

Source apportionment of fine organic aerosol in Mexico City during the MILAGRO Experiment 2006

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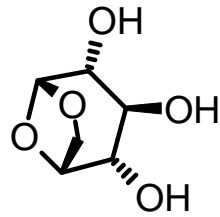
Measurement Summary

- Medium Volume PM_{2.5} Filter Samples
 - 92 LPM
 - 24-hr & 12-hr samples at T0 and T1
- Laboratory Analysis
 - ECOC – ACE-Asia Protocol
 - Particle-Phase Organics Compounds
 - 100 compounds including Molecular Markers
 - LCMSMS – Macromolecules & polar organics

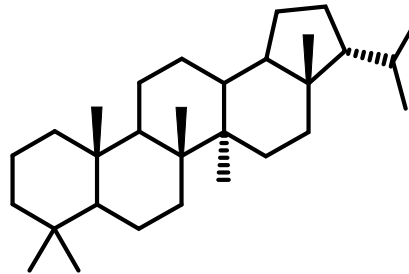
Molecular Markers

- Organic compounds found in ambient environments that are unique to a single source category and are stable in the atmosphere

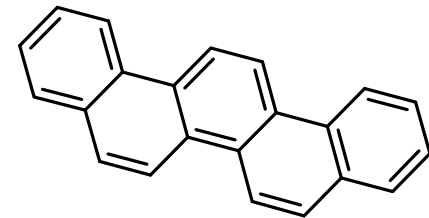
Levoglucosan,
an anhydrous
carbohydrate
formed in the
combustion of
cellulose



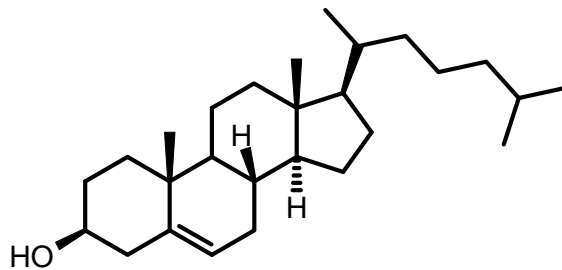
Hopanes, a tracer for
fossil fuel combustion



