

# The ECHAM5 Aerosol Model

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1) Results

2) Issues

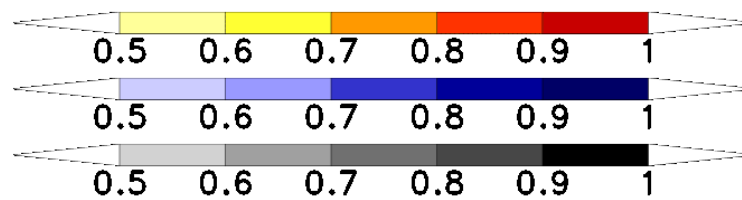
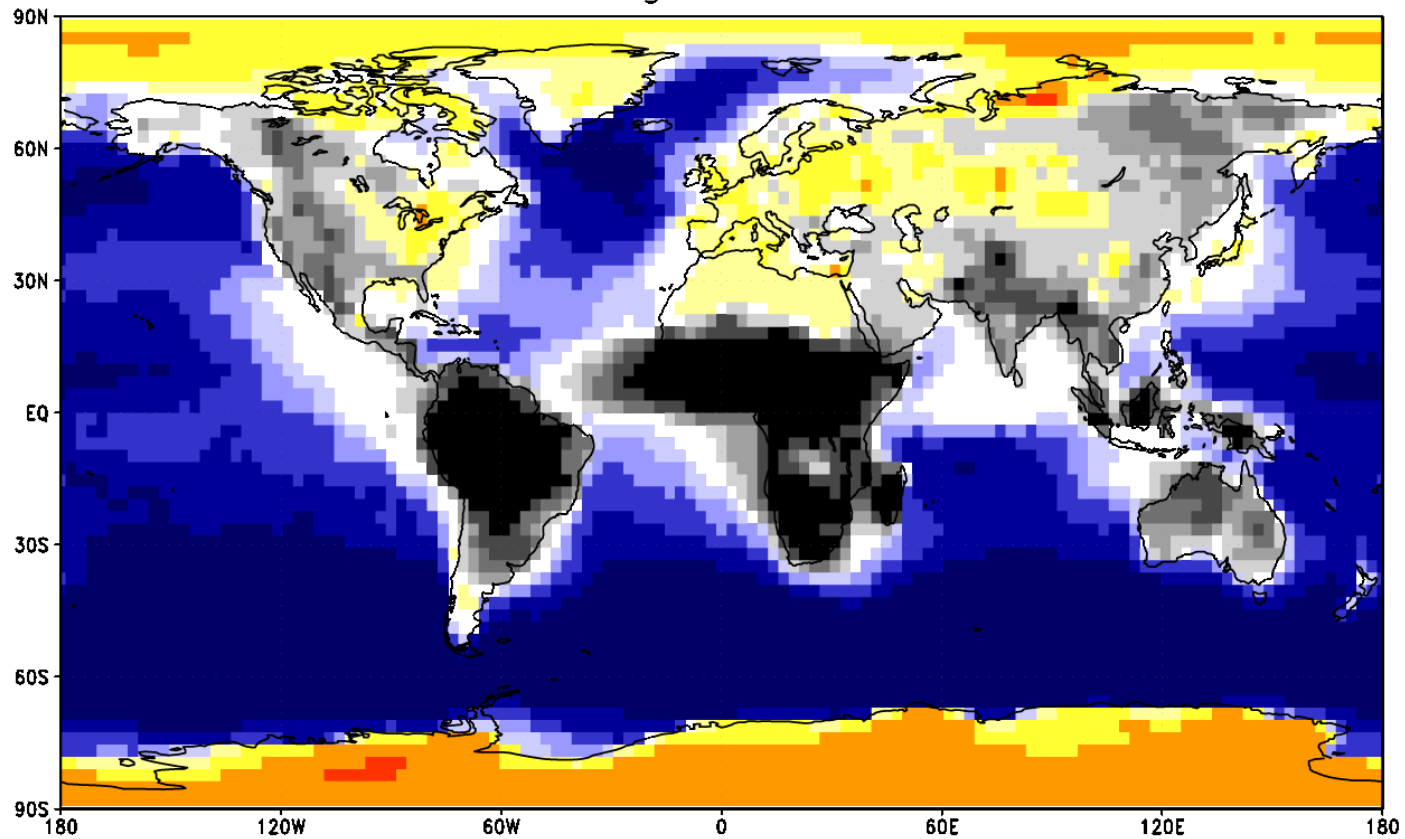
## 1) Preliminary Results

- 1 year climatological simulation
- 3 months spin up
- Horizontal resolution: T42 (spectral)  $\Leftrightarrow$  2.8° on Gaussian grid  
Vertical resolution: 19 levels

