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CoastWatch Ocean Color L1A Data, L2 Data and Applied Products

SUBMISSION AGREEMENT

BETWEEN

NOAA CoastWatch

AND

NOAA National Oceanographic Data Center

APPROVALS

CoastWatch Ocean Color L1A Data, L2 Data and Applied Products

SUBMISSION AGREEMENT

BETWEEN

NOAA CoastWatch

AND

NOAA National Oceanographic Data Center

APPROVALS	
ORGANIZATION: NOAA CoastWatch Program **DATE**: **INDIVIDUAL**: Kent Hughes, NOAA CoastWatch Program Manager	**ORGANIZATION**: NOAA National Oceanographic Data Center **DATE**: **INDIVIDUAL**: Kenneth S. Casey, Technical Director
ORGANIZATION: NOAA CoastWatch Program **DATE**: **INDIVIDUAL**: Banghua Yan, NOAA CoastWatch Ocean Color Project Area Lead	**ORGANIZATION:** NOAA CLASS **DATE:** **INDIVIDUAL:** Robert Rank, EOS CLASS Manager
CMO RELEASE APPROVAL: **RELEASE DATE:** **INDIVIDUAL:** Tess Brandon, Submission Agreement CM Manager	

EXECUTIVE SUMMARY

This Submission Agreement between NOAA/NESDIS' National Oceanographic Data Center (NODC) and NOAA CoastWatch specifies which data products from NOAA CoastWatch are submitted for archiving by NODC, and their transfer mechanisms. NOAA CoastWatch routinely produces ocean color products from multiple satellite sensors, including the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) on board the OrbView-2 spacecraft, the Moderate Resolution Imaging Spectroradiometer (MODIS) on board the EOS Aqua spacecraft, and the Medium Resolution Imaging Spectroradiometer (MERIS) on board the ESA Envisat spacecraft. These products are used by CoastWatch customers for coastal monitoring, habitat assessment, water quality assessment, harmful algal bloom (HAB) forecasts, carbon dioxide fluxes, ocean acidification assessment, eutrophication assessment, and other applications. The NOAA CoastWatch ocean color products covered by this Submission Agreement include SeaWiFS Level 1A data, SeaWiFS Level 2 data, MODIS Level 2 data, MERIS Level 2 data, and the *Emiliania huxleyi* product, which includes bloom presence/absence maps and calcite concentration data.

NODC is responsible for the overall suite of archive services for these products. NODC will use the Comprehensive Large Array-data Stewardship System (CLASS) for information technology support, with a focus on ingest, archival storage and access. Using CLASS, NODC will archive approximately 19.3 GB/day of HDF4 and netCDF4 data files from NOAA CoastWatch. 400 MB/day of this is SeaWiFS Level 1A data, which has been ingested by CLASS daily since April 1998. 18.85 GB/day of this is Level 2 ocean color data from SeaWiFS, MODIS and MERIS, beginning in November 2009. Beginning in August 2010, the rest of the volume is comprised of the *Emiliania huxleyi* products, which are transferred every 8 days with a volume of approximately 849 MB.

All SeaWiFS data, including Level 1A and Level 2 products, are restricted and may only be distributed to users covered by the SeaWiFS CoastWatch Contract. MERIS Level 2 data are also restricted, and may only be distributed to authorized users registered by the European Space Agency (ESA). All other data products covered by this Submission Agreement are freely and openly accessible to the public, and are distributed online via the CLASS electronic library.

This Submission Agreement will serve as a signed, approved agreement between the agencies. No charges are entailed by this agreement.

DOCUMENT CHANGE RECORD

DOCUMENT TITLE:				
INITAL RELEASE DATE:				
VERSION / REVISION	**RELEASE DATE**	**CHANGE AUTHORITY**	**CHANGE DESCRIPTION**	**SECTION(S) AFFECTED**
0.1	04/29/2010	Tess Brandon	Initial draft without input from CLASS or Data Provider	All
0.2	05/04/2010	Tess Brandon	Added input from CoastWatch (Heng Gu)	3, 4, 5, 6
0.3	01/17/2011	Tess Brandon	Updated CoastWatch and CLASS contacts	2.0
0.4	05/17/2011	Tess Brandon	Updated CoastWatch and CLASS contacts	2.0

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Appendices

SECTION 1.0 INTRODUCTION

This document represents the agreement that the NOAA CoastWatch Program (the "Provider") and the NOAA National Oceanographic Data Center (the "Archive") have reached for submitting the Provider's data, the CoastWatch Ocean Color L1A Data, L2 Data and Applied Products, to the Archive for long-term preservation. It represents a joint effort between the Provider and the Archive to accurately document the agreement and the expectations between the two organizations. Formal approval to accept the Provider's data for retention in a NOAA Archive was established through implementation of the NOAA Procedure for Scientific Records Appraisal and Archive Approval and preceded submission agreement negotiations.

1.1 PURPOSE AND SCOPE

This submission agreement (SA) is a signed, approved agreement for data acquisition and becomes a reference document for the Provider and the Archive. It is a negotiated agreement between the parties indicating a common understanding of performance similar to a "letter of intent". It contains, or has references to, all of the information needed to develop appropriate interfaces between two systems for data transfer and provide information on data access and dissemination. Whether or not the information is contained directly in this document or is contained by reference is largely dependent on factors such as the complexity of the Provider's data and delivery systems and the existence of relevant technical documentation.

This document neither captures nor defines formal requirements. However, the process of negotiating an SA may bring to light additional requirements. In those instances, the formal definition of such requirements occurs elsewhere and is captured in the appropriate requirements specifications.

The definitions and concepts used in this SA are primarily based on the recommendations contained in two documents developed by the Consultative Committee for Space Data Systems (CCSDS) that have been approved by the International Organization for Standards (ISO): the Reference Model for an Open Archival Information System (OAIS) (ISO 14721:2003); and the Producer-Archive Interface Methodology Abstract Standard (PAIMAS) (ISO 20652:2006). Refer to Appendix A for a full explanation of the terminology used in this SA.

The OAIS Reference Model establishes in its recommendation minimal responsibilities that an organization must discharge in order to operate an OAIS archive, including the responsibility to obtain sufficient control of the information provided to the level needed to ensure long-term preservation, and to ensure that the information to be preserved is independently understandable to the Designated Community. In other words, the community should be able to understand the information without needing the assistance of the experts who produced the information. This agreement acknowledges by all parties the Archive's right to continually refresh, migrate and emulate the content information as necessary for this (digital) long-term preservation. This may include actions such as future migration to different physical media and data conversion from a native data format to a better understood and timely data format.

1.2 DOCUMENT ORGANIZATION

The organization of this document:

- Section 1 – introduction to the Submission Agreement.

- Section 2 – contact information for the stakeholder organization representatives.

- Section 3 – descriptive information and information sources relating to the data (i.e., the Submission Information Packages) being provided by the Provider.

- Section 4 – specifics for each Submission Session.

- Section 5 – information about how the data will be preserved within the Archive.

- Section 6 – information about how the data will be accessed within the Archive.

- Appendix A – definitions of terminology.

- Appendix B – definitions of acronyms.

- Appendix C– a review record for the document.

1.3 APPLICABLE REFERENCES

The following documents are referenced in and/or are applicable to this submission agreement document. In the event of conflict between the documents referenced herein and the contents of this SA, the contents of this SA shall have precedence, unless stated otherwise.

Table 1.3-1: Applicable and Reference Documents

Document Number	Document Title
CCSDS 651.0-B-1	Producer-Archive Interface Methodology Abstract Standard (PAIMAS), CCSDS 651.0-B-1, May 2004, (ISO 20652:2006), available at http://public.ccsds.org/publications/archive/651x0b1.pdf.
CCSDS 650.0-B-1	Reference Model for an Open Archival Information System (OAIS), CCSDS 650.0-B-1, January 2002, (ISO 14721:2003), available at http://public.ccsds.org/publications/archive/650x0b1.pdf.
FGDC-STD-001-1998	Federal Geographic Data Committee (FGDC) (1998) Content Standard for Digital Geospatial Metadata, Version 2, FGDC-STD-001-1998, available at http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/base-metadata/v2_0698.pdf.
FGDC-STD-012-2002	Content Standard for Digital Geospatial Metadata: Extensions for Remote Sensing Metadata, FGDC-STD-012-2002, available at http://www.fgdc.gov/standards/projects/FGDC-standards-projects/csdgm_rs_ex/MetadataRemoteSensingExtens.pdf.
ISO 19115:2003	Geographic information — Metadata, available at http://www.iso.org/iso/home.htm.
ISO 19115-2	Geographic information - Metadata - Part 2: Extensions for imagery and gridded data, available at http://www.iso.org/iso/home.htm.
TBD	NOAA Procedure for Scientific Records Appraisal and Archive Approval: Guide for Data Managers, U.S. DOC / NOAA, August 15 2008, available at http://www.nosc.noaa.gov/docs/products/NOAA_Procedure_document_final_12-16-1.pdf.
NAO 212-15	NOAA Administrative Order 212-15 Management of Environmental and Geospatial Data and Information, December 2, 2008, available at http://www.corporateservices.noaa.gov/~ames/NAOs/Chap_212/naos_212_15.html.
N1-370-03-10	NOAA Records Disposition Handbook, Chapter 1400 NESDIS, U.S. DOC / NOAA, July 2005, available at http://www.corporateservices.noaa.gov/~ames/pdfs/noaa1400.pdf.

1.4 CHANGE MANAGEMENT

This section takes into account changes to the agreement that could occur after completion of the SA. These changes include any upgrade requests from either the Provider or the Archive as well as any imposed changes. The change management process to be followed by the Provider and the Archive (below) is based on

the "Change Management After Completion of the Submission Agreement", in the Formal Definition Phase of the PAIMAS, section 3.2.2.6.

