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, 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, oceans, and inland water bodies. Comparisons with AERONET observations have shown that the data are suitable for quantitative scientific use [1,2]. The resolution of Level 2 pixels is 13x13.5 km² at the center of the swath. Level 3 daily and monthly data are composed by using best quality level 2 pixels at resolution of both 0.5x0.5° and 1.0°x1.0°. Focusing on the southwest Asia region, this presentation shows seasonal variations of AOD, and the result of comparisons of 5-years (2003-2007) of AOD from SWDB (Version 3) and MODIS Aqua (Version 5.1) for Dark Target (MYD-DT) and Deep Blue (MYD-DB) algorithms. The dataset is available from NASA Goddard Earth Science Data and Information Services Center (GES Disc) at http://disc.gsfc.nasa.gov/measures/.

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 Arabian Peninsula by southwest summer 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 500nm (upper panels) and valid data points (lower panels) from SWDB (red), MYD-DB (blue), and MYD-DT (black) over land (left panels) and ocean (right panels) over southwest Asia (46°/90°E, 8°/30°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 rainy season.

Spatial patterns of differences of AOD between SWDB and 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-DT 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-DB, is very low, which may cause artifacts in calculating area mean.

Where to Obtain SeaWiFS Deep Blue Aerosols Data

SeaWiFS Deep Blue (SWDB) aerosol products is one of seven MEAURES products that are archived and distributed at NASA GES DISC: http://disc.gsfc.nasa.gov/measures/.

Data Services:
- MEaSUREs Portal
- SWDB Daily Products
- SWDB Monthly Products
- MYD_DT_products
- Giovanni
- Direct FTP

Visualizations and Analysis with Giovanni

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

Visualization Features:
- Single Parameter Exploration:
  - Lat-Lon area plots of time-averaged parameters
  - Time-series plots of area-averaged parameters
  - Calculations of corrective Lat-Lon area plots
- Multi-parameter Intercomparison:
  - Time-series plots of multiple parameters
  - Time-series of two parameter differences
  - Scatter plots with regression statistics

Download:
- Data in formats: ASCII, HDF, netCDF
- Image: PNG, KMZ for Google Earth

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 Ferret, etc.

True-color and L2 Images Viewer

To simplify visualizing L2 swath products, we provide a WSDL-based service to view true-color and L2 images and are working on adding the aerosol products. Filtering by a Point of Interest (POI) can also be performed.

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2. Koga, K., Hsu, N. C., Bettenhausen, J., O’Reilly, J. E., and a team of operators: Daily true-color images and weekly true-color images with the MODIS Ocean Čl. of the Österreichischen Akademie der Wissenschaften, Vienna, Austria, 100, 130-139, 2010.