New AVHRR, MODIS, and VIIRS aerosol products from Deep Blue

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https://deepblue.gsfc.nasa.gov/
Using multiple similar satellite sensors we move towards a consistent long-term record

https://deepblue.gsfc.nasa.gov/
AVHRR
MODIS Collection 6.1
VIIRS
AVHRR Deep Blue: a proof of concept for AVHRR AOD retrieval over land


AOD at 550 nm and AVHRR band 1 (~630 nm) over land and ocean

Level 2 data in 5-minute granules, ~8.8x8.8 km² pixel size at the sub-satellite point

Level 3 daily and monthly composites at 1° horizontal resolution

NetCDF4 format, CF version 1.6 metadata conventions
Error characteristics are broadly similar between the different AVHRR sensors

Expected error envelopes 0.03+15% over water, 0.05+25% over land
Also examined errors vs. aerosol type, region
Very limited validation available before mid-1990s (pre-AERONET)
We can examine inter-sensor consistency and think about combining data records
The C6.1 reprocessing has begun!

Collection 6.1 (061) Release Schedule

<table>
<thead>
<tr>
<th>MODIS Platform &amp; Stream</th>
<th>Production Public Release Date (for any part of stream)</th>
<th>Production Completion Date (for entire stream)</th>
<th>Data Dates (start to end)</th>
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<tbody>
<tr>
<td>Terra and Aqua Forward Processing Streams</td>
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<td>Terra Forward</td>
<td>15 Oct 2017</td>
<td>15 Oct 2017</td>
<td>1 Sep 2017 and forward</td>
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<tr>
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<td>1 Nov 2017</td>
<td>1 Feb 2018</td>
<td>25 Feb 2000 (Terra 1st Day) to 31 Aug 2017</td>
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Nominal processing is 50x corresponding to 4 years of MODIS L1B & ATM data for a single platform processed in 1 calendar month.

Improved cloud/smoke discrimination: less overscreening in complex environments
Suppressed surface artefacts and improved plume detection in rugged terrain
A frequent low bias in AOD over mountains has been addressed.
Other updates for C6.1 include…

- Calibration updates for both sensors
- Thermal crosstalk fix for Terra
- Retrieval-level AOD uncertainty estimates now split by surface type
- Regional adjustments to aerosol optical models
- Attribute/metadata updates
AVHRR
MODIS Collection 6.1
VIIRS
VIIRS Deep Blue extends and improves upon MODIS heritage products

Horizontal pixel size **6 km** at nadir
Reduced bowtie distortion compared to MODIS
Pixel-level quality assurance (QA) flags
Level 2 (swath) and 3 (daily/monthly) data products
Full (re)processing(s) with **consistent** algorithm and calibration

Validation results similar to/better than SeaWiFS, MODIS
Although VIIRS and MODIS are different sensors, VIIRS should be able to continue the EOS-era record.
Summary

The Deep Blue project provides freely-available aerosol data from:
- 2 years N11, 5 years N14, 6 years N18 AVHRR (demonstration)
- 13 years SeaWiFS
- 17+ years Terra, 15+ years Aqua MODIS (C6.1 underway)
- 5+ years S-NPP VIIRS (coming soon)

Taking a consistent approach as much as possible between sensors helps us to move towards the goal of a long-term climate data record

Each data set is validated and is (or will soon be) published in peer-reviewed journals

For news, documentation, links, and more, visit https://deepblue.gsfc.nasa.gov