

Improving Environmental Data and Information Management in NOAA

Prepared for the Data Archiving and Access Requirements Working Group (DAARWG)



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Deirdre Jones, EDMC Deputy Chair

December 8, 2010





- Introduction and Motivation
- Recent High Visibility Drivers
 - Deep Water Horizon Incident
 - Ocean Policy Task Force Recommendations
 - NOAA Climate Service
- Role of Environmental Data Management Committee
- Summary of FY 2011 Activities
- Next Steps

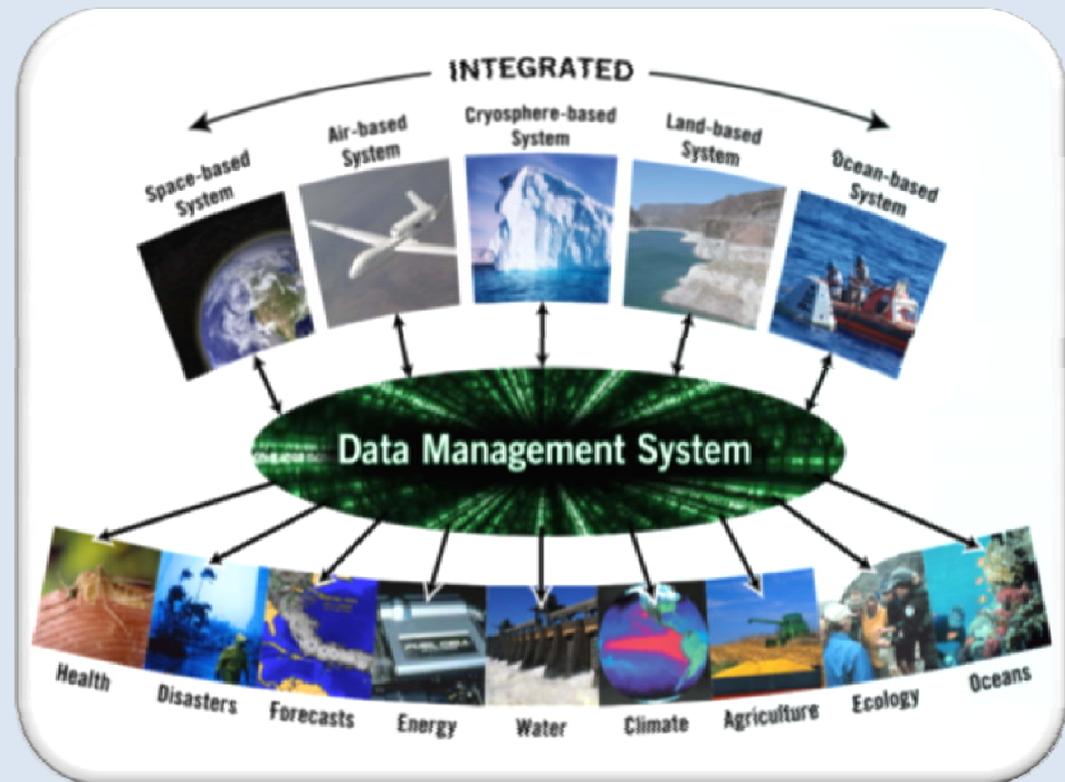
NOAA is an Environmental Information-Generating Organization



“Environmental information is critical to achieving the objectives of all of NOAA’s goals.

NOAA is, at its foundation, an environmental information generating organization.”