Picene, a tracer for
coal combustion

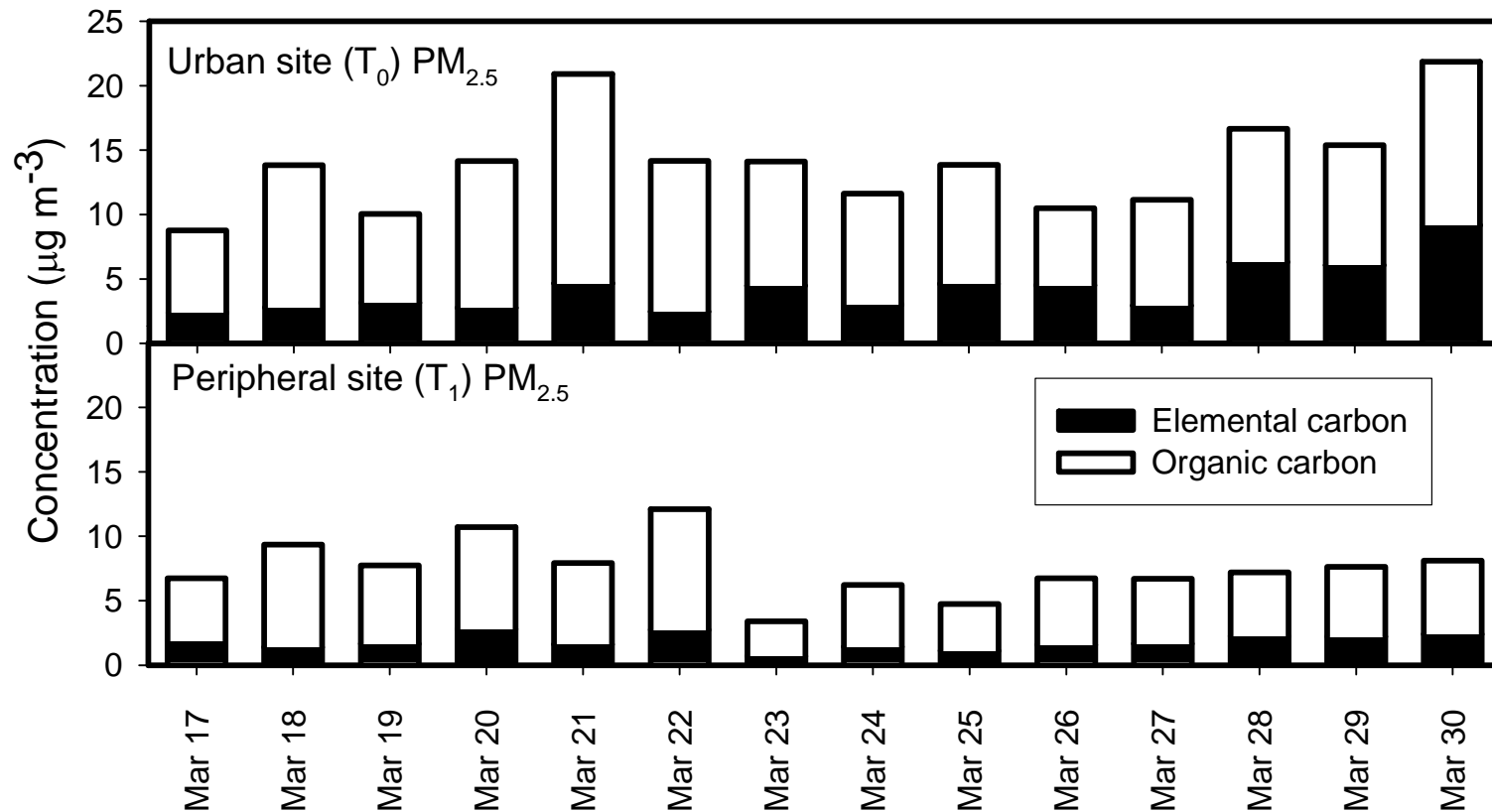


Cholesterol, a product
of meat-cooking



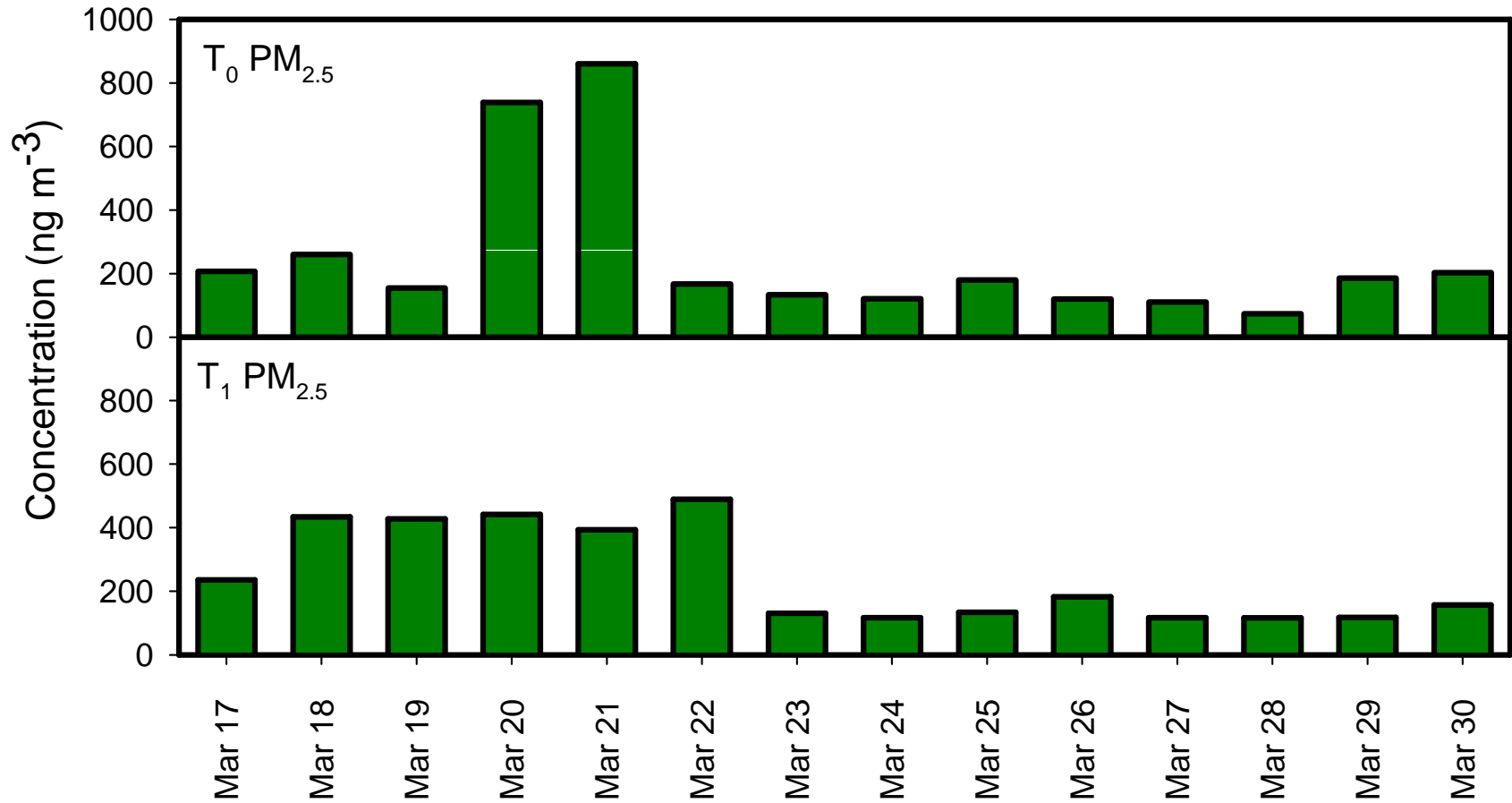
C₁₇-C₃₉ odd-numbered
n-alkanes indicate
vegetative detritus

