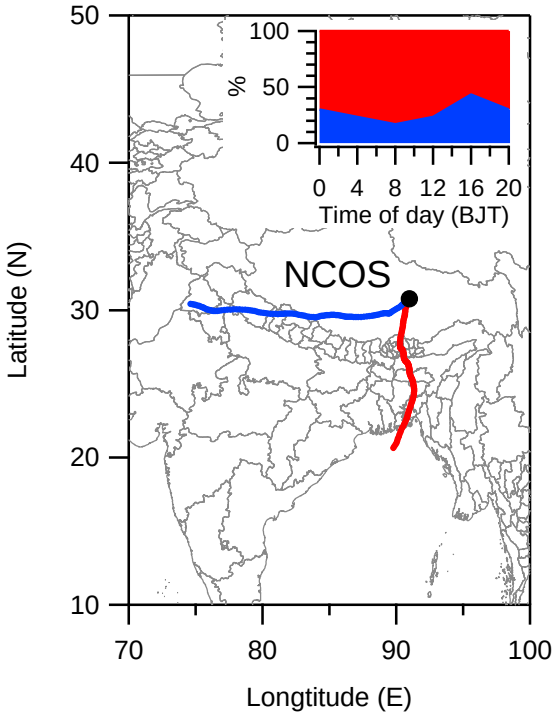

Figure S6. The diurnal contribution of two class air trojectories arrived at Nam Co during sampling period.

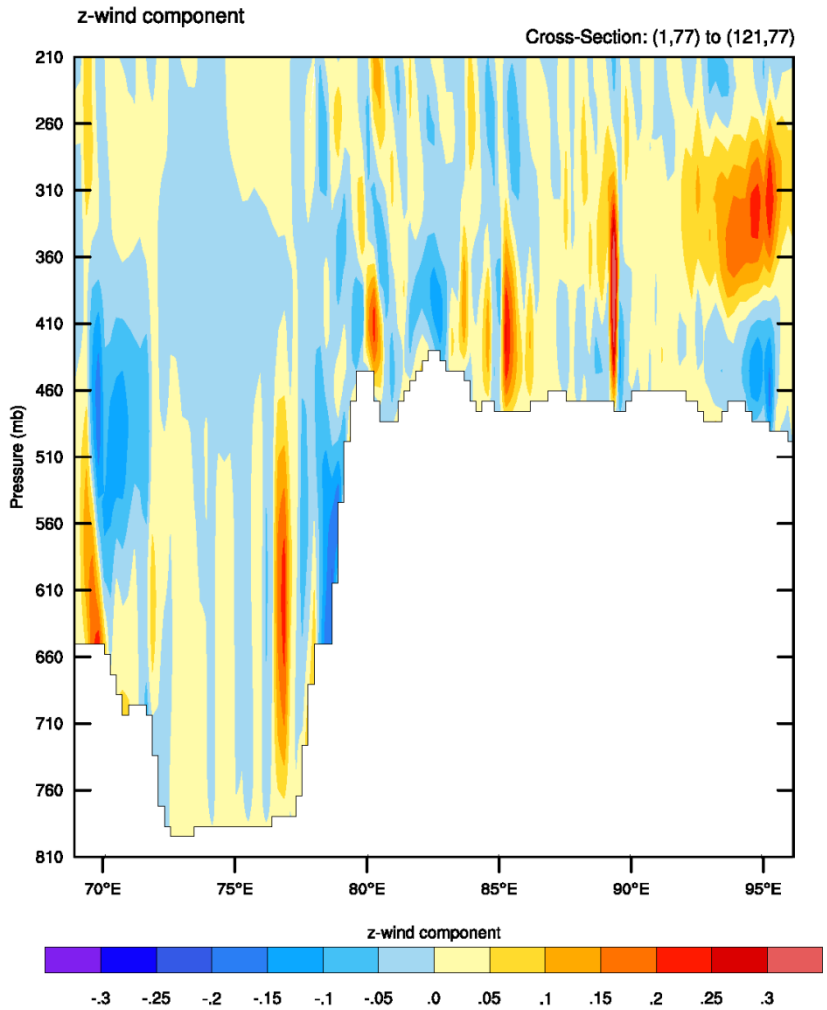

Figure S7. Vertical wind field at a cross-section during P2 during our study. Note that Nam Co Station loactes at 90°57′E.

