

Aerosol composition at a rural site southeast of London measured by high resolution mass spectrometry

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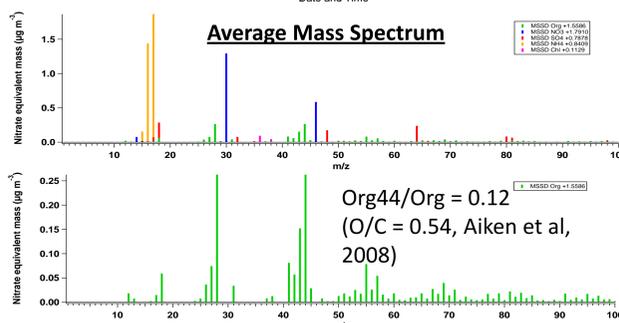
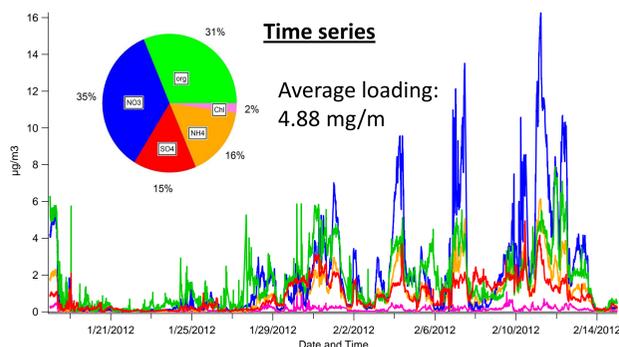
Contact: ng@chbe.gatech.edu

Site information

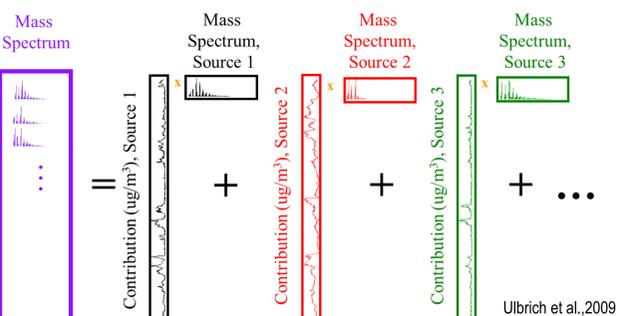


- High Resolution Time-of-Flight Aerosol Mass Spectrometer
- Data: 1/18/2012 to 2/14/2012 (27 days)
- Bypass and thermal denuder

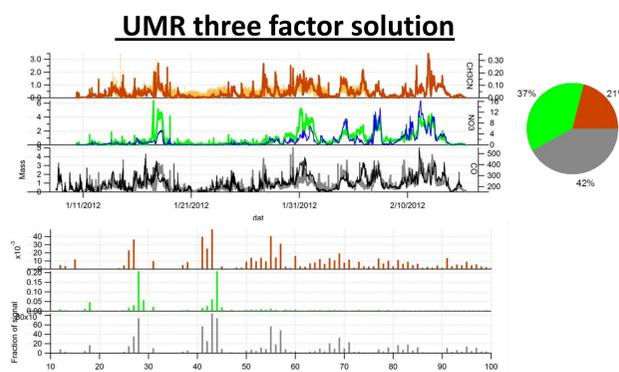
Bypass Data



Positive Matrix Factorization (PMF)

