

Phoenix NERL Platform Data Quality Issues and Supplementary Analyses

Data Quality Issues and Supplementary Analyses

- Platform data
- Receptor modeling
- Scanning electron microscopy
- Health effects

Phoenix NERL Platform Data

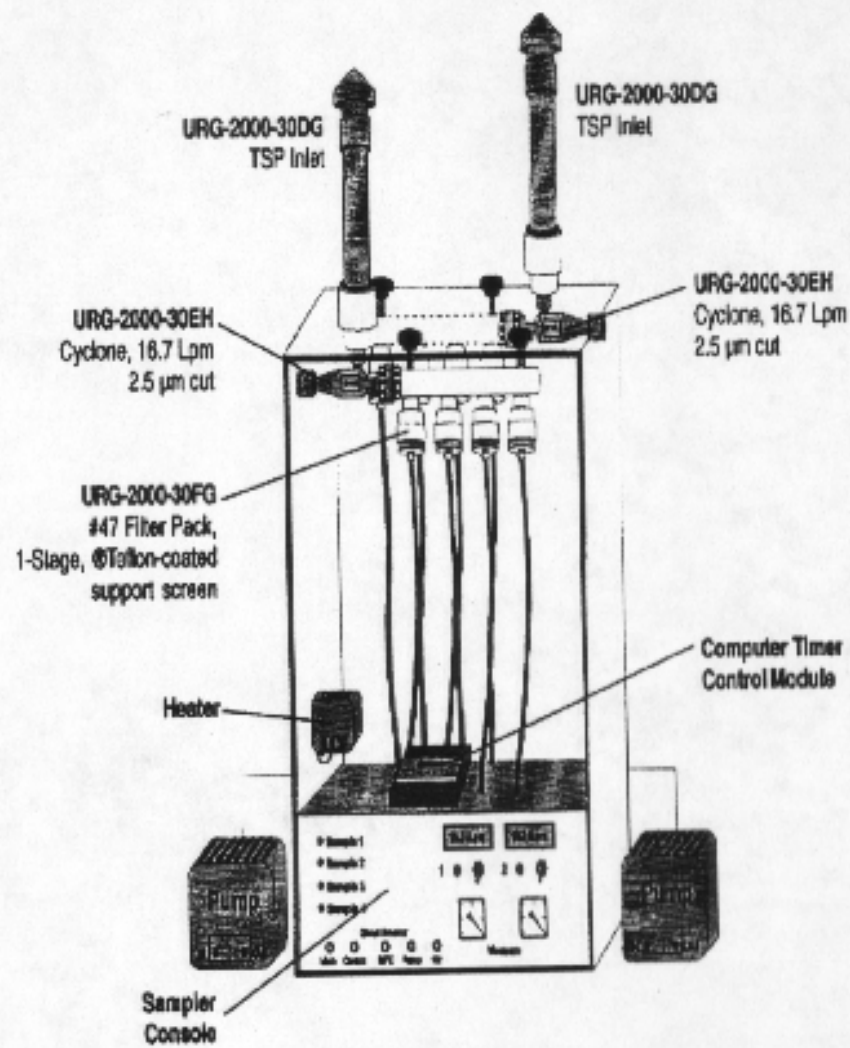
- Available to researchers
- 3 EPI studies are using the data to evaluate the association between PM and mortality outcomes
- QST and NERL evaluated the platform data using CMB

