AERONET: New Aerosol products, data access, and reanalysis of data for mixtures of fine and coarse mode aerosols

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AERONET—An Internationally Federated Network

- Characterization, Climatology, Validation, Synergism
- Near real-time acquisition; ~Decade of measurements
- ~155 permanent sites in 2002
- Homepage access http://aeronet.gsfc.nasa.gov
- What’s New?
New Developments from the AERONET Program

- New Instrumentation supported
- Synergism with ancillary observations supported
- Spheroid Inversion
- Quality Assured Inversion Products
- AOD climatology
Instrumentation-Significant Developments

- Standard 340-1020 nm: $8\lambda$ AOT, $4\lambda$ Almuc
- Polar 440-1020 nm: $4\lambda$ AOT, $4\lambda$ Almuc, $1\lambda$ Polar
- SeaPRISM 440-1020 nm + $413$ & $555$ nm sea radiance + $4\lambda$ almuc
- Extended $\lambda$, 340–1640 nm: $9 \lambda$ AOT, 380-1640 almuc (6)
New instrumentation

- SeaPrism-ocean leaving radiances
- Platform mounted sun and ocean viewing
- 413 & 555 nm
- 15 min measurement ocean radiance obs
- 5 in network

- Extended $\lambda$ (1.64$\mu$m)
- Almucantars UV & NIR
- Enhance non spherical retrievals
- Initial deployments in coarse aerosol regions
- Multi almucantar retrievals to be evaluated
- ~15 in network
Ancillary Data sets - Back trajectories

Data from MAR 30 of 2003

Almucantar No 1 on MAR 30 of 2003

Additional Lidar and Satellite data expected to become available
Quality Assured Retrievals (LEVEL 2.0)

**Filters:**
- $\tau$ is for Level 2
- Solar Zenith Angle $\geq 25^\circ$
- Size Distr. tails $< 15\%$ of maximum
- almucantar symmetrical at 21 angles

**Primary Data-base:**
- $\tau$ Level 1.5
- All Solar Zenith angles
- 10 symmetrical angles

**Check for Non-sphericity**

**Filter: Sky fitting error:**
- error: 5%-15%
- error: < 5%

**Levels 2 OUTPUT:**
- Size distribution ($0.05 \mu m < r < 15 \mu m$)
- Real Part of Ref. Index
- Imaginary Part of Ref. Index
- Single Scattering Albedo ($\lambda = 0.44; 0.67; 0.87; 1.02 \mu m$)
Non-Spericity Check & Spheroid Processing (2.0)

Processing almucantars as non-spherical:
(using model of randomly oriented spheroids)

Check for NON-SPHERICITY:
- Ångström parameter \( \leq 0.6 \)
- Solar Zenith Angle \( \geq 45^\circ \)
- Sky fitting error 5%-15%

Level 2 OUTPUT:
- Size distribution \((\sim 0.6 \mu m \leq r \leq 15 \mu m)\)
- Real Part of Ref. Index \((\lambda = 0.87; 1.02 \mu m)\)
- Imaginary Part of Ref. Index
- Single Scattering Albedo \((\lambda = 0.44; 0.67; 0.87; 1.02 \mu m)\)

Filters:
- \( \tau \) is for Level 2
- Solar Zenith Angle \( \geq 45^\circ \)
- Size Distr. tails < 15% of maximum
- almucantar symmetrical at 21 angles

Filter:
- Sky fitting error <10%

Filter:
- \( \tau(440) \geq 0.4 \)
- Size distribution \((0.05 \mu m \leq r \leq 15 \mu m)\)
- Real Part of Ref. Index
- Imaginary Part of Ref. Index
- Single Scattering Albedo \((\lambda = 0.44; 0.67; 0.87; 1.02 \mu m)\)
AERONET Data Download Tool

Click Geographic Region, Country/State or AERONET Site to change site selection:
- **Geographic Region**: South_America
- **Country/State**: Brazil
- **AERONET Site**: Abracos_Hill

Download Data for Abracos_Hill

Select the start and end time of the data download period:

```
START: 1 : JAN : 1999
END: 1 : JAN : 2002
```

Data Descriptions  Data Units  Development Status  Update Log

**Note**: Data are not available if the data type is italicized.

Select the data type(s) with checkbox:

**SPECIAL SPHEROID AND SPHERICAL ALMUCANTAR INTERFACE**

<table>
<thead>
<tr>
<th>Almucantar Retrievals</th>
<th>Almucantar Retrieval Settings (Advanced users only)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Only</strong></td>
<td><strong>Recommended</strong></td>
</tr>
<tr>
<td>9. □ Size Distribution</td>
<td></td>
</tr>
<tr>
<td>10. □ Refractive Index</td>
<td></td>
</tr>
<tr>
<td>11. □ AOT Coincident</td>
<td></td>
</tr>
<tr>
<td>□ Select All Retrievals</td>
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</tr>
<tr>
<td>12. □ Volume</td>
<td><strong>Provisional</strong></td>
</tr>
<tr>
<td>13. □ AOT Absorption</td>
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</tr>
<tr>
<td>14. □ AOT Extinction</td>
<td></td>
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<tr>
<td>15. □ SSA</td>
<td></td>
</tr>
<tr>
<td>16. □ Asymmetry Factor</td>
<td></td>
</tr>
<tr>
<td>18. □ Combined Retrievals (9-16)</td>
<td></td>
</tr>
</tbody>
</table>

**Data Mode**

- Default Options
- Advanced Options

**Advanced Level 2.0 Retrieval Options**

<table>
<thead>
<tr>
<th>Angles (No.)</th>
<th>Solar Zenith Angle (Degrees)</th>
<th>Sky Error (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>21</td>
<td>77</td>
</tr>
<tr>
<td>Max</td>
<td>25</td>
<td>15</td>
</tr>
</tbody>
</table>

**Data Format**

- □ All Points
- □ Daily Averages
- □ Monthly Averages

Download

Please wait for the new window
(larger intervals will require longer processing time)
Aerosol Climatology


- Aerosol optical depth (500 nm)
- Spheres (5698/1041)
- Spheroids (4911/984)

$dV/d\ln R, \mu m^3/\mu m^2$
Performance of spheroid model for mixed aerosol with dust component
Beijing 2001 & 2002
Mean of 8 almucantars/ AOD level
Spherical Model Inversions

BEIJING 2001 & 2002
Mean of 8 almucantars / AOD level
Spheroid Model Inversions

Angstrom Exponent (440/870 nm) < 0.75

AOD 440 nm

Spherical model

Spheroid model
BEIJING 2001 & 2002
Mean of 30 almucantars/AOD level
Spherical Model Inversions

Spherical model

BEIJING 2001 & 2002
Mean of 39 almucantars / AOD level
Spheroid Model Inversions

Spheroid model
Single Scattering Albedo

BEIJING  2001 & 2002
Mean of 8 almucantars / AOD level
Spheroid Model Inversions

BEIJING  2001 & 2002
Mean of 39 almucantars / AOD level
Spheroid Model Inversions

Spheroid model
AERONET Summary

- Network open for expansion into Asia, oceans, high latitudes, Africa
- New Extended wavelength instrument supported
- Ancillary data sets added to AERONET website (BT, MPL w/ possible sat imagery)
- Download Tool-Inversions QA’d, ‘Recommended’
- Spheroid model inversions supported, recommended output eminent
- AEROSOL climatology supported for AOD