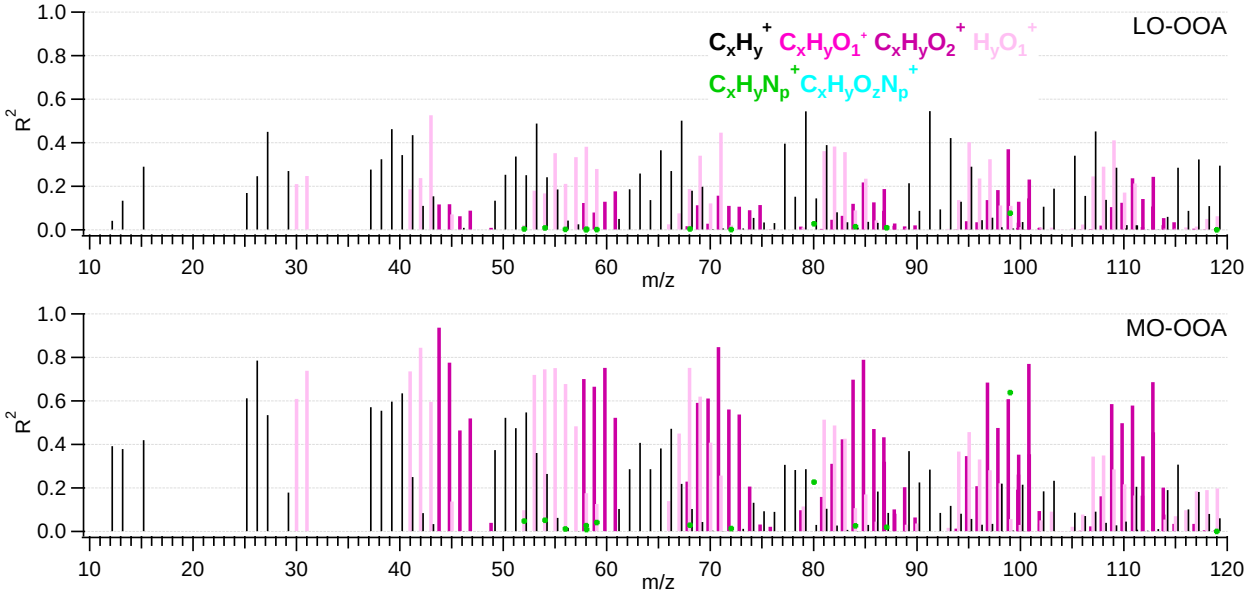

Figure S8. The correlation coefficent of time series between OOA factor and ions.

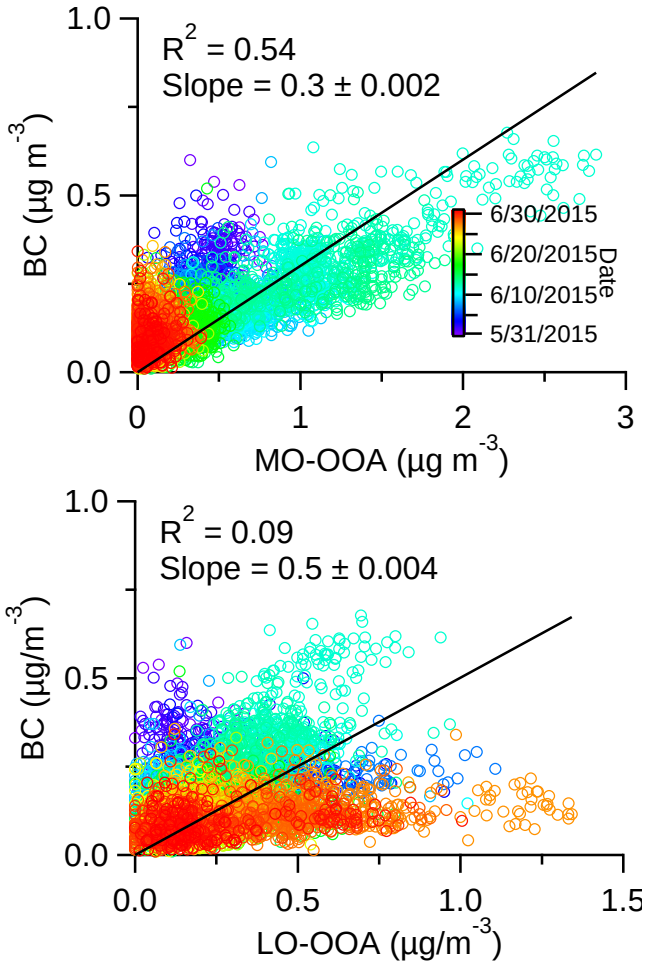

Figure S9. Scatter plots between BC and OOA factors.

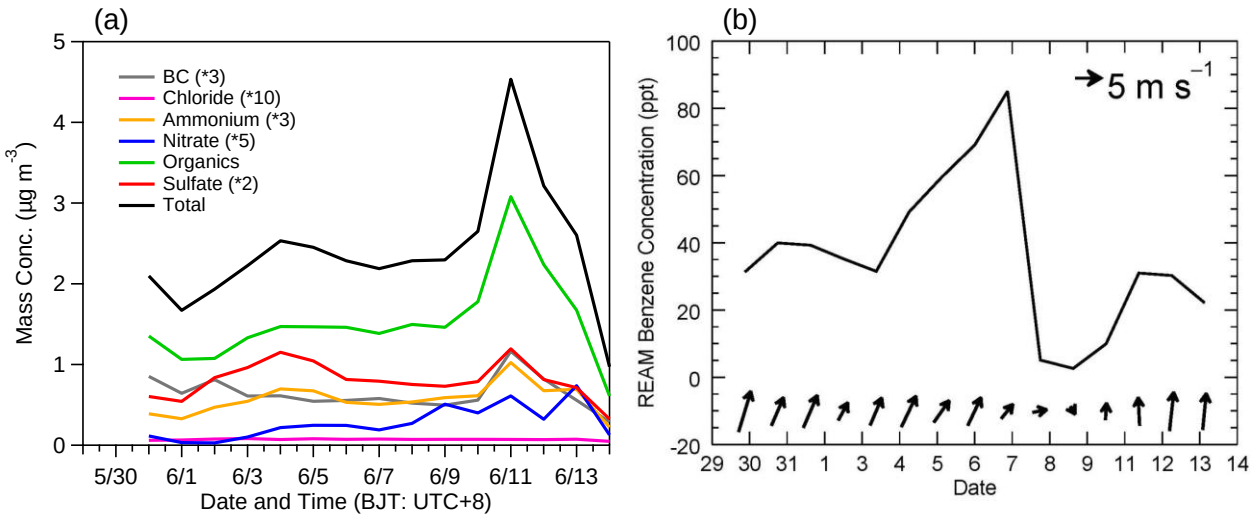

Figure S10. The mass concentration of (a) AMS results and (b) REAM-simulated reactive aromatics and the averaged wind data.

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