Absorbing Aerosol Index

Paul Ginoux (GFDL) & Omar Torres (GSFC)

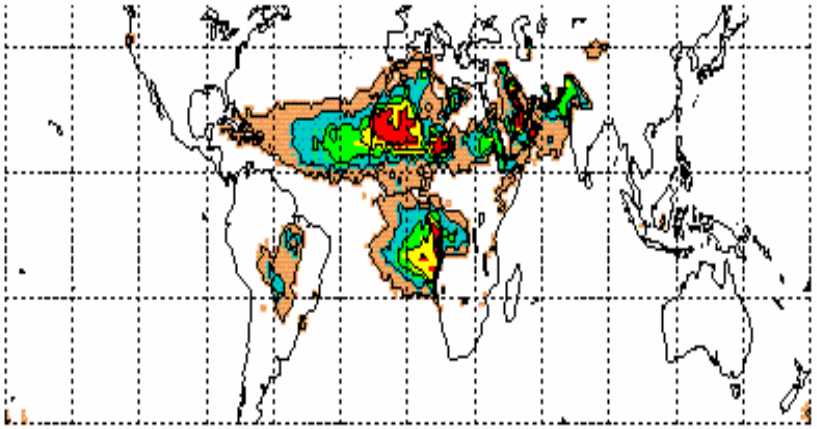
$$AI = -100\left[\log\left(\frac{I_\lambda}{I_{\lambda_0}}\right)_{meas} - \log\left(\frac{I_\lambda}{I_{\lambda_0}}\right)_{calc}\right]$$ Herman et al., 1997

Total Ozone Mapping Spectrometer (TOMS)

nUV measurements

λ, shorter wavelength (331 nm)

λ_0, longer wavelength (380 nm)



Specifics:

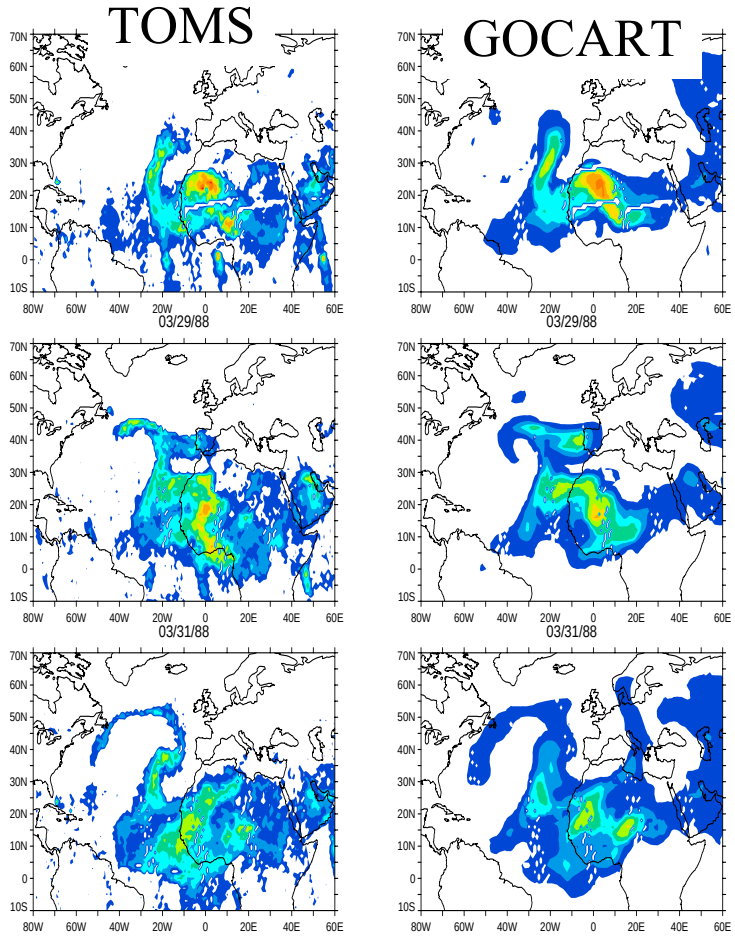
- Low surface albedo
  => **Global retrieval**
- N7, EP TOMS, OMI
  => **>25 years of data**
- Positive values = absorption
  => **BC** and **Dust**

