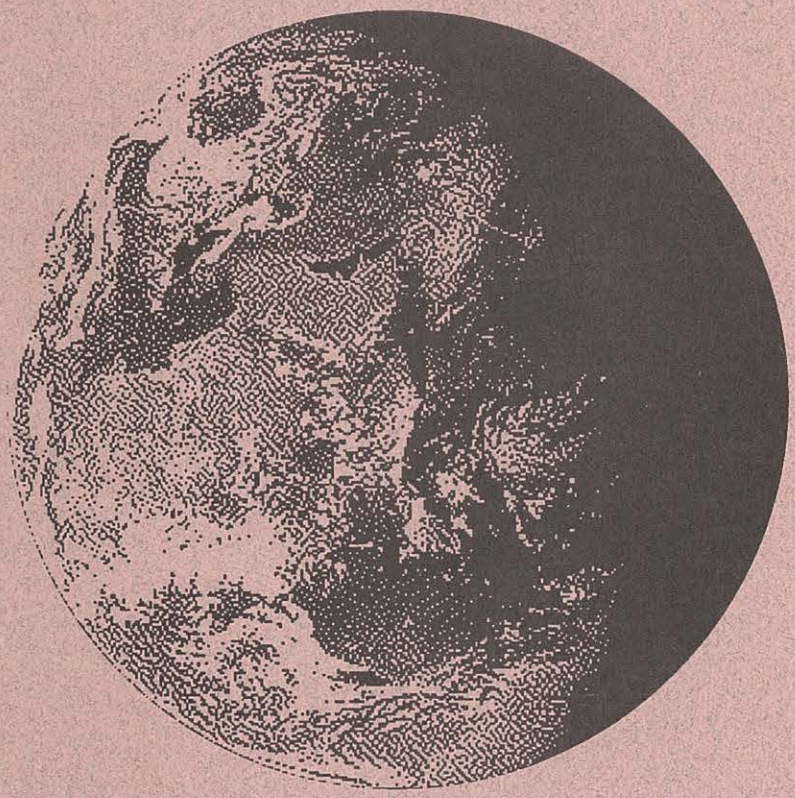
Version 1
3/30/92

Global Change Data and Information System (GCDIS)

A Draft Tri-Agency Implementation Plan



NASA

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

March 30, 1992

This document is the result of a six-month planning activity undertaken at our direction to examine ways for NASA, NOAA, and USGS to move ahead together in the area of data and information management for global change research. The three agencies have a substantial history of cooperative efforts in Earth science and global change research and have a number of formal agreements linking our programs. Our intent in this present activity has been to identify and focus on opportunities to work together towards a Global Change Data and Information System (GCDIS).

This document is intended to provide a working model for GCDIS activities within the three agencies and to help us focus our agency global change data and information management programs. Hopefully, the model will serve also as a focus for discussion and planning of the broader Federal interagency GCDIS implementation and as a catalyst in that implementation.

The model presented in this document is clearly a working model that will evolve with time. The document will be widely distributed within the interagency global change community for comment and discussion. We invite other Federal agencies to join with us in creating a detailed plan for implementation of the GCDIS.

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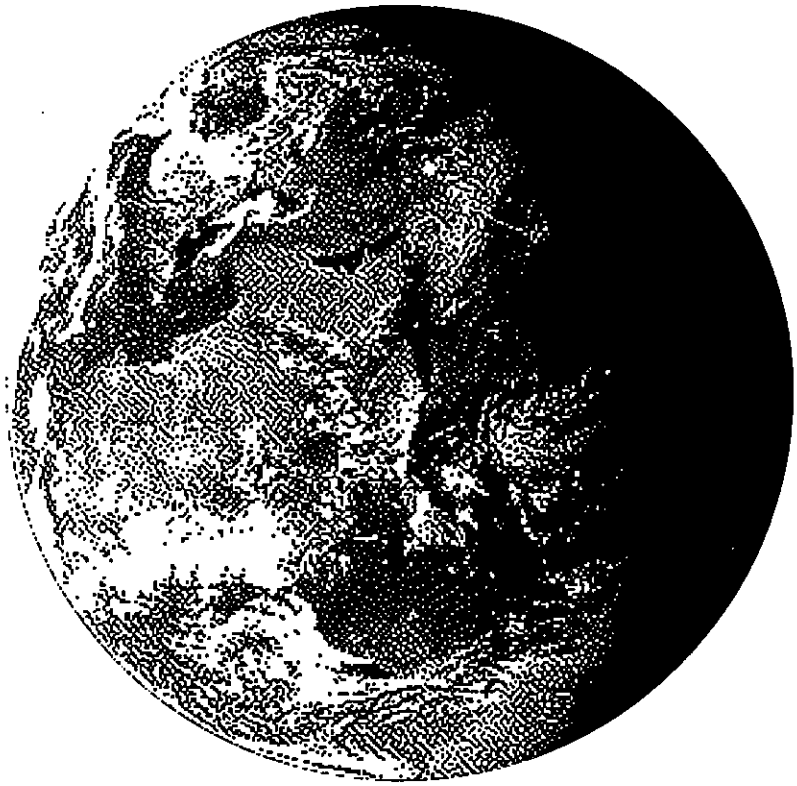

