

DAURE campaign Barcelona, March 2009

PSI results and further analysis plans

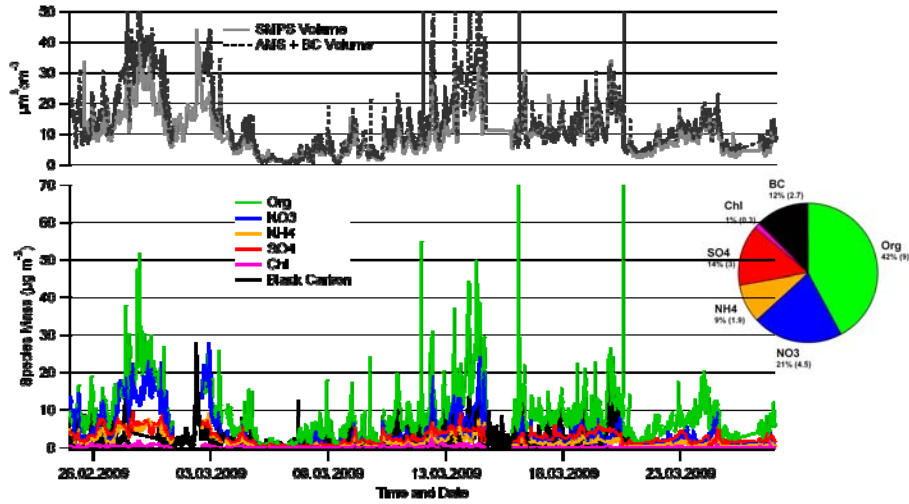
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Andre Prevot, Urs Baltensperger

6th DAURE Campaign Meeting
CSIC, Barcelona, 14-January-2010

Status of PSI data analysis

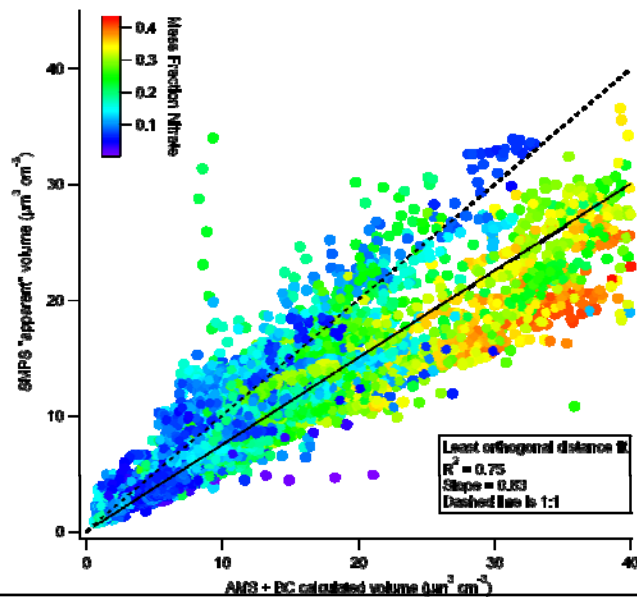
- Fixed Site
 - AMS
 - UMR analyzed
 - In process of comparisons
 - In process of UMR PMF
 - SMPS
 - In process of comparisons
 - Aethalometer
 - Take care of scattering/shadowing effects
 - RDI
 - Data analyzed
 - Filter comparison satisfying
- Mobile Van
 - AMS
 - UMR analyzed
 - Ancillary data partially analyzed