# Mixing State

The ECHAM5 Aerosol Model

Dominant Surface Mass Regimes – Mixed Accumulation Mode



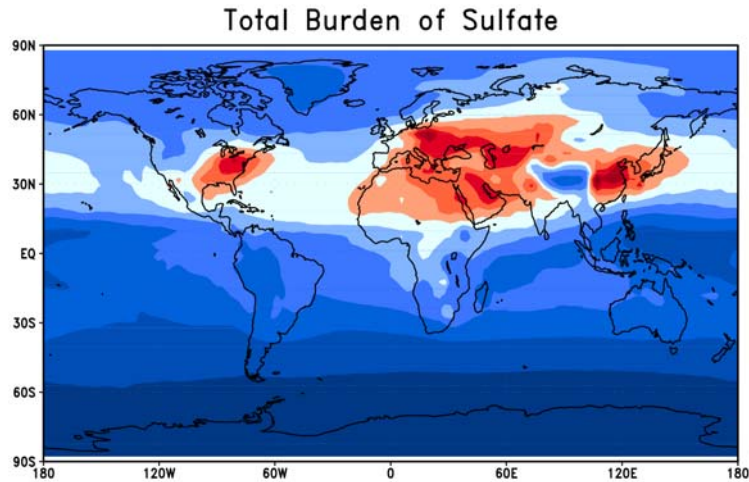
Sulfate

Sea Salt

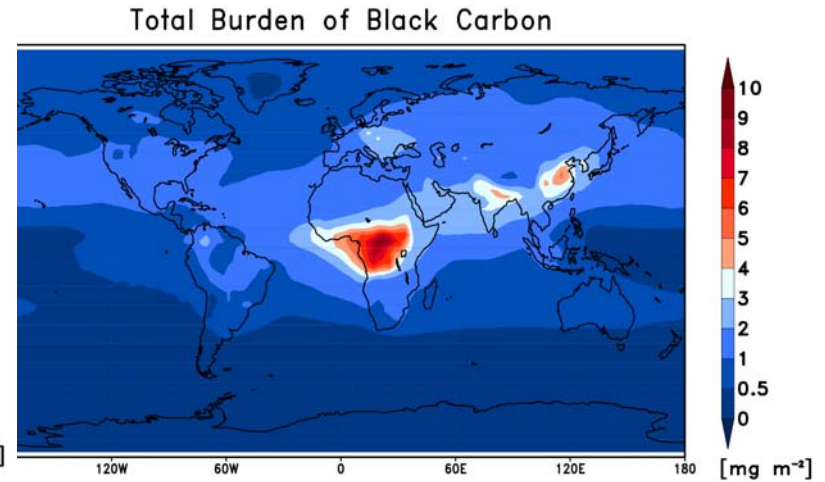
Carbonaceous

# Column Burden

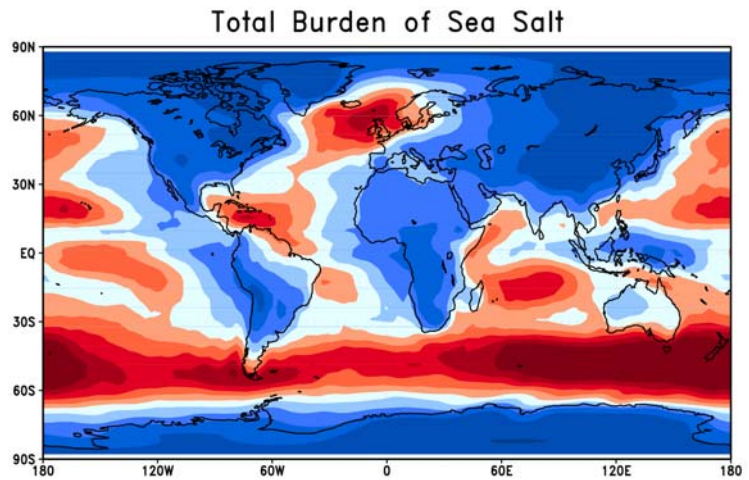
The ECHAM5 Aerosol Model



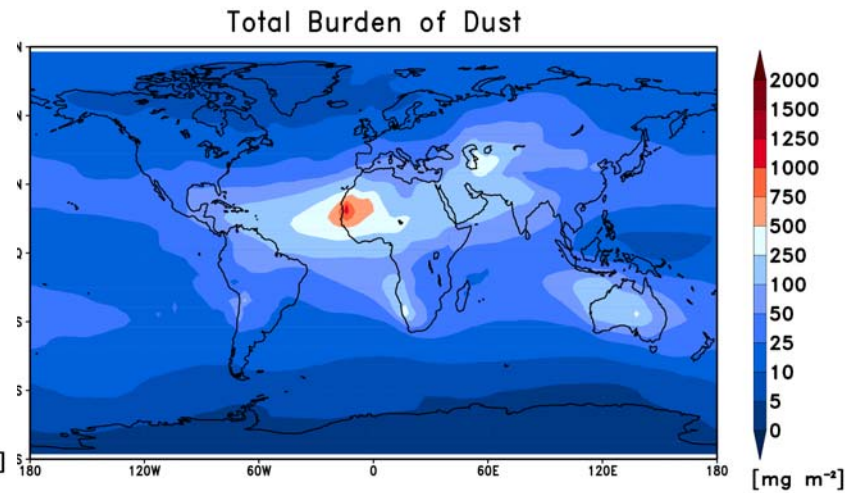
Global Total: 1.75901 [Tg(S)]



Global Total: 0.494374 [Tg]