Step 1 – Notification: As a first step, the origin, type, and cause for the change will be communicated to the relevant stakeholders. A notification will be given by the responsible change representative as soon as possible as timing is critical for successful implementation. The most efficient means of change notification should be clearly understood between the stakeholders. See Section 2 for specific contact information. A change can originate from either the Provider or the Archive and the type may be temporary or definitive. The causes for a change are numerous. A cause could relate to infrastructure, information, resource and/or legal aspects.

Step 2 – Analysis: The stakeholders will then identify and analyze the possible scenarios for managing the change including cost and feasibility assessments. Each possible scenario studied should consider the impacts on the entire ingest, archive, and dissemination processes.

Step 3 – Decision: Step three determines the degree and severity of the change based on the scenarios and their impacts for managing the change. The decision on how to proceed and the consequences on this SA depend on the degree of severity of the change: 1) a minor change will be communicated and taken into account without any modifications to this SA; 2) a more extensive change must be approved without this SA being fully renegotiated; and 3) a major change requires a complete renegotiation of this SA with approval signatures.

Step 4 – Implementation: Step four defines and executes an action plan that incorporates the change.

1.5 DOCUMENT MANAGEMENT SYSTEM

The Archive will be responsible for document version control. An Archive Document Management System (DMS) will be used to track and store this Submission Agreement.

SECTION 2.0   CONTACT INFORMATION

This section of the SA contains information about contacts within the Provider and Archive organizations, and the Designated Community.

2.1 PROVIDER ORGANIZATION

The Provider is the organization or entity that will provide data to the Archive as specified in this agreement. A description of the Provider is below. A component of the Provider or a separate entity that assists with Provider operations is also identified.

Table 2.1-1: Provider Organization

Organization	NOAA CoastWatch Program
Operations Support	CoastWatch Ocean Color
Description	NOAA CoastWatch makes satellite data products and in-situ data from NOAA environmental sensors available to federal, state and local marine scientists and coastal resource managers for a wide variety of applications.
Address Line	5200 Auth Road, Rm 601
City, State / Province	Camp Springs, MD
Postal Code	20746
Country	USA
Telephone	301.763.8184
E-mail	coastwatch.info@noaa.gov
Additional Information	

2.2 ARCHIVE ORGANIZATION

The term "Archive" refers to one of the NOAA National Data Centers that will receive and archive the Provider's data. A description of the Data Center is below. A component of the Archive or a separate entity that assists with Archive operations is also identified.

Table 2.2-1: Archive Organization

Organization	National Oceanographic Data Center
Operations Support	Comprehensive Large Array-data Stewardship System (CLASS)
Description	NODC provides scientific stewardship of national and international marine environmental and ecosystem data and information, and archives and distributes global oceanographic data and information.
Address Line	1315 East West Highway, SSMC3, 4th Floor
City, State / Province	Silver Spring, MD
Postal Code	20910
Country	USA
Telephone	301.713.3277
E-mail	NODC.Services@noaa.gov

Additional Information	

2.3 DESIGNATED COMMUNITY

The Archive is responsible for preserving data and making it available for the Designated Community. The skill and knowledge base of the Designated Community will determine the level of support offered for the data by the Archive.

Table 2.3-1: Designated Community Description

Designated Community Description	Users in the NOAA National Ocean Service who require chlorophyll concentrations for use in coastal monitoring, habitat assessment, water quality assessment, harmful algal bloom (HAB) forecasts, carbon dioxide fluxes, ocean acidification assessment, eutrophication assessment, and other uses. Biologists are using ocean color (e.g. chlorophyll-a) products to predict harmful algal blooms, manage living marine resources, and assess ocean climate effects. CoastWatch provides near real-time ocean color products from remote-sensing platforms in order to serve the efforts of these users, as well as the efforts of federal, state and local government environmental decision makers. Other users include recreational boaters, educators, resource managers, and researchers. MERIS Level 2 ocean color products may not be distributed to anyone besides authorized European Space Agency (ESA) MERIS users. SeaWiFS Level 1A and Level 2 ocean color products may not be distributed to anyone besides users covered by the SeaWiFS CoastWatch contract. Richard Stumpf (See Table 2.4-1, Individual Contacts) is the Point of Contact for information on those covered by the CoastWatch contract. There are no such restrictions on MODIS Level 2 ocean color products.

2.4 INDIVIDUAL CONTACTS

There are a variety of key players involved in managing data between the Provider, the Archive, and the Designated Community. These individual contacts represent specific roles associated with these interactions.

Table 2.4-1: Individual Contacts

Management	Data POC	Tech POC	Consumer	Other	Name / Title	Organization / Department	Phone	Email	Description
x					Kent Hughes / NOAA CoastWatch Program Manager	NOAA/STAR/Satellite Oceanography and Climatology Division	+1.301.763.8102x171	Kent.Hughes@noaa.gov	Management contact for *Provider*
x	x				Banghua Yan / NOAA CoastWatch Ocean Color Project Area Lead	NOAA/STAR	+1.301.763.8142x137	Banghua.Yan@noaa.gov	Management and data contact for *Provider*
	x	x			Heng Gu / Senior Programmer/Analyst	NOAA/STAR	+1.301.763.8209x347	Heng.Gu@noaa.gov	Metadata contact for *Provider*
		x			Robert Williamson, Contractor	NOAA/OSDPD	+1.301.763.8027x212	Robert.Williamson@noaa.gov	Contact for *Provider* for technical and transfer/ingest issues
x	x				Tess Brandon / Acting Team Lead, Satellite Oceanography Group	NESDIS/NODC/ Marine Data Stewardship Division	+1.301.713.3272x181	Tess.Brandon@noaa.gov	Submission Agreement and Archive Metadata Author; Management and lead contact for *Archive*
x		x			Deepika Dhuria / Senior Systems Engineer	NESDIS CLASS	+1.301.713.3284x165	Deepika.Dhuria@noaa.gov	CLASS operations, Interface Control Document, Technical contact for *Archive*

Management	Data POC	Tech POC	Consumer	Other	Name / Title	Organization / Department	Phone	Email	Description
		x			Lisa Krolak / Senior Applications Engineer	NESDIS CLASS	+1.828.271.4129	Lisa.Krolak@noaa.gov	CLASS operations (ingest, storage, access), Interface Control Document; Technical contact for *Archive*
	x		x		Christopher Brown / Oceanographer	NESDIS/STAR/CORP /Satellite Climate Studies Branch	+1.301.405.8031	Christopher.W.Brown@noaa.gov	Project Lead, EHUX; data contact for *Provider*
	x		x		Richard Stumpf / Oceanographer	NOAA/NOS/NCCOS	+1.301.713.3028	Richard.Stumpf@noaa.gov	Maintains list of authorized SeaWiFS data users
			x		Richard Feely / Program Leader, PMEL CO2	Pacific Marine Environmental Laboratory	+1.206.526.6214	Richard.A.Feely@noaa.gov	EHUX User, ocean acidification community
			x		Kenric Osgood / Chief, Marine Ecosystems Division	Center for Sponsored Coastal Ocean Research/Coastal Ocean Program	+1.301.713.3338x163	Kenric.Osgood@noaa.gov	EHUX User, marine ecosystem community
	X	X			Phillip Keegstra / Contractor	NOAA/STAR	+1.301.763.8102x355	Phillip.Keegstra@noaa.gov	Technical contact for EHUX processing

SECTION 3.0   SUBMISSION INFORMATION PACKAGE

This section identifies and describes the logical components of one or more Submission Information Packages (SIPs) covered in this SA. The SIP is a conceptual package centered on the primary target for preservation, the Information Object. The Information Object is composed of the Data Object together with its Representation Information. The OAIS defines a Data Object as simply either a physical or digital object. The Preservation Descriptive Information (PDI) helps to trace, analyze, and ultimately preserve the Information Object in the SIP. Components of the SIP(s) to be delivered to the Archive are identified in the respective Submission Session in Section 4.0.

3.1   REFERENCE INFORMATION

Information Packages, including SIPs, are referenced in the SA with unique identifiers. The table below identifies a reference identifier (REF ID) for each information package and/or data object covered by this SA.

Table 3.1-1: Reference Information

REF ID	Title	Context
SWL1A	SeaWiFS Level 1A Data (purchased for CoastWatch Operational Use)	NOAA CoastWatch Ocean Color Data
SWL2	SeaWiFS Level 2 Ocean Color Data	NOAA CoastWatch Level 2 Ocean Color Data
MODL2	MODIS Level 2 Ocean Color Data	
MERL2	MERIS Level 2 Ocean Color Data	
EHUX	Global *Emiliania huxleyi* bloom maps	NOAA CoastWatch Level 3 Ocean Color Applied Products

3.2   SeaWiFS Level 1A Data (purchased for CoastWatch Operational Use) SIP

The logical components of this specific SIP are identified in this section.

3.2.1 Data Information

The identifications and descriptions in this section are general metadata applicable for the life of the SIP.

3.2.1.1 Citation

Below is the citation information by which the SIP is known.

Table 3.2.1.1-1: Citation

REF ID	SWL1A
Title	SeaWiFS Level 1A Data (purchased for CoastWatch Operational Use)
Edition/Version	
Release Date	19970904
Originator	GeoEye (formerly ORBIMAGE Inc.)
Originator Contact Information	21700 Atlantic Boulevard, Dulles, VA 20166 Phone: +1.703.480.7500 Fax: +1.703.450.9570 Email: info@geoeye.com

Presentation Form	Digital files in Hierarchical Data Format (HDF) 4.1r4
Additional Information	

3.2.1.2 Description

This section summarizes what the SIP is and how the information is represented.

