Satellite Aerosol Validation

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Satellite Remote Sensing of Dust, Fires, Smoke, and Air Quality, July 10-12, 2018
Objectives

By the end of this presentation, you will learn to:

• Validate satellite-derived aerosol optical depth
• List the uncertainties in the MODIS aerosol product
• Access data and tools for validating satellite aerosol products
AERONET measurements of aerosol depth are considered ground truth and are used to validate satellite aerosol retrievals.
Spatial and Temporal Collocation

Satellite

Sun photometer data subset time interval: 1 hour (30 minutes before and after a satellite overpass)

Aerosol plume

Satellite data subset surface circle diameter: 50-55 km

Petrenko et al., 2012
MODIS Dark Target (DT) AOD Validation

EE% = ±(0.05 + 15%)

Source: Gupta et al., 2016
MODIS DT Aerosol Retrieval at 10 km in the U.S.

Source: P. Gupta
MODIS DT Aerosol Retrieval at 3 km in the U.S.

Source: P. Gupta
Dark Target

http://darktarget.gsfc.nasa.gov/
MODIS Dark Target AOD Uncertainties

### MODIS 10 Km Product

<table>
<thead>
<tr>
<th>Collection 5</th>
<th>Collection 6 (Interim Values)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ocean</strong></td>
<td><strong>Ocean</strong></td>
</tr>
<tr>
<td><strong>Land</strong></td>
<td><strong>Land</strong></td>
</tr>
<tr>
<td><strong>Aqua</strong></td>
<td><strong>Aqua</strong></td>
</tr>
<tr>
<td>+/- (0.03 + 5% of (\tau))</td>
<td>+/- (0.05 + 15% of (\tau))</td>
</tr>
<tr>
<td>(0.04 + 10% of (\tau))</td>
<td>(0.05 + 15% of (\tau))</td>
</tr>
<tr>
<td><strong>Terra</strong></td>
<td><strong>Terra</strong></td>
</tr>
<tr>
<td>+/- (0.03 + 5% of (\tau))</td>
<td>+/- (0.05 + 15% of (\tau))</td>
</tr>
<tr>
<td>Data not yet available</td>
<td>Data not yet available</td>
</tr>
</tbody>
</table>

### MODIS 3 km Product Uncertainty Values for Collection 6 (Interim Values)

<table>
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<tr>
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Validation Maps

http://darktarget.gsfc.nasa.gov/
Scatter Plot

Website not working, will update scatter plot.
Deep Blue Product

http://deepblue.gsfc.nasa.gov
MAPSS

Multi-sensor Aerosol Products Sampling System

• Giovanni instances
• Used to evaluate the quality of satellite retrievals
• MAPSS allows you to compare AERONET data with coincident satellite data
• Quick and effective way to evaluate the quality of the satellite retrieval at particular locations for a range of dates or seasons
• Data from MODIS & MISR
  – Satellite-AERONET Inter-Comparison: http://giovanni.gsfc.nasa.gov/mapss/
MAPSS: Multi-sensor Aerosol Products Sampling System

This user interface is used to obtain selected parameter statistics from the MAPSS database for a chosen location and time period. Time Series Plot is the available service. Plot output is rendered as a graph and is also available in ASCII format.
MAPSS Statistical Explorer

http://giovanni.gsfc.nasa.gov/mapss_explorer/

Published Validation Results