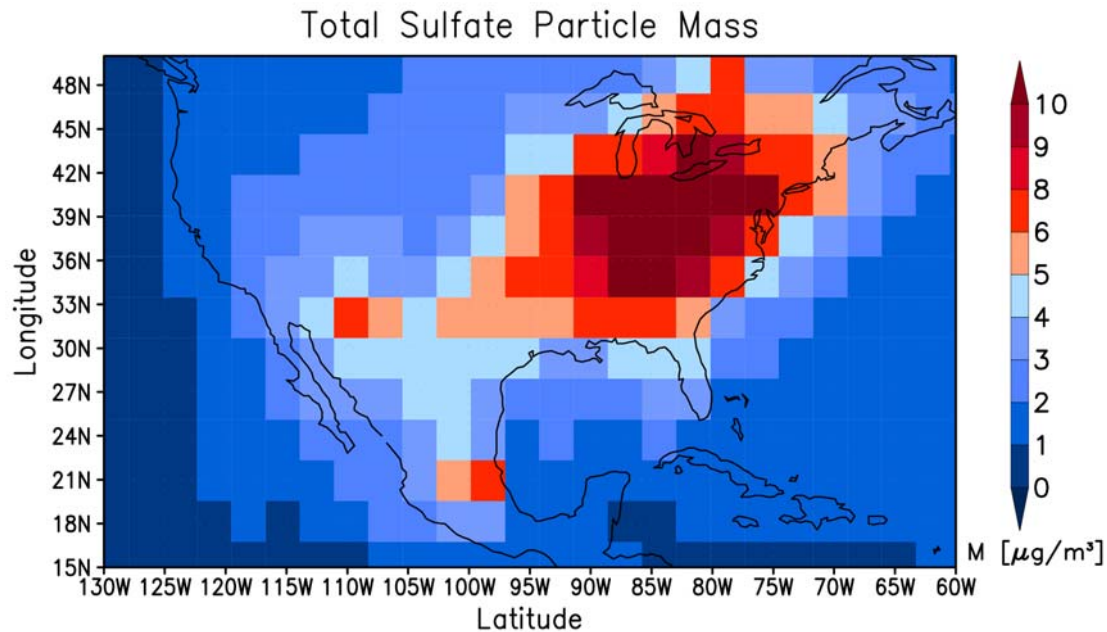


Global Total: 27.4789 [Tg]

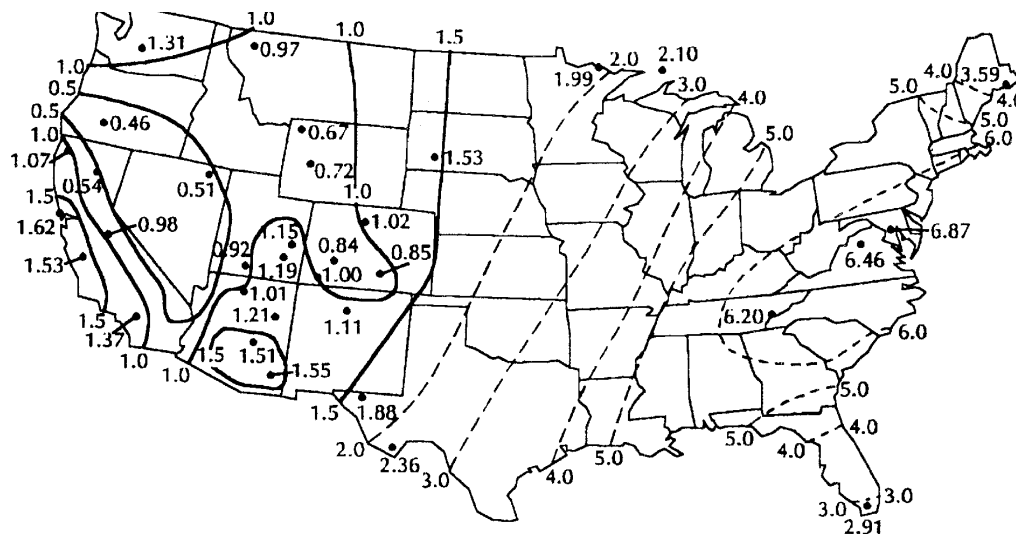


Global Total: 24.1209 [Tg]

# Surface Aerosol Mass



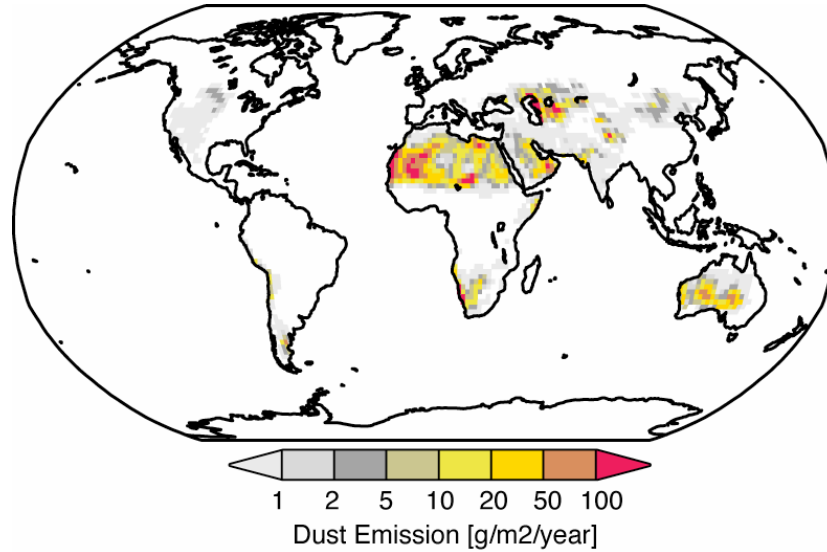
Modelled near-surface annual-mean total sulfate mass concentration. Sulfate is assumed fully neutralised by ammonia.



