

Integrating the Scientific Community with a Measurement Based, Multi-Sensor Data Processing and Distribution System

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NASA Ocean Biology Processing Group

The Ocean Biology Processing Group

A Component of NASA's Missions-to-Measurements Initiative

- Heritage: SeaWiFS, SIMBIOS, SeaBASS, SeaDAS
- Designated NASA team responsible for the processing and distribution of ocean color measurements and SST from various spaceborne instruments.

Ocean Color: CZCS, OCTS, SeaWiFS, MODIS/Aqua

SST: MODIS/Aqua, MODIS/Terra

- Product Evaluation & Test Element (PEATE) for OC and SST, and Science Team Lead for OC on NPP/VIIRS.
- Designated as the software development, processing, and distribution element for Sea Surface Salinity measurements from Aquarius.

NASA's Goal

To make available the highest quality ocean data products to the broadest user community in the most timely and efficient manner possible, and to provide sufficient documentation and support to facilitate the use of that data for global and regional studies.

Approach

- highly integrated project structure with all elements co-located
- flexible, mission-independent data processing system that constantly upgrades procedures, technologies, and hardware
- comprehensive, centralized calibration and validation program closely coupled to the data processing and quality control system
- multi-mission software development
 - common code for MODIS, SeaWiFS, OCTS, CZCS, future sensors
 - common Level-2 & Level-3 formats
- a project philosophy designed to support and involve as large a community as possible
 - providing opportunities for user input, evaluation, and feedback

Data Processing and Storage

- database controlled, distributed processing and storage system
- many Linux-based, processing nodes (34 dual 3GHz Xeon)
- 200X processing for MODIS/Aqua ocean color
- 4000X processing through-put for SeaWiFS ocean color
- 9-month OCTS mission can be reprocessed over lunch
- all data online for direct access (100TB RAID-5 array)
- capacity for global mission testing prior to reprocessing, allowing opportunity for community participation in reprocessing decisions
- direct and near real-time user access to data archives

gigabit ethernet



processing node



storage node



database server



Current Level-1 & Level-2 Data Latency

Minimizing Time Between Observation and Data Availability

- MODIS/Aqua Level-1 & Level-2 Ocean Color & SST
 - Quicklook, average latency 4 hours, 52 minutes
 - Refined, available within 2-8 days
- MODIS/Terra Level-1
 - Quicklook, average latency 4 hours, 38 minutes
- SeaWiFS Level-1 & Level-2 Ocean Color
 - Quicklook, 1-13 hours (2 downlinks per day)
 - Refined, available within 4 days
- Latency minimization facilitates near real-time applications
 - coastal monitoring (HAB detection), GHRSSST, cruise support

Most Data Available By FTP

Simplifying Data Access

- All Level-3 data available
 - bin & map files
 - daily, 8-day, monthly
 - seasonals & climatologies
- Rolling archives of Level-1 & 2
 - quicklook
 - refined
 - 30-days
- All ancillary files
 - meteorological data
 - ozone data
 - attitude & ephemerides

MODIS Aqua

Binned

[Level 3 Binned Standard Product Suite](#)

[Binned Daily](#)

[Binned Daily / 8Day Quicklook](#)

[Binned 8Day](#)

[Binned Monthly](#)

[Binned Monthly Climatology](#)

[Binned Seasonal](#)

[Binned Seasonal Climatology](#)

[Binned Annual](#)

Mapped

[Level 3 Mapped Standard Product Suite](#)

[Mapped Daily](#)

[Mapped Daily / 8Day Quicklook](#)

[Mapped 8Day](#)

[Mapped Monthly](#)

[Mapped Monthly Climatology](#)

[Mapped Seasonal](#)

[Mapped Seasonal Climatology](#)

[Mapped Annual](#)

Level 1, GEO, & Level 2

[Quicklook Daytime](#)

[Refined Daytime](#)

SeaWiFS Level 3

Binned

[Level 3 Binned Standard Product Suite and PAR](#)

[Binned Daily](#)

[Binned 8 Day](#)

[Binned Monthly](#)

[Binned Monthly Climatology](#)

[Binned Seasonal](#)

[Binned Annual](#)

Mapped

[Level 3 Mapped Standard Product Suite and PAR](#)

[Mapped Daily](#)

[Mapped 8 Day](#)

[Mapped Monthly](#)

[Mapped Monthly Climatology](#)

[Mapped Seasonal](#)

[Mapped Annual](#)

Ancillary Products

[METOZ](#): NCEP Meteorological (MET) and TOMS/TOAST Ozone (OZ) ancillary data used for L1 L2 processing (updated every 4 hours)

[OISST](#): NOAA Optimum Interpolation (OI) Sea Surface Temperature. These files are used as input for the L1 L2 SST processing

[MODISA/ATTEPH](#): MODIS Aqua definitive attitude and ephemeris data

[MODISA/CAL](#): Updated MODIS Aqua Level 1B LUTs (Look-up tables) and Geolocation files

[MODIS/T/CAL](#): Updated MODIS Terra Level 1B LUTs and Geolocation files

[utopole.dat](#): Most recent version of the Earth motion file used in Level 1 processing.

[leapsec.dat](#): Most recent version of the Leap seconds file - required for accurate time conversions in Level 1 processing.

[SeaWiFS GPS elements \(elements.dat\)](#)

[Global 1 Kilometer Land Mask \(landmask.dat\) Documentation](#)

Level-3 Multi-Sensor Browse & Distribution

Level-3 Standard Mapped Images

[Help](#)

[View the color scales.](#)

[Browse the rolling 32-day composites.](#)

[Browse the "filled-in" version of the rolling 32-day biosphere composites.](#)

[Browse the seasonal, monthly, and 8-day climatologies.](#)

Aqua-MODIS	Chlorophyll	Diffuse attenuation	nLw at 551 nm	Aerosol optical thickness	Angstrom coefficient	SST
SeaWiFS	Chlorophyll	Diffuse attenuation	nLw at 555 nm	Aerosol optical thickness	Angstrom coefficient	
	Biosphere	PAR	NDVI	Land Reflectance		
OCTS	Chlorophyll	Diffuse attenuation	nLw at 565 nm	Aerosol optical thickness	Angstrom coefficient	
CZCS	Chlorophyll		nLw at 550 nm	Aerosol optical thickness	Angstrom coefficient	
Evaluation Products	Calcite	Fluorescence Line Height				

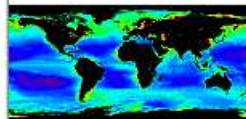
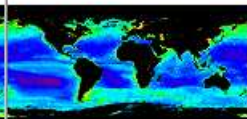
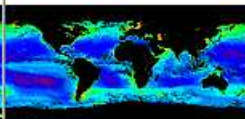
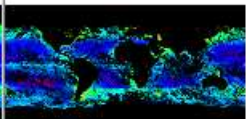

						Jul 2002	Aug 2002	Sep 2002	Oct 2002	Nov 2002	Dec 2002
Jan 2003	Feb 2003	Mar 2003	Apr 2003	May 2003	Jun 2003	Jul 2003	Aug 2003	Sep 2003	Oct 2003	Nov 2003	Dec 2003
Jan 2004	Feb 2004	Mar 2004	Apr 2004	May 2004	Jun 2004	Jul 2004	Aug 2004	Sep 2004	Oct 2004	Nov 2004	Dec 2004
Jan 2005	Feb 2005	Mar 2005	Apr 2005	May 2005	Jun 2005	Jul 2005	Aug 2005	Sep 2005	Oct 2005	Nov 2005	Dec 2005

[Previous](#)

Chlorophyll (Aqua-MODIS)

rows in the rightmost column

[Next](#)

Yearly	Seasonal	Monthly	Weekly	Daily
				
2004 9km png HDF 4km png HDF	Autumn-2004 9km png HDF 4km png HDF	Oct-2004 9km png HDF 4km png HDF	23Oct2004 to 30Oct2004 9km png HDF 4km png HDF	25-Oct-2004 9km png HDF 4km png HDF 26-Oct-2004 9km png HDF 4km png HDF

Level-1 & 2 Multi-Sensor Browse & Distribution

SeaWiFS User Login

SeaWiFS

GAC LAC MLAC

OCTS (ADEOS) MODIS (Aqua) CZCS (Nimbus-7)

Radius (km) about map click or typed-in location:
 36 400 800 1200 1500

Select swaths containing (at least):
 any part 25 % 50 % 75 % all of the area of interest.

