Overview of SeaWiFS Deep Blue Aerosols

Long-term climate data records on aerosols are needed in order to improve understanding of air quality, radiative forcing, and for many other applications. The Sea-viewing Wide Field-of-view Sensor (SeaWiFS) provides a global well-calibrated 13-year (1997–2010) record of top-of-atmosphere radiance, suitable for use in retrieval of atmospheric aerosol optical depth (AOD). Recently, global aerosol products derived from SeaWiFS with Deep Blue algorithm (SWDB) have become available for the entire mission, as part of the NASA Making Earth Science data records for Use in Research for Earth Science (MEASUREs) program.

The latest Deep Blue algorithm retrieves aerosol properties not only over bright desert surfaces, but also vegetated surfaces.

Where and How to Obtain SeaWiFS Deep Blue Aerosols Data

SeaWiFS Deep Blue (SWDB) aerosol products is one of seven MEASUREs products that are archived and distributed at NASA GES DISC:

http://disc.gsfc.nasa.gov/measures/

Comparison with Aerosols from MODIS

The dataset is monthly data are composed by using best quality level 2 pixels at resolution of 0.5 x 0.5 resolution over both oceanic and inland water bodies. The latest Deep Blue algorithm retrieves aerosol properties not only over bright desert surfaces, but also vegetated surfaces.

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Data Services:

- Mirador
- Reverb
- GCMD
- OPeNDAP
- Giovanni
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Visualization and Analysis with Giovanni

SeaWiFS mission-averaged AOD at 550nm. (grey-color indicates very low aerosols.)

Area averaged monthly SeaWiFS Deep Blue AOD at 550 nm, calculated with Giovanni.

Seasonal Variations of Aerosols over Southwest Asia

The image to the left is the mission-averaged SWDB AOD at 550nm, illustrating the global distribution of aerosols. The time series (right plot) show AOD over the southwest Asia region, which is higher significantly than both the global and northern hemisphere average.

Lower images show seasonal variations of AOD at 550nm over the southwest Asia region. The aerosols over this region are from both local sources and long-range transport. The largest aerosol loadings appear during the summer and are mostly associated with dust transported from the Arabian Peninsula by southwest monsoon. The data sampling is low during summer over India due to very high cloudiness.

Comparisons with Aerosols from MODIS

Time series are monthly AOD at 550nm (upper panels) and valid data points (lower panels) from SWDB (red), MYD (blue), and MYD (black) over land (left panels) and over ocean (right panels) over south Asia (46°S, 89°E, 89°N, 38°N). The differences are small over the ocean; and, in general, are less than 0.1 over land except the summer, which may be partially due to significant lower sampling during the monsoon rainfall season.

Spatial patterns of differences of AOD between SWDB and MYD-DA (upper panels) or MYD-DB (lower panels) for Jan, Apr, Jul, and Oct (from left to right, respectively). Interestingly, differences show seasonal variations with larger differences in the spring and summer. SWDB is lower significantly than both MYD-DA and MYD-DB over India during pre-monsoon season. In July, over land, the number of matching data points between SWDB and MODIS, in particular MYD-DA, is very low, which may cause artifact in calculating area mean.

Accessing Data in OPeNDAP

OPeNDAP has been added recently to serve SWDB products for increasing the interoperability of the data. A user is able to access the data remotely with applications, such as Panoply, GIADIS, ISV, and Fenest, etc.

True-color and L2 Images Viewer

To simplify visualizing L2 swath products, we provide a web-based service to view daily true-color images and are working on editing the aerosol products. Filtering by Grid ID will also be available.

2 Kapas, R. M.; Hsu, N. C.; Bettenhausen, C.; Jenny, M. J.; Holben, B. N.; and Fang, J.; Global and regional evaluation of land-based optical aerosol depth retrievals from SeaWiFS, Remote Sens. Environ., 136, 2011-17F, and 136 E3103-136 E3103, 2013. The work was supported by NASA's Earth Science Data System (ESDS) and NASA's EOS DISC (Earth Observing System Data and Information System, DISC.) The authors wish to express special appreciation for the technical support of Dr. Jose Michalsky and his group at NASA/GSFC.