



Document Purpose

This document is an addendum to the overarching Okeanos Explorer FY12 Data Management Plan (EX_FY12_DMP.pdf) and is specific to Legs 2 and 3 of the EX-12-02 mission entitled “Gulf of Mexico Exploration” For more detailed information on the data management effort for the Okeanos Explorer in FY12, please refer to that document.

General Description of the Data to be Managed

- Name of Dataset
 - : “EX1202 Legs II & III: Gulf of Mexico Exploration”
- Mission Specific Keywords:
 - Tampa
 - Desoto Canyon
 - Mississippi Canyon
 - Green Canyon
 - West Florida Shelf Break
 - West Florida Shelf Slope
 - West Florida Shelf
 - Deepwater Horizon
 - Flower Garden Banks
 - National Marine Sanctuary
 - Pascagoula
 - Galveston
 - Water-column flux
 - Ground-truth acoustic
 - Gas seeps
 - Deep corals
- Summary description:
 - During Legs II and III of the *Okeanos Explorer* (EX) mission EX1202, the vessel will perform ROV, CTD, and mapping operations in the northeastern region of the Gulf of Mexico around DeSoto, Mississippi, and Green Canyons.
 - Data management procedures are fully documented in the data management plan for the Okeanos Explorer for the FY12 field season (EX_FY12_DMP.pdf)
- Temporal Bounds:
 - Leg II: March 19, 2012 – April 7, 2012
 - Leg III: April 11, 2012 – April 29, 2012
- Spatial Bounds:
 - Legs II and III:
 - Northern – 30
 - Southern – 26
 - Western – -92

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- Eastern – -85
- Data Type Collections for Preservation/Stewardship:
 - Multibeam Bathymetry – continuous collection during the entire duration of the expedition
 - Bottom Backscatter – continuous collection during the entire duration of the expedition
 - Water Column Backscatter – continuous collection during the entire duration of the expedition
 - Scientific Computing System (SCS) output – continuous collection of navigational, meteorological, integrated oceanographic sensor data
 - XBT – continuous casts approx. 2-4 hours apart collecting water temperature at depth for sound velocity calculations
 - CTD – test casts with Rosette firings collecting conductivity, temperature, depth and water samples at targeted depths
 - Knudsen CHIRP 3260 –sub-bottom profiler data as deemed appropriate by the ship
 - EK60 – single beam sonar for water column features during the entire duration of the expedition
 - Low and medium-resolution video clips
 - Video framegrabs
- Data Product/Product Collections for Preservation/Stewardship:
 - Gridded bathymetry (.txt)
 - Gridded bathymetric image (.tif)
 - Fledermaus gridded bathymetry imagery (.sd)
 - Fledermaus gridded backscatter imagery (.sd)
 - Google Earth gridded bathymetry (.kml)
 - ArcView gridded bathymetry (.asc)
 - SCS data output in NetCDF
 - CTD data output in NetCDF
 - Final Mapping Summary document
 - Final Cruise Summary document
 - Dive Planning Reports
 - Dive Summary Reports
 - ROV Tracklines
 - Dive Trailers
 - Highlight Images
 - Cruise Summary Report
- Volume of Data Expected
 - Approximately 150 GB of data is expected to be collected on this mission.
- Personally Identifiable Information (PII) concerns
 - No PII will be included in these data.

Points of Contact

- Overall Point of Contact (POC) for the data:
 - Data Acquisition: Jeremy Potter (Jeremy.Potter@noaa.gov)
 - Data Management: Susan Gottfried (Susan.Gottfried@noaa.gov)
- Responsible for Data Quality:
 - Seafloor mapping and water column data: Mashkoor Malik
 - SCS data: Office of Marine and Aviation Operations (OMAO): Lt. Megan Nadeau, Okeanos Explorer Operations Officer (Ops.Explorer@noaa.gov)
 - Imagery and Video data: Webb Pinner (Webb.Pinner@noaa.gov)