Table 3.2.1.2-1: Description

Abstract	This data set consists of satellite measurements of global and regional ocean color data obtained by the Sea-viewing Wide Field of View Sensor (SeaWiFS), in orbit on the OrbView-2 (formerly SeaStar) platform. The concentration and predominant identity of substances and particles in the euphotic (lighted) zone of the upper ocean influences the apparent color of the ocean, which can range from deep blue to varying shades of green and ruddy brown. Living phytoplankton (which contain chlorophyll and associated photosynthetic pigments), inorganic sediments, detritus (particulate organic matter), and dissolved organic matter all contribute to the color of the ocean. SeaWiFS acquires approximately 15 pole-to-pole orbital swaths of data per day, and approximately 90% of the ocean surface is scanned every two days. SeaWiFS L1A data is processed from SeaWiFS Level 0 data that is collected by selected High Resolution Picture Transmission (HRPT) ground stations. SeaWiFS L1A data contains all the Level 0 data (raw radiance counts from eight bands - six in visible and two in near infrared spectrum), calibration data, navigation data, instrument telemetry, and selected spacecraft telemetry.
Purpose	The purpose of SeaWiFS data is to examine oceanic factors that affect gobal change and to assess the ocean's role in the global carbon cycle, as well as other biogeochemical cycles, through a comprehensive research program. SeaWiFS data are being used to help clarify the magnitude and variability of chlorophyll and primary production by marine phytoplankton, and to determine the distribution and timing of spring blooms, i.e. the time of highly abundant growth.
Development Status	Operational
Processing Level	NOAA Level 1A
Data Format	Hierarchical Data Format (HDF4.1r4)
Vocabulary	
Additional Information	http://oceancolor.gsfc.nasa.gov/DOCS/SeaWiFS_Level-1A_Data_Products.pdf Research and monitoring programs are generally interested in the live phytoplankton biomass and the suspended sediment concentration. The chlorophyll algorithms for SeaWiFS provide a relationship between SeaWiFS bands and standard measurements of chlorophyll for live phytoplankton biomass. For sediment concentrations, a measure of scatter provides the best information. At present, experimental backscattering algorithms exist, additional work needs to be done to validate these algorithms. As an alternative, using the remote sensing reflectance for bands that are most sensitive to scatter (and least sensitive to absorption), provides the best characterization of suspended sediments. The current turbidity product is the remote sensing reflectance for band 5 (555 nm). It provides a good measure of turbidity related to sediment over a range of water clarity and provides a measure of the sediment load in the water. (In the engineering community, "turbidity" is measured by an instrument called a nephelometer, which is

	designed only to measure the relative scattering in units called NTU's, nephelometric turbidity units. In oceanography, turbidity is a catch-all term for poor water clarity or visibility. Visibility, as measured with a Secchi disk, is influenced by absorption, but driven mostly by the sediment load. To confuse this issue, water clarity is based on the diffuse light attenuation, which is strongly influenced by absorption as well as scattering, and efforts are being made to determine attenuation coefficients for SeaWiFS.) Chlorophyll-related pigments have little influence on the reflectance at 555 nm. Because of the low absorption by water, band 5 is extremely sensitive to changes in sediment concentration. (Certain phytoplankton groups, such as coccolithophores, are highly scattering, so they produce strong signals in this band). Under extremely high pigment loads (especially dissolved pigments and detrital, non-algal, pigments), band 5 is less effective, because the absorption is a significant part of the signal, potential causing a reduction in the reflectance. Because of the low absorption by water, band 5 can "see" the bottom in relatively clear water. In very clear water, it can detect sand bottom in 20-30 m. In areas where turbidity events are common, the bottom signal would be the minimum reflectance observable. SeaWiFS band 6 (670 nm) is less sensitive to dissolved and detrital pigments, and does not detect the bottom in more than ~6 m, but does not provide the sensitivity of band 5 for clearer water. Trials have been made of algorithms that determine backscatter. Ultimately, the calculated backscatter will be the best method of describing turbidity. Several factors determine water clarity: absorption due to live phytoplankton, absorption due to dissolved pigments, absorption due to detrital pigments, and scattering due to particulates (mostly inorganic sediments).

3.2.1.3 Spatial and Temporal Information

The spatial coverage of the SIP is given in terms of spatial extent and resolution. The farthest bounding coordinates of the represented region define the spatial extent. The minimum difference between two adjacent spatial elements specifies the spatial resolution of the data.

Table 3.2.1.3-1: Spatial Information

Bounding Coordinates	Western Longitude	-142
	Eastern Longitude	-60
	Northern Latitude	64
	Southern Latitude	13
Coordinate System	Geographic	
Spatial Resolution	Global Area Coverage (GAC) data	4.5 km at nadir
	Local Area Coverage (LAC) data	1.13 km at nadir
Spatial Representation	Satellite swath projection	
Additional Information		

The temporal extent specifies the entire period of record (POR) that the SIP represents. The minimum temporal difference between two time-referenced elements specifies the temporal frequency of the data.

Table 3.2.1.3-2: Temporal Information

Temporal Extent	19970904 to 20110215

Temporal Frequency	Full-time operation of SeaWiFS obtains approximately 14.5 swaths of Level 1A and Level 2 GAC data per day, with each swath representing approximately 40 minutes of data.
Temporal Reference	UTC
Additional Information	The SeaWiFS rotating mirror rotates at a rate of 6 resolutions per second. GAC scans represent an Earth view of 21 milliseconds.

3.2.1.4 Platform and Instrument Information

Identification of the originating platforms and instruments that contribute to the data provide context for the SIP.

Table 3.2.1.3-1: Platform and Instrument Information

Mission	Platform	Instrument	Additional Information
GeoEye OrbView-2	OrbView-2	Sea-viewing Wide Field-of-view Sensor (SeaWiFS)	Platform built by Orbital Sciences Corporation. For more information see http://www.geoeye.com/CorpSite/products/imagery-sources/OV2_details.aspx

3.2.1.5 Supplemental Information

Additional information on the data in this SIP is below.

Table 3.2.1.6-1: Supplemental Information

Supplemental Information	Level 1A data consists of at-spacecraft raw radiance counts with calibration and navigation information available separately in the data file. The following table lists the center wavelength for each of the eight SeaWiFS bands, along with the primary use of each wavelength. SeaWiFS bands 1-6 are 20nm wide, and bands 7 and 8 are 40 nm wide.

Band	Center (nm)	Wavelength ("color")	Primary use
1	412	violet	Dissolved organic matter (including Gelbstoffe chlorophyll absorption)
2	443	blue	Chlorophyll absorption
3	490	blue-green	Pigment absorption (Case 2), K(490)
4	510	blue-green	Chlorophyll absorption
5	555	green	Pigments, optical properties, sediments
6	670	red	Atmospheric correction and sediments (CZCS heritage)
7	765	near-infrared	Atmospheric correction, aerosol radiance
8	865	near-infrared	Atmospheric correction, aerosol radiance

3.2.2 Supporting Items

This section identifies information resources and items from the Provider that support the use, understanding and thus the preservation of the Data Object in the SIP.

3.2.2.1 Representation Information

For a Data Object to be useful decades from now, its format specification and characteristics must be documented and preserved. The Representation Information provides syntax (structure) and/or semantics (meaning) to decode the encoded Data Object.

Table 3.2.2.1-1: Representation Information Items

Item	Description
This Submission Agreement, Table 3.2.1.6-1	List of lengths, colors and primary uses of SeaWiFS bands.
http://seadas.gsfc.nasa.gov/DOCS/SeaWiFS_Level-1A_Data_Products.pdf	Description of SeaWiFS L1A file format and content

3.2.2.2 Preservation Descriptive Information

This section identifies the Preservation Descriptive Information (PDI) for the Information Object. PDI materials provide context, provenance, and quality information for the Information Object.

Table 3.2.2.2-1: Preservation Descriptive Information Items

Item	Description
Okeanos System Overview, Version 3.0 (June 2008)	Okeanos is the automated processing system developed by Coastwatch to process ocean color and sea surface temperature products. This document describes the system architecture, hardware, software (including ingest modules for SeaWiFS, MODIS and MERIS), a catalog of products, and file-naming conventions for those products.
SeaWiFS Project website: http://oceancolor.gsfc.nasa.gov/SeaWiFS	Information on the SeaWiFS Project and products, as well as information on the SeaDAS software used to process SeaWiFS data

3.3 CoastWatch Level 2 Ocean Color Data SIP

The logical components of this specific SIP are identified in this section.

3.3.1 Data Information

The identifications and descriptions in this section are general metadata applicable for the life of the SIP.

3.3.1.1 Citation

Below is the citation information by which the SIP is known.

Table 3.3.1.1-1: Citation

REF ID	SWL2, MODL2, MERL2
Title	CoastWatch Level 2 Ocean Color Data
Edition/Version	
Release Date	TBD
Originator	NOAA CoastWatch
Originator Contact Information	See Table 2.1-1
Presentation Form	Digital files in Hierarchical Data Format 4.1r4
Additional Information	

3.3.1.2 Description

This section summarizes what the SIP is and how the information is represented.

Table 3.3.1.2-1: Description

Abstract	CoastWatch provides near real-time ocean color products , e.g. chlorophyll-a concentration and turbidity (reflectance), with data from NASA's Earth Observing Satellite (EOS), Aqua, as well as GeoEye's OrbView-2 satellite (via contractual purchase) and the European Space Agency's (ESA) Envisat satellite. Each satellite-specific product has unique characteristics dependent on the sensor and algorithm applied.
Purpose	Biologists are using ocean color (e.g. chlorophyll-a) products to predict harmful algal blooms, manage living marine resources, and assess ocean climate effects. CoastWatch provides near real-time ocean color products from remote-sensing platforms in order to serve the efforts of these users, as well as the efforts of federal, state and local government environmental decision makers. Other users include recreational boaters, educators, resource managers, and researchers.
Development Status	Operational
Processing Level	Level 2
Data Format	Hierarchical Data Format (HDF4.1r4) with CoastWatch Metadata
Vocabulary	CoastWatch HDF
Additional Information	

3.3.1.3 Spatial and Temporal Information

The spatial coverage of the SIP is given in terms of spatial extent and resolution. The farthest bounding coordinates of the represented region define the spatial extent. The minimum difference between two adjacent spatial elements specifies the spatial resolution of the data.