- From the Next Generation Strategic Plan, 2010



NOAA's Environmental Information Management Challenges



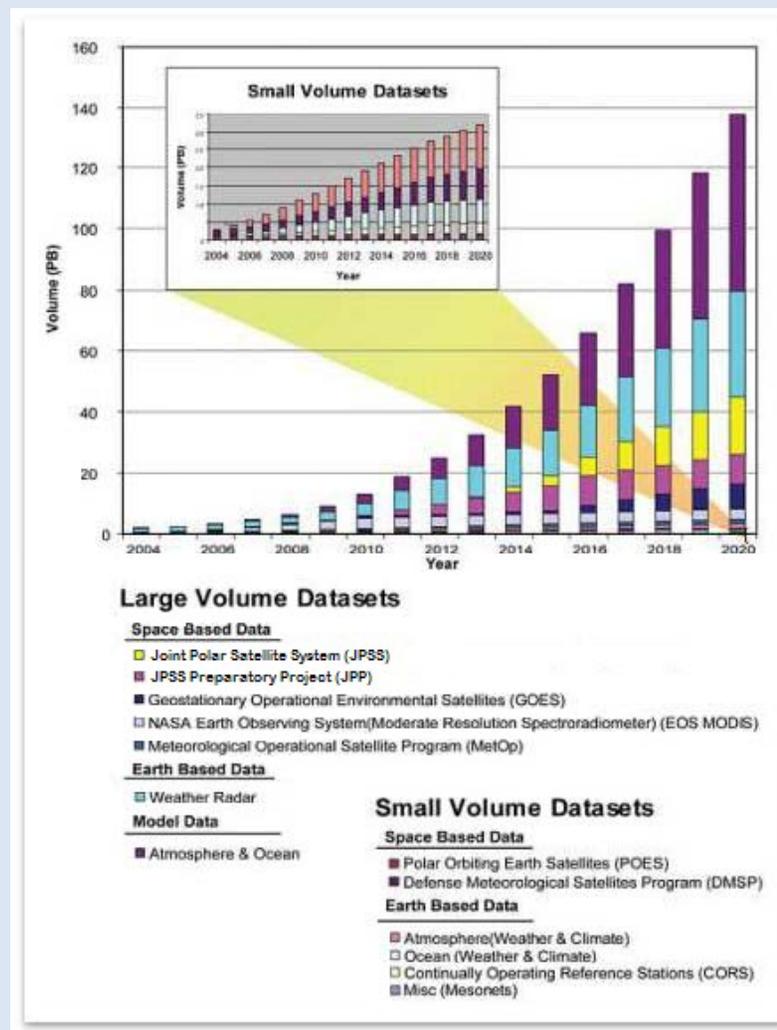
Broad Scope for Environmental Data Stewardship

- ~150 Research & Operational Observing Systems
- ~4-5 Petabytes of data/year (~15 Pb total)



Data Management Challenges are Changing

- No longer just about data volume
- Data discovery and integration
- Data stewardship and information



Deep Water Horizon Lessons Learned



Need for:

- Clear and consistent data management policy
- Better data documentation (metadata)
- An overarching response plan

Immediate post-incident Data management challenge

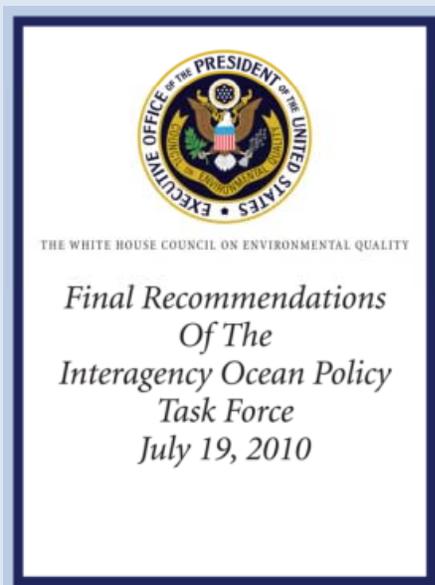
- Quickly identify applicable / available data

Pre-incident (routine) data management challenges

- Volume and diversity of data
- Collected for one-use; potential for multi-use
- Infrastructure needed to support multiple access mechanisms

Post-incident data management challenges

- Releasability of data (organizational vs. technical)
- Coordination of collection and distribution
- Comparison and utilization of modeling outputs and observations



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**COASTAL &
MARINE
SPATIAL
PLANNING**
Jennifer Lukens

ACTIONS: Data and Tools Theme Team

1. Develop and implement a comprehensive strategy for identifying and integrating relevant NOAA data sets to support regional Coastal and Marine Spatial planning.
2. Contribute to the design and creation of the interagency NIMS.
3. Work with NOAA and partners to assess, enhance and provide access to robust and flexible analytical tools to evaluate alternative ocean use scenarios.

