

SAFARI 2000 SeaWiFS Site and Regional Imagery Descriptions

Abstract

The Sea-viewing Wide Field-of-view Sensor (SeaWiFS) project at NASA/GSFC produced subsets of SeaWiFS imagery for SAFARI 2000 at the site and regional level. The SeaWiFS sensor, launched in late 1997, collects data in 8 bands ranging from 402 nm to 885 nm. SeaWiFS data are available at two spatial resolutions, local area coverage (LAC), at 1.1 km, and global area coverage (GAC) at 4.5 km resolution. The SeaWiFS data provided here contain two main sets of LAC data, Level-1 and Level-2 200 km x 200 km image subsets over the SAFARI Core Sites (except 400 x 400 km for Etosha), and Level-1 swaths of the southern Africa region. The data are provided in HDF format files.

The following descriptions apply to these two data sets:

SAFARI 2000 SeaWiFS Images for Core Study Sites, 2000-2001

SAFARI 2000 SeaWiFS Images for the Southern African Region, 1999-2001

The data sets are available online [<http://www.daac.ornl.gov/>] from the ORNL Distributed Active Archive Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.

The SeaWiFS Web site is <http://seawifs.gsfc.nasa.gov/SEAWIFS.html>.

Background Information

Investigator(s): Gene Feldman

Project: SAFARI 2000

Site: Southern Africa

SeaWiFS Data File Information

Level-1A Data Products

Level-1A products contain all the Level-0 data (raw radiance counts from all bands as well as spacecraft and instrument telemetry), appended calibration and navigation data, and instrument and selected spacecraft telemetry that are reformatted and also appended. Each Level-1A product is stored as one physical HDF file.

There are Level-1A products for each of the following data types: global-area coverage (GAC), local-area coverage (LAC), lunar calibration, solar calibration, time delay and integration (TDI) check, and high resolution picture transmission (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 the NASA/GSFC HRPT station or NOAA HRPT 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.

Level-1A Browse Products

Each Level-1A browse product is generated from a corresponding Level-1A GAC or HRPT product. The main data contents of the product are a subsampled version of the band-8 raw radiance counts image 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.

Level-2 GAC Data Products

Each Level-2 GAC product is generated from a corresponding Level-1A GAC 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 GAC 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 12 geophysical values derived for each pixel are five water-leaving radiances for bands 1 to 5, two aerosol radiances for bands 6 and 8, the pigment concentration using a coastal zone color scanner (CZCS)- type algorithm, the chlorophyll a concentration, the diffuse attenuation coefficient at band 3, the epsilon value for the aerosol correction of bands 6 and 8, and the aerosol optical thickness at band 8. In addition, 16 flags are associated with each pixel indicating if any of the following conditions existed for that pixel: atmospheric correction algorithm failure, land, missing ancillary data, Sun glint, total radiance greater than the knee value, large spacecraft zenith angle, shallow water, negative water-leaving radiance, stray light, cloud or ice, coccolithophores, Case 2 water, large solar zenith angle, high aerosol concentration, low water-leaving radiance at band 5, and a chlorophyll algorithm failure.

Level-2 Browse Products

Each Level-2 browse product is generated from a corresponding Level-2 GAC 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.

SeaWiFS Level-2 Product Parameters

Parameter	Storage (bytes)	Slope*	Intercept*	Approximate Range Covered	Units	Alternate Value ⁺
nLw_412	2	0.001	0.0	0-32	mW cm ⁻² um ⁻¹ sr ⁻¹	Band-1, L1A rad. cnts
nLw_443	2	0.001	0.0	0-32	mW cm ⁻² um ⁻¹ sr ⁻¹	Band-2, L1A rad. cnts
nLw_490	2	0.001	0.0	0-32	mW cm ⁻² um ⁻¹ sr ⁻¹	Band-3, L1A rad. cnts
nLw_510	2	0.001	0.0	0-32	mW cm ⁻² um ⁻¹ sr ⁻¹	Band-4, L1A rad. cnts
nLw_555	2	0.001	0.0	0-32	mW cm ⁻² um ⁻¹ sr ⁻¹	Band-5, L1A rad. cnts
La_670	2	0.002	0.0	0-64	mW cm ⁻² um ⁻¹ sr ⁻¹	Band-6, L1A rad. cnts
La_865	2	0.001	0.0	0-32	mW cm ⁻² um ⁻¹ sr ⁻¹	Band-8, L1A rad. cnts
CZCS_pigment	2	0.001	32.0	0-64	mg m ⁻³	0
chlor_a	2	0.001	32.0	0-64	mg m ⁻³	0
K_490	2	0.0002	0.0	0-6.4	m ⁻¹	0
eps_68	1	0.01	0.0	0-2.5	_____	0
tau_865	1	0.005	0.0	0-1.3	_____	0

*All scalings are linear and of the form (integer * slope) + intercept = geophysical value.

⁺Value used when the Level-2 value is not derived due to a mask bit having been set.

Hierarchical Data Format (HDF) File Viewing Options

WebWinds HDF Viewer

WebWinds is a free interactive tool to aid in the visualization and exploration of scientific data, developed by NASA/JPL. It is the successor to LinkWinds. WebWinds is written in Java and is currently running on most major computer platforms. The latest version and additional information can be found at

the [JPL's WebWinds Web Site](#).

Commercial HDF-viewing Products

- [IDL \(Interactive Data Language\) and Noesys](#)
- [PCI \(EASI, PACE\)](#)
- [HDF Explorer](#)

File Compression Information

The data files have been compressed with the MS Windows-standard Zip compression scheme. These files were compressed using Aladdin's DropZip on a Macintosh. DropZip uses the Lempel-Ziv algorithm, also used in Zip and PKZIP programs. The compressed files may be uncompressed using PKZIP (with the -expand option) on MS Windows and UNIX, or with StuffIt Expander on the Mac OS. You can get the latest versions from the PKZIP Web site at <http://www.pkware.com/shareware/>.

Additional Sources of Information

These are some references for SeaWiFS.

Hu, C.M., K.L. Carder, F.E. Muller-Karger. How precise are SeaWiFS ocean color estimates? Implications of digitization-noise errors. *Remote Sens Environ* 76: (2) 239-249, May 2001.

Hooker, S.B., C.R. McClain. The calibration and validation of SeaWiFS data. *Prog Oceanogr* 45: (3-4) 427-465, 2000.

Barnes, R.A., R.E. Eplee, F.S. Patt, et al. Changes in the radiometric sensitivity of SeaWiFS determined from lunar and solar-based measurements. *Applied Optics* 38: (21) 4649-4664, Jul 20 1999.

McClain, C.R., M.L. Cleave, G.C. Feldman, W.W. Gregg, S.B. Hooker, N. Kuring. Science quality SeaWiFS data for global biosphere research. *Sea Technology* 39: (9) 10-16, Sep 1998.

Citation and Acknowledgement

When using these data, please include the appropriate ORNL DAAC data set citation, the processing acknowledgment, as well as citations of relevant papers in the References section.

Feldman, Gene C. 2002. SAFARI 2000 SeaWiFS Images for Core Study Sites, 2000-2001. Available online [<http://www.daac.ornl.gov/>] from the ORNL Distributed Active Archive Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.

Feldman, Gene C. 2002. SAFARI 2000 SeaWiFS Images for the Southern African Region, 1999-2001. Available online [<http://www.daac.ornl.gov/>] from the ORNL Distributed Active Archive Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.

Gene Feldman, of the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) project at NASA/GSFC produced subsets of SeaWiFS imagery for the SAFARI 2000 Project.