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- Video products: Jeremy Potter
- Responsible for data documentation and metadata activities:
 - National Coastal Data Development Center (NCDDC); Susan Gottfried, OER Data Management Coordinator
- Responsible for the data storage and data disaster recovery activities:
 - NOAA National Data Centers; National Oceanographic Data Center (NODC), National Geophysical Data Center (NGDC), NOAA Central Library (NCL)
- Responsible for ensuring adherence to this data management plan, including resources are made available to implement the DMP:
 - Data Acquisition: Jeremy Potter, OER, Expedition Manager
 - Data Acquisition: Lt. Megan Nadeau, OMAO, Okeanos Explorer Operations Officer
 - Video data: Webb Pinner, OER, Okeanos Explorer Systems Architect
 - Data Management: Susan Gottfried, OER Data Management Coordinator

Data Stewardship

- What quality control procedures will be employed?
 - Quality control procedures for the data from the Kongsberg EM302 is handled at UNH CCOM/JHC. Raw (level-0) bathymetry files are cleaned/edited and converted to a variety of products.
 - Data from sensors monitored through the SCS are archived in their native format and are not quality controlled.
 - Data from the unmanned vehicles are archived in their native format and are not quality controlled.
- What is the overall lifecycle of the data from collection or acquisition to making it available to customer?
 - All data from this mission is expected to be archived and accessible within 60-90 days post-mission.
 - METOC data from the SCS are converted in a post-mission model into archive-ready compressed NetCDF3 format and stored within the NODC/NCDDC THREDDS open-access server.

Data Documentation

- An ISO format metadata record to document the mission will be generated during pre-cruise planning and published in an OER catalog for public discovery and access. Data collections and products will be documented with ISO, FGDC CSDGM, or MARC metadata and published at the appropriate NOAA Data Center.
- ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed.

Data Sharing

- All data recorded, observed, generated or otherwise produced on the Okeanos Explorer are considered non-proprietary and will be made available to the public as soon as possible after a period of due diligence in performing quality assurance and data documentation procedures. Special consideration will be made to data availability in the case where submerged cultural resources are targeted or inadvertently discovered.

Initial Data Storage and Protection

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- Data are recorded and stored on NOAA shipboard systems compliant with NOAA IT procedures. Data are moved from ship to shore using a variety of standard, documented data custody transfer procedures. Data are transferred to NOAA data centers using digital and physical data transfer models depending upon data volume.

Long-Term Archiving and Preservation

- Data from this mission will be preserved and stewarded through the NOAA National Data Centers. Refer to the Okeanos Explorer FY12 Data Management Plan (EX_FY12_DMP.pdf) for detailed descriptions of the processes, procedures, and partners involved in this collaborative process. Appendix A has an excerpt from EX_FY12_DMP.pdf that illustrates the data and product pipelines that will be employed for this mission.

Data Management Objectives

The DMT's objectives for this mission are:

- Provide personnel to man the potential ECC at Stennis Space Center; provide escort for Foreign Nationals, if necessary.
- Develop ISO collection-level and dataset-level metadata records for multibeam, singlebeam sonar, and sub-bottom profiler data.
- Develop ISO metadata for individual survey track lines.
- Develop ISO metadata for multibeam survey products.
- Develop FGDC metadata for XBT, CTD, and METOC data.
- Develop FGDC metadata for each video clip, both medium and low-resolution.
- Develop MARC metadata for each ROV dive operation video collection.
- Develop MARC metadata for each ROV dive operation image collection.
- Develop MARC metadata for each video or image product and for each report or summary generated.
- The Expedition Coordinator will be notified to direct someone onboard to copy all SCS, EK60, CTD, XBT, and multimedia data (native, low, and medium resolutions) to hard-drive supplied by the data management team to bring back for post-processing.
- Ensure the near real-time update of the *Okeanos Atlas* with
 - Ship track and hourly observations received via email.
 - Daily logs pulled from URI through RSS feeds and links to related images on oceanexplorer.noaa.gov website.
 - CTD cast locations with thinned profiles to be compared to the World Ocean Atlas historical profiles for the general location and month.
 - Daily cumulative bathymetric image overlays received via URI SRS.
 - ROV tracklines with representative image, if available
- Execute multibeam, oceanographic, and video data pipelines according to the FY12 DMP (EX_FY12_DMP.pdf).

Expedition Principals for Data Management

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Appendix A: Data and Product Pipelines (excerpt from EX_FY12_DMP.pdf)

Oceanographic/Meteorological/Navigational Data Archive Pipeline

Data from hull-mounted and off-board oceanographic and meteorological (METOC) sensors; integrated oceanographic sensors from the submersibles; and navigational instrumentation on both the vessel and its submersibles are monitored through the ship’s Scientific Computer System (SCS). Some of these data will be used in a near real-time mode to update the *Okeanos Atlas*. All of these data will be archived at the National Oceanographic Data Center (NODC) Marine Data Stewardship Division (MDS) in Silver Spring, MD. A collection level metadata record describing the data inventory to be archived at the NODC/MDS will be included with the data submission.