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**OCEAN,
COASTAL, & GREAT
LAKES OBSERVATIONS,
MAPPING &
INFRASTRUCTURE**
**Gerd Glang &
Zdenka Willis**

ACTIONS:

1. Develop source to repository data management system.
2. Adopt and implement common standards for data transport, metadata, data models, and data discovery.



NCS Core Capability 1: Observing Systems, Data Stewardship, and Monitoring

- NCS users will obtain *easy and timely access* to the nation's trusted data and information about the current state of the climate system in context with the past.

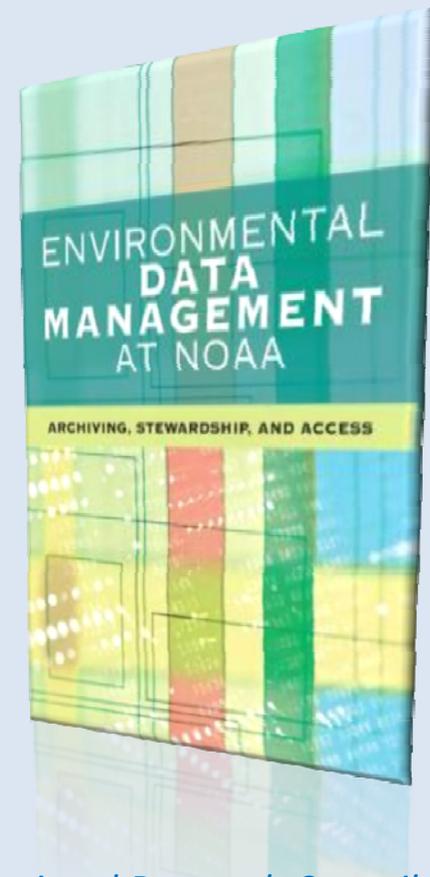
The screenshot shows the NOAA Climate Services website. At the top left is the NOAA logo. The main header reads "NOAA CLIMATE SERVICES" with "NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION" in smaller text below it. To the right of the header is a "Prototype" logo. Below the header is a navigation bar with tabs for "ClimateWatch Magazine", "Data & Services", "Understanding Climate", and "Education". A search bar labeled "Search all of NOAA" is on the right. The main content area features five columns of information:

- Past & Present Climate**: "Climate at a Glance" - Read and explore summaries and digests of recent climate-related phenomena from NOAA's distributed climate service community. (Image: Earth with temperature anomalies)
- Predictions**: "Looking Ahead" - Explore how climate phenomena are likely to unfold in the coming days, weeks, and months. (Image: Earth with weather patterns)
- NOAA Partners**: "Locate Climate Expertise" - Use an interactive map to find national and regional climate services. (Image: Map of the United States)
- Climate & You**: "Utilizing Climate Data" - Climate information is essential for business and community planning. These resources focus on needs of specific sectors of society. (Image: Wind turbines)
- Data Library**: "Visualizing & Explore" - NOAA is a leading provider of access to data from research projects, stations, and satellites to the nation and the world. (Image: Line graph of temperature anomalies from 1880 to 1990)

Principles for Effective Environmental Data Management



1. Data should be archived and accessible
2. Adequate resources for end-to-end management
3. Management activities should involve users
4. Interagency and international partnerships
5. Metadata are essential
6. Expert stewards required for management
7. Process to decide what data to archive
8. Archive must support discovery, access, and integration
9. Effective management requires a formal, ongoing planning process