- No physical meaning
- Low resolution
- Dependency on altitude

Absorbing Aerosol Index: DUST model

TOMS AI.v7 for dust model has been fitted by an

Empirical Explicit function of the physical quantities: ps, Z, τ, and ω



Ginoux et al., 2004

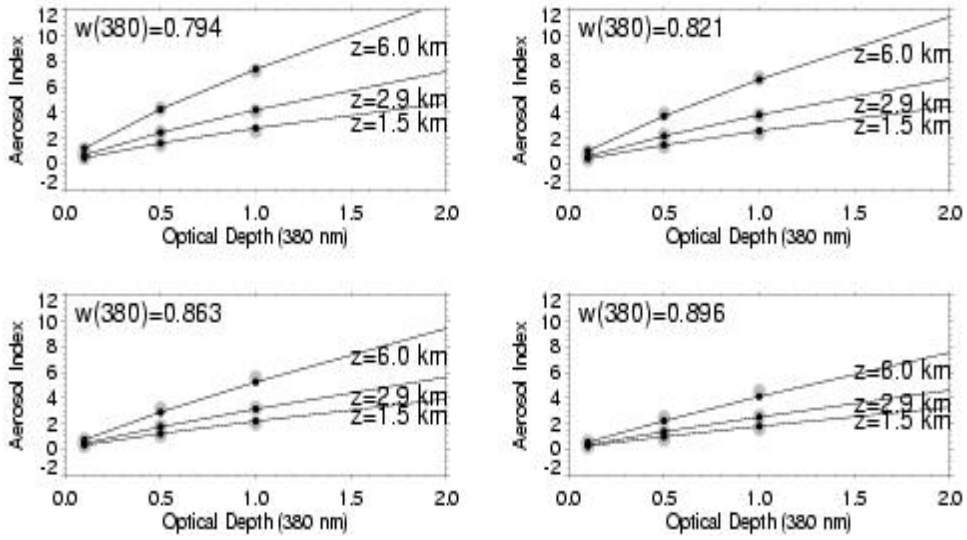
For $0.75 < \omega < 0.95$

$$\overline{AI} = (1 - 0.2\log(ps))[a + b(1-\omega)h](\tau)^{\omega}$$

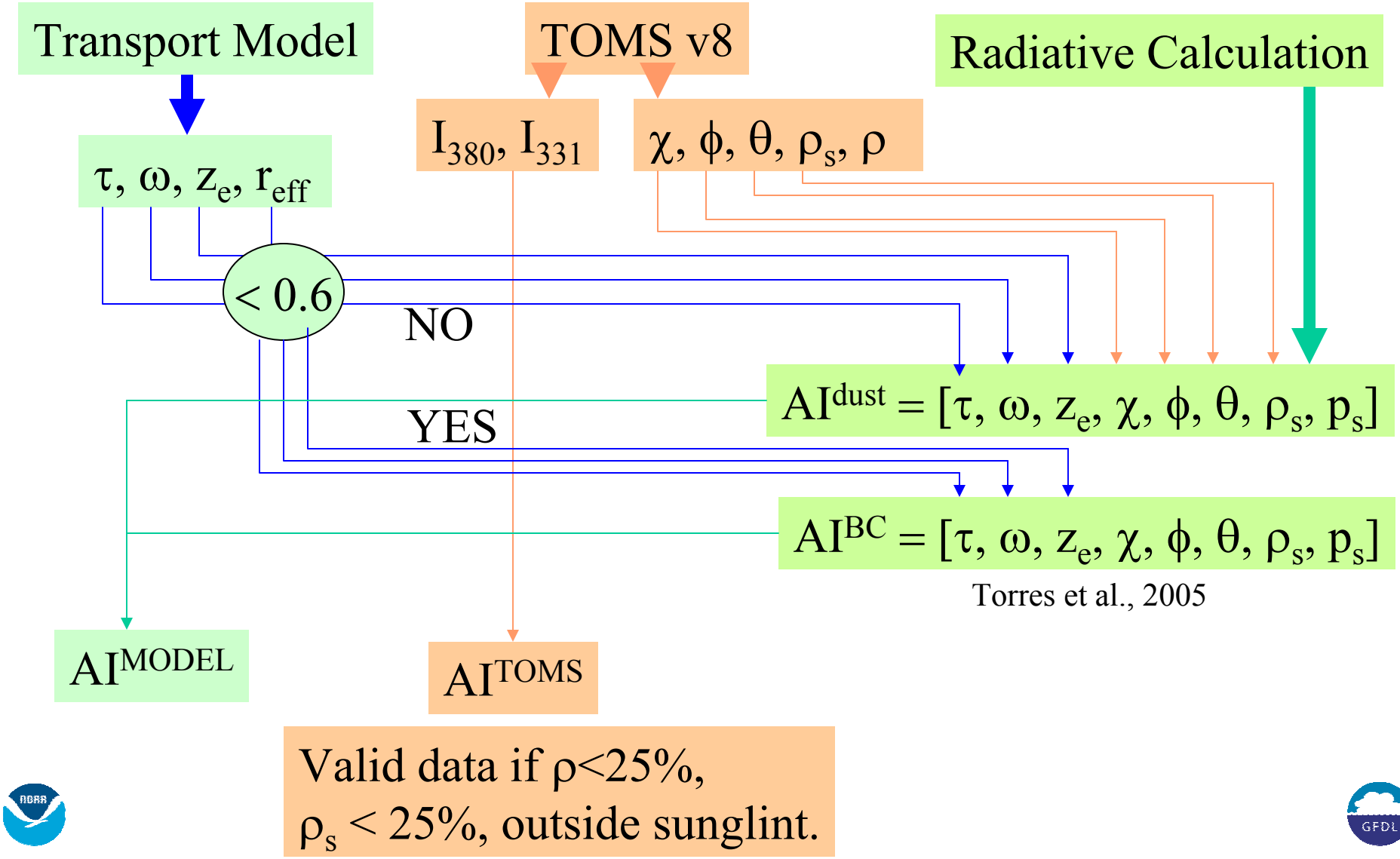
Ginoux and Torres, 2003

TOMS (331/360): a=0.65 b=4.25