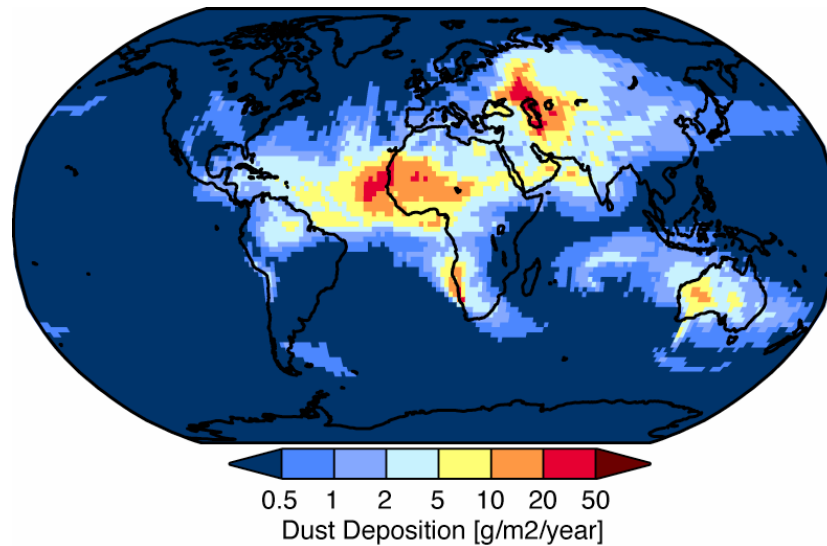
3-year annual-mean fully neutralised PM<sub>2.5</sub> sulfate mass concentration [ $\mu\text{g m}^{-3}$ ]. From IMPROVE network (Malm et al.; 1994).