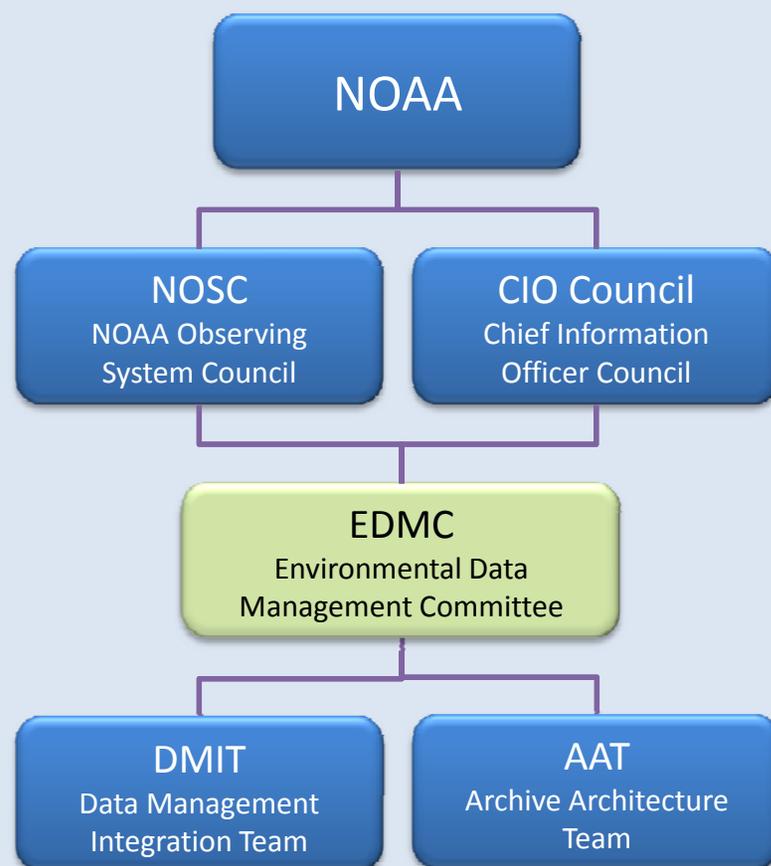
*National Research Council
Committee on Archiving and
Accessing Environmental and
Geospatial Data at NOAA, 2007*

Role of Environmental Data Management Committee



“This [effective utilization of NOAA’s environmental information] will only be possible if operational and scientific users and environmental information providers work collaboratively.” - From the NGSP, 2010

- EDMC kicked off in January 2010
- Good cross-NOAA participation
- Working collaboratively with other NOSC and CIO Council Committees
- Focus on harmonizing, leveraging, and integrating effective data management efforts across NOAA
- Advised by NOAA SAB DAARWG

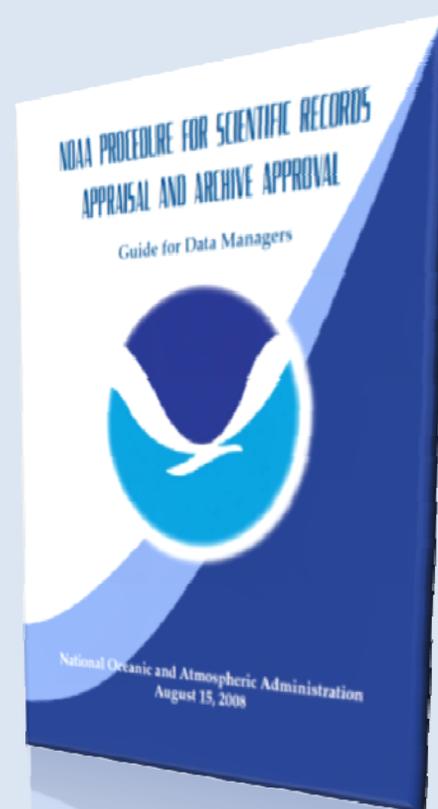


Revision of NOAA-wide Policy (NAO) 212-15



Environmental data will be visible, accessible and independently understandable to users, except where limited by law, regulation, policy or by security requirements.