Display results at a time.

Monday, 30 October 1978 through Wednesday, 5 October 2005

Chlorophyll

Select one or more regions:
 AdriaticSea
 AegeanSea
 Antarctica
 ArabianSea
 AralSea
 Australia
 Azores

or specify boundary coordinates or a single location:
 N:
 W: :E
 S:

or check this box to select all of this time period's scenes.

Mission

1978	J	F	M	A	M	J	J	A	S	O	N	D
1979	J	F	M	A	M	J	J	A	S	O	N	D
1980	J	F	M	A	M	J	J	A	S	O	N	D
1981	J	F	M	A	M	J	J	A	S	O	N	D
1982	J	F	M	A	M	J	J	A	S	O	N	D
1983	J	F	M	A	M	J	J	A	S	O	N	D
1984	J	F	M	A	M	J	J	A	S	O	N	D
1985	J	F	M	A	M	J	J	A	S	O	N	D
1986	J	F	M	A	M	J	J	A	S	O	N	D
1996	J	F	M	A	M	J	J	A	S	O	N	D
1997	J	F	M	A	M	J	J	A	S	O	N	D
1998	J	F	M	A	M	J	J	A	S	O	N	D
1999	J	F	M	A	M	J	J	A	S	O	N	D
2000	J	F	M	A	M	J	J	A	S	O	N	D
2001	J	F	M	A	M	J	J	A	S	O	N	D
2002	J	F	M	A	M	J	J	A	S	O	N	D
2003	J	F	M	A	M	J	J	A	S	O	N	D
2004	J	F	M	A	M	J	J	A	S	O	N	D
2005	J	F	M	A	M	J	J	A	S	O	N	D

August 2005							September 2005							October 2005						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5	6					1	2	3							1
	xxx	xxx	xxx	xxx	aaa	aaa					xxx	xxx	xxx							xxx
7	8	9	10	11	12	13	4	5	6	7	8	9	10	2	3	4	5	6	7	8
aaa	aaa	aaa	aaa	aaa	aaa	ooo	xxx	xxx	aaa	aaa	aaa	aaa	aaa	xxx	xxx	xxx	xxx	xxx	xxx	aaa
14	15	16	17	18	19	20	11	12	13	14	15	16	17	9	10	11	12	13	14	15
ooo	ooo	ooo	ooo	ooo	ooo	ooo	aaa	aaa	aaa	ooo	ooo	ooo	ooo	aaa	aaa	aaa	aaa	aaa	aaa	aaa
21	22	23	24	25	26	27	18	19	20	21	22	23	24	16	17	18	19	20	21	22
***	***	***	***	***	***	***	ooo	ooo	ooo	ooo	***	***	***	ooo	ooo	ooo	ooo	ooo	ooo	ooo
28	29	30	31				25	26	27	28	29	30	23	24	25	26	27	28	29	
**	xxx	xxx	xxx				***	***	***	***	***	xxx	ooo	***	***	***	***	***	***	
													30	31						
													***	***						

Single File Browse and Download

△ < > ↺ 10 OIL SST

[Comment](#)

[Help](#)

[A2004038191500.L1A_LAC](#)

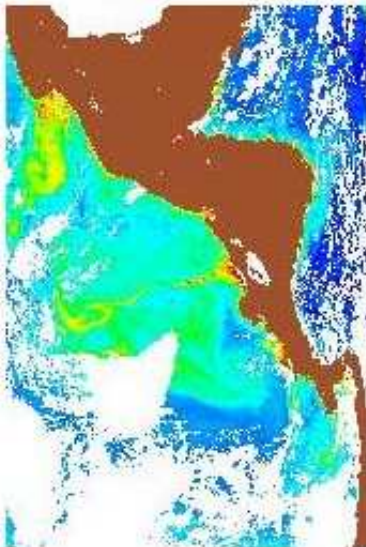
50,998,234 bytes

[A2004038191500.L2_LAC](#)

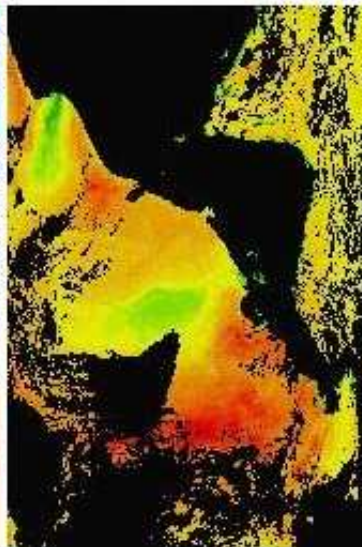
20,472,527 bytes

(The above hyperlinks point to [bzip2-compressed HDF files](#).
Documentation on these **prototype** products can be found [HERE](#).)

Chlorophyll

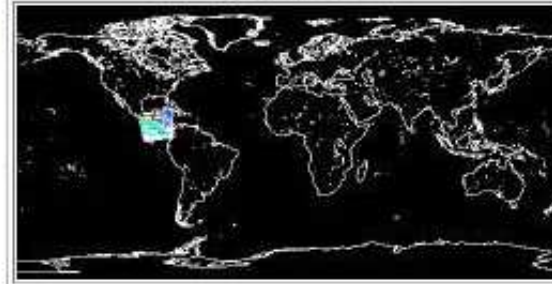


Sea Surface Temperature



Saturday, 7 February 2004

2004038



Search Criteria

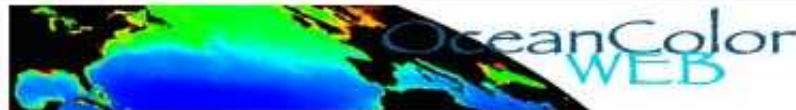
Time Period: Saturday, 7 February 2004

Sensors: MODIS(Aqua)

Area of Interest: Within 36 km of 16.5N,90.4W

Percentage of AOI that swaths must include: Any part

Number of swaths: 1 swath found



Multiple File Browse and Order

users can order one file or the entire multi-mission data set

SeaWiFS User Login | Display 10 at a time. | **ORDER DATA** | Comment | Help

S2004060182255.L2_MLAC			S2004059174213.L2_MLAC			A2004057181500.L2_LAC					
S2004060164427.L2_MLAC				A2004058172000.L2_LAC							
29Feb2004			28Feb2004			27Feb2004			26Feb2004		
****	****	****	****	****	****	****	****	****	****	****	
A2004060171000.L2_LAC			S2004058183847.L2_MLAC			S2004057175910.L2_MLAC					
A2004059180500.L2_LAC				S2004058170107.L2_MLAC							

Search Criteria

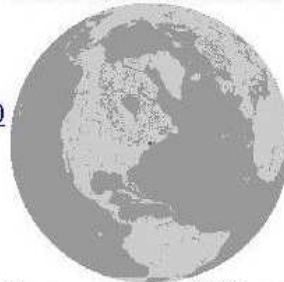
Time Period: February 2004

Sensors: SeaWiFS and MODIS(Aqua)

SeaWiFS Data Types: MLAC

Area of Interest: Within 36 km of 43.2N,70.0W

[1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#)



Regional and Product Subsetting of Order

users only download what they need

Enter your email address.