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PREFACE

This document has been developed at the request of senior personnel within the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Geological Survey (USGS) who have major responsibilities for managing data and information programs as part of the U.S. Global Change Research Program (GCRP). The three agency Principals are:

Dixon Butler, NASA
Greg Withee, NOAA
Al Watkins, USGS.

The Principals chartered a team composed of representatives from each member agency to develop this document. The members of this team and their agency affiliations follow:

Bob Seals, NASA (Chairman)
Matt Schwaller, NASA (Executive Secretary)
Bud Booth, NOAA
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Sara Graves, NASA
Gail McConaughy, NASA
Gary Metz, USGS
Larry Pettinger, USGS
Bill Turnbull, NOAA
R.J. Thompson, USGS.

The document and the Implementation Plan it presents are intended as working tools to facilitate the development of interagency cooperation toward a Global Change Data and Information System (GCDIS). This document will be submitted for formal review and endorsement to the participating agencies and their parent Departments. The document will also be provided for review to various interagency groups, such as the Committee on Earth and Environmental Sciences (CEES), especially the Subcommittee on Global Change Research, and the Interagency Working Group on Data Management for Global Change (IWGDMGC). In addition, the document will be provided to the National Academy of Sciences (NAS) Committee on Geophysical Data for comment.

1. INTRODUCTION

1.1. STATEMENT OF PURPOSE

Easy access to pertinent data, information, and system resources is a necessary condition for scientific success in the interdisciplinary arena of global change research. Consequently, the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Geological Survey (USGS) have initiated a cooperative effort to enhance interdisciplinary research through development of a tri-agency plan to begin implementing a Global Change Data and Information System (GCDIS). The goal of this tri-agency activity is to establish the means for easy access by researchers to the global change data and information holdings for which these three agencies are responsible. NASA, NOAA, and USGS initiated this implementation process as a result of the following:

- Extensive cooperative efforts in the development of data and information systems for global change research
- Formal agreements that exist among these organizations for global change data management activities, such as the Earth Observing System Data and Information System (EOSDIS).

The purpose of this document is to present the tri-agency GCDIS Implementation Plan. It is hoped that this implementation will serve both to improve researcher access to significant quantities of important global change data and to act as a catalyst for development of a broader GCDIS implementation plan involving all of the agencies in the U.S Global Change Research Program (GCRP). These U.S. GCRP agencies include the U.S. Department of Agriculture (USDA), Department of Commerce (DOC, including NOAA), Department of Defense (DoD), Department of Energy (DOE), Department of Interior (DOI, including USGS), Environmental Protection Agency (EPA), NASA, National Science Foundation (NSF), and Smithsonian Institution.

1.2. BASIS OF PLAN

The overall framework for the Tri-Agency Implementation Plan is established by the document "Describing Global Change: A Plan for Global Change Data and Information Management," a program plan prepared under the auspices of the Committee on Earth and Environmental Sciences (CEES). A GCDIS, as conceived by the *ad hoc* Interagency Working Group on Data Management for Global Change (IWGDMGC), would utilize a combination of individual agency assets and a shared infrastructure.

Fundamental to the overall program plan and to this Tri-Agency Implementation Plan are seven statements of principle contained in the U.S. data policy "Data Management for Global Change Research Policy Statements." These statements have been endorsed by the IWGDMGC member agencies and CEES at large, and have been put forth by the Director of the White House/Office of Science and Technology Policy (OSTP) as a statement of U.S. policy. These statements of principle have guided development of the Tri-Agency Implementation Plan, and are presented in Table 1.