- Maintains NOAA's policy of "full and open access" to environmental data
- Provides mechanism for EDMC to develop procedural directives for more detailed guidance
- Presents an end-to-end lifecycle framework for the management of environmental data





As specified in revised NAO 212-15

- Determining what environmental data are required to be preserved for the long term and how preservation will be accomplished
- Developing and maintaining metadata throughout the environmental data lifecycle that comply with standards
- Obtaining user requirements and feedback
- Developing and following data management plans that are coordinated with the appropriate NOAA archive for all observing and data management systems
- Conducting scientific data stewardship to address data content, access, and user understanding
- Providing for delivery to the archive and secure storage
- Providing for data access and dissemination
- Enabling integration and/or interoperability with other information and products

FY 2011 EDMC Operating Plan Activities



End-to-End Environmental Data Management Functions								
Planning	Observation Acquisition and Transmission		Scientific Data Management			Archive and Access		
	Maintain/ Monitor	Collect/ Rescue	Calibrate/ Validate	Appropriate Formats	Complete Metadata	Long-term Preservation	Data Discovery	Access/ Disseminate
Contingency Planning								

- *Develop Data Management Plan Guidance*
- *Improve Data Documentation*
- *Develop Archive Architecture ConOps*
- *Enhance Data Access Activities*
- *Develop Data Sharing Policy for NOAA Grants*

FY 2011 Activities Mapped to Lifecycle Components



FY 2011 EDMC Activities ▶

■ = work in progress

NAO 212-15 Lifecycle Components

	Metadata Standard	Archive Architecture Team	Data Management Plan	Data Management Integration Team	Data Sharing / NOAA Grants	Data.gov	External Engagement
Long term preservation (what & how)	■	■					
Develop and maintain metadata	■		■	■		■	
User requirements	■			■			■
Developing and following data management plans		■	■				
Scientific data stewardship		■					
Delivery to the archive		■	■				
Data access	■	■		■	■	■	
Integration and/or interoperability	■			■			

External Engagement



Federation of Earth Science
Information Partners

MAKING DATA MATTER

ESIP



IOC

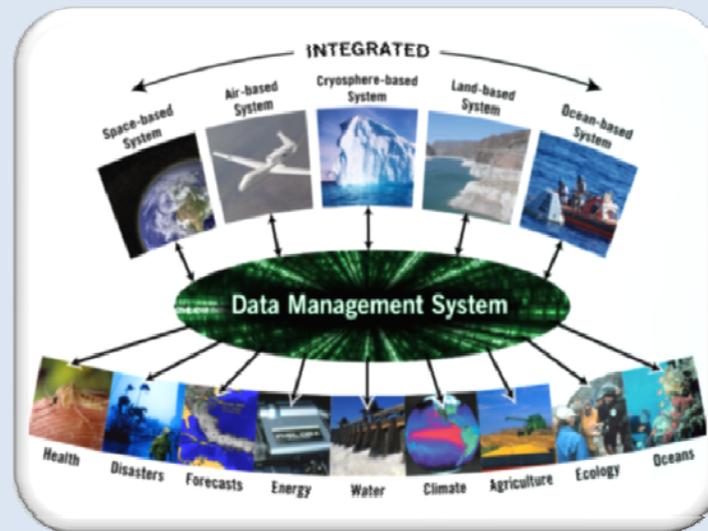


NSTC



WMO

Next Steps



- Roll out new policies and procedures
- Entrain NOAA programs
- Assess progress
- Address gaps

Improving Environmental Data and Information Management in NOAA

Prepared for NOAA Leadership
by the Environmental Data Management Committee



BACKUP SLIDES



EDMC Terms of Reference



Purpose

The Environmental Data Management Committee (EDMC) coordinates the development of NOAA's environmental data management strategy, and policy, and provides guidance to promote consistent implementation across NOAA, on behalf of the NOSC and CIO Council. Environmental data management is an end-to-end process that includes acquisition, quality control, validation, reprocessing, storage, retrieval, dissemination, and long-term preservation activities. The goal of the EDMC is to enable NOAA to maximize the value of its environmental data assets through sound and coordinated data management practices.