In order to reduce the volume of data that you have to deal with, we can extract the geographical area indicated at right from the swaths you ordered before we place the data in our download area. (This extraction currently only applies to SeaWiFS AOC and MODIS level-2 files.)

Please choose one of the following options.

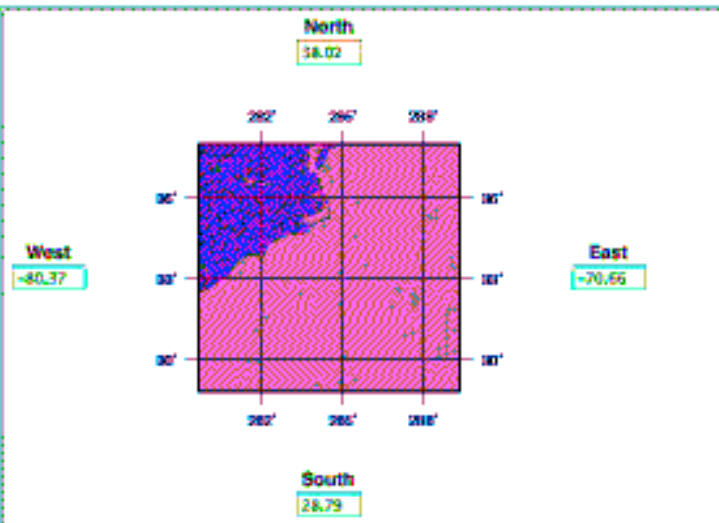
Do Do not extract my order for me.

You may adjust the extraction region by altering the coordinates at right.

The default coordinates are the ones which circumscribe the area or areas of interest that you used to do your search. If you started your search by just clicking on the world map without specifying a larger search radius, then you may want to increase the size of your extract region since the default search radius is 36 kilometers.

All four coordinates are expected to be in decimal degrees. Degrees north of the equator and east of the Greenwich meridian should be positive, and degrees south of the equator and west of the Greenwich meridian should be negative.

SeaWiFS extracts are processible with SeaDAS.



Pick which data products you want for your selected scenes.

Level 1

If you plan to process Level-1 files using SeaDAS, then you will also need the following:

- Meteorology & Ozone
- Attitude & Ephemeris (optional)

Level 2

You may select to receive only the following selected level-2 products if you wish. If you select none of these and simply check "Level 2" above, then you will receive all of the available level-2 products for a given sensor.

- Chlorophyll a
- Kd10
- normalized, water-leaving radiances
- aerosol products
- sea surface temperatures (MODIS only)

Remind me when my order is about to expire.

Require my email confirmation for early file deletion.

Notify me when my data files have been deleted from the staging area.

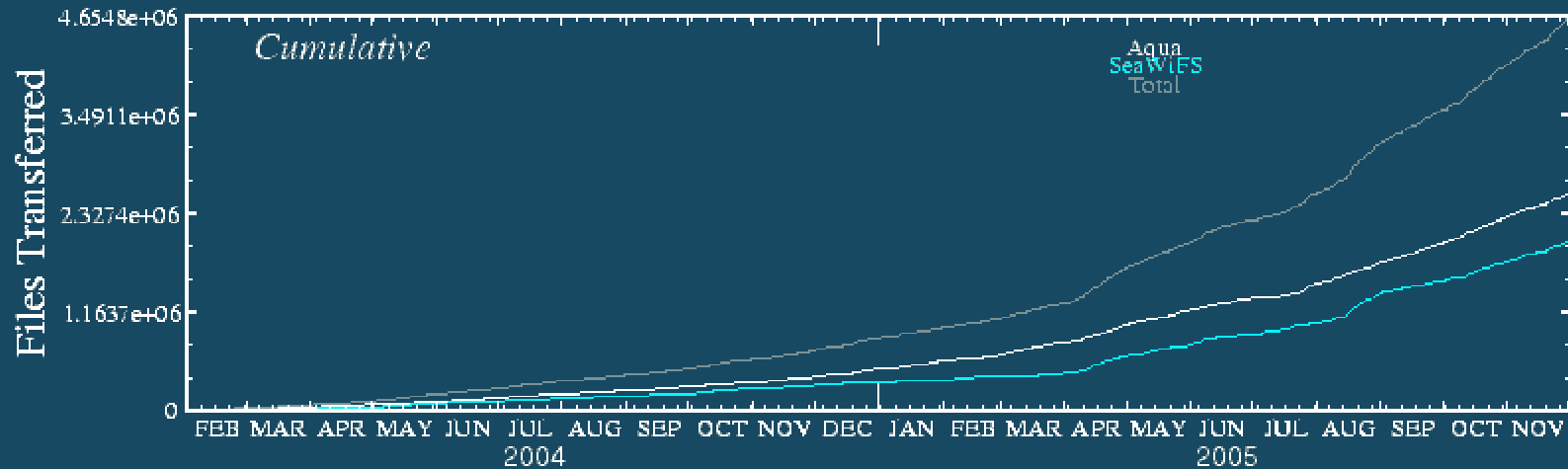
Data Subscription Service

users can fully automated future data acquisition

North	South	West	East
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Start Date	<input type="text" value="03"/>	<input type="text" value="Dec"/>	<input type="text" value="2005"/>
End Date	<input type="text" value="None"/>	<input type="text" value="None"/>	<input type="text" value="None"/>
<input checked="" type="checkbox"/> Aqua	<input type="checkbox"/> Terra (Level 1 only)	<input type="checkbox"/> SeaWiFS	
<input type="checkbox"/> Level 1	<input checked="" type="checkbox"/> Level 2	<input type="checkbox"/> Ancillary Data	<input type="checkbox"/> Attitude/Ephemeris
<input type="checkbox"/> Wait for Refined Processing	<input checked="" type="radio"/> Daytime Granules	<input type="radio"/> Nighttime/Mixed Granules	
<input type="button" value="Submit New Request"/> <input type="button" value="Help"/> <input type="button" value="Clear"/>			

- specify region of interest
- specify type of data (Level-1, Level-2, Quicklook or Refined, Day/Night)
- files automatically staged for ftp transfer