Elemental and Organic Carbon

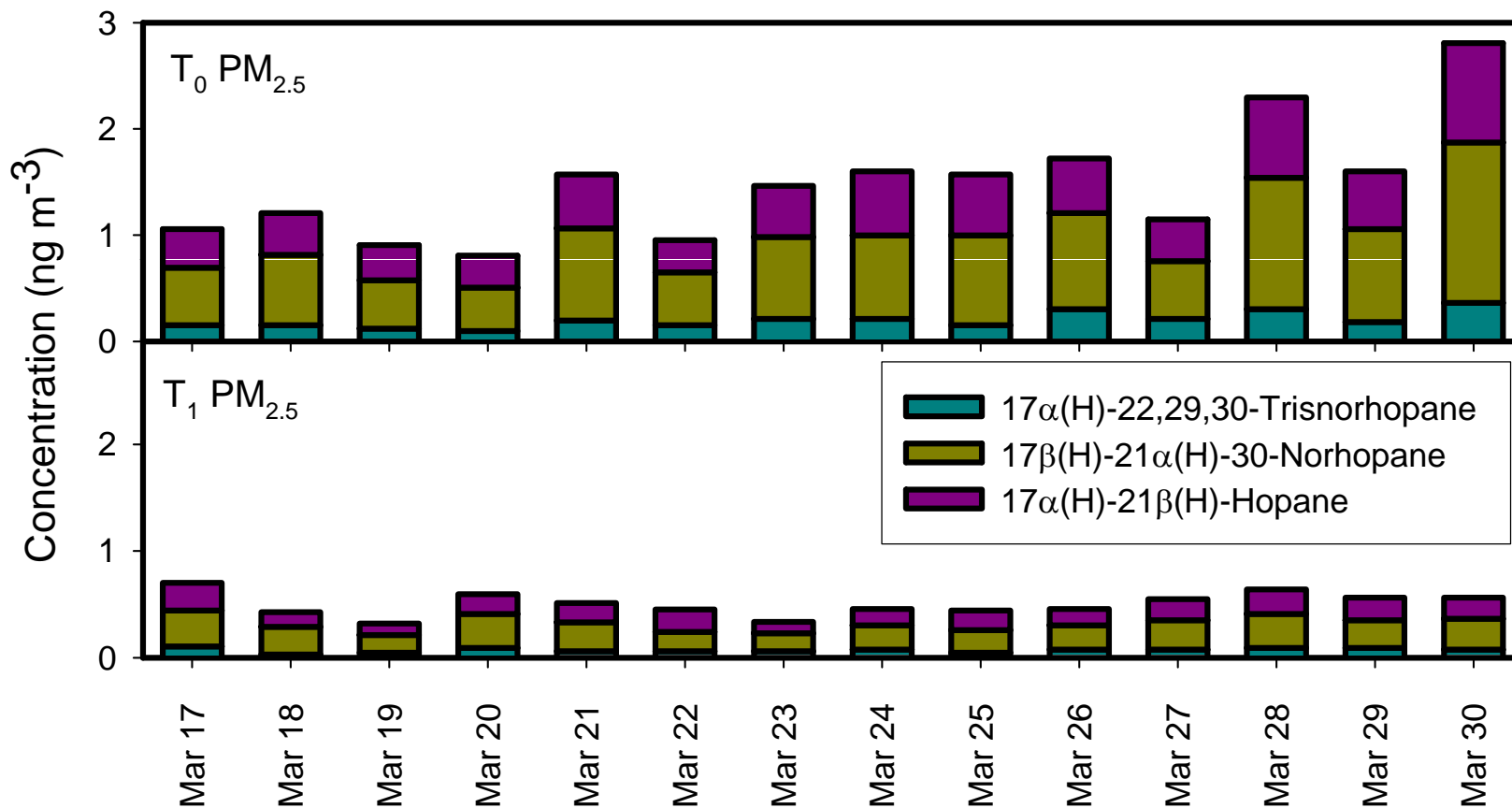


- T₀ averages - OC $9.79\mu\text{g m}^{-3}$ and EC $4.03\mu\text{g m}^{-3}$
- T₁ averages - OC $5.71\mu\text{g m}^{-3}$ and EC $1.82\mu\text{g m}^{-3}$