Oceanographic/Meteorological/Navigational Data/Products Pipeline

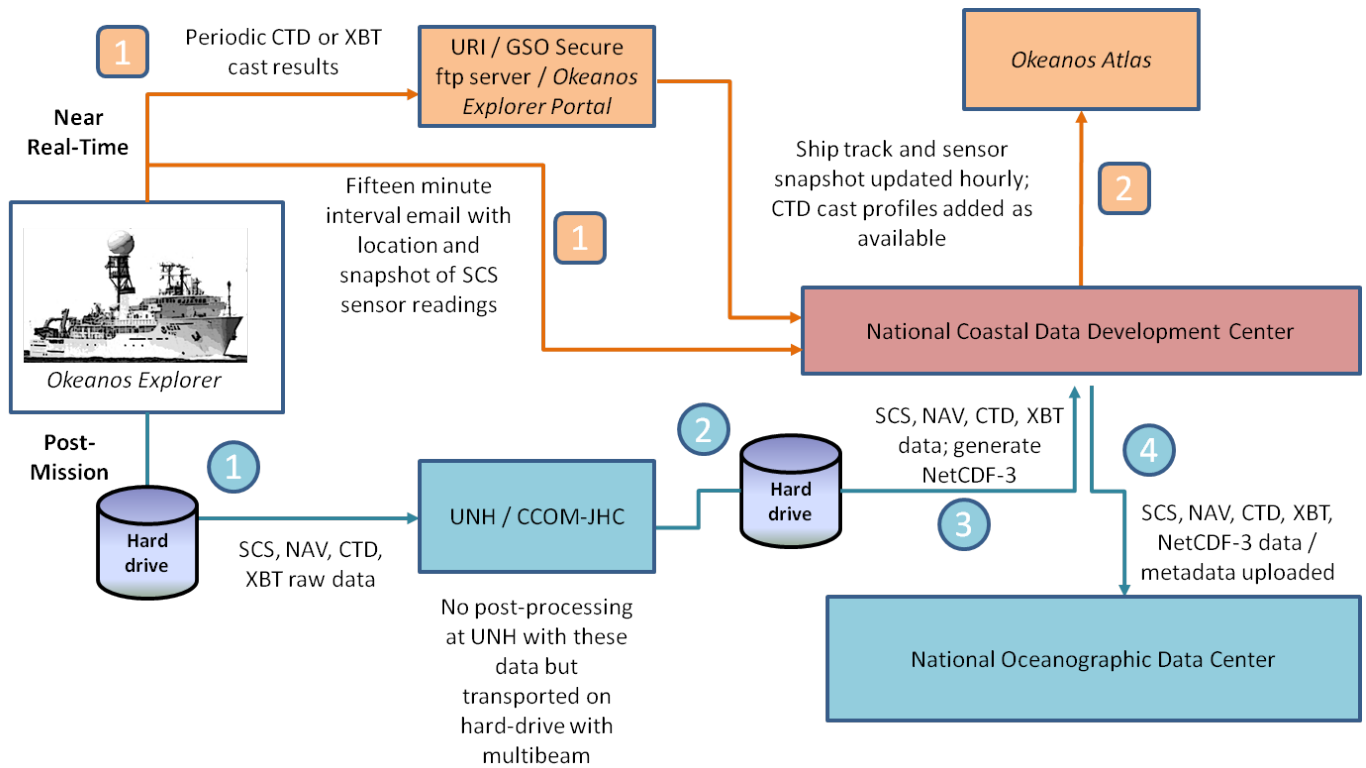


Fig 1: Oceanographic/Meteorological/Navigational Data Archive Pipeline

1

At periodic (currently twenty minutes) intervals, an email from the ship to NCDDC is delivered with the ship’s position and a snapshot of the SCS sensor suite.

As CTD or XBT casts are deployed, the results of the cast are included in the hourly synchronizations to the SRS.