Aerosol chemical species from BCN fixed site

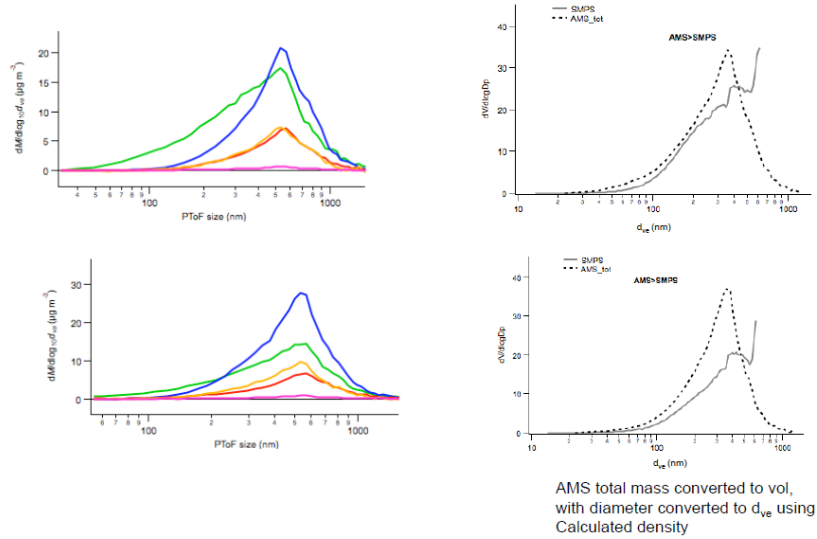


CE = 0.5

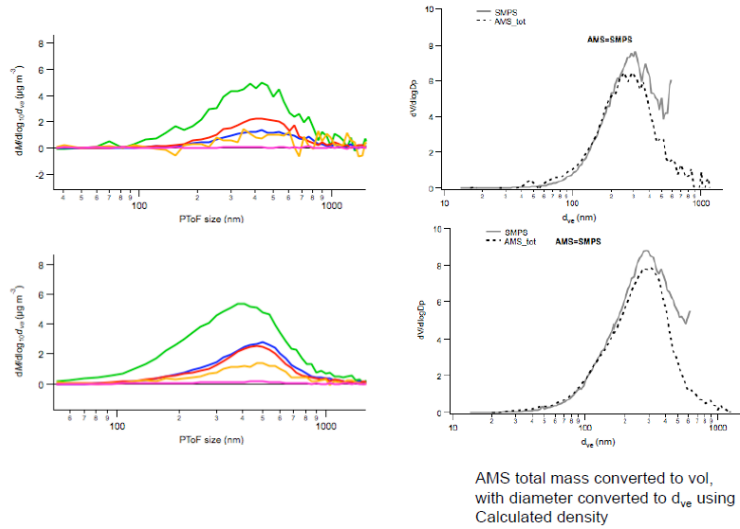
BCN fixed site: AMS+BC compared to SMPS



SMPS vs AMS: High NO₃ mass fraction size distribution

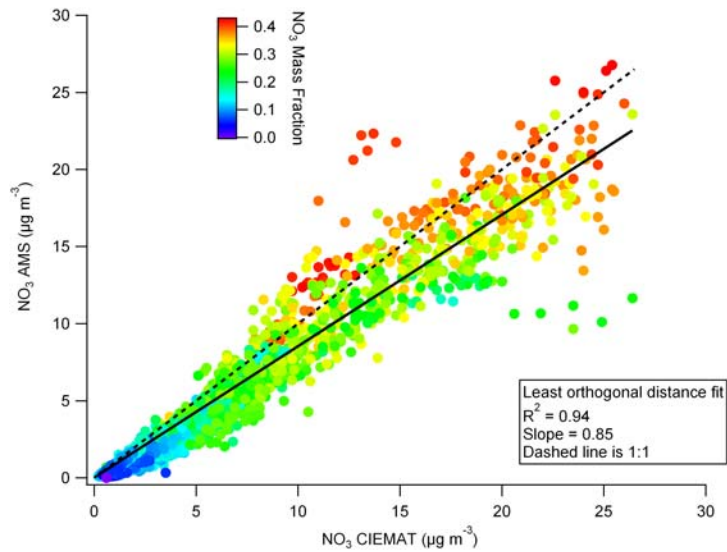


SMPS vs AMS: Low NO₃ mass fraction size distribution

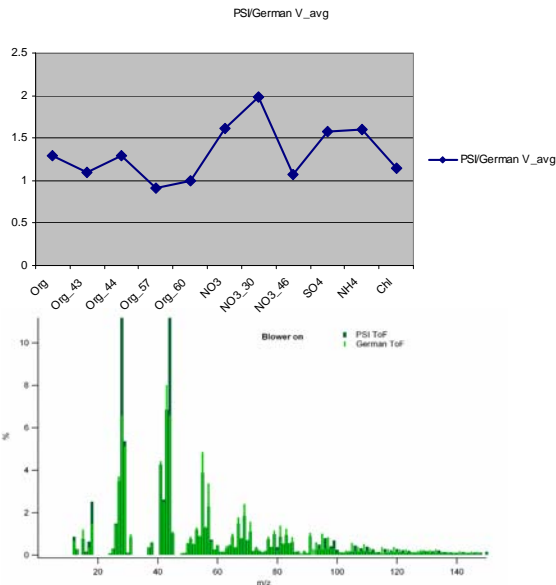


AMS calculated volume distribution agrees well
with SMPS calculated volume distribution -
sphericity assumption likely valid here

BCN fixed site: NO₃ AMS compared to NO₃ CIEMAT



Comparison of AMS in trailer (PSI) and AMS in mobile van (German)



- Differences in absolute concentrations/species: German CE = 1, PSI CE = 0.5
- Mass spectral differences
- Inlet characteristics of mobile van
- Work in progress!