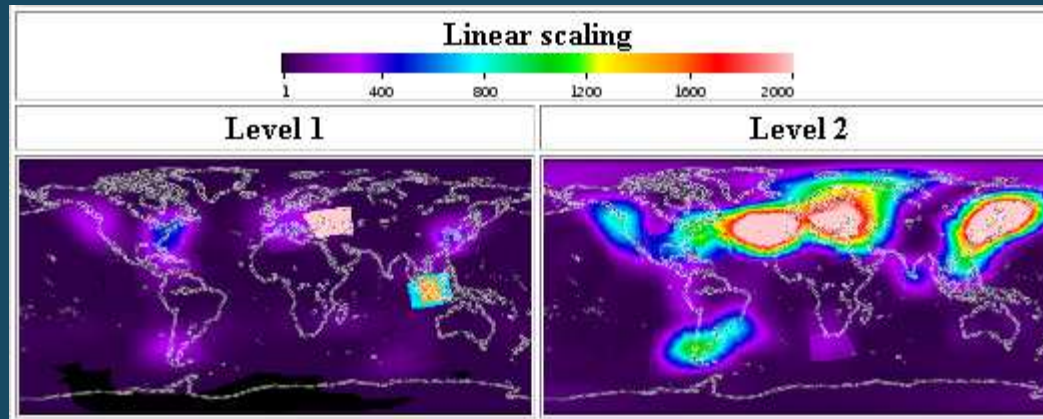
Files Distributed to Users 4.6 Million Since February 2004



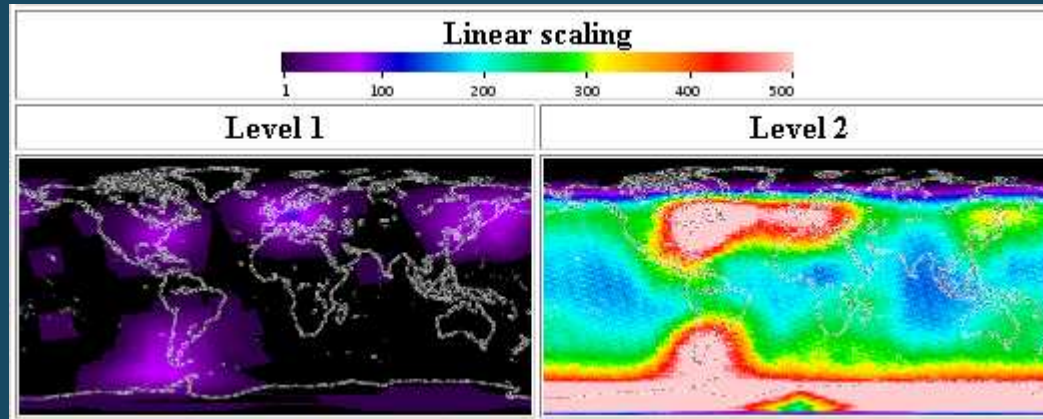
Source	L1				L2				L3				Ancillary	Totals
SeaWiFS	HTTP	REQ	REC	ARC	HTTP	REQ	REC	ARC	HTTP	REQ	REC	ARC	ARC	SeaWiFS
	Files: 2494	297058	0	2611	Files: 3842	525249	0	1590	Files: 9165	0	0	625455	Files: 535783	Files: 2003247
	GB: 71.7	3636.3	0	14.5	GB: 68.7	2151.2	0	23.2	GB: 14.8	0	0	3295.2	GB: 557.07	GB: 9832.67
Aqua	HTTP	REQ	REC	ARC	HTTP	REQ	REC	ARC	HTTP	REQ	REC	ARC	ARC	Aqua
	Files: 15576	54249	18308	21036	Files: 42787	304417	455401	10209	Files: 21841	0	0	321904	Files: 1302814	Files: 2568542
	GB: 303.8	2443.9	559.6	204.7	GB: 286	2026.8	3116.9	83.7	GB: 35.2	0	0	1792	GB: 3879.48	GB: 14732.08
TOTALS	Files: 411332				Files: 1343495				Files: 978365				Files: 1838597	Files: 4571789
	GB: 7234.5				GB: 7756.5				GB: 5137.2				GB: 4436.55	GB: 24564.75

Geographical Distribution of File Downloads

Web Browser Downloads



FTP Downloads



European and Asian researchers prefer web access,
while American and Southern Ocean folks prefer ftp.

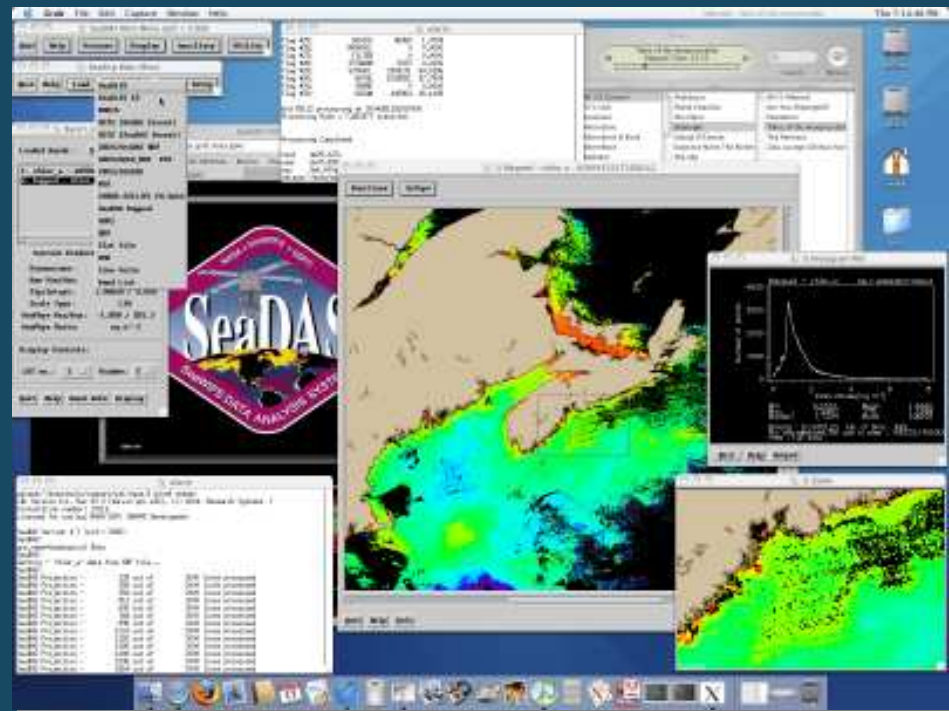
SeaDAS

providing the user with the required tools
expanding the standard product suite

- software to display and analyze all products produced by the OBPB
- software AND source code to process from Level-0 through Level-3
- allows users to do local reprocessing (reproduce standard products)
- provides for user-specific product suites

Some Product Algorithms in SeaDAS

- water-leaving radiances
- remote sensing reflectance
- SST (thermal and short-wave IR)
- chlorophyll (8 algorithms)
- diffuse attenuation of sea water
- IOP (GSM01, Carder, QAA):
- particulate organic carbon
- total suspended matter
- calcite concentration
- fluorescence line height
- PAR, IPAR
- aerosol products (AOT, Angstrom)
- intermediate products (Lr, La, etc.)