2

The GIS team at NCDDC processes CTD cast data into thinned profiles for comparison to World Ocean Atlas historical profiles in the same region and month. The thinned profiles are geo-located on the Okeanos Atlas. Ship track and sensor snapshot readings are geo-located on the Okeanos Atlas.

1

All SCS data, including navigation and CTD/XBT cast data are saved to a hard-drive. This hard-drive is the same that will hold the multibeam survey raw data and products generated on-board. This hard-drive will be either brought back or shipped to the University of New Hampshire Center for Coastal and Ocean Mapping (UNH CCOM) for post-processing, after which it will be shipped to NCDDC.

2

The Data Management team will post-process the SCS, NAV, CTD, and XBT raw data files, adding ASCII headers to each file and generating NetCDF-3 formatted files for the entire cruise for both SCS/NAV data and CTD/XBT data. FGDC CSDGM metadata will be generated for the navigational data and for the METOC sensor data.

3

The ASCII files, and the metadata will be uploaded to the National Oceanographic Data Center (NODC), where they will be accessioned and archived.

4

The NetCDF3 files will be stored within an NCDDC hosted Thematic Real-time Environmental Distributed Data Services (THREDDS) server for user discoverability and access.

Data Class	Instrument	Data Type	Format	Metadata Granularity	Archive Center
OCN/ MET	All SCS monitored sensors	Meteorological and Oceanographic data sensors	ASCII	1 meta rec	NODC/MDSO
NAV	DGPS, CNAV	EX, ROV, and sled navigation	ASCII	1 meta rec	NODC/MDSO
ALL	All	Archive Ready	NetCDF-3	1 meta rec	NODC/MDSO

Table 4: Oceanographic/Meteorological/Navigational Metadata Granularity and Target Archive

Multibeam Survey Data Archive Pipeline

The multibeam survey data collected by bottom-looking and complementary sensors, data from the calibration instruments, and the products generated after the data is returned to and post-processed at UNH will be archived at the NGDC. These data will be accompanied with a collection level metadata record for the NGDC as well as individual metadata records for each raw (level-0) file, each edited (level-1) file and each data product (level-2) and report (level-3) generated as a result. In addition, the submission to NGDC will include the following:

- raw (level-0) mapping survey and water column data files,
- CTD and/or XBT profile data used for calibration in multibeam survey,
- post-processed, quality assured, and edited (level-1) data files,
- specific data products (level-2) including cumulative GeoTIF images, gridded bathymetric files, KML files, Fledermaus output files, and an ArcGrid format, and
- comprehensive mapping survey data summary (level-3) report.