# Simulated Dust Cycle (Ina Tegen, Martin Werner)

**Dust emission  
computed by  
ECHAM5 with  
Jena scheme**

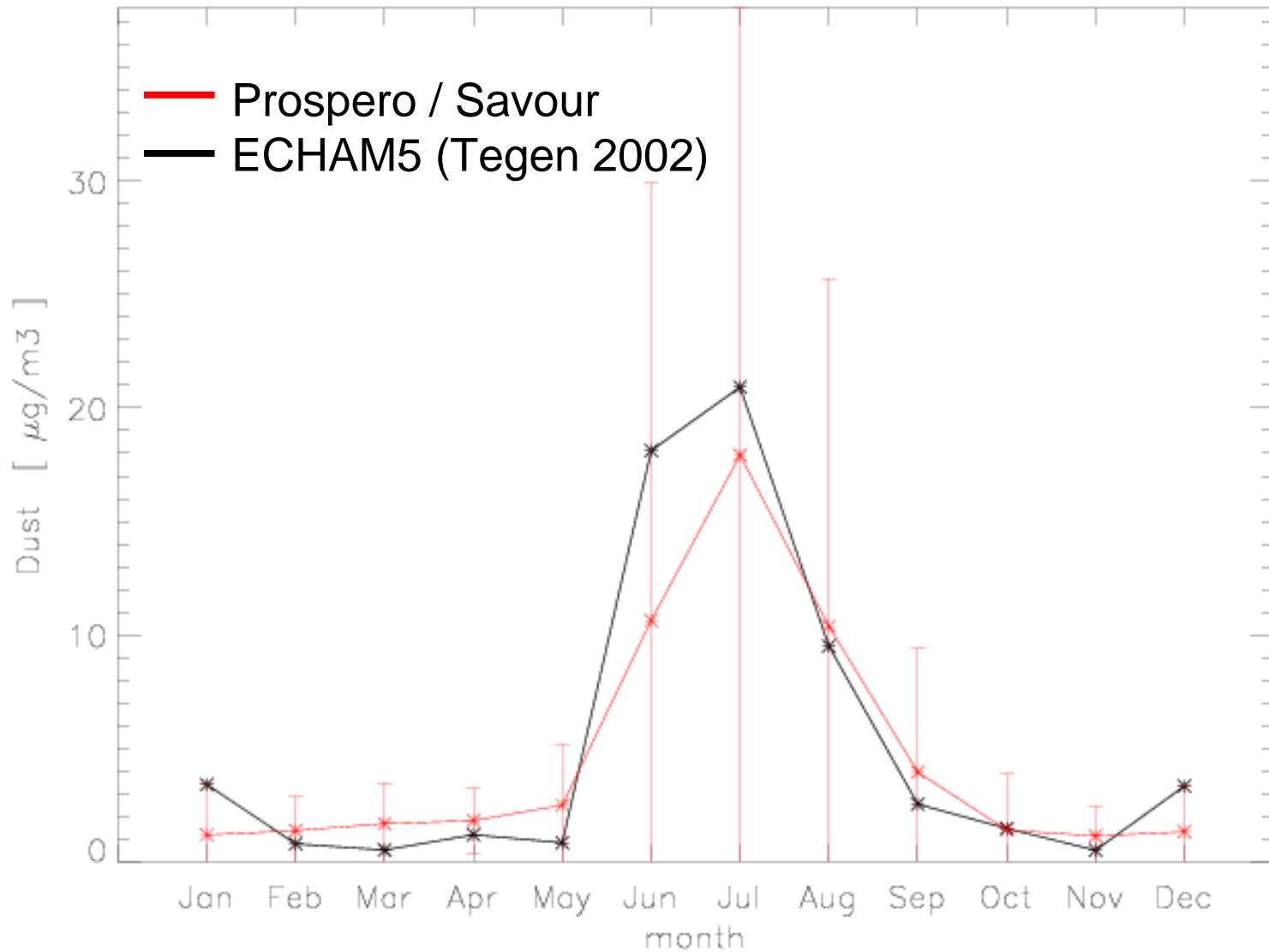


**Dust deposition  
from ECHAM5**



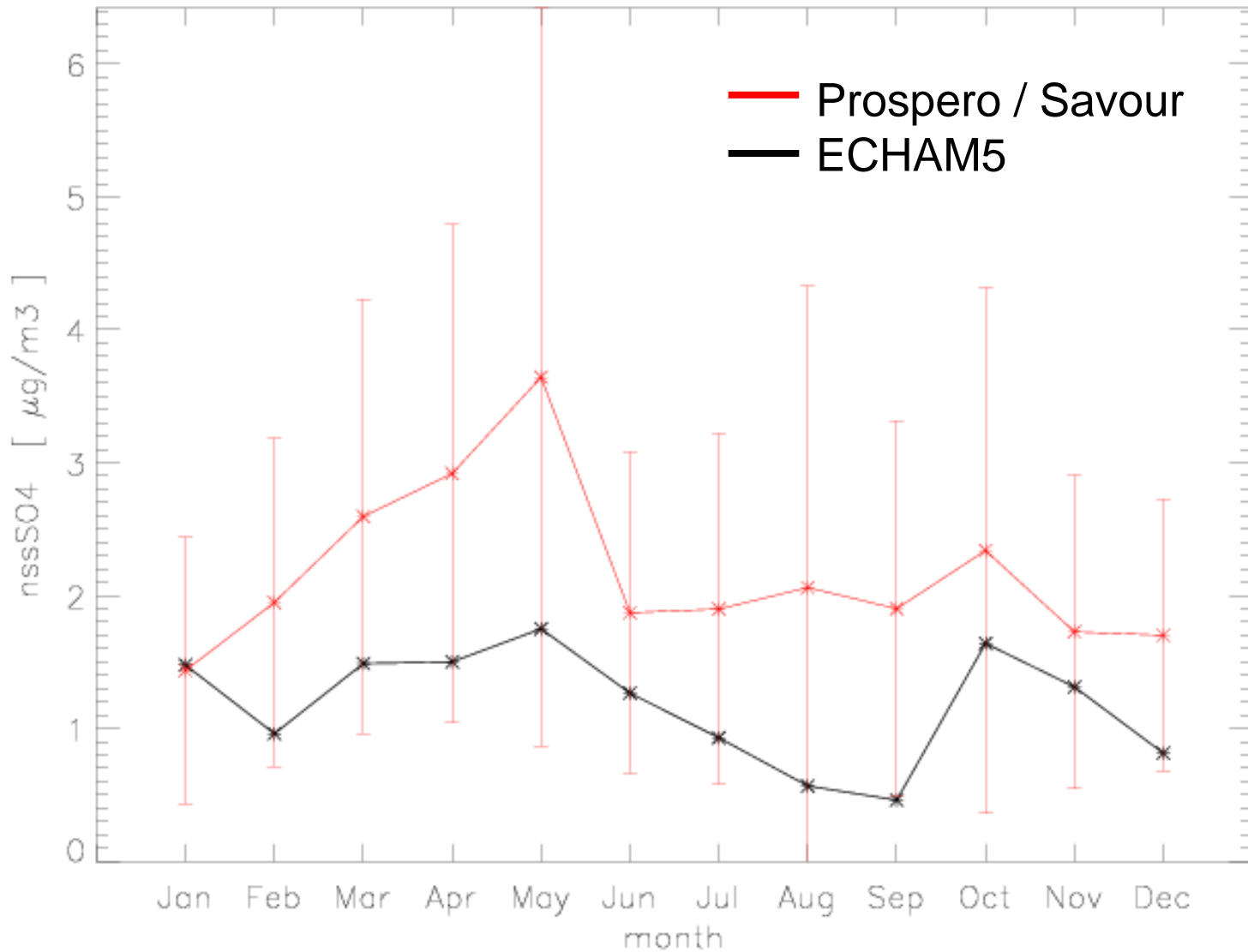