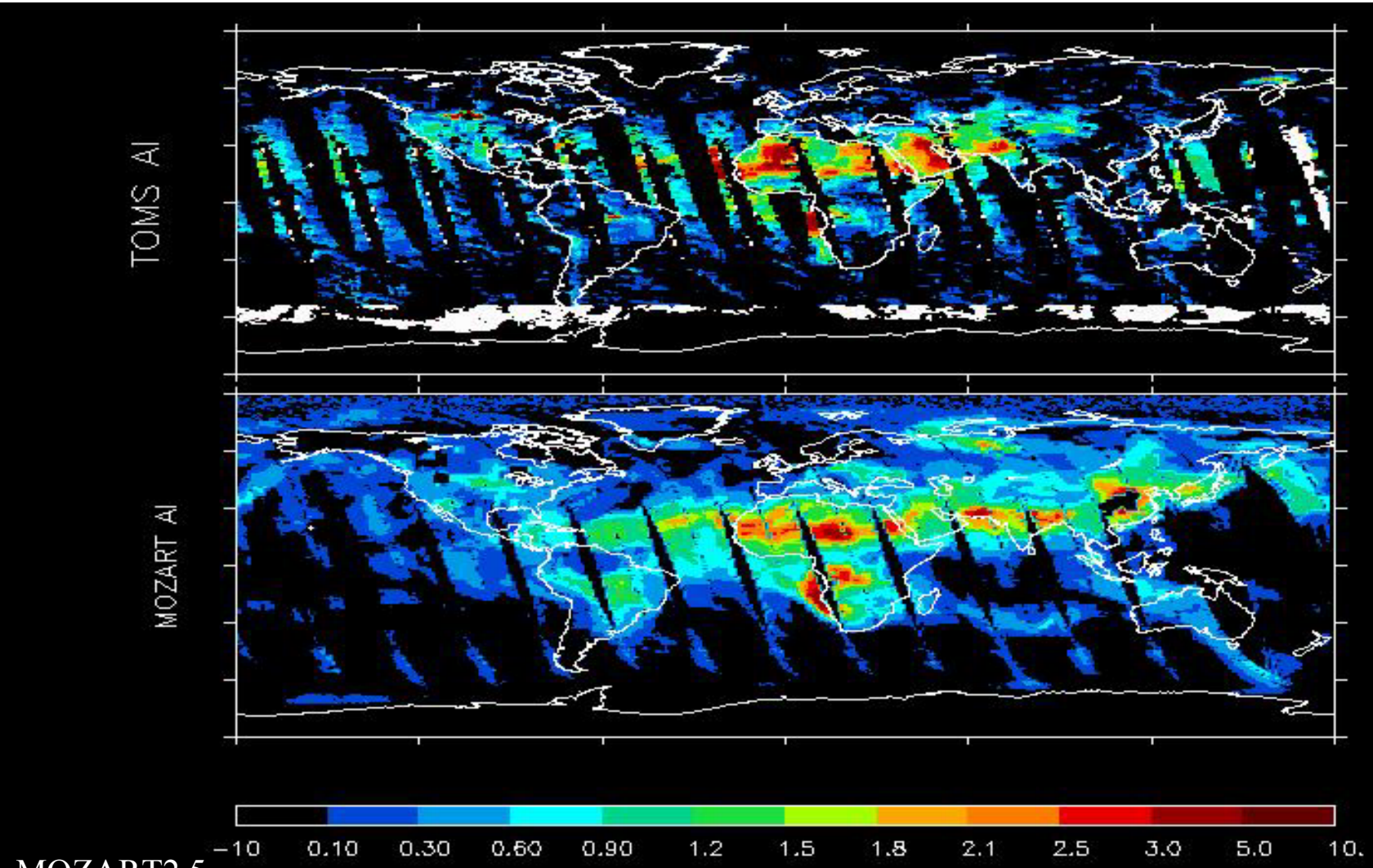
TOMS (340/380): a=1.25 b=5



Absorbing Aerosol Index: DUST & BC

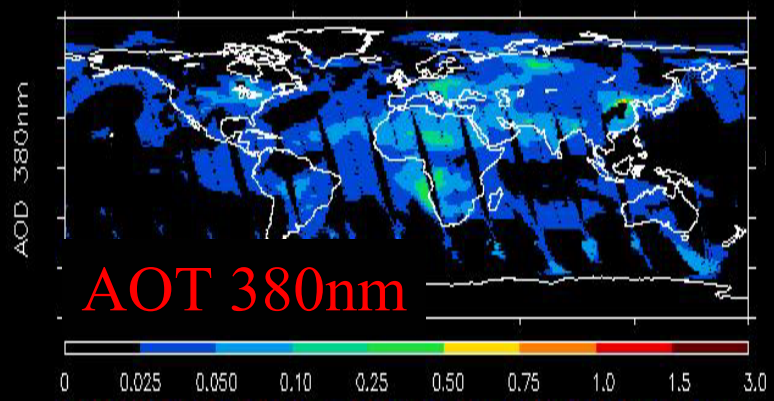


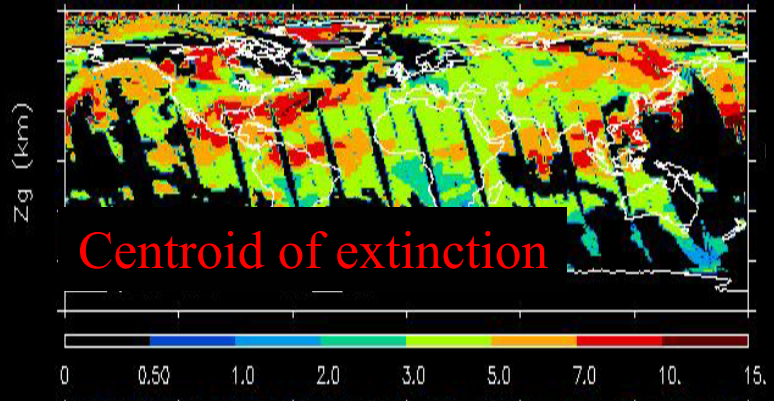
Absorbing Aerosol Index: MOZART with Aerocom-B emissions/TOMS