EDMC Membership



Member Name	Role	Representing
Helen Wood	Chair	NOAA
Deirdre Jones	Deputy Chair	NOAA
David Layton	Member	NOAA (Enterprise Architect)
Ken McDonald	Member	NOAA (Data Architect)
Scott Hausman	Member	NCS
Selina Nauman	Member	NESDIS
Harry Tabak	Member	NWS
Tony LaVoi	Member	NOS
Chris Miller	Member	OAR
Jim Sargent	Member	NMFS
Cecile Daniels	Member	OMAO
Shanna Pitter	Member	PPI

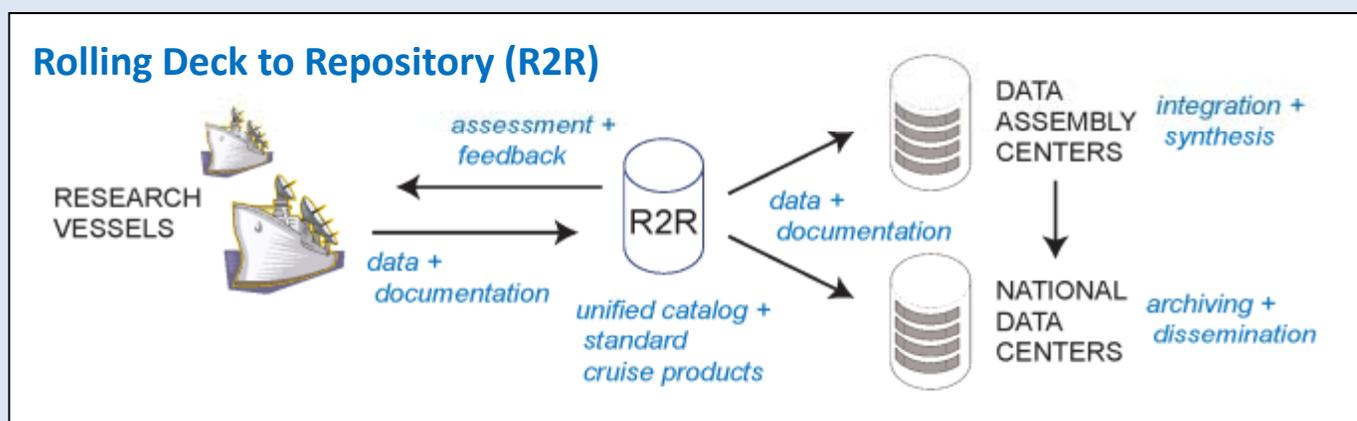
Selected FY 2011 EDMC Operating Plan Activities



Improve Data Documentation



- The primary focus in FY 2011 will be to establish detailed guidance on utilizing metadata standards across NOAA
- NOAA will be encouraging the use and convergence on International Standard Organization (ISO) Metadata Standard
- Detailed guidance to be built on NMFS Data Documentation Procedural Directive which is nearing completion
- NOAA's Rolling Deck to Repository (R2R) is an example of end-to-end data documentation