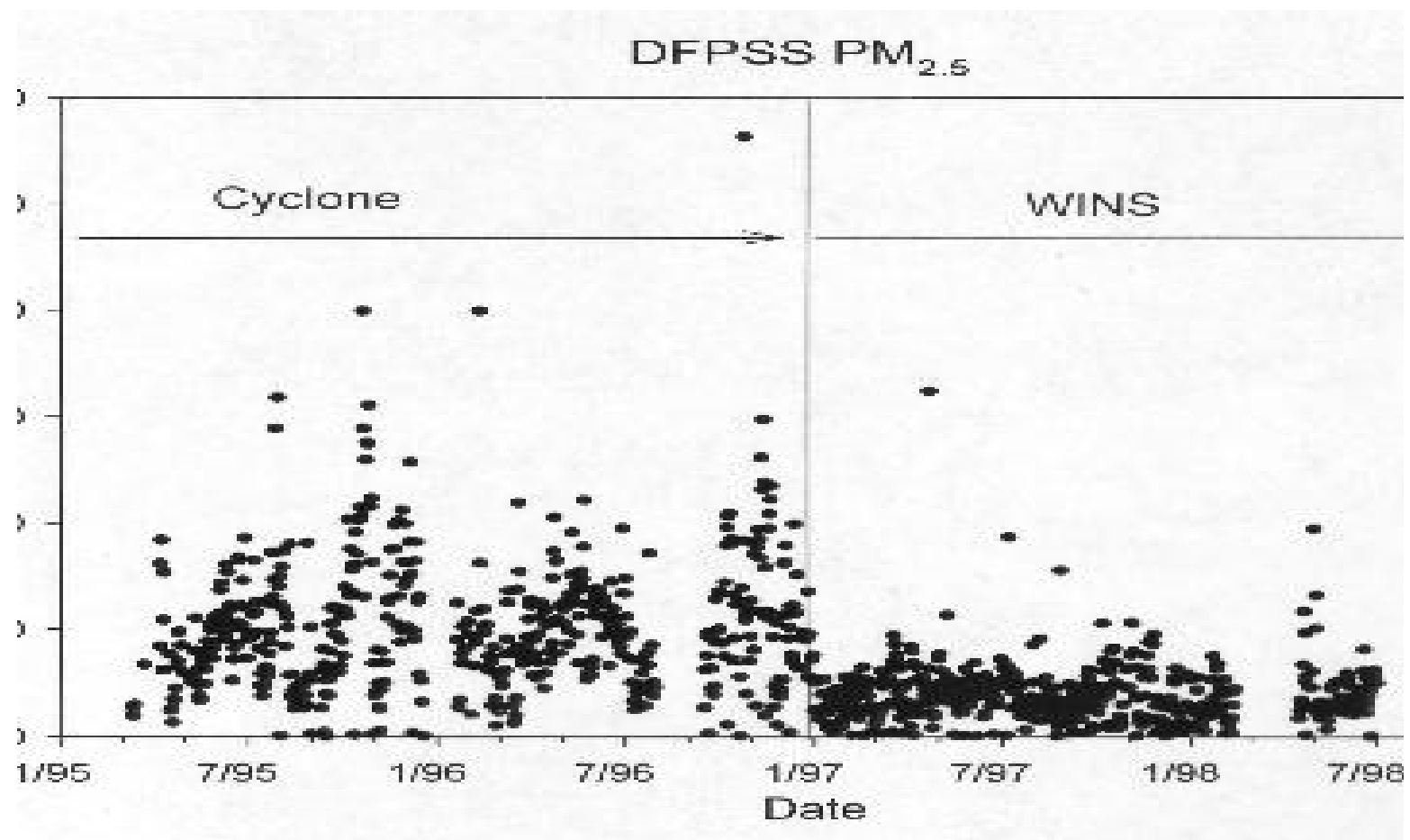
Phoenix NERL Platform

- QST Environmental collected measurements from Feb 1, 1995 to June 30, 1998
- Samplers
 - DFPSS (daily $PM_{2.5}$ mass, elements (XRF), OC/EC)
 - Dichot (every 3rd day $PM_{2.5}$ mass, PM_{CF} mass, elements (XRF))
 - TEOM PM_{10} , $PM_{2.5}$, $PM_{1.0}$ (hourly mass)
- Meteorology
 - Wind speed, wind direction, temperature, relative humidity (hourly)

Measurements

URG, Dual Fine Particulate Sequential Sampler (DFPSS)





Phoenix PM₁₀ Study

- The 1989 - 90 Phoenix PM₁₀ Study

Chow J.C., Watson J.G., Richards L.W., Hasse D.L., McDade C., Dietrich D.L., Moon D., Slone C. DRI Document No. 8931.6F1