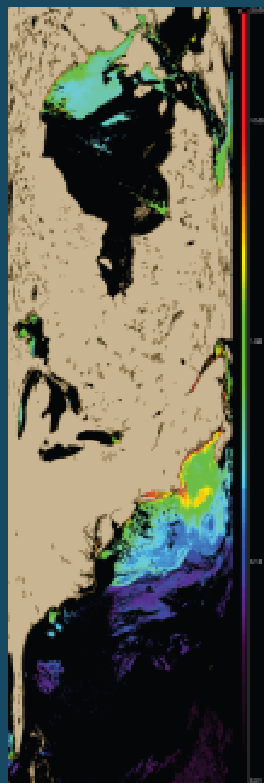


Direct Broadcast Support

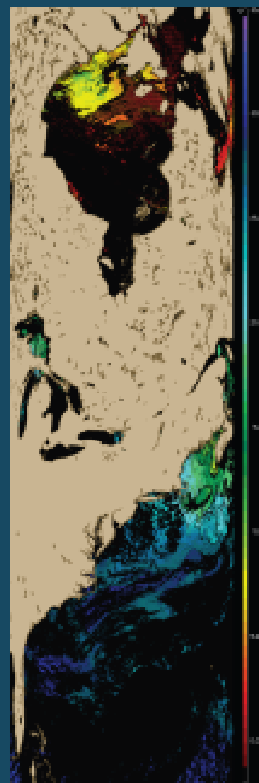
facilitating real-time product generation



True Color

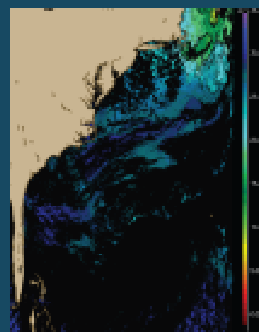
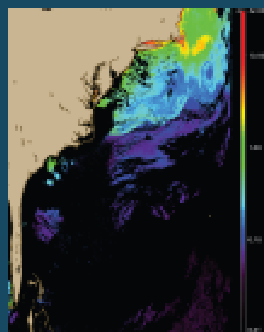
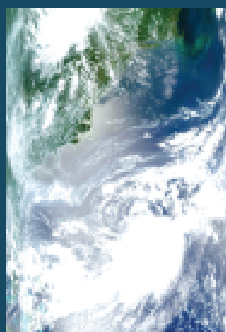


Chlorophyll



SST

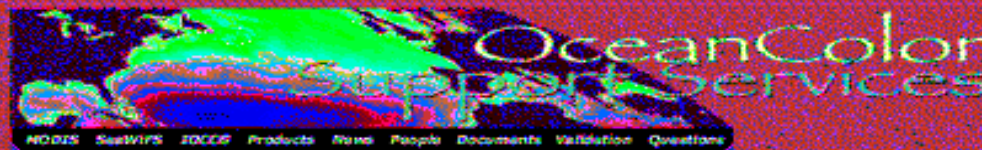
12 minute MODIS pass from University of Wisconsin DB Station, processed from Level-0 through Level-2 with SeaDAS



Standard 5-minute MODIS granule processed from Level-0 to Level-2 by OBPG

Near Real-Time Mapped Image Support

supporting field campaigns for collection of validation data



OceanColor Extracts and Mapping

1. Selected Mission
MODISA

2. Select parameters for the job

Start Date:

Stop Date:

3. Specify a region

4. Select starting region: Home

5. Create new region: Name

6. Region:

7. Region:

8. Region:

4. Select MODISA product

Aerosol Optical Thickness

Angstrom

Chlorophyll a

SST

Sea Surface Temperature

Total Chlor

Total Chlor - Cloud adjusted

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

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Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

Water Leaking Radiance (4-Gauss)

5. Select new sensors

CO2

CO2

CO2

CO2

CO2

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CO2

CO2

CO2

6. Select the distribution method of the new region

Ocean Color FTP Server (oceanic.gel.noaa.gov) (Only option currently supported for HDF distribution)

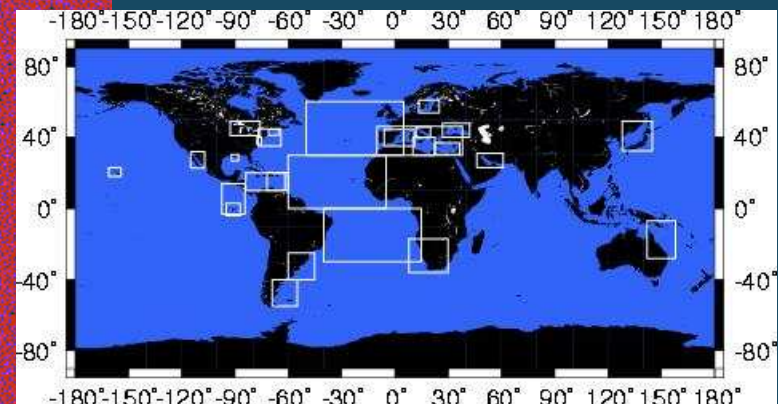
Created by the OceanColor Team
Approved by the OceanColor Team
Updated: 25 May 2002

Science, Policy, and Operations Policy



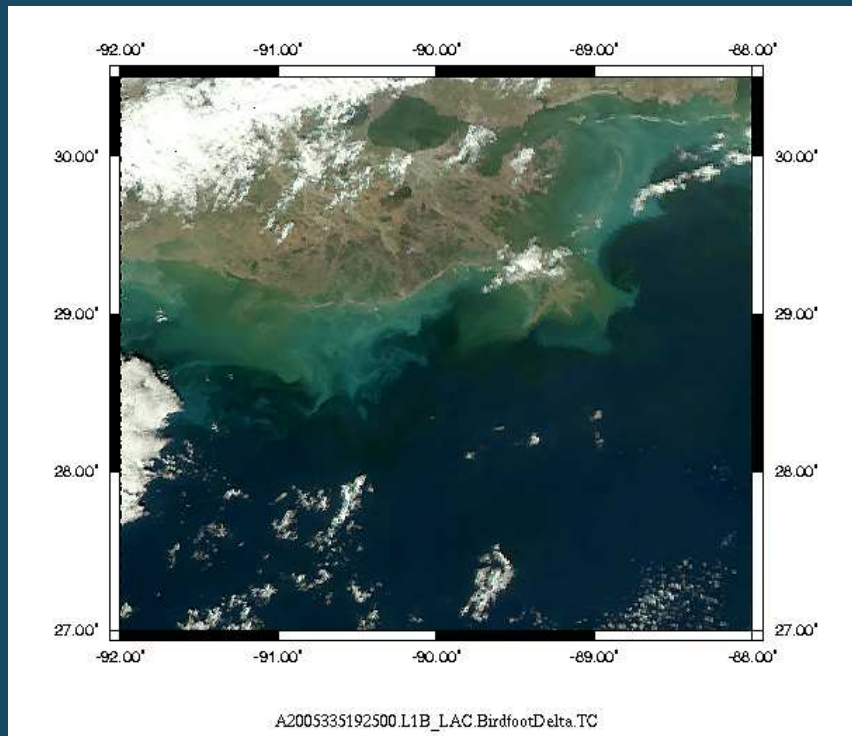
- select region
- select products
- select map characteristics
- receive daily images
- email or ftp