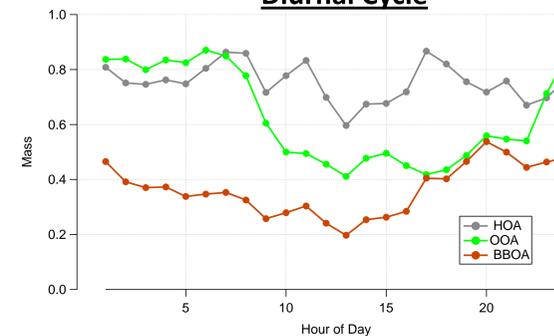


Deconvolution of organics spectra



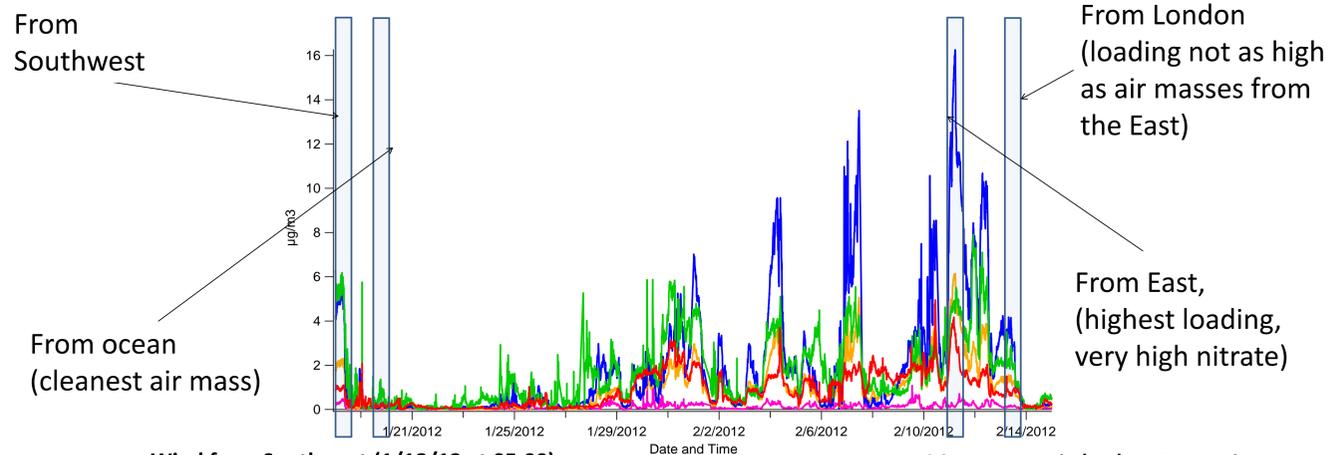
BBOA: fresh OA, correlates with CH3CN
OOA: correlates better with nitrate than sulfate
HOA: correlates with CO

Diurnal Cycle

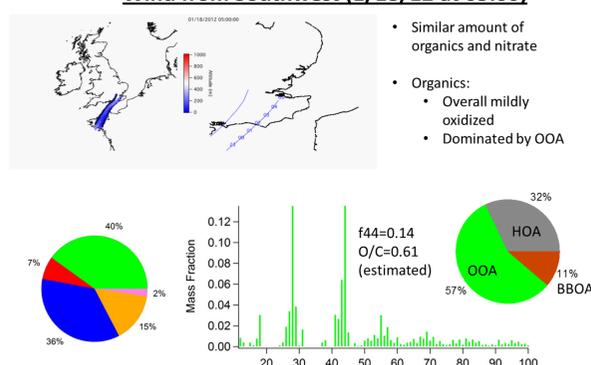


OOA diurnal cycle: similar to nitrate → fresh, semi-volatile OA
BBOA: increases in the evenings (wood/trash burning in the area)

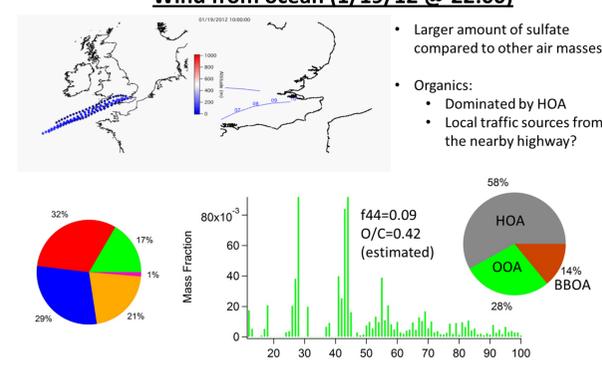
Different air masses



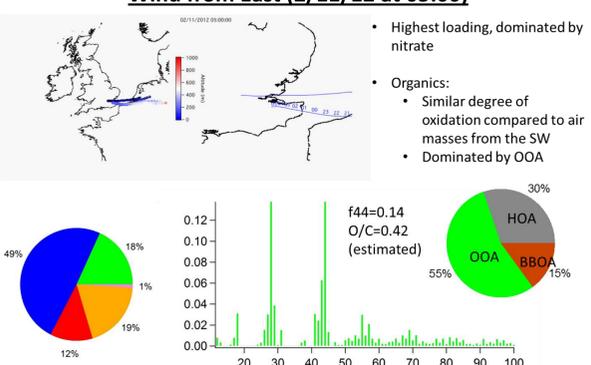
Wind from Southwest (1/18/12 at 05:00)