Multibeam Data/Products Pipeline

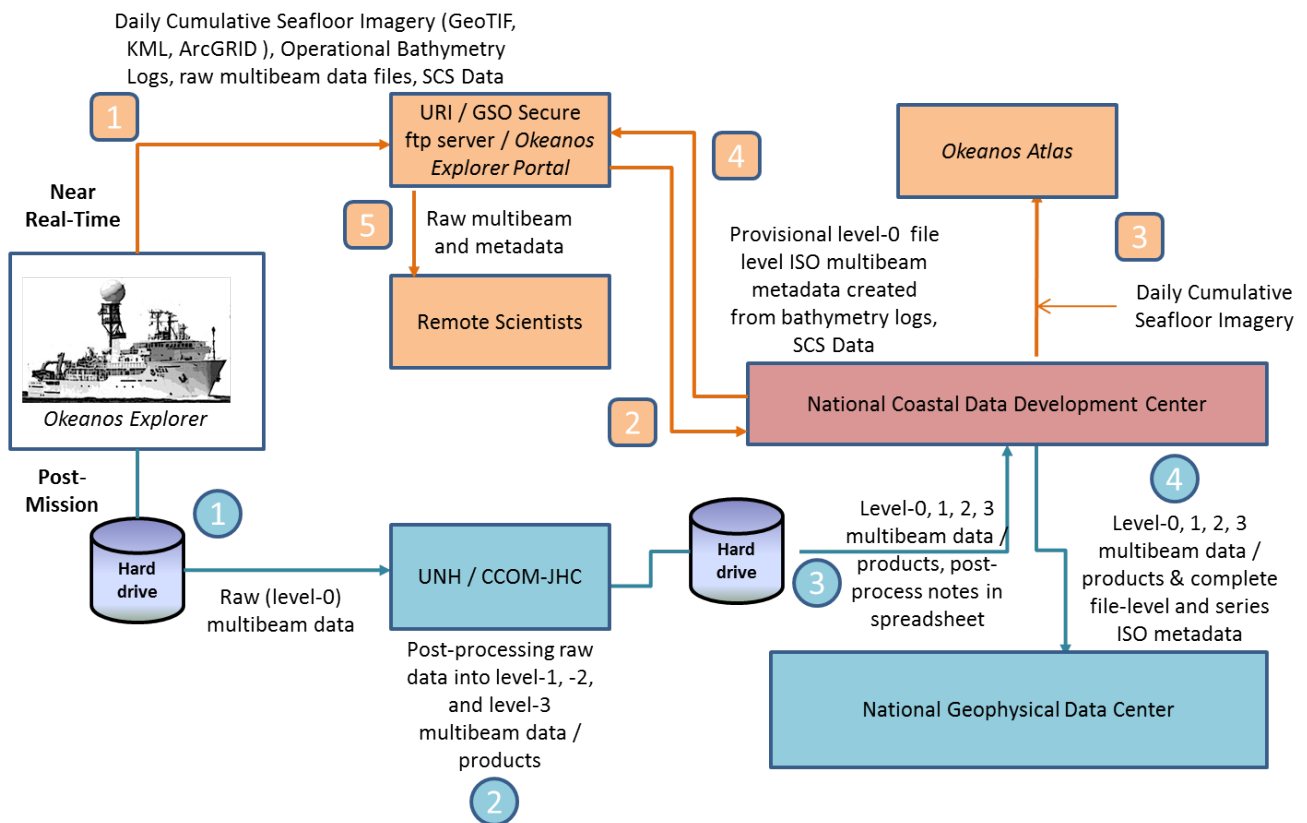


Figure 2: Multibeam Survey Data Archive Pipeline

Near Real-Time

1

The mapping survey team on the EX will include their operational processing spreadsheet in the folder that is targeted for synchronization to the SRS periodically throughout the day. As operational GeoTIFF images are created, these will also be saved to this folder.

2

The data management team at NCDDC pulls the GeoTIFF images, operational bathymetry processing spreadsheet and the SCS data streams for near real-time metadata generation and Okeanos Atlas update procedures.

3

Daily cumulative GeoTIFF images of the seafloor imagery are geo-located on the Okeanos Atlas by the GIS team at NCDDC.

4

Provisional metadata in an ISO format is generated for each raw (level-0) multibeam raw files using the SCS exported data, the operational processing spreadsheet and saved to the SRS.

5

Participating scientists wanting access to the raw multibeam in near real-time can pull the individual files with the metadata that provides operational and provisional processing steps and a disclaimer for non-QC status of the data.

Post-Mission

1

All bottom-looking sensor data and complementary data (water column and sound velocity) are saved to a hard-drive. This hard-drive will be either brought back or shipped to the University of New Hampshire Center for Coastal and Ocean Mapping (UNH CCOM) for post-processing.

2

A full complement of multibeam data from a 30-day EX cruise on which the Kongsberg EM302 multibeam system runs continuously will produce 200-300 Gigabytes of raw multibeam (37.5% of total volume) and water column data (62.5% of total volume). At UNH, the mapping team will post-process the multibeam data through the following steps:

- The raw (level-0) data will be saved to the CCOM file servers, where they will be quality checked and post-processed.
- The edited level-0 data is saved as level-1 data files in a non-proprietary format – ASCII xyz files (cleaned not gridded).

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- The post-processing steps used to produce the level-1 data will be documented.
- Level-2 products will be generated from the level-1 data files.
- The post-processing steps used to produce the level-2 data products will be documented.
- The level-1 data, level-2 products, post-processing steps, and working data processing spreadsheets will be copied to the hard drive in a new folder. A processing spreadsheet for FY12 will contain the temporal and spatial limits of each file and any supplemental information documenting problems or issues that affected the quality of the data in that file.

3 The hard-drive will be shipped to the NCDDC within approximately 3 weeks from cruise end date.

4 At NCDDC, all multibeam related files will be post-processed through metadata generation procedures. Metadata will be generated for each individual survey track file (level-0 and -1), for accompanying CTD/XBT profile data sets, for composite xyz files, KMLs, GeoTIFs, png images, and Fledermaus output (level-2), and a set of data products and reports (level-3). The metadata will be added to the hard-drive and the hard-drive will be shipped to NGDC.