current subscriptions for image support

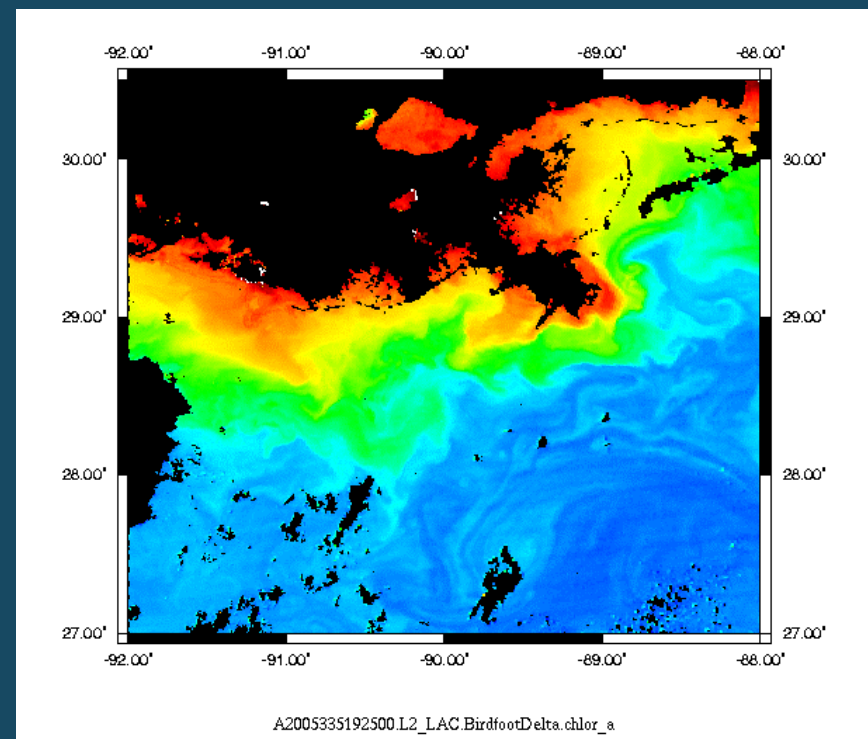


Near Real-Time Mapped Image Support

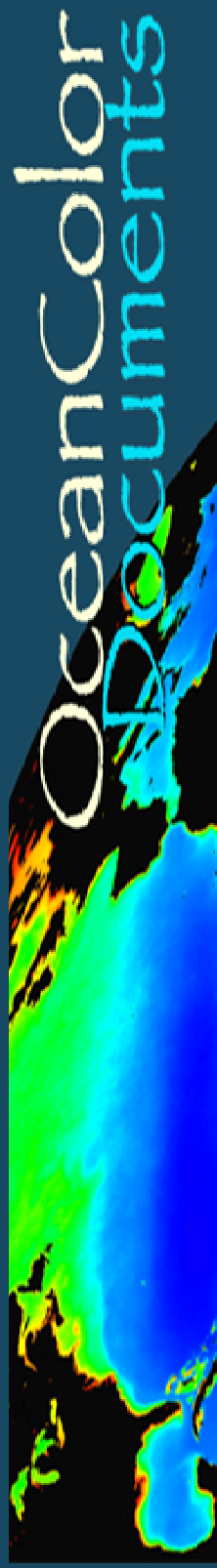
True Color



Chlorophyll-a



Option to receive corresponding Level-1 and Level-2 HDF files, extracted to the region



Ocean Color Data Reprocessing

As algorithms mature, reprocessing of the data set is required to improve the archived products. Additionally, it occasionally becomes necessary to redefine the archive product suite as more useful data products are recommended to the Project. To address these issues, periodic reprocessings are planned by the Project. The Ocean Color Data Processing staff continues to work diligently to address those problems that remain in the data products. Further details on current and past reprocessing efforts are available below.

SeaWiFS

[Reprocessing 5.1 - Completed July 5, 2005](#)

[Reprocessing 5 - Completed March 18, 2005](#)

[Reprocessing 4.1 - Completed May 24, 2004](#)

[Reprocessing 4 - Completed July 25, 2002](#)

[Reprocessing 3 - Completed May 24, 2000](#)

[Reprocessing 2 - August, 1998](#)

[Reprocessing 1 - January, 1998](#)

[Calibration Update - April 10, 2001](#)

[Calibration Update - December 1, 2000](#)

Aqua

[Reprocessing 1.1 - Completed August 4, 2005](#)

[Reprocessing 1 - Completed February 2005](#)

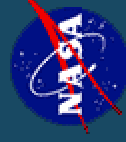
[Initial Processing by ODPS - Completed May 24, 2004](#)

Curator: [OceanColor Webmaster](#)

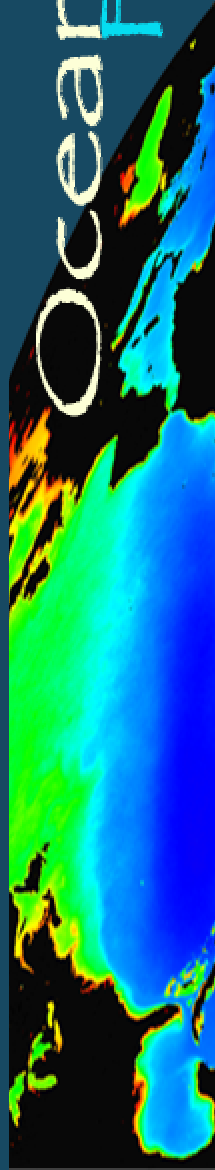
Authorized by: [gene carl feldman](#)

Updated: 10 August 2005

[Security, Privacy, and Accessibility Policy](#)



OceanColor Forum



Ocean Color Forum - Welcome, bryan

Forum OceanColor Home Help Search Options Logout

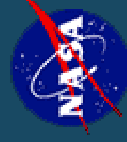
Forum

Mark Old Mark Read New Unread Replies ToDo Feeds Info

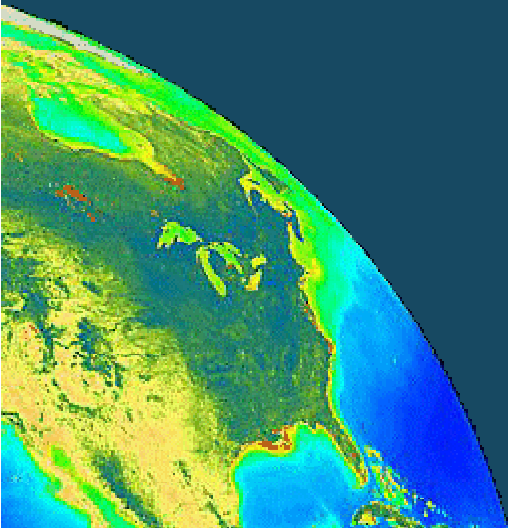
<input type="checkbox"/> Ocean Color	Posts	Last Post
<input checked="" type="checkbox"/> OceanColor Announcement	42	2005-08-19 09:38
<input type="checkbox"/> Algorithms and Products	Posts	Last Post
<input checked="" type="checkbox"/> Frequently Asked Questions	23	2005-10-25 14:24
<input checked="" type="checkbox"/> Satellite Data Products & Algorithms	563 (2 new)	2005-12-02 16:27
<input checked="" type="checkbox"/> Satellite Data Access	445 (1 new)	2005-12-02 16:43
<input checked="" type="checkbox"/> Field Data	14	2005-09-12 14:27
<input checked="" type="checkbox"/> Mission Events	2	2004-04-23 12:17
<input type="checkbox"/> SeaDAS	Posts	Last Post
<input checked="" type="checkbox"/> SeaDAS: Known Problems and Fixes	5	2005-11-01 16:25
<input checked="" type="checkbox"/> SeaDAS: General Questions	1217 (8 new)	2005-12-03 13:14
<input checked="" type="checkbox"/> MODIS Direct Broadcast Support	20	2005-11-18 18:50

Curator: OceanColor Webmaster
 Authorized by: gene carl feldman
 Updated: 20 October 2005

Security, Privacy, and Accessibility Policy



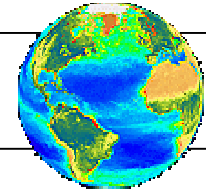
<http://oceancolor.gsfc.nasa.gov/>



Notes

The Ocean Color Web <http://oceancolor.gsfc.nasa.gov> was developed and is maintained by the Ocean Biology Processing Group (OBPG) at NASA's Goddard Space Flight Center as a means for disseminating information and data in support of NASA's Ocean Color program. The OBPG is responsible for the processing, validation, and distribution of Ocean Color and SST data from MODIS, and Ocean Color data from SeaWiFS, OCTS, and CZCS. The Ocean Color web is the public interface to a fully automated data system for acquisition, processing, analysis, and distribution of data from these spaceborne sensors. Key features include web and ftp-based data access, timely availability of data products, data subscription services, parameter and regional subsetting, image support for field campaigns, extensive documentation, and user support forums. This paper presents an overview of the valuable Ocean Color Web resources that allow the scientific community to browse, download, and analyze Ocean Color and SST data from multiple satellites.