Table 1. Data Management for Global Change Research Policy Statements

The overall purpose of these policy statements is to facilitate full and open access to quality data for global change research. They were prepared in consonance with the goals of the U.S. Global Change Research Program and represent the U.S. Government's position on the access to global change research data.

1) The Global Change Research Program requires an early and continuing commitment to the establishment, maintenance, validation, description, accessibility, and distribution of high-quality, long-term data sets.

2) Full and open sharing of the full suite of global data sets for all global change researchers is a fundamental objective.

3) Preservation of all data needed for long-term global change research is required. For each and every global change data parameter, there should be at least one explicitly designated archive. Procedures and criteria for setting priorities for data acquisition, retention, and purging should be developed by participating agencies, both nationally and internationally. A clearinghouse process should be established to prevent the purging and loss of important data sets.

4) Data archives must include easily accessible information about the data holdings, including quality assessments, supporting ancillary information, and guidance and aids for locating and obtaining the data.

5) National and international standards should be used to the greatest extent possible for media and for processing and communication of global data sets.

6) Data should be provided at the lowest possible cost to global change researchers in the interest of full and open access to data. This cost should, as a first principle, be no more than the marginal cost of filling a specific user request. Agencies should act to streamline administrative arrangements for exchanging data among researchers.

7) For those programs in which selected principal investigators have initial periods of exclusive data use, data should be made openly available as soon as they become widely useful. In each case, the funding agency should explicitly define the duration of any exclusive use period.

Several other documents have guided development of this Tri-Agency Implementation Plan. Among these are the U.S. GCRP Annual Reports and the report "Solving the Global Change Puzzle: A U.S. Strategy for Managing Data and Information" by the Committee on Geophysical Data (CGD) of the National Academy of Sciences (NAS). Existing agreements among the three agencies form an additional basis for the plan, as follow:

- USGS-NOAA Memorandum of Agreement for Landsat Data Handling and Processing Services Performed at the EROS Data Center (1986)
- USGS-NASA Memorandum of Understanding for Experimental Land Remotely Sensed Data Processing, Distribution, Archiving, and Related Science Support (1988)
- NASA-NOAA Memorandum of Understanding for Earth Observations Remotely Sensed Data Processing, Distribution, Archiving, and Related Science Support (1989)
- USGS-NOAA Memorandum of Agreement Concerning Reception and Processing of Recorded TIROS Satellite Data by the USGS EROS Data Center (1990)
- NASA-NOAA Cooperative Agreement on Early EOSDIS Pathfinder Data Set Activity (1990).

In addition to these agreements, the agencies participating in this plan have agreed to develop a set of "Agency GCDIS Implementation Plans." These plans will define the manner in which each agency handles its requirements for internal programs that support GCDIS. Although these plans will be specific to each agency, they will be distributed for comment to all agencies participating in the GCDIS implementation.

1.3. REQUIREMENTS

A set of four high-level requirements has been identified to guide the implementation of the tri-agency GCDIS. The requirements follow both from the U.S. data policy outlined in Table 1 and from the above documents. For the tri-agency GCDIS to be effective, it must accomplish the following:

- **Provide full and open access to data and information for all global change researchers.** Full and open access is necessary to support research in all of the U.S. GCRP science elements, including as a basic tenet the delivery of data to all global change researchers at the lowest effective cost consistent with the U.S. data policy.
- **Identify, collect, and generate high-quality, long-term data sets.** This includes establishment of processes to identify needed data sets, and agreement on responsibilities for collecting data sets and for generating data products.

- **Preserve and archive global change data sets.** This includes agreement on responsibilities for archiving data sets and information relating to global change parameters, and agreement on basic archive functions to ensure preservation of data.
- **Provide an open architecture that employs accepted standards.** An open architecture utilizing standards allows the system to be both evolutionary and flexible to ensure effective use of existing capabilities, to take advantage of changing technologies, and to adapt to changing needs. It must also be interoperable to provide wide user access to GCDIS resources, and it must be responsive, to both user needs (which may be agency-specific) and to changes in scientific understanding.

