AEROSOL DATA FROM SPACE

What dataset to choose?

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# Satellite DATA

<table>
<thead>
<tr>
<th>sensor</th>
<th>method</th>
<th>simulation</th>
<th>authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODIS</td>
<td>(.44/.67/1.6/2.2µm) refl</td>
<td>(2001)</td>
<td>Chu /Remer /Kaufman /Tanre</td>
</tr>
<tr>
<td></td>
<td>(.63µm) reflectance</td>
<td>(1979-1991)</td>
<td>Stowe</td>
</tr>
<tr>
<td>TOMS</td>
<td>(.34/.38µm) refl. diff</td>
<td>(1979-2000)</td>
<td>Torres /Herman</td>
</tr>
<tr>
<td>POLDER</td>
<td>(.67/.87µm) pol./refl.</td>
<td>(11/96-6/97)</td>
<td>Tanre /Goulomb</td>
</tr>
</tbody>
</table>

- All data-sets are 'normalized to .55µm wavelength
- Resolution of all data-sets is degraded to 1°*1° horizontal resolution

- **Concerns**
  - **MODIS:** model, aerosol shape, limited land-coverage
  - **AVHRR:** model, ocean-limited, calibration, clouds
  - **TOMS:** model, height, cloud-contamination (50km pixel size)
  - **POLDER:** model, aerosol shape, larger sizes, clouds, no entire year
aerosol optical depth from satellite data:

- MO – MODIS, 01
- TO – TOMS, 79-00
- PO – POLDER, 96-97
- AVg – AVHRR, 85-88
- AVn – AVHRR, 85-88

(yearly averages, 0.55\(\mu m\))

a ‘best’ data-set?

- supplement MODIS with TOMS (M/T)
‘ground’ vs ‘space’

for yearly average aerosol optical depth $<\text{aot}>$:

- **Similar pattern**
- **Satellite data are a bit larger** *(mainly due to snow contamination in winter)*

regional corr. factors were applied to AERONET data
over-estimates vs under-estimates

of MODIS with respect to AERONET
summary

- **combine data-sets!**
  - do we get closure or smooth transitions?

- **for global aot data from space**
  - MODIS with support from TOMS is currently the best
  - MODIS / MISR combination should be future basis
    - MISR can detect aerosol over deserts
    - MODIS and MISR are on the same orbiter

- **tests with quality ground-data are essential**
  - AERONET did reveals MODIS snow bias!