Ocean Biology Data Processing System - Processing Node



Supermicro 6024 rack mount server

2 Intel Xeon CPUs 3.06 Ghz

8 1 GB DDR2 RAM modules

2 Intel Gigabit Ethernet network interfaces

1 Seagate 80 GB EIDE disk (system)

5 Maxtor 73.4 GB Atlas 10K IV Ultra320 SCSI disks (processing)

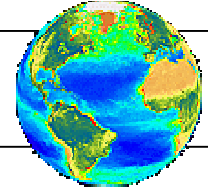
1 CD-ROM (low profile)

1 Supermicro X5DP8-G2 motherboard with built-in Ultra320 SCSI controller

1 Supermicro 6024H 2U rack mount server case with dual power supplies

Operating system: Linux

Ocean Biology Data Processing System - Storage Node

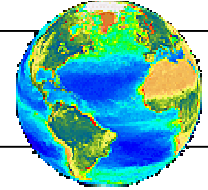


NAS 1.2 TB rack mount server

- 1 Intel Pentium-4 CPU 3.06 Ghz**
- 2 512 MB DDR2 RAM modules**
- 1 Gigabit Ethernet network interface**
- 1 Seagate 80 GB EIDE disk (system)**
- 8 Maxtor 250 GB MaxLine Plus II EIDE disks (RAID 5, 6 data + 2 hot spares)**
- 1 CD-ROM (low profile)**
- 1 Asus P4C800-E Motherboard**
- 1 3ware Escalade RAID controller for 8 drives**
- 1 Comix Computer RM-3U9SCA (IDE) ATX rackmount chassis 3 U, 9 hot swappable drive bays**

Operating system: Linux

Ocean Biology Data Processing System - Large Server



SunFire V880 rack mounted

4-8 UltraSPARC-III+ processors

8-16 GB RAM

6-12 73 GB 10K RPM FibreChannel disks

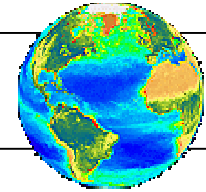
2 Gigabit Ethernet network interfaces

1-5 Fast Ethernet network interfaces

1 External FibreChannel adapter

Operating system: Solaris

Ocean Biology Data Processing System - Network Switch



Extreme Networks Black Diamond 6816

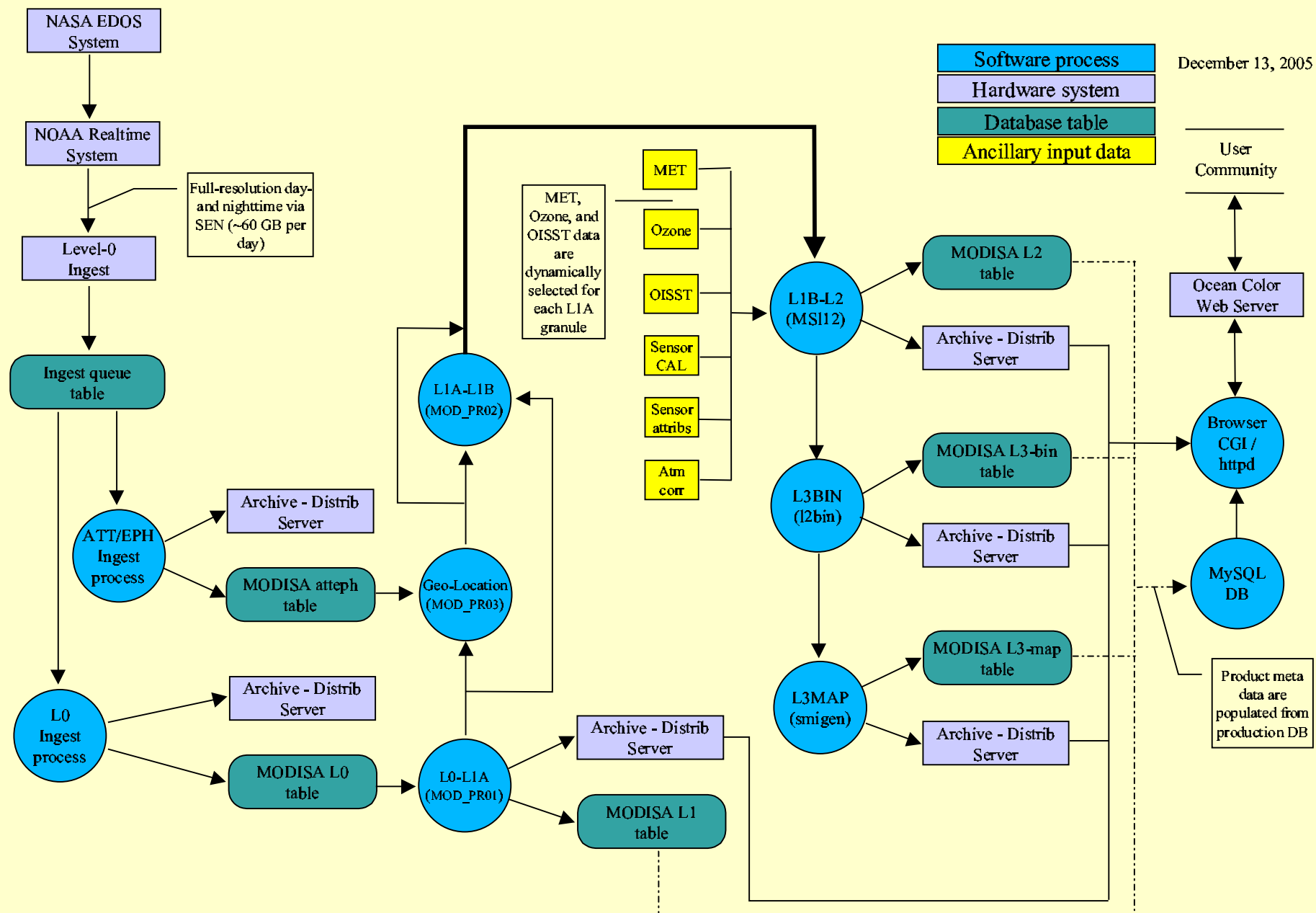
**768 Gbps total switching capacity
Route/filter/forward 192 million pps**