Table 3.3.1.3-1: Spatial Information

Bounding Coordinates	CoastWatch ocean color products cover 13 regions (7 coastal, 6 open ocean) globally. SeaWiFS products cover 10 of these 13 regions; MODIS ocean color products cover all of these 13 regions; and MERIS products cover 7 of these 13 regions.				
	Region	**Western**	**Eastern**	**Northern**	**Southern**	**REF ID**

		Longitude	Longitude	Latitude	Latitude	
	Northeast	-82	-60	46	30	SWL2, MODL2, MERL2
	Southeast	-88	-72	37	22	SWL2, MODL2, MERL2
	Caribbean	-80	-60	30	8	SWL2, MODL2, MERL2
	Gulf of Mexico	-99	-79	31	17	SWL2, MODL2, MERL2
	Great Lakes	-93	-75	51	38	SWL2, MODL2, MERL2
	West Coast	-142	-112	51	29	SWL2, MODL2, MERL2
	Eastern Tropical Pacific	-142	-80	30	8	SWL2, MODL2, MERL2
	Alaska	-180	-126	64	50	SWL2, MODL2
	Hawaii	-167	-147	29	10	SWL2, MODL2
	Pacific Basin	-180	-140	50	0	SWL2, MODL2
	Equatorial Atlantic	-60	0	30	-10	MODL2
	North Atlantic	-60	0	60	20	MODL2
	Chesapeake Bay	-78	-74	40	36	MODL2
Coordinate System	Geographic					
Spatial Resolution	SWL2, MODL2: Approximately 1.1 km per pixel at nadir. MERL2: Approximately 1.2 km per pixel at nadir.					
Spatial Representation	Satellite swath projection					
Additional Information						

The temporal extent specifies the entire period of record (POR) that the SIP represents. The minimum temporal difference between two time-referenced elements specifies the temporal frequency of the data.

Table 3.3.1.3-2: Temporal Information

Temporal Extent	CoastWatch retains Level 2 ocean color products for 5-10 days, so the time period covered by the L2 products will be the day archival storage begins minus 5-10 days. Archive will continue forward in time indefinitely. This agreement will be updated to reflect the start date of archival storage.

Temporal Frequency	SWL2: 10-minute granules
	MODL2: 5-minute granules
	MERL2: 2600-second granules
Temporal Reference	UTC
Additional Information	For SWL1A and SWL2, a "granule" is the entire portion of orbit visible by the ground station, which can be greater than 10 minutes. SWL2 also products collect the granules into daily and 61-day composites. MODIS-Aqua L1B files are received as individual 5-minute granules and processed to MODL2. MERIS L2 N1 files are 2600-second granules (half orbit).

3.3.1.4 Platform and Instrument Information

Identification of the originating platforms and instruments that contribute to the data provide context for the SIP.

Table 3.3.1.3-1: Platform and Instrument Information

Mission	Platform	Instrument	Additional Information
GeoEye OrbView-2, ongoing since August 1997	OrbView-2	Sea-viewing Wide Field-of-View Sensor (SeaWiFS)	SWL2
NASA Earth Observing System (EOS) Aqua mission, ongoing since April 2002, and Terra mission (backup), ongoing since February 2000	Aqua, Terra (backup)	Moderate Resolution Imaging Spectroradiometer (MODIS)	MODL2
European Space Agency (ESA) Envisat mission, ongoing since March 2002	Envisat	Medium Resolution Imaging Spectroradiometer (MERIS)	MERL2

3.3.1.5 Supplemental Information

Additional information on the data in this SIP is below.

Table 3.3.1.6-1: Supplemental Information

Supplemental Information	See Appendix D: CoastWatch Level 2 Ocean Color Data File Contents

3.3.2 Supporting Items

This section identifies information resources and items from the Provider that support the use, understanding and thus the preservation of the Data Object in the SIP.

3.3.2.1 Representation Information

For a Data Object to be useful decades from now, its format specification and characteristics must be documented and preserved. The Representation Information provides syntax (structure) and/or semantics (meaning) to decode the encoded Data Object.

Table 3.3.2.1-1: Representation Information Items

Item	Description
This Submission Agreement, Appendix D: CoastWatch Level 2 Ocean Color Data File Contents	List of and definitions for all potential data layers within each Level 2 ocean color file from SeaWiFS, MODIS and MERIS.
http://cwcaribbean.aoml.noaa.gov/hdf.html or http://coastwatch.noaa.gov/data/cwf/cwf_ug_3_2_3.pdf	Description of CoastWatch HDF format
ftp://okeanos.noaa.gov/pub/README_file_names.txt	File-naming convention document for L2 Data

3.3.2.2 Preservation Descriptive Information

This section identifies the Preservation Descriptive Information (PDI) for the Information Object. PDI materials provide context, provenance, and quality information for the Information Object.

Table 3.3.2.2-1: Preservation Descriptive Information Items

Item	Description
Okeanos System Overview, Version 3.0 (June 2008)	Okeanos is the automated processing system developed by Coastwatch to process ocean color and sea surface temperature products. This document describes the system architecture, hardware, software (including ingest modules for SeaWiFS, MODIS and MERIS), a catalog of products, and file-naming conventions for those products.
This Submission Agreement, Appendix E: SeaWiFS L1A Data Product Lineage	This section was taken from the original Submisison Agreement between CoastWatch Ocean Color and CLASS for SeaWiFS L1A data (CLASS-1133-CLS-AGR-DSA) from March 2006.
SeaWiFS Project website: http://oceancolor.gsfc.nasa.gov/SeaWiFS	Information on the SeaWiFS Project and products, as well as information on the SeaDAS software used to process SeaWiFS data
Algorithm Theoretical Basis Documents for MODIS	Available through the NASA GSFC website at http://modis.gsfc.nasa.gov/data/atdb/ocean_atdb.php
Werdell, P. Jeremy, et al., "Approach for the long-term spatial and temporal evaluation of ocean color satellite data products in a coastal environment," *Proc. of SPIE*, Vol. 6680, 66800G (2007).	Paper containing description of regional algorithm used for Chesapeake Bay product (MODIS only)
Algorithm Theoretical Basis Documents for MERIS	Available through the ESA website at http://envisat.esa.int/instruments/meris/atbd
NODC Submission Information Form for CoastWatch Level 2 Ocean Color Data	Provides summary information relevant to the data sets in the following categories:

Item	Description
	• Basic Tracking Information • Basic Data Discovery and Usage Information • Detailed Data Processing and Quality Information • Data Stewardship Information • Logistics Information for Routine Transfers to the *Archive* • Archive Appraisal and Justification Information

3.4 Global *Emiliania huxleyi* Bloom Maps SIP

The logical components of this specific SIP are identified in this section.

3.4.1 Data Information

The identifications and descriptions in this section are general metadata applicable for the life of the SIP.

3.4.1.1 Citation

Below is the citation information by which the SIP is known.

Table 3.4.1.1-1: Citation

REF ID	EHUX
Title	CoastWatch *Emiliania huxleyi* Bloom Maps
Edition/Version	
Release Date	August 2011
Originator	NOAA CoastWatch
Originator Contact Information	See Table 2.1-1
Presentation Form	Digital files in netCDF-4
Additional Information	

3.4.1.2 Description

This section summarizes what the SIP is and how the information is represented.

Table 3.4.1.2-1: Description

Abstract	This data set consists of global maps that illustrate the presence or absence of blooms of the sentinel coccolithophorid species *Emiliania huxley* (a calcite-producing single-celled algae) and the resulting calcite concentration. This species is used to study ocean acidifcation and its effects on marine ecosystems. Various ecologically important parameters, such as bloom timing and areal extent, may be estimated from these maps.
Purpose	To document and assess the response of pH-sensitive phytoplankton species to ocean acidification and climate change.
Development Status	Developmental

Processing Level	Level 3
Data Format	netCDF-4
Vocabulary	
Additional Information	The two types of EHUX products, the presence/absence maps and the calcite concentration maps, are generated using daily and 8-day binned Level 3 4km MODIS-Aqua files generated by NOAA.

3.4.1.3 Spatial and Temporal Information

The spatial coverage of the SIP is given in terms of spatial extent and resolution. The farthest bounding coordinates of the represented region define the spatial extent. The minimum difference between two adjacent spatial elements specifies the spatial resolution of the data.

Table 3.4.1.3-1: Spatial Information

	Western Longitude:	-180.0375
	Eastern Longitude:	180.0375
	Northern Latitude:	89.775
	Southern Latitude:	-89.775
Coordinate System	Geographic	
Spatial Resolution	Approximately 4km per pixel	
Spatial Representation	Cylindrical equidistant	
Additional Information		

The temporal extent specifies the entire period of record (POR) that the SIP represents. The minimum temporal difference between two time-referenced elements specifies the temporal frequency of the data.

Table 3.4.1.3-2: Temporal Information

Temporal Extent	Ongoing from start date of archive (forward stream)
Temporal Frequency	8-day composite
Temporal Reference	UTC
Additional Information	

3.4.1.4 Platform and Instrument Information

Identification of the originating platforms and instruments that contribute to the data provide context for the SIP.

Table 3.4.1.3-1: Platform and Instrument Information

Mission	Platform	Instrument	Additional Information
NASA Earth Observing System (EOS) Aqua mission, ongoing since April 2002	Aqua	Moderate Resolution Imaging Spectroradiometer (MODIS)	

3.4.1.5 Supplemental Information

Additional information on the data in this SIP is below.