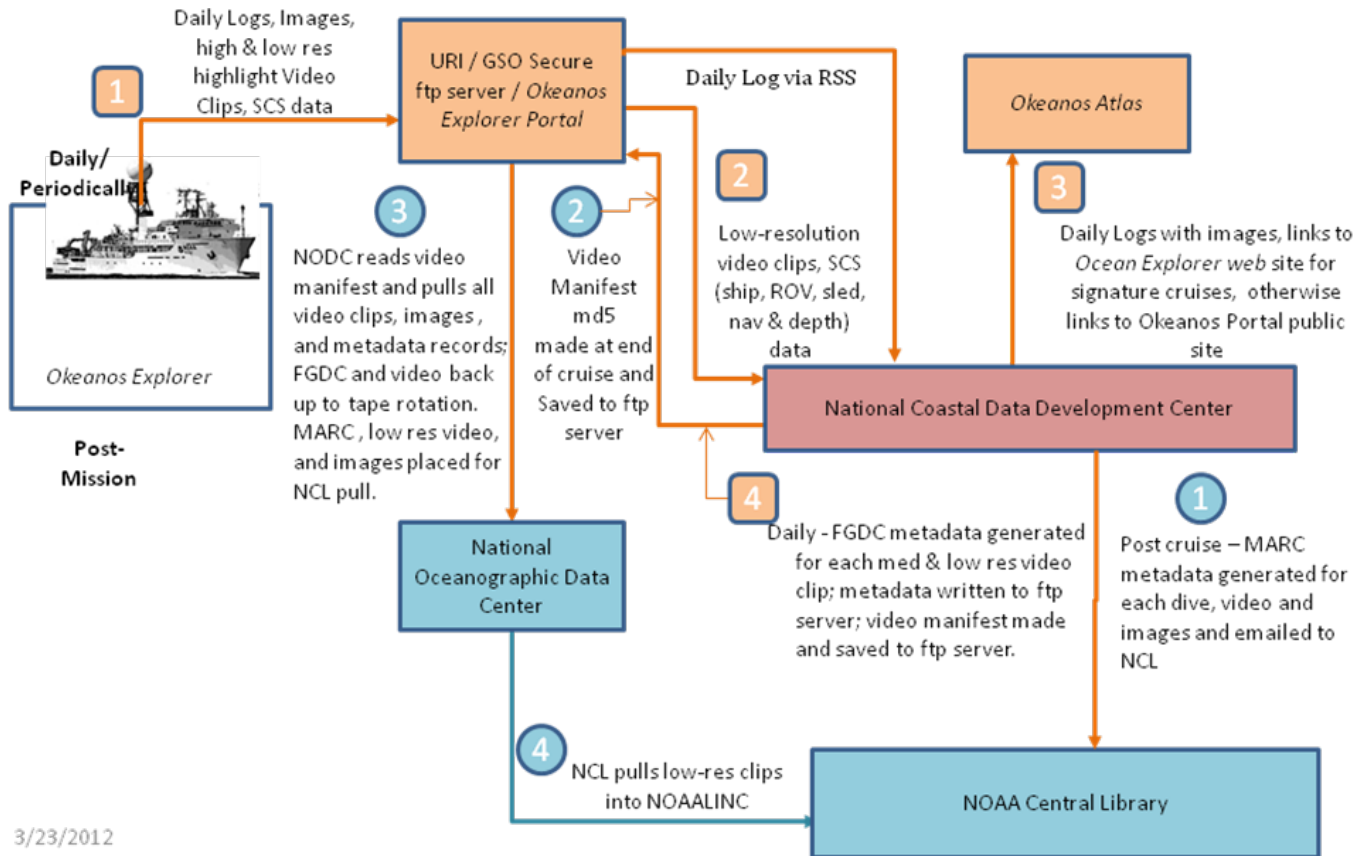
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Data Class	Instrument	Data Type	Format	Metadata Granularity	Archive Center
GEO	Kongsberg EM302 (30 kHz)	Multibeam Bathymetry, Bottom Backscatter, Water Column Backscatter (proprietary format read into MBSsystem)	.all, .wcd (proprietary)	1 meta rec per .all file in Multibeam Data folder and subfolders	NGDC
GEO	Simrad EK60	Singlebeam (time,depth)	.txt, (ASCII), .raw (proprietary)	Included in the SCS feed	TBD
GEO	Knudsen CHIRP 3260 (3.5 kHz)	Sub-bottom profile	.sgy, .kea, .keb (proprietary)	1 meta rec = Subbottom Profile Data folder	NGDC
OCN	SeaBird SBE-911plus	CTD Cast	.hex, .con (Proprietary); .cnv, .hdr, .bl, .jpg (processed)	1 meta rec = CTD folder	NGDC
OCN	Sippican MK-21 eXpendable BathyThermograph (XBT)	XBT	.edf (ASCII), .rdf (proprietary)	1 meta rec = XBT folder	NGDC
OCN	RESON	Sound Velocity (m/s)	TBD	1 meta rec = RESON folder	NGDC
OCN	Calculated	Sound Velocity (m/s)	.asvp (ASCII)	1 meta rec = Profile_Data/SVP or Profile_Data/ASVP	NGDC