- Factor analysis of Background PM_{2.5} samples
 - A factor was identified that had high loadings for Zn, As, Cu, and Pb
 - Source contribution was not evaluated
 - Not discussed further due to the focus on PM₁₀

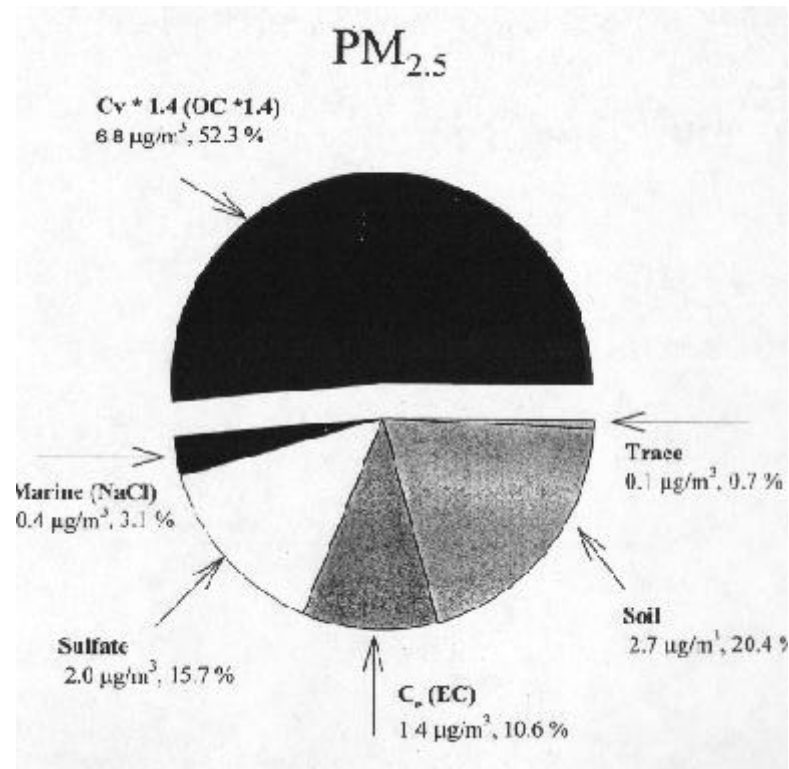
Composition and Sources of Particulate Matter in Phoenix, Arizona

G.A. Norris*, R.B. Zweidinger*, H.J. Th. Bloemen**, L.J. Purdue** and J. Bowser**,
R.K. Stevens ***

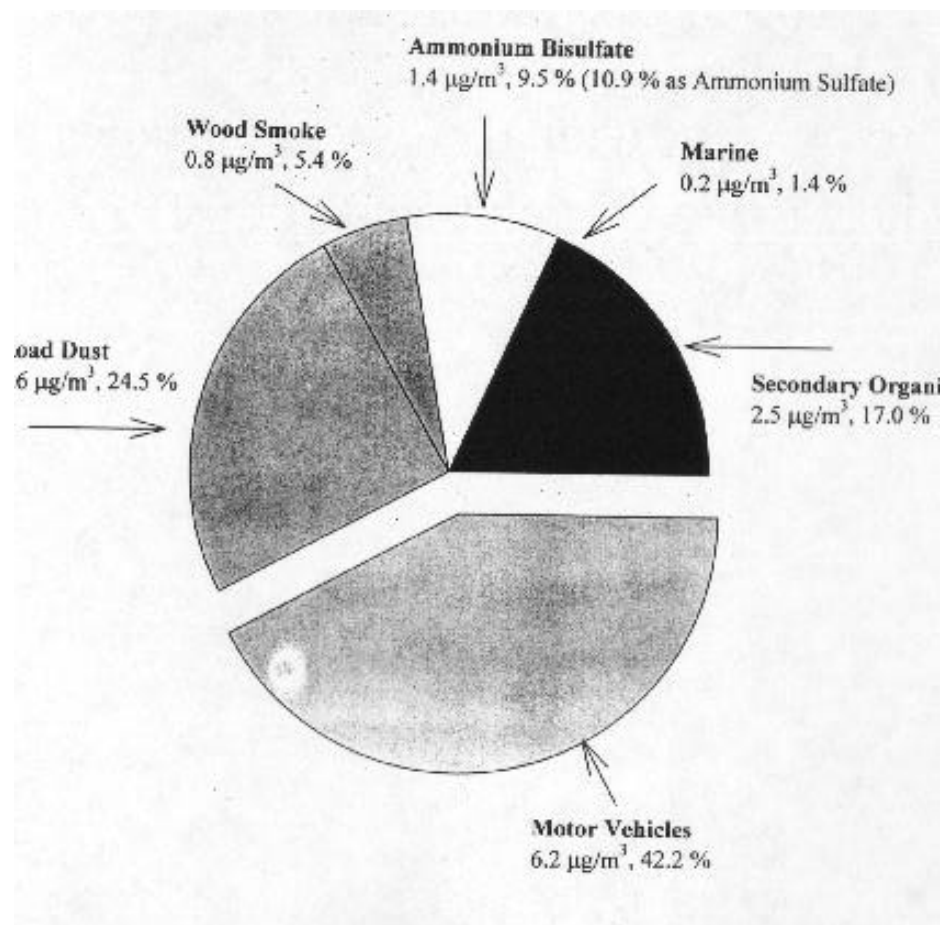
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Composition and Sources of Particulate Matter in Phoenix, Arizona