Table 3.4.1.6-1: Supplemental Information

Supplemental Information	Each 8-day composite product consists of two netCDF-4 files: one containing a map of bloom presence/absence, and one containing calcite concentration data. The data layers are named 'ehux' and 'calcite,' respectively. Auxiliary arrays include for ehux, the nLw bands used as input for the presence/absence computation.

3.4.2 Supporting Items

This section identifies information resources and items from the Provider that support the use, understanding and thus the preservation of the Data Object in the SIP.

3.4.2.1 Representation Information

For a Data Object to be useful decades from now, its format specification and characteristics must be documented and preserved. The Representation Information provides syntax (structure) and/or semantics (meaning) to decode the encoded Data Object.

Table 3.4.2.1-1: Representation Information Items

Item	Description

3.4.2.2 Preservation Descriptive Information

This section identifies the Preservation Descriptive Information (PDI) for the Information Object. PDI materials provide context, provenance, and quality information for the Information Object.

Table 3.4.2.2-1: Preservation Descriptive Information Items

Item	Description
Iglesias-Rodriguez, M.D. et al., 2002: Representing key phytoplankton functional groups in ocean carbon cycle models: coccolithophorids. *Glob .Biogeochem. Cycles*, 16, 1100, doi: 10.1029/2001GB001454	The science algorithm used to derived the bloom presence/absence maps is described in this paper.
Gordon, H.R. and Balch, W.M., 1999: MODIS detached coccolith concentration. Algorithm Theoretical Basis Document. Version 4. MODIS Ocean Discipline Group. URL http://oceancolor.gsfc.nasa.gov/DOCS/MSL12/master_prodlist.html/#prod19	Algorithm Theoretical Basis Document for calcite concentration data
Okeanos System Overview, Version 3.0 (June 2008)	Okeanos is the automated processing system developed by Coastwatch to process ocean color and sea surface temperature products. This document describes the system architecture, hardware, software, a catalog of

Item	Description
	products, and file-naming conventions for those products.
NODC Submission Information Form for CoastWatch *Emiliania huxleyi* products	Provides summary information relevant to the data sets in the following categories: - Basic Tracking Information - Basic Data Discovery and Usage Information - Detailed Data Processing and Quality Information - Data Stewardship Information - Logistics Information for Routine Transfers to the *Archive* - Archive Appraisal and Justification Information

SECTION 4.0   INGEST

The transfer of data from the Provider to the Archive is performed during a data Submission Session. The Submission Session information in this section provides the data and metadata transfer details.

4.1   SUBMISSION SESSION INFORMATION

This section contains the information specific to a data Submission Session.

4.1.1 Submission Method Information

The submission method for the Submission Session defines the means and conditions of the data delivery.

4.1.1.1 Ocean Color L1A Data, L2 Data and Applied Products Submission Method

This section contains the information specific to this data submission method.

Table 4.1.1.1-1: Submission Method

Delivery Method	FTP pull
Delivery Network	*Provider*: Okeanos System (ftp server) *Archive*: CLASS
Transfer Initiation	By *Archive*
Staging Period	72 hours
Security Steps	The *Archive* storage facility (CLASS) will have sufficient redundancy in network connectivity so that when CLASS is unable to receive, ingest, or store data, the data from the *Provider* may still be rerouted to other CLASS facilities via the CLASS-dedicated Multiprotocol Label Switching (MPLS) network. Internal CLASS data transfer mechanisms ensure that all data delivered to one of the CLASS sites is replicated and stored at all other CLASS sites. During Data Submission Sessions, SWL1A data must be protected from unauthorized copying or distribution.
Additional Information	The *Provider* and the *Archive* storage facility (CLASS) will be collocated in the NOAA Satellite Operations Facility (NSOF). They are connected via the Environmental Satellite Processing Center (ESPC) Network. The CLASS facility will be connected to the ESPC Network via three 1 Gigabit Ethernets (Ges). The CoastWatch *Provider* (Okeanos Server) will be connected to the ESPC Network via one 1 GE. The transaction begins with the transmission of the Archive Manifest file via FTP pull by *Archive* to *Provider*. The corresponding data files follow the Manifest. The Archive Manifest contains the names of the data files that should be pulled by CLASS for archival storage. The Archive Manifest also specifies the total number of files and the size and checksum of each file. These file sizes and checksums enable CLASS to check the integrity of each data file.

4.1.2 Delivery Schedule

A Submission Session will follow the delivery schedule information described below.

Table 4.1.2-1: Delivery Schedule

No.	Start Time	End Time	Frequency	Additional Information
1	Ongoing	Ongoing	Periodic (>1x per day)	Submission Information Package and corresponding Archive Manifest
2	Ongoing	Ongoing	Once a day	CoastWatch File and Manifest Reports
3	Ongoing	Ongoing	Once every 8 days	Submission Information Package and corresponding Archive Manifest
4	Ongoing	Ongoing	As Needed	CLASS Activity Report

4.1.3 Data Submission Inventory

The packaging inventory, or the Packaging Information, provides the structure, naming conventions and other information that identify each item to be delivered in a Submission Session.

Table 4.1.3-1: Submission Session Inventory

Item	Item Naming Convention	Volume Each	Quantity	Delivery Schedule No.	Additional Information
REF ID: All					
CoastWatch Archive Manifest	CoastWatch.OC.MANIFEST.D*yyyyddd*.T*hhmmss*.xml *yyyyddd*: The year and day of year of the creation date of the file *hhmmss:* The hours, minutes and seconds of the creation time of the file	2460 bytes	~5 files/day	1	~12,300 bytes/day
CoastWatch Manifest Activity Report	CoastWatch.OC.ACTMANI.REPORT.D*yyyyddd*.T*hhmmss* *yyyyddd*: The year and day of year of the creation date of the file *hhmmss:* The hours, minutes and seconds of the creation time of the file	280 bytes	1 file/day	2	~2,800 bytes/day. This manifest report contains the list of all archive manifest files generated by Okeanos in the past 72 hours.
CoastWatch File Activity Report	CoastWatch.OC.ACTFILE.REPORT.D*yyyyddd*.T*hhmmss* *yyyyddd*: The year and day of year of the creation date of the file *hhmmss:* The hours, minutes and seconds of the creation time of the file	?	1 file/day	2	This file report contains the list of all data files submitted for archive by Okeanos in the past 72 hours.
CLASS Activity Report	CLASS.OC.ACTREPORT.D*yyyyddd*.T*hhmmss* *yyyyddd*: The year and day of year of the creation date of the file *hhmmss:* The hours, minutes and seconds of the creation time of the file	26 bytes	~5 files/day, when requested	4	Number of files will match number of CoastWatch Archive Manifest files that day
REF ID: SWL1A					
SeaWiFS L1A Data	*Syyyydddhhmmss*.L1A_*xxxx*.Z *S:* Source, one character identifying the source of the file. S =	80 MB	~5 files/day	1	~400 MB/day.

	NASA; O = OrbImage *yyyydddhhmmss:* The year, day of year, hours, minutes, and seconds of the first scan line in the file *xxxx:* Four-character station code designator (see Table 4.1.3-2). Most station codes start with "H" for HRPT station. All station codes consist of four capital letters that uniquely identify the agency and the location of the HRPT ground station where the data was collected.				

REF ID: SWL2, MODL2, MERL2					
SeaWiFS L2 Data	For CoastWatch HDF: *DataProduct.Syyyyddd.hhmmss.hdf* *DataProduct:* SWFCW = SeaDAS standard SeaWiFS processed from L1; SWRCW = Stumpf SeaDAS processed from L1 *yyyyddd:* four digit year + day of year *hhmmss:* four digit starting time (hour + minutes + seconds) of granule For Standard HDF: *Syyyydddhhmmss.*L2.*xxxx_algorithm-code.*Z *S:* Source, one character identifying the source of the file. S = NASA; O = OrbImage *yyyydddhhmmss:* The year, day of year, hours, minutes, and seconds of the first scan line in the file *xxxx:* Four-character station code designator (see Table 4.1.3-2). Most station codes start with "H" for HRPT station. All station codes consist of four capital letters that uniquely identify the agency and the location of the HRPT ground station where the data was collected. *algorithm-code:* Two or three character algorithm code used to create this file. Valid values are: OC4, RS, RC.	5405.1 MB total SIP	39	1	See Table 4.1.3-3.
MODIS L2 Data	For CoastWatch HDF: *DataProduct.Pyyyyddd.hhmm.hdf* *DataProduct:* MODSCW = SeaDAS standard MODIS processed from L1B *yyyyddd:* four digit year + day of year *hhmm:* four digit starting time (hour + minutes) of granule	9093.9 MB total SIP	87	1	See Table 4.1.3-3

	For Standard HDF:				
	P*yyyydddhhmm*.L2.hdf				
	yyyydddhhmm: The year, day of year, hours, and minutes of the first scan line in the file				

MERIS L2 Data	For CoastWatch HDF: *DataProduct.Myyyyddd.hhmmss.hdf* *DataProduct:* MERCW = MERIS L2 ocean color file *yyyydddss:* four digit year + day of year *hhmm:* four digit starting time (hour + minutes) of granule	4800 MB total SIP	8	1	See Table 4.1.3-3
REF ID: EHUX					
Emiliania huxleyi bloom presence/absence maps	**DataProduct_PYYYYJJJ_PYYYYJJJ_D8_WW00_closest_ehux.nc** *DataProduct:* MODEHCW = MODIS Ehux *YYYYJJJ*: Starting and ending 4-digit year and 3-digit day of year for 8-day composite WW00: Specifies global (WW) geographic (gctp projection opt 00) closest: Designates a particular non-default way of performing geoprojection D8: Specifies an 8-day arithmetic mean	165 MB	1	3	165 MB/every 8 days
Calcite concentration maps	**DataProduct_PYYYYJJJ_PYYYYJJJ_D8_WW00_closest_calcite.nc** *DataProduct:* MODEHCW = MODIS Ehux *YYYYJJJ*: Starting and ending 4-digit year and 3-digit day of year for 8-day composite WW00: Specifies global (WW) geographic (gctp projection opt 00) closest: Designates a particular non-default way of performing geoprojection D8: Specifies an 8-day arithmetic mean	664 MB	1	3	**664 MB/every 8 days**