1.4. USER SERVICES AND FEATURES

The success of GCDIS will be determined primarily on its ability to deliver the desired data and information and needed services to the user. A summary of the principal user services and features to be implemented follows:

- The ability to search for global change data products across heterogeneous systems and to order data products through a simplified "one-stop shopping" procedure
- Global change data directory information, employing a common agency-independent user interface
- Guide information about data to assist the researcher in assessing data availability and suitability
- Summary, reduced-resolution browse products and full-resolution data products in standard formats
- Delivery of data to users on a variety of standard media, including electronic delivery for moderately sized products
- Interagency user referral service.

In addition to these direct user services and features, several basic enhancements in the data and information area are being proposed:

- A process for identifying and generating key interagency global change data sets
- Coordination of data submission procedures for participating GCDIS centers
- Agreement to standard methods for describing and documenting data
- Agreement to a common set of archive responsibilities
- Uniform order validation, tracking, and billing.

2. IMPLEMENTATION PLAN OVERVIEW

2.1. PROGRAM OVERVIEW

The U.S. GCRP is a major Federal Government initiative focused on research to help establish the scientific understanding and basis for national and international policymaking related to natural and human-induced changes in the global Earth system. It is directed through the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) Committee on Earth and Environmental Sciences (CEES) by authority of the Global Change Research Act of 1990. The funds to execute the U.S. GCRP are identified within the budgets of the agencies involved, and each agency executes its own responsibilities.

Since its inception, the U.S. GCRP has recognized that data and information management are crucial to the effectiveness of the research program. While discussions on formalizing a program for the data and information component of the U.S. GCRP continue, a consensus is emerging on a fundamental part of data and information management (i.e., GCDIS), the scope of which includes data and information from remote-sensing systems, *in situ* measurements, process studies, and models.

This GCDIS will support all of the various U.S. GCRP science elements as well as the integrating themes. It encompasses data collection and information generation activities from observations through delivery of information for decisionmaking. Information derived from new observing systems and the large amounts of data and information already collected must be made readily available, including both data and information focused specifically on global change research and contributing data and information important for global change research.

GCDIS will be the broadest U.S. support mechanism for data and information related to global change research. Although its most intensive users will be global change researchers, GCDIS clientele ranges from policymakers to private citizens, both domestic and international. The major agencies involved in global change research intend to collaborate closely in creating GCDIS. The following sections outline the program commitments of three of those agencies—NASA, NOAA, and USGS.

2.1.1. Tri-Agency Program

Because it covers a broad spectrum of data and information, GCDIS spans many Federal agency programs, touching many international programs as well. As such, GCDIS must find common ground among a wide range of

existing and proposed data and information systems embedded within discrete agency programs, only a few of which are part of agency-funded U.S. GCRP programs. The following paragraphs summarize relationships of NASA, NOAA, and USGS to GCDIS; greater detail on individual agency programs is provided in Appendix C.

Within NASA, the Earth Observing System (EOS) is the fundamental program supporting the U.S. GCRP. EOS does have a separately identified program for data and information management, known as the EOS Data and Information System (EOSDIS). EOSDIS is considered the NASA component of GCDIS; furthermore, the agency has decided to manage virtually all Earth science research data and information for which NASA is custodian through the EOSDIS program. EOSDIS is focused primarily on research in Earth science; however, NASA also funds the Consortium for International Earth Science Information Networks (CIESIN), which addresses socio-economic and related U.S. GCRP research. Although the EOSDIS program is centrally managed and funded through NASA, it includes participation by NOAA and USGS.

NOAA has initiated an agency-wide data system modernization program that meets the needs of the global change research community. It will include data collection from within NOAA programs as well as from non-NOAA programs, including some within foreign satellite programs and others within DoD. It also includes the creation of a variety of information products, incorporating a wide range of analyses. The resulting NOAA-wide data and information services will range across NOAA's extensive *in situ*, operational, and satellite data. These services will form the backbone of the NOAA component of GCDIS.

USGS has a wide range of data and information programs that are essential for global change research. These data are derived from both satellite- and aircraft-based remote sensing, as well as terrestrial-based observations. USGS will provide access to these data through the Global Land Information System (GLIS), which will be the interface with GCDIS and access point to USGS data for the global change community. As part of the USGS global change research program, USGS is developing and distributing regional and global land-related data sets (e.g., improved land cover characterizations based on satellite data) to meet the specific needs of global change researchers as inputs to process studies and modeling. USGS is also supporting the NASA EOS program by establishing the EOSDIS Land Processes Distributed Active Archive Center (DAAC) at the EROS Data Center (EDC).