Phoenix SEM Studies

- Chemistry of Individual Aerosol Particles from Chandler, Arizona (Feb 9 and 10th, 1980)

(Post J.E., Busek P.R., Environ. Sci. Technol, 18, 25 - 42, 1984)

- Sources

- Soil
- Automobile exhaust (Pb)
- Sulfates
- Emissions from secondary iron foundries
- Oil fired power plants (soot)

Phoenix SEM Studies

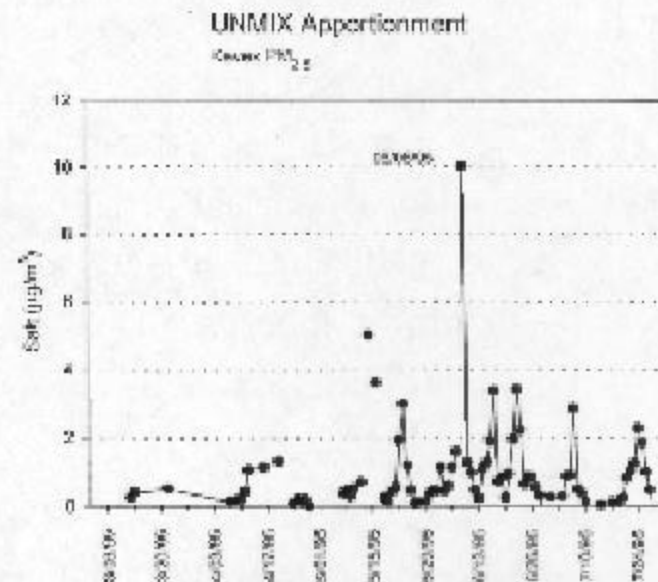
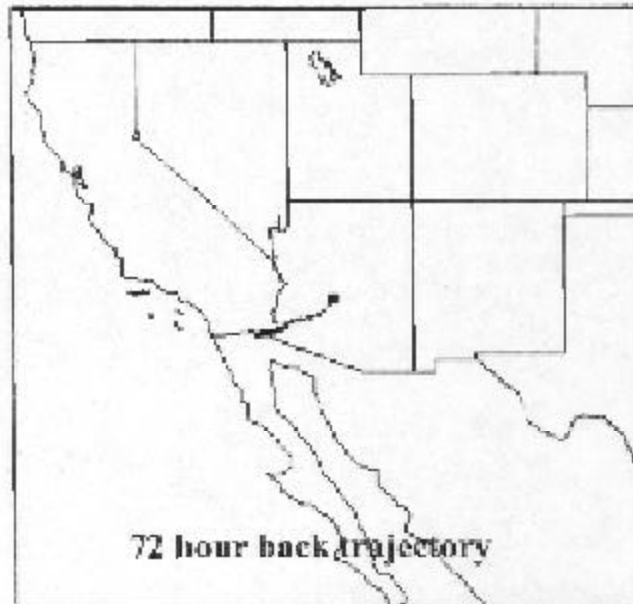
- Chemistry of Individual Aerosol Particles from Chandler, Arizona (Feb 26 - March 5, 1982)