Table 4.1.3-2: Station Codes for SeaWiFS Data

Station Code	Description	REF ID
HBIO	Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada	SWL1A, SWL2
HIGP	University of Hawaii, Honolulu	SWL1A, SWL2
HNAV	Naval Research Laboratory, Stennis Space Center, Stennis, MS	SWL1A, SWL2
HNSG	NASA Goddard Space Flight Center, Greenbelt, MD	SWL1A, SWL2
HMBR	Monterey Bay Aquarium Research Institute (MBARI), Moss Landing, CA	SWL1A, SWL2
HORB	ORBIMAGE (NASA Goddard Space Flight Center)	SWL1A, SWL2
HUSF	University of South Florida, St. Petersburg, FL	SWL1A, SWL2
HOSA	SeaSpace, San Diego, CA	SWL1A
HROT	Rota, Spain	SWL1A, SWL2
HUAF	University of Alaska, Fairbanks	SWL1A, SWL2
HUSC	University of California, Santa Barbara	SWL1A, SWL2
HUTX	University of Texas, Austin	SWL1A, SWL2
ODUL	ORBIMAGE (now GeoEye), Dulles, VA	SWL1A

Table 4.1.3-3: Level 2 Ocean Color Submission File Sizes and Number of Files

File Type	Format	Number of Files	Total File Size (MB)
SeaWiFS Total	**HDF, md5**	**39**	**5405.1**
General_Purpose	HDF	7	1229.89
General_Purpose_(Stumpf)	HDF	6	1405.41
General_Purpose	HDF (CW)	7	1459.54

File Type	Format	Number of Files	Total File Size (MB)
General_Purpose	md5	7	0.000348
General_Purpose_(Stumpf)	HDF (CW)	6	1310.25
General_Purpose_(Stumpf)	md5	6	0.00029
MODIS Aqua Total	**HDF, md5**	**87**	**9093.9**
General_Purpose	HDF	29	5581.85
General_Purpose	HDF (CW)	29	3512
General_Purpose	md5	29	0.001711
MERIS Total	**HDF, md5**	**8**	**4800**
General_Purpose	HDF (CW)	4	4800
General_Purpose	md5	4	0.002
All Total	**HDF5, md5**	**134**	**19299**

4.2 RECEIPT CONFIRMATION

This function provides a confirmation of receipt of a SIP to the Producer.

4.2.1 Error Handling

Errors and/or anomalies can occur during any data submission session. Actions to remedy potential error conditions for a Submission Session are identified below.

Table 4.2.1-1: Error Handling

Error / Anomalous Condition	Error Action
REF ID: All	
FTP failure	Retry FTP configurable number of times over a configurable time period. For persistent FTP failure, contact *Provider*.
Incomplete file transfer; Ill-formed Archive Manifest; Filesize and/or file checksum not maching with those in the Archive Manifest (data fails integrity check)	Contact *Provider*; CLASS may send a retransmission request to *Provider.*
Duplicate File Received	If a file with a duplicate name is received, the existing file will be overwritten and the inventory record associated with that file will be overwritten by the new inventory information provided.

4.2.2 Submission Reports

These Submission Reports from the Archive document aspects of a data submission for the Provider.

Table 4.2.2-1: Submission Reports

Report Type	Schedule	Description
Ocean Color Activity Reporting	Daily	Transmission of activity report from *Provider* to CLASS. There are two types of Ocean Color Activity Reports: 1) Manifest report (ACTMANI) – contains the names of Archive Manifest files transferred to CLASS 2) File report (ACTFILE) – for each data file submitted to CLASS for archival storage, contains the file name, file size, and checksum. These reports are created and sent to CLASS every 24 hours and reflect the activity of the previous 72 hours.
CLASS Activity Reporting	As needed	Transmission of activity report from CLASS to *Provider*. Provides the CLASS Activity reports to the *Provider* to facilitate data archive management. The CLASS Activity report includes the names of all data files ingested and archived.

Report Type	Schedule	Description
		This transaction begins with the *Provider* requesting a CLASS Activity report covering a specific time period. CLASS creates the report and provides the file to the *Provider* via email attachment.

4.3 QUALITY ASSURANCE

The Quality Assurance validates the successful transfer of the SIP.

4.3.1 Validation

Validation is essential to ensure consistent data quality throughout the Ingest process. It is the means by which the transfer of the data is tested so that data integrity is preserved. Both the Provider and Archive have a responsibility to ensure this integrity. The validation criteria for data will be limited to the criteria listed below.

Table 4.1.5-1: Validation

Validation Method	Validation Error Action
REF ID: All	
Data filename must be formatted according to Submission Agreement and ICD	Data file considered to be invalid; retained by CLASS for 96 hours; notify *Provider* in a Data File Error Message
Data type, coverage date and time information in data file must be valid	Data file considered to be invalid; retained by CLASS for 96 hours; notify *Provider* in a Data File Error Message

4.3.2 Quality Measures

The algorithms to evaluate data quality are defined with clear expectations of values and boundary limits. If data do not meet these quality measures, then the corrective actions will be executed.

Table 4.1.6-1: Quality Measures

QA Method	QA Error Action
REF ID: Not Applicable	
None	None

SECTION 5.0   ARCHIVAL STORAGE

Aspects of managing archival data storage are of interest to both the Provider and the Archive. This section outlines expected data volumes, storage duration, and handling procedures of archived data.

5.1 STORAGE

The amount of data and the amount of time required to keep and maintain the data is crucial to archive planning.

5.1.1 Volume

The total volume of the data and how the volume will increase with respect to time throughout the course of data submission is outlined below.

Table 5.1.1-1: Storage Volume

Time	Volume (GB)	Cumulative Volume (GB)	Additional Information
REF ID: SWL1A			
2004	9.28	9.28	
2005	52.36	61.64	
2006	68.19	129.83	
2007	78.49	208.32	
2008	47.63	255.95	
2009	28.21	284.16	
2010	13.56	297.72	Growth rate will taper off as satellite is retired
REF ID: SWL2			
2000	27.14	27.14	
2001	42.93	70.07	
2002	22.22	92.29	
2003	16.34	108.63	
2009	2.24	110.87	
2010	2.07	112.94	Growth rate will taper off as satellite is retired; currently 1.88 TB/year
REF ID: MODL2			
2009	183.85	183.85	
2010	177.91	361.76	Growth rate projected to be 3.17 TB/year for out years
REF ID: MERL2			
2009	24.72	24.72	
2010	19.33	44.05	
			Growth rate projected to be 1.67 TB/year for out years
REF ID: EHUX			
2010	26.63	26.63	

Time	Volume (GB)	Cumulative Volume (GB)	Additional Information
2011	39.94	66.57	Growth rate projected to be 39.94 GB/year for out years

5.1.2 Retention Schedule

Archived data will follow a disposition schedule in accordance with the identified authority.

Table 5.1.2-1: Retention Schedule

Storage Facility	Retention Schedule	Retention Authority
REF ID: All		
CLASS	In perpetuity	NOAA

5.2   HANDLING

The handling policies explain how the archive data security, maintenance, updates, changes, and additions will be performed.

5.2.1 Archive Constraints

Archive Constraints address the data restrictions imposed on the Archive.

Table 5.2.1-1: Archive Constraints

Constraint Type	Constraint
REF ID: SWL1A, SWL2	
Restricted	SeaWiFS data must be protected from unauthorized copying, distribution, and access by anyone other than users covered by the SeaWiFS CoastWatch Contract.
REF ID: MERL2	
Restricted	MERIS data must be protected from unauthorized copying, distribution, and access by anyone other than authorized ESA MERIS users.

5.2.2 Update Procedures

This section explains the procedures to be followed for updates to the archived data record.

Table 5.2.2-1: Update Procedures

Update Type	Frequency/Condition	Update Procedure
REF ID: All		
Replace	Infrequent	If a file with a duplicate name is received, the existing file will be overwritten and the inventory record associated with that file will be overwritten by the new inventory information provided.

Update Type	Frequency/Condition	Update Procedure
Purge	Infrequent	The *Provider* must sent a request to *Archive* listing files to be purged and justification.

5.2.3 Risks

Identification of potential risk factors in long-term preservation addresses the sustainability of the data in archive.

Table 5.2.3-1: Risk Factors

Risk Factor	Mitigation Option
REF ID: All	
None known at current time.	

SECTION 6.0   ARCHIVE ACCESS

Access is the OAIS entity that contains the services and functions which make the archival information holdings and related services visible to Consumers. The Archive accepts responsibility for managing the search, dissemination and support of the data it manages. This section describes how the data in the Archive may be accessed by Consumers and disseminated and supported by the Archive. This section covers the features of Access that may be of interest to the Provider and the Designated Community, and consequently this agreement.

6.1 DATA DISCOVERY AND DISSEMINATION

This section contains information on the search and dissemination capabilities and procedures available through the Archive.

6.1.1 Consumer Constraints

This section contains information concerning the restrictions placed on the data for the Consumers. Access constraints address the restrictions imposed on the Designated Community for accessing the data in the Archive. Usage constraints address the restrictions on the data after access is granted to the Designated Community. These restrictions should be known for proper data servicing by the Archive.