Table 5: Multibeam Survey Metadata Granularity and Target Archive

Video Data Archive Pipeline

Low-resolution video segments will be archived at the NOAA Central Library (NCL) in Silver Spring, MD, a division of NODC. The raw, unAll of the medium and low-resolution video segments and their metadata will be temporarily stored in private and dedicated storage space on the NODC server and periodically backed up in a scheduled tape rotation.



3/23/2012

Fig 3: Video Data Pipeline

Near Real-Time

1 Video segments to be preserved will be marked and saved onboard the EX through collaboration with the remote science team. These clips will be saved with embedded metadata – cruise ID, camera ID, date/time, lat/lon, and file name and saved in the Ship Board Repository Server (SBRS). These enhanced multimedia files will be transmitted via an automated process (outlined in Section VI-B) to the Shoreside Redistribution Server (SRS) and saved in two resolutions – medium-resolution and web-streaming low-resolution quality using a strict naming convention outlined in the “Okeanos Shore-Side FTP Server Standard Operating Procedures” document and in Section VI-C of this document.

2 Low-resolution images will be downloaded by NCDDC from the SRS for metadata generation routines. Image and video files will have embedded metadata and the file name will also include fields for the metadata.

Daily logs generated by the Expedition Coordinator will also be pulled from the SRS as they become available. Dive tracks in kml format are pulled from the SRS as they become available.

3 Daily Logs and representative images and dive tracks and links to representative video clips are displayed on the Okeanos Atlas,

4 The embedded information and the file names of the downloaded low-res images will be used in the routines to produce the FGDC metadata for each low-resolution video clip. An FGDC metadata record will also be generated for the medium-resolution counterpart to the clip, although that clip will not be downloaded from the SRS. The generated metadata records will be named similarly to the video clips they represent and all metadata will be uploaded to the SRS in the same folder with the video clips. A manifest file with md5 checksum values will be generated daily for all of the video clips and metadata records available on the SRS. The manifest file will be uploaded to the SRS.

Post-Mission

1 At the end of the mission, MARC metadata for each dive will be generated for video clips and framegrab images. All MARC metadata records are emailed to the NOAA Central Library for the mission catalog.

2 A final manifest file and md5checksum file are generated and uploaded to the SRS.

3 NODC automated routines will be in place to recognize when the md5 checksum file is available for processing. Video clips and corresponding metadata will be saved to NODC dedicated storage space and backed up to tape until such time that a permanent solution to high-definition video archive is available.

- 4 The NOAA Central Library will pull all of the low-res video clips from the NODC server and do a bulk ingest into their system, cataloging these clips by corresponding dive in their online video data management system (VDMS).

Data Class	Instrument	Data Type	Format	Metadata Granularity	Archive Center
MUL	ROV/Sled Cameras	Low-res video clips	h.264 low	1 MARC meta rec per each	NCL
MUL	ROV/Sled Cameras	Medium-res video clips	h.264 med	1 FGDC meta rec per each	NODC/MDSD (temporary hold)
MUL	ROV/Sled Cameras	Highlight Images	.jpg	1 MARC meta rec for the folder	NCL
MUL	ROV/Sled Cameras	Still images	.jpg	1 MARC meta rec for the folder	NCL
MUL	Topside Cameras	Still images	.jpg	1 MARC meta rec for the folder	NCL

Table 6: Video Metadata and Target Archive