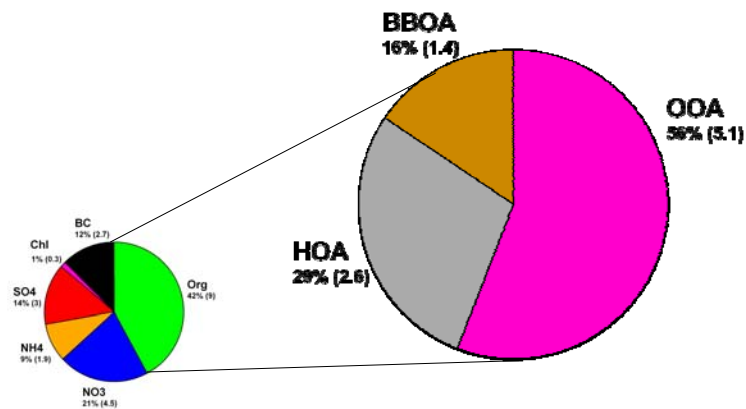
Results BCN site: Sources of organics

$$tr' \text{ (or HOA)} = \text{org57} - [a*(\text{org60} - c*OA) + e*\text{org44}]/b$$

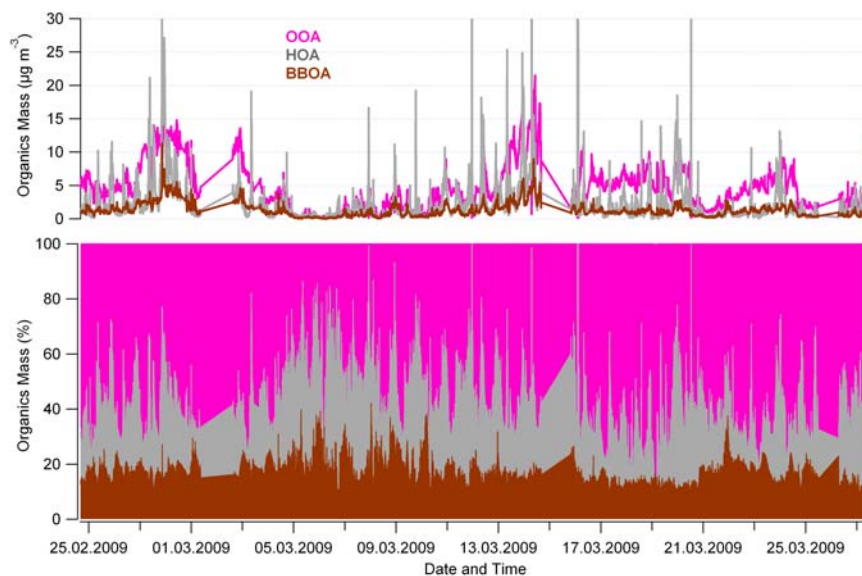
$$bboa' = [\text{org60} - c*OA]/d$$

$$ooa' = OA - (tr' + bboa')$$

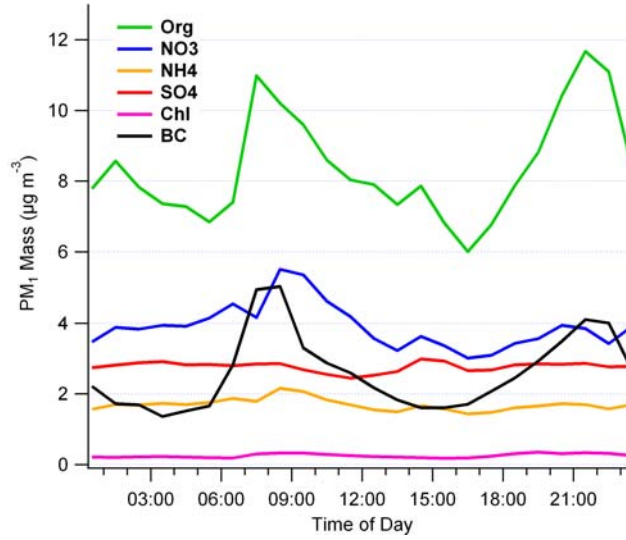
$a = 0.16$
 $b = 0.085$
 $c = 0.003$
 $d = 0.0278$
 $e = 0.076$