Table 6.1.1-1: Consumer Constraints

Constraint Type	Constraint
REF ID: SWL1A, SWL2	
Access	SeaWiFS data may not be distributed to anyone besides users covered by the SeaWiFS CoastWatch contract. The *Archive* must maintain this list of authorized users through communication with Richard Stumpf (see Table 2.4-1).
REF ID: MERL2	
Access	MERIS data may not be distributed to anyone besides authorized ESA MERIS users. The updated list of authorized ESA users is available at http://eopi.esa.int/searc (select the country, then search within the list of ESA US PI's). The *Archive* must maintain this list of authorized users for use in distribution of data. CoastWatch users not yet registered by ESA can do it easily at http://eopi.esa.int (select registration).
REF ID: SWL2, MODL2, MERL2	
Usage	Not intended for legal use. Data may contain inaccuracies due to clouded or mixed pixels.

6.1.2 Dissemination Services

This section identifies the Archive's dissemination service available for Consumers.

Table 6.1.2-1: Dissemination Services

Service	Description	Capabilities	Anticipated Volume	Additional Information
REF ID: All				
CLASS	NOAA Comprehensive Large Array-data Stewardship System online distribution service	Provides online search, discovery and ordering services to consumers. Delivery is via FTP (free), or LTO, DVD or CD-ROM for a fee.	Not Applicable	http://www.class.ngdc.noaa.gov
NODC Ocean Archive System	NODC online archive search interface	Provides online search and discovery. NODC accessions contain links to CLASS holdings for order and delivery.	Not Applicable	http://www.nodc.noaa.gov/search/prod

6.1.3 Search and Display Metadata

This section describes aspects of the data that may be used to support data discovery in the Archive. These defined fields are derived from a Data Object filename, or other source, and are used for search queries and/or for search results display. The "Use" column specifies how a field will be utilized by the Archive for data search and display.

Table 6.1.3-1: Search and Display Metadata

Field	Definition	Source	Use	Additional Information
REF ID: All				
Date	Starting year and day of year of granule (YYYYDDD)	Filename	SD	Used for definition of "start date" and "end date" of search
Time	Starting time of granule (HHMMSS)	Filename	SD	Used for definition of "start time" and "end time" of search

Field	Definition	Source	Use	Additional Information
REF ID: SWL1A, SWL2				
Station	HRPT Receiving Station	Filename	S	See Table 4.1.3-2 for HRPT station codes and names
REF ID: SWL1A, SWL2, MODL2, MERL2				
Datatype	Type of data – SeaWiFS Level 1A, SeaWiFS Level 2, MODIS Level 2, MERIS Level 2	Filename	SD	See file-naming conventions in Table 4.1.3-1 for domain
REF ID: EHUX				
Datatype	Type of data – bloom presence/absence map or calcite concentration data	Filename	SD	

6.1.4 Dissemination Reports

These status reports for the Provider document the Archive's dissemination of the data.

Table 6.1.4-1: Dissemination Reports

Report Type	Schedule	Description
Dissemination	As requested	Dissemination reports will be provided by the *Archive* upon request from the *Provider*. Get details of reports from updated ICD

6.2 DESIGNATED COMMUNITY SUPPORT

The Archive accepts responsibility for supporting the Designated Community with their data service needs.

6.2.1 Archive Standard Metadata

Standard metadata is created and maintained by the Archive to effectively provide data support to diverse user communities, often beyond the scope of the Designated Community.

Table 6.2.1-1: Archive Standard Metadata

MD Reference	MD Standard	Repository
REF ID: All		
gov.noaa.class:OC	FGDC-STD-012-2002	- NOAA Metadata Manager and Repository (NMMR) - Federal e-government Geospatial One Stop (GOS) - NODC Web Accessible Folder (http://data.nodc.noaa.gov/NESDIS_DataCenters/metadata/NODC)
REF ID: SWL1A		
gov.noaa.class:SW_L1A	FGDC-STD-012-2002	- NOAA Metadata Manager and Repository (NMMR) - Federal e-government Geospatial One Stop (GOS) - NODC Web Accessible Folder (http://data.nodc.noaa.gov/NESDIS_DataCenters/metadata/NODC
REF ID: SWL2		
gov.noaa.class:SW_L2	FGDC-STD-012-2002	- NOAA Metadata Manager and Repository (NMMR) - Federal e-government Geospatial One Stop (GOS) - NODC Web Accessible Folder (http://data.nodc.noaa.gov/NESDIS_DataCenters/metadata/NODC
REF ID: MODL2		

MD Reference	MD Standard	Repository
gov.noaa.class:MOD_L2	FGDC-STD-012-2002	• NOAA Metadata Manager and Repository (NMMR) • Federal e-government Geospatial One Stop (GOS) • NODC Web Accessible Folder (http://data.nodc.noaa.gov/NESDIS_DataCenters/metadata/NODC
REF ID: MERL2		
gov.noaa.class:MER_L2	FGDC-STD-012-2002	• NOAA Metadata Manager and Repository (NMMR) • Federal e-government Geospatial One Stop (GOS) • NODC Web Accessible Folder (http://data.nodc.noaa.gov/NESDIS_DataCenters/metadata/NODC
REF ID: EHUX		
gov.noaa.class:EHUX	FGDC-STD-012-2002	• NOAA Metadata Manager and Repository (NMMR) • Federal e-government Geospatial One Stop (GOS) • NODC Web Accessible Folder (http://data.nodc.noaa.gov/NESDIS_DataCenters/metadata/NODC

6.2.2 Support Items and Services

This section identifies the items and services specifically needed by the Consumers from the Archive for processing and/or understanding the data available from the Archive.

Table 6.2.2-1: Support Items and Services

Item / Service	Support Description
REF ID: All	
Collection-level metadata	Available through CLASS interface for CoastWatch Ocean Color (CW_OC). Also available within online NODC accession for each datatype.

6.2.3 Designated Community Monitoring

This section identifies ways the Archive may stay current with the technical needs of the Consumers so that the Archive can best serve the Designated Community.

Table 6.2.3-1: Designated Community Monitoring

Monitoring Description	Users may contact the *Archive* or other points of contact identified in the metadata record or *Archive* website. Registered CLASS users may also submit tickets to the CLASS HelpDesk system at **class.help@noaa.gov**.

APPENDIX A. TERMINOLOGY

This glossary defines the common terminology as it is used in this document. Most terms originate from the CCSDS Recommendation for an OAIS Reference Model.

Access: The OAIS entity that contains the services and functions which make the archival information holdings and related services visible to Consumers.

Archival Information Package (AIP): An Information package, consisting of the Content Information and the associated Preservation Description Information (PDI), which is preserved within an OAIS.

Archive: An organization that intends to preserve information for access and use by a Designated Community.

Consumer: The role played by those persons, or client systems, who interact with OAIS services to find preserved information of interest and to access that information in detail. This can include other OAISs, as well as internal OAIS persons or systems.

Content Data Object: The Data Object that, together with associated Representation Information, is the original target of preservation.

Content Information: The set of information that is the primary target for preservation. It is an Information Object comprised of its Content Data Object and its Representation Information. An example of Content Information could be a single table of numbers representing, and understandable as, temperatures, but excluding the documentation that would explain its history and origin, how it relates to other observations, etc.

Data/Product: A collection of Content Information that is understood by the Producer to be of uniform, consistent content. It may be made of up multiple data types or produced in multiple Submission Information Packages. One Submission Agreement, in most cases, will describe one *data/product*.

Data Object: Either a Physical or Digital Object.

Data Submission Session: A delivered set of media or a single telecommunications session that provides Data to an OAIS. The Data Submission Session format/contents are based on a data model negotiated between the OAIS and the Producer in the Submission Agreement. This data model identifies the logical constructs used by the Producer and how these are represented on each media delivery or in the telecommunication session.

Data Type Family: A logical grouping for presentation of data to the Consumer that shares many attributes including search criteria and techniques, results presentation, and dissemination options.

Data Type: A logical grouping of data sharing many common attributes such as format and metadata; often, but not always, corresponds to a SIP.

Descriptive Information: The set of information, consisting primarily of Package Descriptions, which is provided to Data Management to support the finding, ordering, and retrieving of OAIS information holdings by Consumers.

Designated Community: An identified group of potential Consumers who should be able to understand a particular set of information. The Designated Community may be composed of multiple user communities.

Digital Object: An object composed of a set of bit sequences.

Dissemination Information Package (DIP): The Information Package, derived from one or more AIPs, received by the Consumer in response to a request to the OAIS.

File: A collection of data bytes stored as an individual entity. Each file has a file name that is generally, but not in all cases, a unique identifier.

Fixity Information: The information that documents the authentication mechanisms and provides authentication keys to ensure that the Content Information object has not been altered in an undocumented manner.

Independently Understandable: A characteristic of information that has sufficient documentation to allow the information to be understood and used by the Designated Community without having to resort to special resources not widely available, including named individuals.

Information: Any type of knowledge that can be exchanged. In an exchange, it is represented by data. An example is a string of bits (the data) accompanied by a description of how to interpret a string of bits as numbers representing temperature observations measured in degrees Celsius (the representation information).

Information Object: A Data Object together with its Representation Information.

Information Package: The Content Information and associated Preservation Description Information which is needed to aid in the preservation of the Content Information. The Information Package has associated Packaging Information used to delimit and identify the Content Information and Preservation Description Information.

Ingest: The OAIS entity that contains the services and functions that accept Submission Information Packages from Providers, prepares Archival Information Packages for storage, and ensures that Archival Information Packages and their supporting Descriptive Information become established within the OAIS.

Knowledge Base: A set of information, incorporated by a person or system, that allows that person or system to understand received information.

Long Term: A period of time long enough for there to be concern about the impacts of changing technologies, including support for new media and data formats, and of a changing user community, on the information being held in a repository. This period extends into the indefinite future.