# Surface Aerosol Mass

RSMAS, Univ. of Miami: Whatman-41, 25.7500N 279.750W



# Surface Aerosol Mass

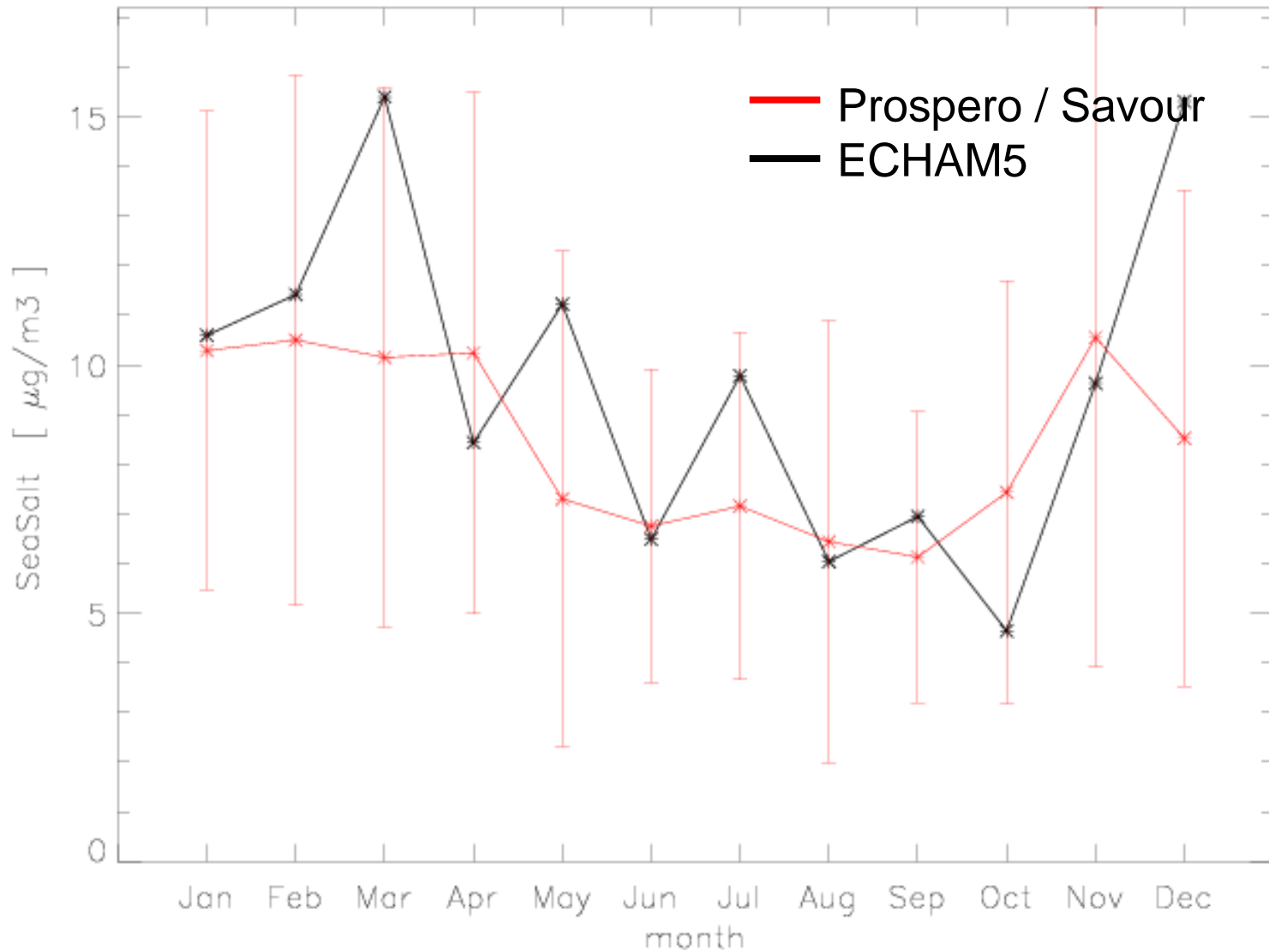
RSMAS, Univ. of Miami: Whatman-41, 25.7500N 279.7500W