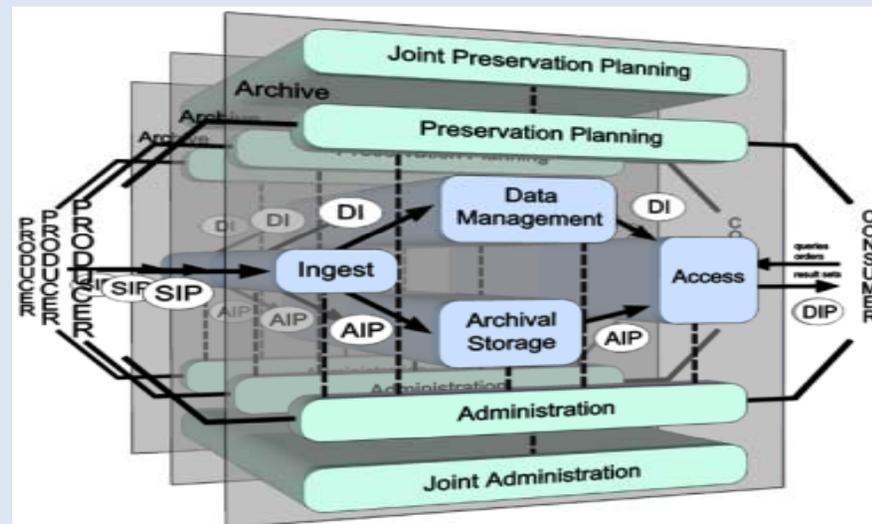
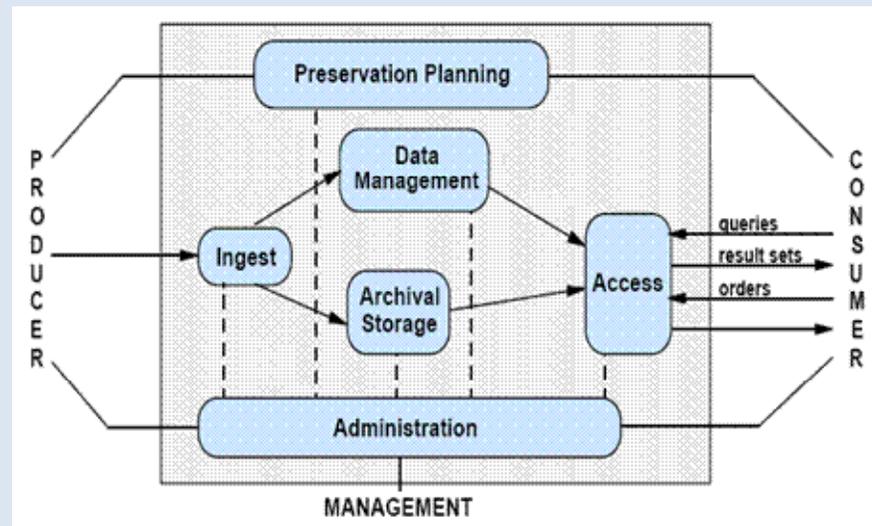
Selected FY 2011 EDMC Operating Plan Activities



Develop Archive Architecture ConOps

Open Archival Information System Reference Model (OAIS-RM) Functions

- NOAA is following the International Standard for information preservation (OAIS-RM)
 - This standard identifies the functions required to provide long-term preservation
- NOAA has multiple organization and systems fulfilling these responsibilities
- The Concept of Operations will establish the enterprise process and procedures for determining who does what



Selected FY 2011 EDMC Operating Plan Activities

Enhance Data Access Activities



Client Tools / Applications



NOAA Portals / Websites



GEOSS Portal



Geospatial One-Stop



Data.gov



Standard Access Services

NOAA Metadata Records

NOAA's Environmental Data & Information Infrastructure

Selected FY 2011 EDMC Operating Plan Activities

Develop Data Sharing Policy for NOAA Grants



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Dissemination and Sharing of Research Results

NSF Data Sharing Policy

Investigators are expected to share with other researchers, at no more than incremental cost and within a reasonable time, the primary data, samples, physical collections and other supporting materials created or gathered in the course of work under NSF grants. Grantees are expected to encourage and facilitate such sharing. See [Award & Administration Guide \(AAG\) Chapter VI.D.4](#).

NSF Data Management Plan Requirements

Beginning January 10, 2011, proposals submitted to NSF must include a supplementary document of no more than two pages labeled "Data Management Plan". This supplementary document should describe how the proposal will conform to NSF policy on the dissemination and sharing of research results. See [Grant Proposal Guide \(GPG\) Chapter II.C.2.1](#) for full policy implementation.

Requirements by Directorate, Office, Division, Program, or other NSF Unit

Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units, are provided below. If guidance specific to the program is not provided, then the requirements established in [Grant Proposal Guide, Chapter II.C.2.1](#) apply.

Please note that if a specific program solicitation provides guidance on preparation of data management plans, such guidance must be followed.