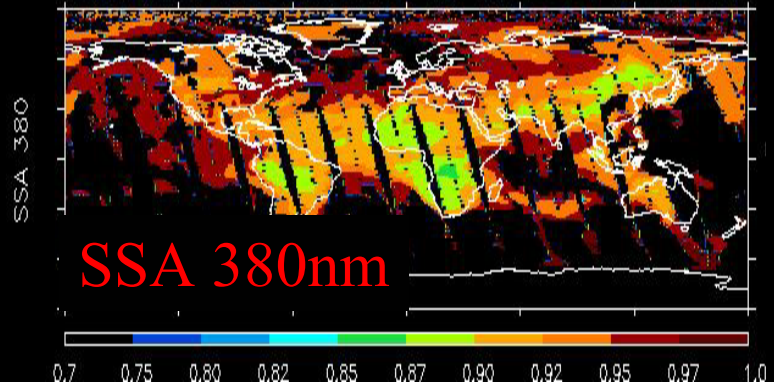


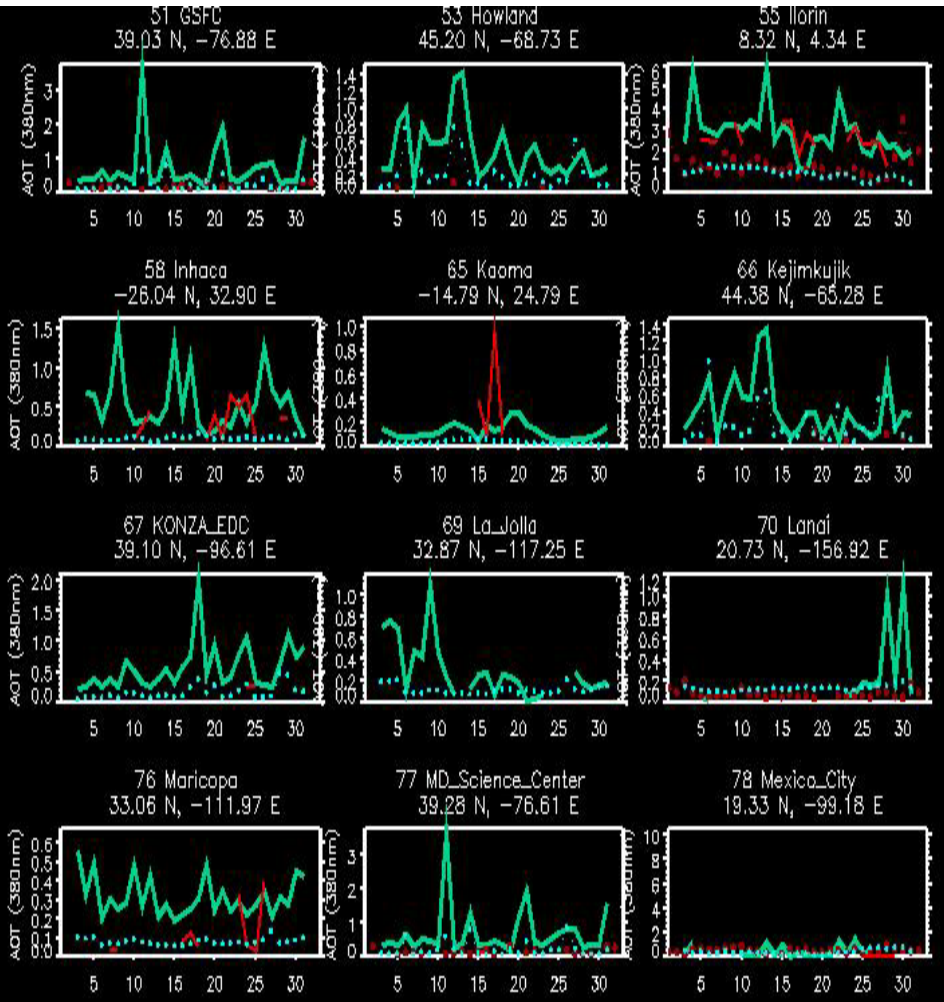
MOZART2.5
Absorbing at 380nm: BC, OC, Dust
Horowitz et al., 2003; Tie et al., 2005

Absorbing Aerosol Index: Input fields and Validation at AERONET sites









Comparison: AOT 380 from MOZART and AERONET, AI from MOZART and TOMS, at 12 sites, for Jan 2000