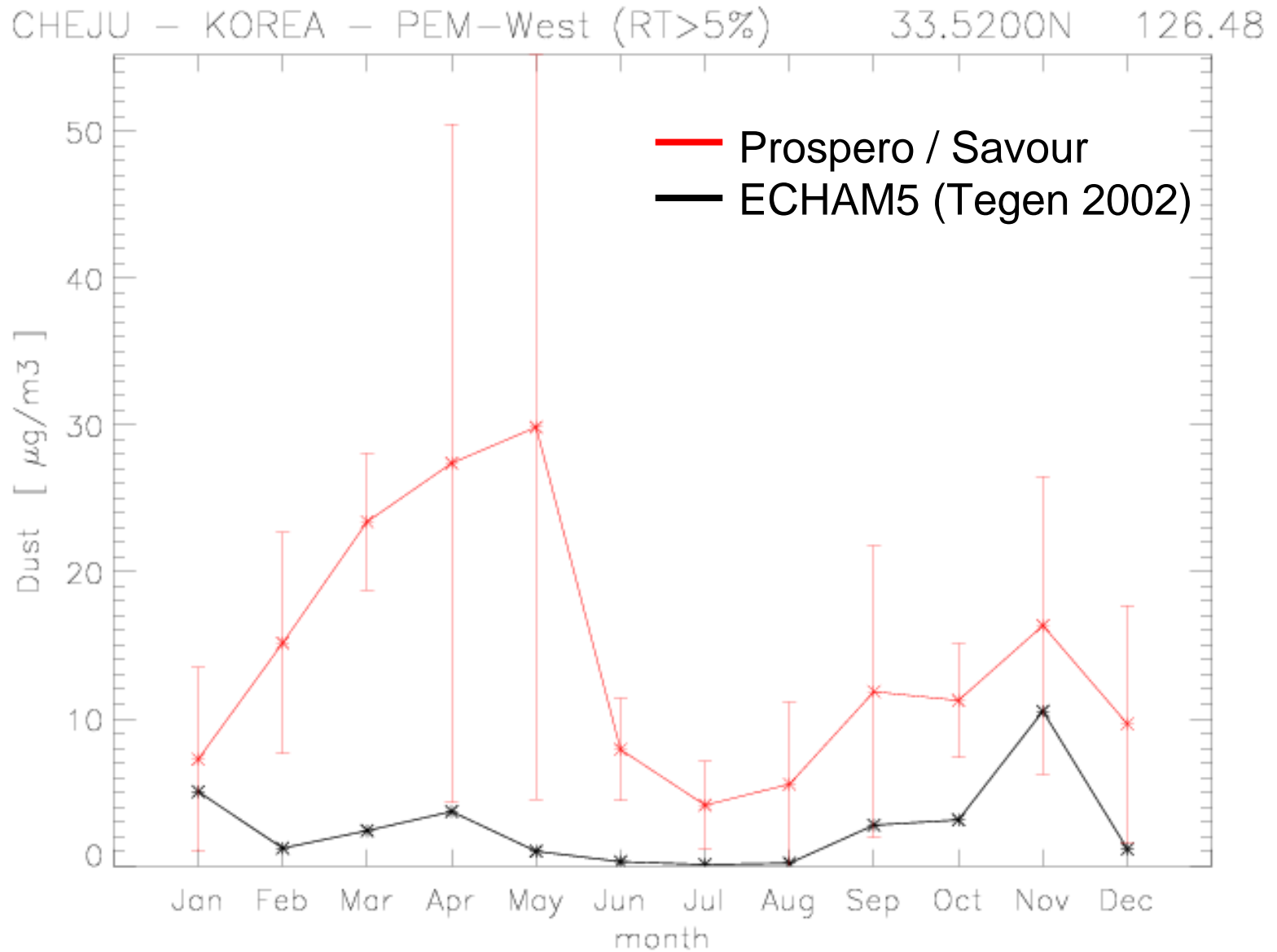


# Surface Aerosol Mass

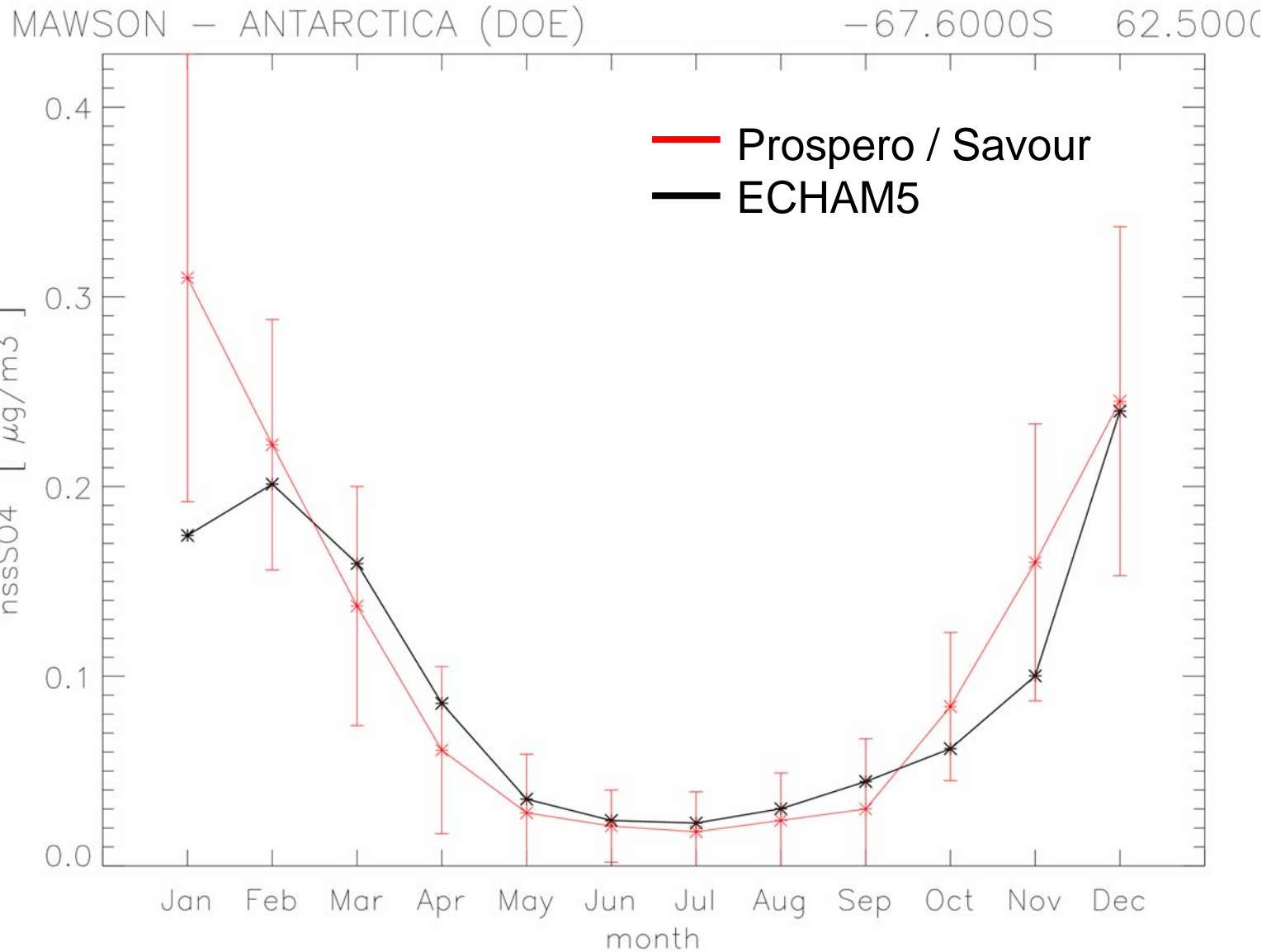
RSMAS, Univ. of Miami: Whatman-41, 25.7500N 279.750W