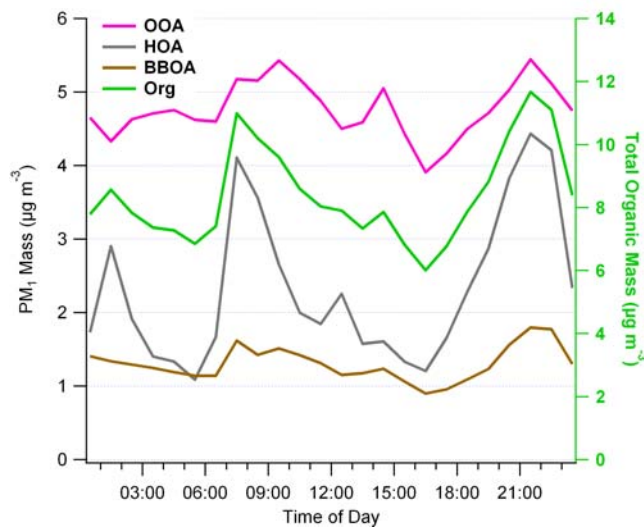
Organic components: Time traces



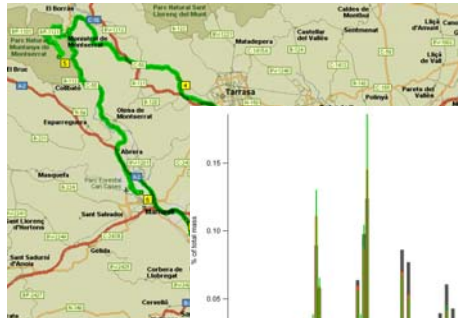
Results BCN site: Diurnal patterns (I)



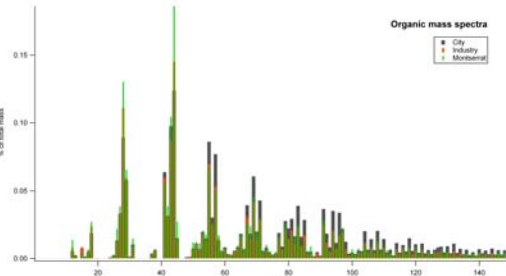
Results BCN site: Diurnal patterns (II) - Organics



Mobile measurements : Drives



Llobregat: Industrial/woodburning emissions



Organic mass spectra



Montserrat: Topography/meteorology

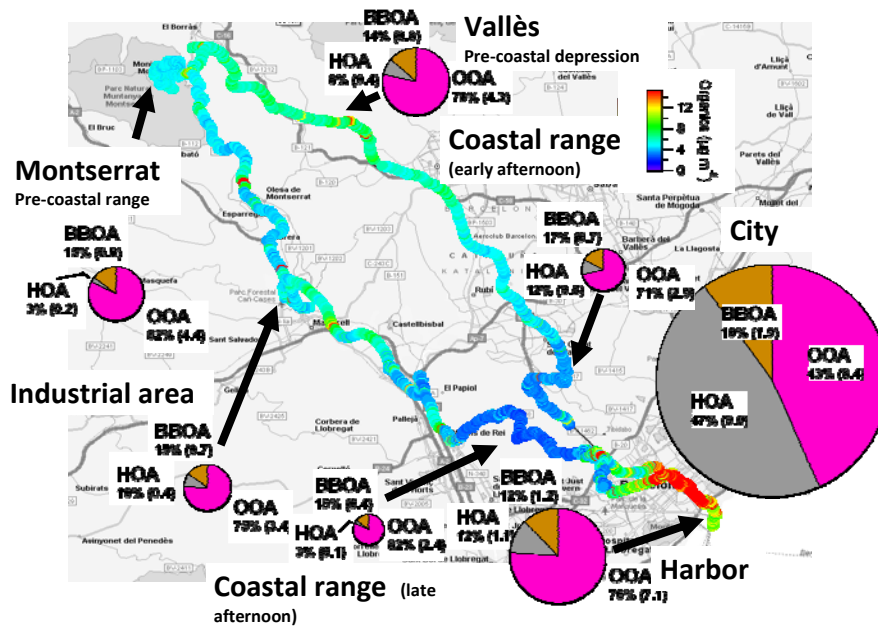


Downtown: Primary emissions



Harbor: Ship emissions

Results mobile measurements: Montserrat



Summary

- BCN fixed site
 - Instrument comparisons show mixed results – further work needed
 - Organic matter makes up the biggest fraction of PM₁.
 - Diurnal patterns of PM₁ species are influenced by traffic and wind regime.
 - Probably the most important sources of PM₁: Secondary production from volatile organic precursor compounds, traffic, and biomass burning.
- Mobile measurements
 - Traffic emissions are most important downtown Barcelona
 - Biomass burning has a significant impact in the agricultural/industrial region of Valles/Montserrat

Outlook

- BCN fixed site:
 - Data comparisons
 - UMR PMF
 - HR Analysis
 - HR PMF
- Mobile data:
 - UMR PMF
 - HR Analysis
 - HR PMF
 - Spatial variation
 - Include ancillary data

Presentations/papers

- Results presented so far:
 - Poster at AAAR 2009
- Future
 - EGU 2010
 - BCN fixed site paper
 - BCN mobile measurements paper
 - Contributions to other papers (e. g. MSY)
 - Paper on RDI results (?)

 - Black Carbon paper?