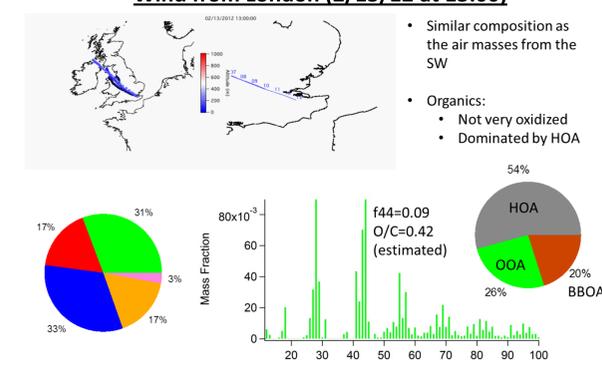
Wind from ocean (1/19/12 @ 22:00)



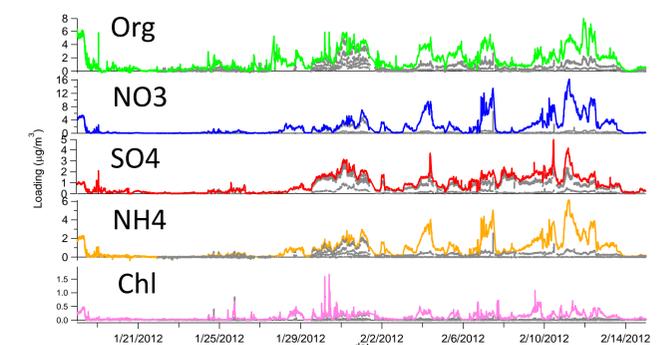
Wind from East (2/11/12 at 05:00)



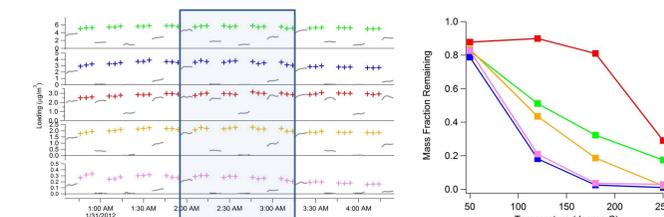
Wind from London (2/13/12 at 13:00)



Bypass vs. denuded data

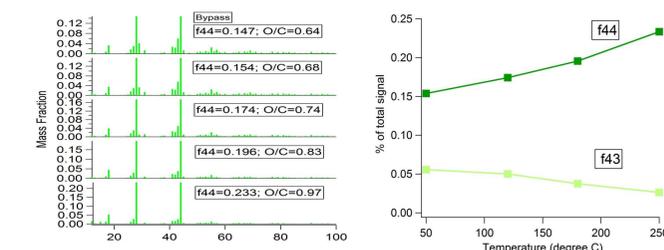


Temperature cycle (°C): 50/180/250/120



- Nitrate and chloride are the most volatile
- Sulfate most non-volatile

Changes in MS with temperature



- f44 increases (i.e., higher O/C) with TD temperature
- f43 decreases with TD temperature
- Evaporation of semi-volatile compounds, with a temperature of 250 °C, the compounds remaining has an O/C of ~1

Summary and Outlook

Summary

- PMF resolved three factors: HOA, OOA, BBOA
- Cleanest air mass comes from the ocean
- Air mass from London: organics loadings not very high (~ 1 µg/m³), O/C ~ 0.4
- Air mass from the East: characterized by high loadings, especially high nitrate
- Mass spectrum of remaining materials appears to be more oxidized with increasing TD temperature

Future Analysis

- High resolution analysis
- Thermal denuder data
- Comparison with SP-AMS
- Comparison with other measurements at the Detling site as well as other sites (especially London site)