Levoglucosan



Hopanes



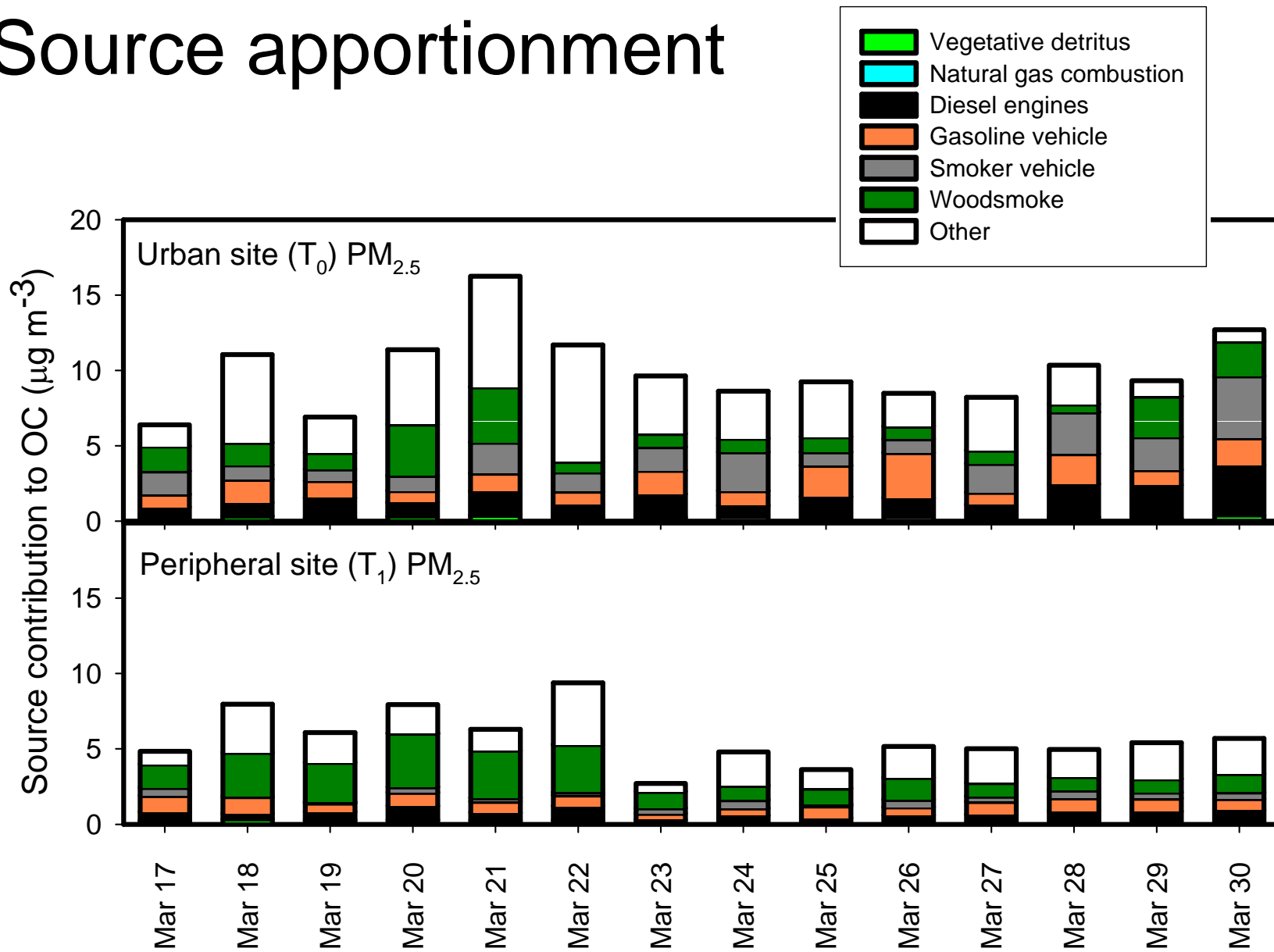
Chemical mass balance model

- Molecular-Marker chemical mass balance modeling (MM-CMB)
 - Receptor-based source apportionment based on highly-specific organic compounds
 - Solves for the effective-variance least-squares solution to a linear combination