160 GigE ports in current configuration

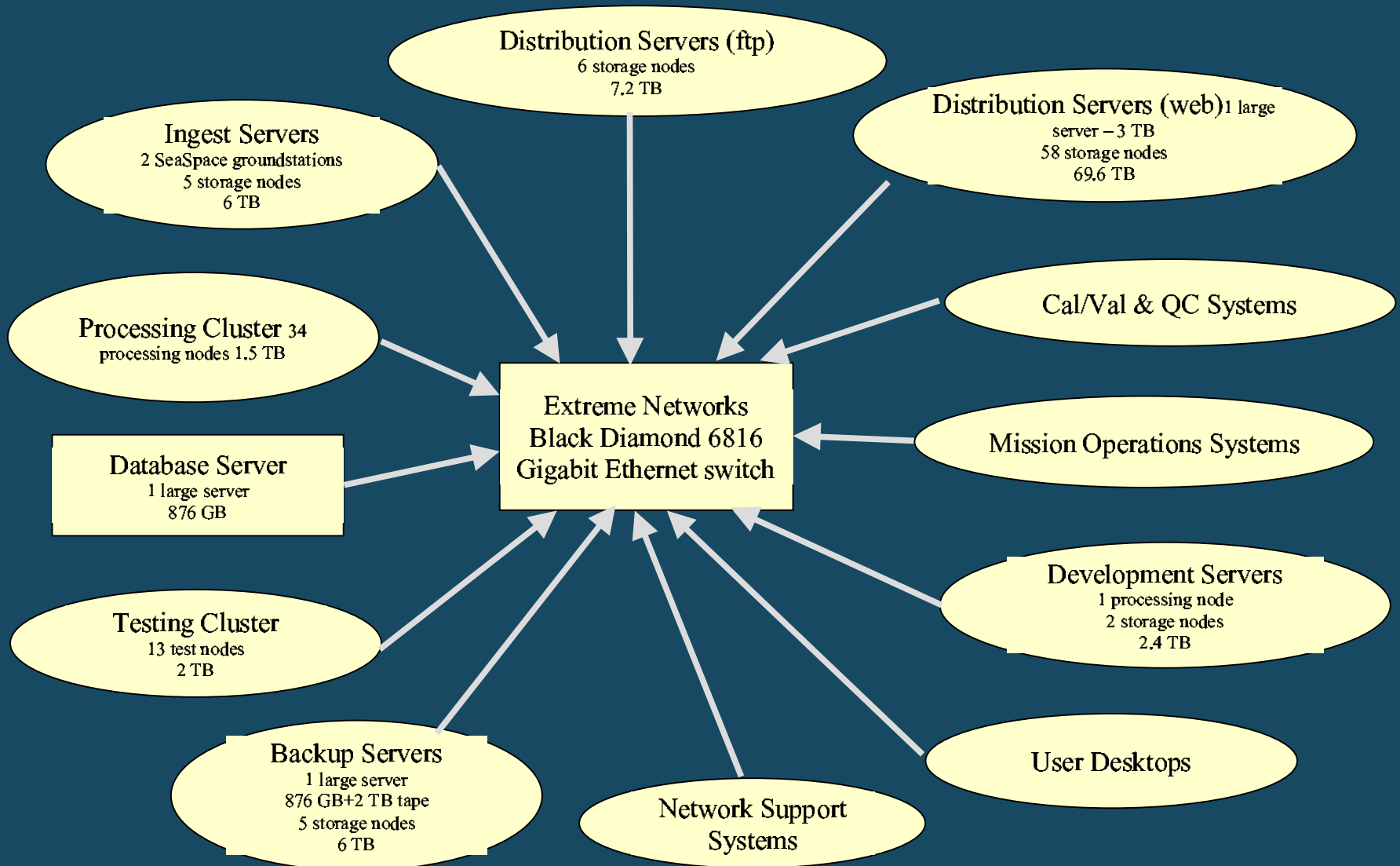
All modules are hot swappable

- 4 MSM management modules**
- 2 G8Ti 8 port Gigabit Ethernet modules**
- 6 G24T3 24 port Gigabit Ethernet modules**
- 4 Hot-swappable power supplies**

Operational MODIS-Aqua Data Flow

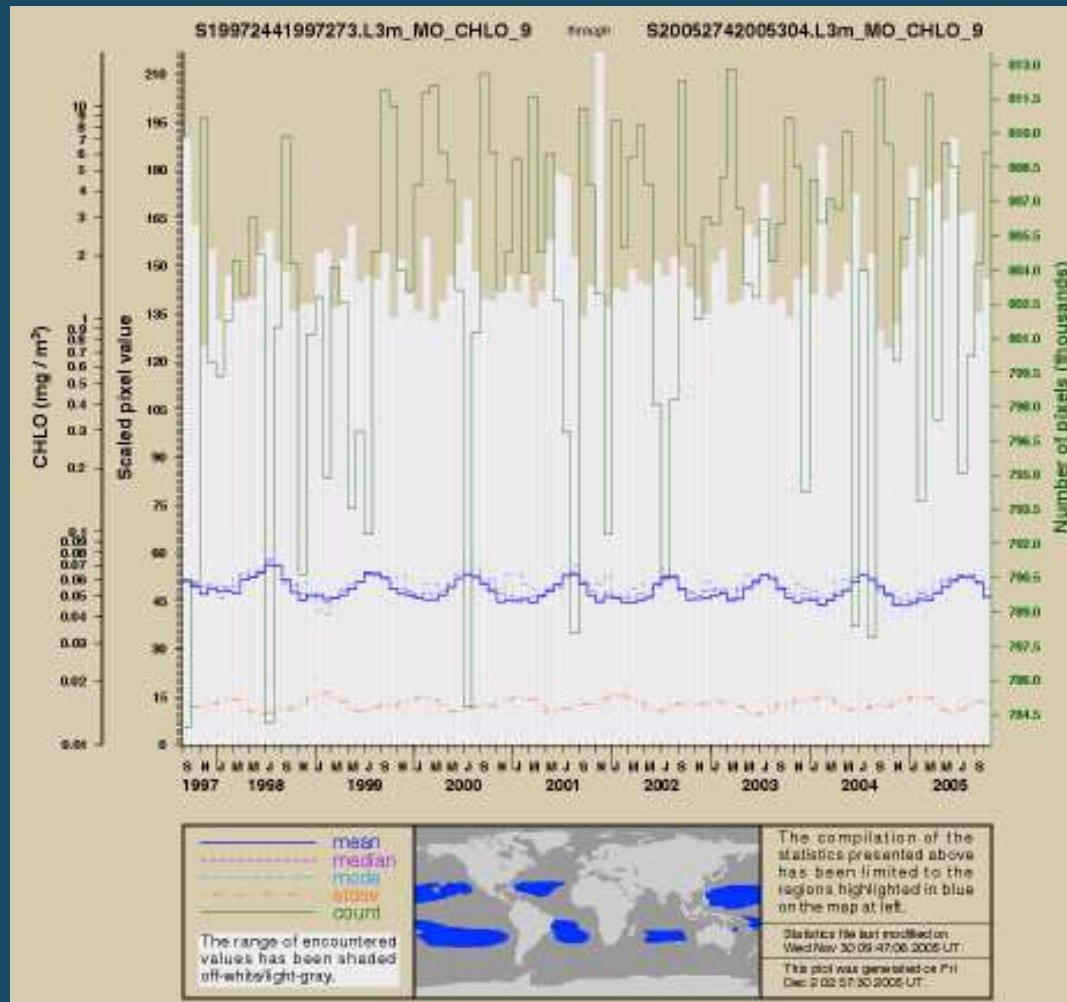


ODPS Data Processing System Current Components



Time-Series Utility

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Product	<input type="text" value="CHLO (mg / m³)"/>							Later	
Blending Period	<input type="text" value="Highday"/>		<input type="text" value="1997"/>	<input type="text" value="1998"/>	<input type="text" value="1999"/>	<input type="text" value="2000"/>			



MODIS Direct Broadcast Receiving Stations