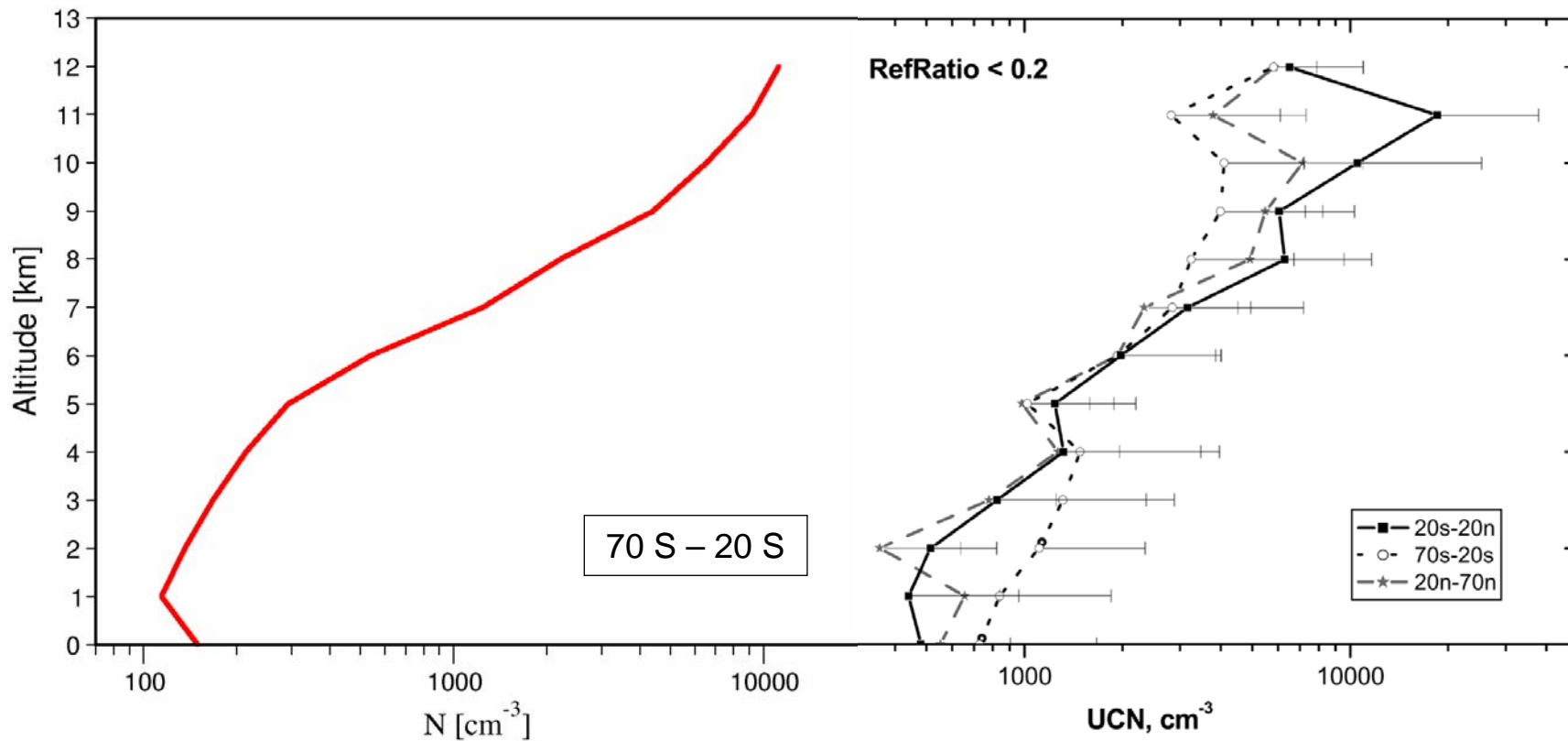
# Surface Aerosol Mass



# Surface Particle Mass



# Number Concentrations



Total aerosol number annual mean  
Pacific profile;  
Averaged over 70S - 20S and 130 E - 90 W

Pacific measurement composite  
(From Clarke and Kapustin; JAS; 2002)

## 2) Discussion

- Relative high column burdens  
(compared to literature – further evaluation)
- Surface mass concentrations show relatively good agreement with measurements  
(spatial and temporal consistency necessary)
- Need for vertically integrated / resolved data
  - Measurement campaign data for nudged simulations
  - Coupling with radiation scheme facilitates evaluation with remote sensing data

## Acknowledgements

- Erich Roeckner and the ECHAM developers team
- Part of this work was performed within the EU project PHOENICS

### PHOENICS Partners:

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- CNRS-LOA, France
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- CNR, Italy