- Engineering Directorate (ENG)
 - [Directorate-wide Guidance](#)
- Geological Sciences Directorate (GEO)
 - [Division of Earth Sciences](#)
 - [Integrated Ocean Drilling Program](#)
 - [Division of Ocean Sciences](#)
- Social, Behavioral and Economic Sciences Directorate (SBE)
 - [Data Archiving Policy](#) for the Division of Social and Economic Sciences (SES)

[Data Management & Sharing Frequently Asked Questions \(FAQs\)](#)

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 - ▶ Applied Sciences Program
 - ▶ Earth Science Technology
 - ▶ Climate Policy Speaker Series
 - ▶ Every Day is Earth Day at NASA
 - ▶ NASA Oceanography
 - ▶ Working Groups
 - ▶ Multimedia Links

DATA & INFORMATION POLICY

NASA's Earth Science program was established to use the advanced technology of NASA to understand and protect our home planet by using our view from space to study the Earth system and improve prediction of Earth system change. To meet this challenge, NASA promotes the full and open sharing of all data with the research and applications communities, private industry, academia, and the general public. The greater the availability of the data, the more quickly and effectively the user communities can utilize the information to address basic Earth science questions and provide the basis for developing innovative practical applications to benefit the general public.

A common set of carefully crafted data exchange and access principles was created by the Japanese, European and U.S. International Earth Observing System (IEOS) partners during the 1990s and the early years of the 21st century. From these principles, NASA has adopted the following data policy (in this context the term "data" includes observation data, metadata, products, information, algorithms, including scientific source code, documentation, models, images, and research results).

NASA will plan and follow data acquisition policies that ensure the collection of long-term data sets needed to satisfy the research requirements of NASA's Earth science program. NASA commits to the full and open sharing of Earth science data obtained from NASA Earth observing satellites, sub-orbital platforms and field campaigns with all users as soon as such data become available.

There will be no period of exclusive access to NASA Earth science data. Following a post-launch checkout period, all data will be made available to the user community. Any variation in access will result solely from user capability, equipment, and connectivity.

NASA will make available all NASA-generated standard products along with the source code for algorithm software, coefficients, and ancillary data used to generate these products. All NASA Earth science missions, projects, and grants and cooperative agreements shall include data management plans to facilitate the implementation of these data principles.

NASA will enforce a principle of non-discriminatory data access so that all users will be treated equally. For data products supplied from an international partner or another agency, NASA will restrict access only to the extent required by the appropriate Memorandum of Understanding (MOU).

In keeping with the Office of Management and Budget (OMB) Circular A-130, NASA will charge for distribution of data no more than the cost of dissemination. In cases where such dissemination cost would unduly inhibit use, the distribution charge will generally be below that cost.

Through MOUs and agreements with appropriate interagency partners, NASA will ensure that all data required for Earth system science research are archived. Data archives will include easily accessible information about the data holdings, including quality assessments, supporting relevant information, and guidance for locating and obtaining data.

NASA will engage in ongoing partnerships with other Federal agencies to increase the effectiveness and reduce the cost of the NASA Earth science program. This interagency cooperation shall include: sharing of data from satellites and other sources; mutual validation and calibration data; and consolidation of duplicative capabilities and functions.

NASA will, in compliance with applicable Federal law and policy, negotiate and implement arrangements with its international partners, with an emphasis on meeting the data acquisition, distribution, and archival needs of the U.S.

NASA will collect a variety of metrics intended to measure or assess the efficacy of its data systems and services, and assess user satisfaction. Consistent with applicable laws, NASA will make those data available for review.

The data collected by NASA represent a significant public investment in research. NASA holds these data in a public trust to promote comprehensive, long-term Earth science research. Consequently, NASA developed policy consistent with existing international policies to maximize access to data and to keep user costs as low as possible. These policies apply to all data archived, maintained, distributed or produced by NASA data systems.

DATA RIGHTS & RELATED ISSUES

- Freedom of Information Act
- Budgets, Strategic Plans and Accountability Reports
- The President's Management Agenda
- Privacy Policy and Important Notices
- Inspector General Hotline
- Equal Employment Opportunity Data Posted Pursuant to the No Fear Act
- Information Dissemination Priorities and Inventories
- USA.gov
- Empower.gov

NASA Official: Ruth Netting
Send us your comments!
Last Updated: July 21, 2010

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Prepared by Environmental Data Management Committee

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