Long Term Preservation: The act of maintaining information, in a correct and Independently Understandable form, over the Long Term.

Management: The role played by those who set overall OAIS policy as one component in a broader policy domain.

Manifest: A file made available by the Provider to the Archive, listing a series of files intended for storage by the Archive.

Metadata: Data about other data, including the content, the quality, condition, and other characteristics of the data.

Open Archival Information System (OAIS): An archive, consisting of an organization of people and systems that has accepted the responsibility to preserve information and make it available for a Designated Community. It meets a set of responsibilities that allows an OAIS archive to be distinguished from other uses of the term "archive." The term "Open" in OAIS is used to imply that the standards are developed in open forums, and it does not imply that access to the archive is unrestricted.

Originator: Those persons or client systems who originally produced the information to be preserved.

Packaging Information: The information used to bind and identify the components of an Information Package. For example, it may be the ISO 9660 volume and directory information used on a CD-ROM to provide the content of several files containing Content Information and Preservation Description Information.

Preservation Description Information (**PDI**): The information which is necessary for adequate preservation of the Content Information and which can be categorized as Provenance, Reference, Fixity, and Context information.

Producer: The role played by those persons, or client systems, who generate the information to be preserved, often synonymous with Originator. However, Producer may or may not be the same as the Provider who delivers the data to the Archive. Producer can include other OAISs or internal OAIS persons or systems.

Provenance Information: The information that documents the history of the Content Information. This information tells the origin or source of the Content Information, any changes that may have taken place since it was originated, and who has had custody of it since it was originated. Examples of Provenance Information are the principal investigator who recorded the data, and the information concerning its storage, handling, and migration.

Provider: The entity or organization that is responsible for delivering the SIP to the Archive.

Reconciliation Report: Allows the Archive to determine if all files intended for storage have been received by the Archive.

Reference Information: The information that identifies, and if necessary describes, one or more mechanisms used to provide assigned identifiers for the Content Information. It also provides identifiers that allow outside systems to refer, unambiguously, to a particular Content Information. An example of Reference Information is an ISBN.

Repackaging: A Digital Migration that alters the AIP Packaging Information.

Replication: A Digital Migration where there is no change to the Packaging Information, the Content Information, and the PDI. The bits used to represent these Information Objects are preserved in the transfer to the same or new media instance.

Representation Information: The information that maps a Data Object into more meaningful concepts. An example is the ASCII definition that describes how a sequence of bits (i.e., a Data Object) is mapped into a symbol.

Submission Agreement: The agreement reached between an OAIS and the Producer that specifies a data model for the Data Submission Session. This data model identifies format/contents and the logical constructs used by the Producer and how they are represented on each media delivery or in a telecommunication session.

Submission Information Package (SIP): An Information Package that is delivered by the Provider to the OAIS for use in the construction of one or more AIPs.

Transfer: The act involved in a change of physical custody of SIPs. This definition is derived from the International Council on Archives Dictionary on Archival Terminology.

Version: An attribute of an AIP whose information content has undergone a transformation on a source AIP and is a candidate to replace the source AIP.

APPENDIX B. ACRONYMS

This table gives definitions for the acronyms used in this document.

Table B.1-1: Acronyms

Acronym	Definition
AIP	Archival Information Package
CLASS	Comprehensive Large Array-data Stewardship System
CSDGM	Content Standard for Digital Geospatial Metadata
DIP	Dissemination Information Package
EOS	Earth Observing System
ESA	European Space Agency
FGDC	Federal Geographic Data Committee
FTP	File Transfer Protocol
GAC	Global Area Coverage
HDF	Hierarchical Data Format
HRPT	High Resolution Picture Transmission
ICD	Interface Control Document
ISO	International Organization for Standardization
L1A	NOAA Processing Level 1A
L2	NOAA Processing Level 2
LAC	Local Area Coverage
MERIS	Medium Resolution Imaging Spectroradiometer
MOA	Memorandum of Agreement
MODIS	Moderate Resolution Imaging Spectroradiometer
MOU	Memorandum of Understanding
NCDC	National Climatic Data Center
NESDIS	National Environmental Satellite, Data, and Information Service
netCDF	Network Common Data Form
NGDC	National Geophysical Data Center
NMMR	NOAA Metadata Manager and Repository
NNDC	NOAA National Data Centers
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
OA	Operations Agreement
OAIS	Open Archival Information System
PAIMAS	Producer-Archive Interface Methodology Abstract Standard
PDI	Preservation Description Information
PDF	Portable Document Format
POR	Period Of Record
RM	Reference Model
RSAD	Remote Sensing and Applications Division
RSE	Remote Sensing Extensions
SA	Submission Agreement
SeaWiFS	Sea-viewing Wide Field-of-view Sensor

Acronym	Definition
SIP	Submission Information Package
SLA	Service Level Agreement
SME	Subject Matter Expert
STAR	Center for Satellite Applications and Research
URL	Universal Resource Locator
XML	eXtensible Markup Language

APPENDIX C. DOCUMENT REVIEW

This document is expected to undergo a periodic review of content for completeness, correctness and overall currency. No later than the Next Review Date identified below in Table D.1, this submission agreement will be reviewed by the Archive to determine whether it should: (1) remain in effect without change; (2) be changed to reflect the impact of new technologies, new requirements, or new directions; or, (3) be retired. All reviews are documented in the Document Review Record, Table D.2, even though a document review may not warrant a document change.

DOCUMENT REVIEW SCHEDULE

The review schedule is defined below.

Table D.1-1: Document Review Schedule

Current Review Frequency	Next Review Date

DOCUMENT REVIEW RECORD

The Review Record table tracks the reviews of the document based on its review schedule.

Table D.2-1: Document Review Record

REVIEW RECORD				
VERSION / REVISION	RELEASE DATE	REVIEW DATE	REVIEWER	COMMENTS

APPENDIX D.
COASTWATCH LEVEL 2 OCEAN COLOR DATA FILE CONTENTS

CoastWatch Level 2 Ocean Color product files may contain any or all of the following variables within a given file:

Variable	Description	Type	Units	Scale	Offset
chlor_a	Chlorophyll a concentration	float	mg m^{-3}	1	0
algal_1	Chlorophyll a concentration	float	mg m^{-3}	1	0
algal_2	Chlorophyll a concentration	float	mg m^{-3}	1	0
K_490	Diffuse attenuation coefficient at 490 nm	int16	m^{-1}	0.0002	0
Rrs_667/670	Remote sensing reflectance at 667/670 nm	float	sr^{-1}	1	0
Rrs 412/885	Remote sensing reflectance at 412/885 nm	float	sr^{-1}	1	0
Es_667/670	Extraterrestrial solar irradiance	float	mW cm^{-2} um^{-1}	1	0
rhos_869	Surface reflectance	int16	count	0.0001	0
l2_flags	Quality flags	int32	-	1	0
nLw_412 – nLw_885	Directional normalized water-leaving radiance for various nm values; ranging from 412 to 885; available wavelengths vary with each instrument.	int16	mW cm^{-2} um^{-1} sr^{-1}	0.001	0
sst	sea surface temperature – 11micron	int16	degrees celsius	0.005	0
latitude	latitude	float	degrees	1	0
longitude	longitude	float	degrees	1	0
sat_zenith	satellite zenith angle	int16	degrees	0.01	0
rel_azimuth	relative azimuth angle	int16	degrees	0.01	0
sun_zenith	solar zenith angle	int16	degrees	0.01	0
par	Photosynthetically Active Radiation	uint16	count	1	-32750
L1a band 1	SeaWiFS radiance count	uint16	count	1	0

L1a band 2	SeaWiFS radiance count	uint16	count	1	0
L1a band 3	SeaWiFS radiance count	uint16	count	1	0
L1a band 4	SeaWiFS radiance count	uint16	count	1	0
L1a band 5	SeaWiFS radiance count	uint16	count	1	0
L1a band 6	SeaWiFS radiance count	uint16	count	1	0
L1a band 7	SeaWiFS radiance count	uint16	count	1	0
L1a band 8	SeaWiFS radiance count	uint16	count	1	0
EV_Band8	Earth View Band 8 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band9	Earth View Band 9 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band10	Earth View Band 10 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band11	Earth View Band 11 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band12	Earth View Band 12 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band13lo	Earth View Band 13low 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band13hi	Earth View Band 13high 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band14lo	Earth View Band 14low 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band14hi	Earth View Band 14high 1KM reflective solar bands; scaled integers	uint1	count	1	0
EV_Band15	Earth View Band 15 1KM reflective solar bands; scaled integers	uint16	count	1	0
EV_Band16	Earth View Band 16 1KM reflective solar bands; scaled integers	uint16	count	1	0

APPENDIX E.
SEAWIFS L1A DATA PRODUCT LINEAGE

Process Description	SeaWiFS Data Analysis System (SeaDAS) module sw101 creates SeaWiFS Level 1A data by appending the following to SeaWiFS Level 0 data (raw radiance counts from all bands as well as spacecraft and instrument telemetry) from a single orbit: calibration data, navigation data, instrument telemetry, and selected spacecraft telemetry. This data product is packaged as one physical HDF file.
Process Date	Same as data collection date (included in the source dataset)
Process Time	Within 1-4 hours of data collection (included I the source dataset)
Process Source	SeaWiFS Level 0 data
Process Contact Information	
Organization	GeoEye
Person	Paul Lyon
Position	Principal Oceanographer
Address Type	Mailing and physical
Address	21600 Atlantic Blvd
City	Dulles
State or Province	VA
Postal Code	20166
Country	USA
Voice Telephone	703.480.5673
TDD/TYY Telephone	Not applicable
Facsimile Telephone	703.450.9693
E-Mail Address	Lyon.Paul@geoeye.com