(Anderson J.R., Aggett F.J., Busek P.R., Germani M.S., Shattuck T.W., Environ. Sci. Technol. 22. 811-818, 1988; Saucy D.A., Anderson J.R., Busek P.R., Journal of Geophysical Research, 96: 7407-7414, 1991)

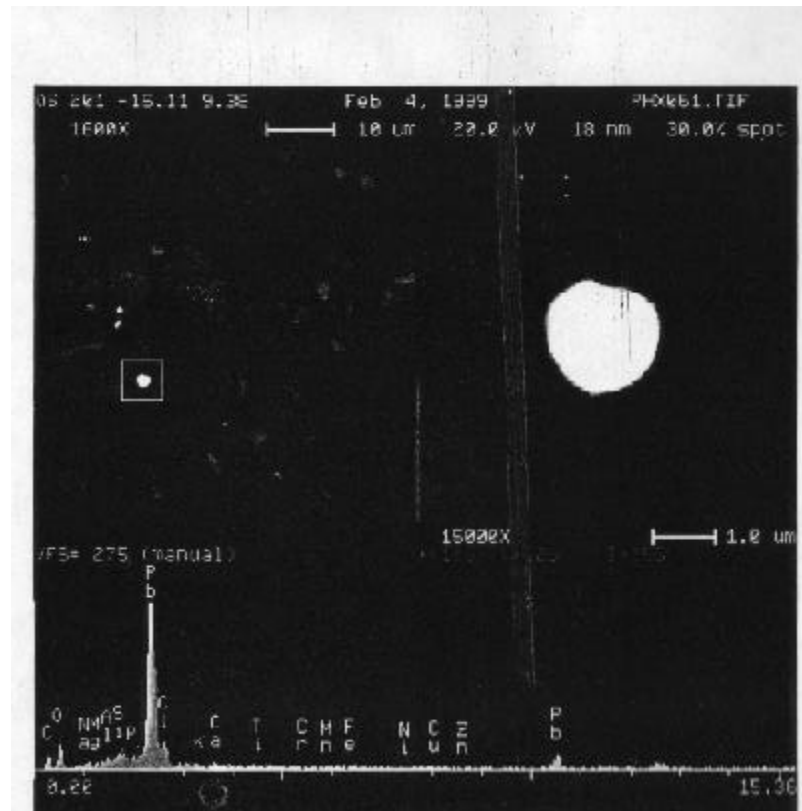
- 3 major sources
 - crustal material (local)
 - copper smelters (transport from mining areas in SE Arizona)
 - marine air (transport from the coastal northern Mexico)
- 2 minor sources
 - Ti -rich (local)
 - Pb- rich (local)

Phoenix SEM

A PM_{2.5} sample collected in Phoenix on 06/08/95 had a 30 percent contribution from marine aerosol (CMB7). SEM/EDX analysis of the coarse fraction filter revealed a large number of salt aerosols on the filter.



Pb Particle



Associations between Air Pollution and Mortality in Phoenix, 1995-1997

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¹Departments of Environmental Health, University of Washington, Seattle, Washington, U.S.A.;

²Department of Civil and Environmental Engineering, University of Washington, Seattle, Washington, USA; and ³US EPA, Research Triangle Park, NC, U.S.A.

Total mortality was significantly associated with CO and NO₂ (p<0.05) and weakly associated with SO₂, PM₁₀, and PM_{CF} (p<0.10).

Cardiovascular mortality was significantly associated with CO, NO₂, SO₂, PM_{2.5}, PM₁₀, PM_{CF} (p<0.05) and elemental carbon (EC).

Factor analysis revealed that combustion related pollutants (motor vehicle exhaust and vegetative burning), and secondary aerosols (sulfates) were associated with cardiovascular mortality.