SeaWiFS and MODIS Data Product Definitions

Level-1A Data Products

Level-1A products contain the raw radiance counts from all bands as well as spacecraft and instrument telemetry. Calibration and navigation data, and instrument and selected spacecraft telemetry are also included. Level-1A data are used as input for geolocation, calibration, and processing.

MODIS Level-1A

More detailed information on the MODIS Level-1A format specifications can be found in the MODIS Level 1A ATBD.

SeaWiFS Level-1A

There are Level-1A products for each of the following data types: global-area coverage (GAC), local-area coverage (LAC), lunar calibration, solar calibration,TDI/gain check, and HRPT for direct-readout data. (The generic term LAC is also used to refer to all full-resolution, recorded data, including lunar, solar, and TDI data.) HRPT data are collected at one of numerous HRPT ground stations, whereas all other data types are from recording dumps to the Wallops Flight Facility.

GAC data are subsampled from full-resolution data with every fourth pixel of a scan line (from LAC pixels 147 to 1135) and every fourth scan line being recorded for each swath (the Earth data collection portion of an orbit). Thus, GAC data are comprised of 248 pixels per scan line, whereas all other types are comprised of 1,285 pixels per scan line. A GAC scene will also represent an entire swath, whereas LAC scenes are defined by the number of continuously recorded scans, and HRPT scenes are defined by the number of continuously received scans from one satellite pass. More detailed information on the SeaWiFS Level-1A format specifications can be found in the SeaWiFS Level-1A Data Product document.

SeaWiFS Level-1A Browse Products

Each Level-1A browse product is generated from a corresponding Level-1A GAC or HRPT product. The main data content of the product is a true-color image generated from subsampled, calibrated, Rayleigh-corrected data for bands 2, 5 and 6, stored as one byte per pixel. Each Level-1A browse product corresponds exactly in geographical coverage (scan-line and pixel extent) to that of its parent Level-1A product and is stored in one physical HDF file. The Level-1A browse images can be viewed here].

MODIS Level-1B Data Products

The Level 1B data set contains calibrated and geolocated at-aperture radiances generated from Level 1A sensor counts. Additional data are provided, including quality flags, error estimates, and calibration data.

More detailed information on the MODIS Level-1B format specifications can be found on the MODIS Characterization Support Team website.

Ocean Color Level-2 Data Products

Each Level-2 product is generated from a corresponding Level-1A product.The main data contents of the product are the geophysical values for each pixel,derived from the Level-1A raw radiance counts by applying the sensor calibration, atmospheric corrections, and bio-optical algorithms. Each Level-2 product corresponds exactly in geographical coverage (scan-line and pixel extent) to that of its parent Level-1A product and is stored in one physical HDFfile.

The 12 geophysical values derived for each pixel are: six water-leaving radiances for bands 1 to 6, the chlorophyll a concentration, the diffuse attenuation coefficient at band 3, the epsilon value for the aerosol correction of bands 7 and 8, the angstrom coefficient for bands 4 and 8, and theaerosol optical thickness at band 8. In addition, 32 flags are associated with each pixel indicating if any algorithm failures or warning conditions occurred for that pixel.

More detailed information on the Level-2 format specifications can be found in the Ocean Color Level-2 Data Product document.

Level-2 Browse Products

Each Level-2 browse product is generated from a corresponding Level-2 product. The main data contents of the product are a subsampled version of the chlorophyll-a image stored as one byte per pixel. Each Level-2 browse product corresponds exactly in geographical coverage (scan-line and pixel extent) to that of its parent Level-2 product and is stored in one physical HDF file. The Level-2 browse images can be viewed here

More detailed information on the Level-2 browse product format specifications can be found in the Ocean Color Level-2 Browse Product document.

Ocean Color Level-3 Binned Data Products

Level-3 binned data products consist of the accumulated data for all Level-2 data corresponding to a period of one day, 8 days, a calendar month, or a calendar year. The data are stored in a representation of a global, equal-area grid whose grid cells, or "bins," are approximately 81 km2.

Each Level-3 binned data product is stored in multiple HDF files. Each multi-file product includes a main file containing all product-level metadata and data for each bin that are common to all the binned geophysical parameters. In addition, each product includes 12 subordinate files, each of which contains data of one binned geophysical parameter for all bins. Subordinate files must be read in conjunction with the associated main file.

More detailed information on the Level-3 data product format specifications can be found in the Ocean Color Level-3 Binned Data Products document.

Ocean Color Level-3 Standard Mapped Image Products

The Level-3 standard mapped image (SMI) products are image representations of binned data products. This image is a byte-valued, two-dimensional array of an Equidistant Cylindrical projection of the globe. Each SMI product contains one image of a geophysical parameter and is stored in one physical HDF file. Actual SMI files can be viewed here

Five SMI products are generated from each binned data product, one for each of the following geophysical parameters: chlorophyll-a concentration, normalized water-leaving radiance at band 5, aerosol optical thickness at band 8, angstrom coefficient for bands 4 and 8, and diffuse attenuation coefficient at band 3. Thus, each SMI product represents data binned over the period covered by the parent product. The arithmetic mean is used in each case to obtain the values for the SMI grid points from the binned data products.

More detailed information on the Level-3 Standard Maped Image data product format specifications can be found in the Ocean Color Level-3 SMI Data Products document.

Level-3 Browse Products

Each Level-3 browse product is generated from a corresponding chlorophyll-a SMI product. The main data content of the product is a subsampled version of the SMI image array, stored as one byte per pixel. Each Level-3 browse product is stored in one physical HDF file. The Level-3 browse images can be viewed here

More detailed information on the Level-3 browse product format specifications can be found in the Ocean Color Level-3 Browse Products document.

Near Real-Time Ancillary Data Products

Products of the meteorological data--meridional wind, zonal wind, pressure, and relative humidity--and total ozone, used during the Level-2 operational processing, are made available by the Project. (Relative humidity is not currently used during the processing.) The meteorological and ozone data are referred to as ancillary data. These products are gridded, Equidistant Cylindrical images of, or derived from, data from other agencies. These data represent global "snapshots" at frequencies of at least once per day and as suchare considered as near real-time (NRT) data. Each product is contained in one physical HDF file.

As part of its quality control procedures, the Project may modify suspect valuesand fill missing values of NRT ancillary data grid points. An associated "Q/C" field is stored with each ancillary parameter image for recording any modifications to the original data. If a grid point's ancillary data value is changed, the corresponding Q/C grid point is set equal to 1; otherwise, it is set equal to 0.

Climatological Ancillary Data Products

Climatologies of the ancillary data required for Level-2 processing have been created by the SeaWiFS Project. These climatologies can be used by the Level-2 processing

software in lieu of NRT data when the NRT data are unavailable or deemed to be of poor quality.

Two climatological products, each a single HDF file, are used--one for four meteorological parameters and the other for ozone. For each of these five parameters, long-term monthly means were calculated using data from other agencies. The means, along with the associated standard deviations and number of observations, are stored as gridded, Equidistant Cylindrical images.

SeaWiFS Sensor Calibration Table

The sensor calibration table is comprised of a set of parameters required for applying the sensor calibration to raw (Level-1A) data. The table is stored as one physical HDF file that is available as a SeaWiFS product.

The calibration table includes parameters that will not be changed and parameters that may be updated. Updates are performed by the SeaWiFS Project and result in the appending of data to the file's contents. Whenever it is updated, a new version of the file is made available as a product. Results of vicarious calibration studies can indicate if updates are needed to improve previous calibration parameter values or to account for changes in sensor