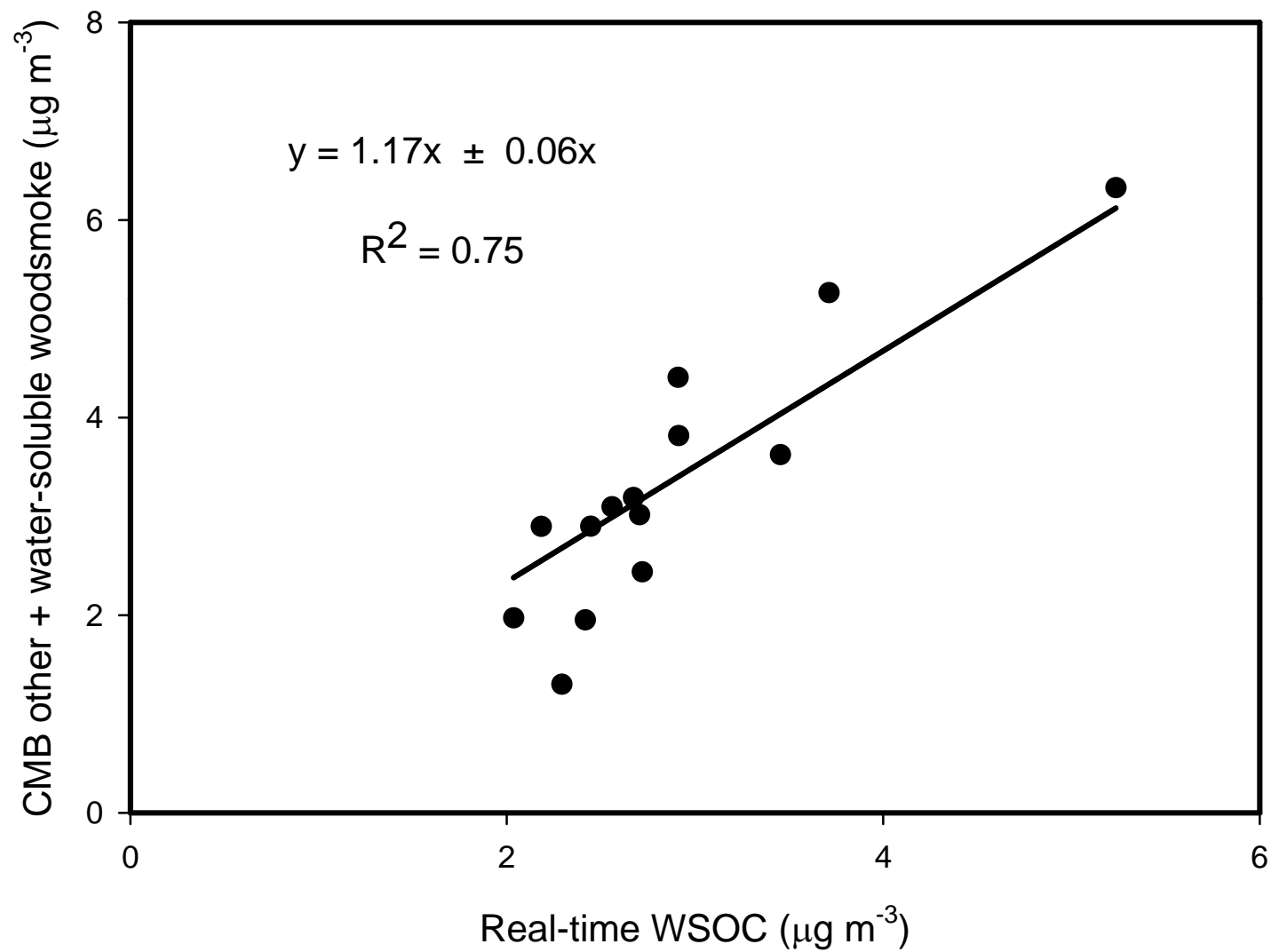
$$X_{ij} = \sum_{k=1}^P C_{ik} S_{kj}$$

- Model inputs : chemically-detailed profiles at receptors (x_{ij}) and sources (C_{ik})
- Assumes conservation of mass and that sources are identified and well-characterized
- Unapportioned organic carbon mass results from unknown primary sources or is secondary in nature

Source apportionment



Water-soluble OC and CMB other



Acknowledgements

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- Chemical analysts
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