2.1.2. Use of Existing Advisory Groups

This implementation will rely principally on the existing structure of interagency, international, and scientific advisory and user groups. In the interagency arena, the main forum for such coordination is the IWGDMGC, a voluntary organization striving to facilitate access to data and information needed for global change research. Although recognized by FCCSET and CEES, IWGDMGC serves in an *ad hoc* advisory capacity to CEES and its Subcommittee on Global Change Research, which oversees the research program. In the scientific arena, the agencies involved in this implementation will as a group regularly seek advice from NAS, specifically its Committee on Geophysical Data and its Committee on Global Change. There are a wide variety of other national and international groups with which the agencies will individually maintain liaison, including Commerce, Energy, NASA, National Library of Medicine, Defense Information (CENDI); the International Council of Scientific Unions (ICSU); the ICSU Committee on Data (CODATA); the International Geosphere-Biosphere Program (IGBP); the United Nations Environment Programme (UNEP); and the Intergovernmental Panel on Climate Change (IPCC).

2.1.3. Coordination Activities

Establishment of the tri-agency GCDIS involves a variety of coordination activities. This Tri-Agency Implementation Plan is subject to concurrence by all three agencies and establishes the overall framework for coordination of GCDIS activities among NASA, NOAA, and USGS. Specifically, it provides for the establishment of a GCDIS Oversight Council, patterned in membership after the IWGDMGC Principals, for formal oversight and coordination of the implementation. Agencies joining GCDIS will be required to demonstrate compliance with GCDIS requirements and interfaces. This process will ensure coordination with existing interagency processes, ranging from bilateral agreements pertaining to pathfinder activities to multi-agency arrangements pertaining to arctic research. It will also work to ensure that the tri-agency GCDIS is consistent with major international research programs and information analysis activities.

Each participating agency recognizes that it faces a major challenge in coordinating its internal programs with the requirements for U.S. GCRP support. For example, USGS must deal with divergent programs in mapping, geology, and water resources; NOAA has to coordinate climate, oceans, and geophysical programs; and NASA must coordinate a range of programs focused originally on specific observing systems. In many cases, these agency-specific programs themselves require extensive coordination with external groups. For example, NASA and NOAA coordinate with international groups representing cooperating space agencies in the area of satellite remote

sensing; USGS coordinates with a wide range of Federal agencies (including NASA and NOAA) in the area of spatial data; and NOAA coordinates with the Navy in its ocean programs. Agency plans to coordinate internal programs will be detailed in the individual agency GCDIS implementation plans mentioned earlier. As stated, these plans will be largely agency-specific, but they will be widely distributed to allow guidance and input from the global change research community.

2.2. SYSTEM OVERVIEW

2.2.1. Architecture Assumptions

A set of four architectural assumptions underlies the tri-agency GCDIS implementation, as delineated below:

- **Focus on science user access to high-quality, long-term data sets.** The Implementation Plan covers data for which one or more of the three agencies are custodians. Initial focus is on research data needs while recognizing the need for access to near-real-time, non-retrospective data. Finally, the agency systems will define and develop interfaces to data providers such as projects and process study experiments.
- **Each agency develops the system to a common "functional" model.** A common "functional" model is adopted as required to improve user access to data (see Figure 1 and Appendix A). The model includes migration to an open system architecture and is jointly agreed to in the Implementation Plan.
- **Each agency retains as much autonomy as possible.** The architecture permits each agency to proceed on somewhat different time scales, allowing one agency to change slightly without affecting another agency's subsystems. Development of one agency's system does not require detailed knowledge of another agency's system in order to interface to it. Where identical standards are not adopted, translation at the interface between agencies is the preferred method of communication. Adoption of common standards within an agency is encouraged.
- **Each agency funds, develops, manages, and standardizes its own sites.** Coordination and standardization within an agency is the responsibility of that agency. Intersite standardization is encouraged as required to improve user access to data.

2.2.2. Functional Model

A high-level functional model for the tri-agency GCDIS is presented in Figure 1. The model consists of six interrelated elements. A general overview of

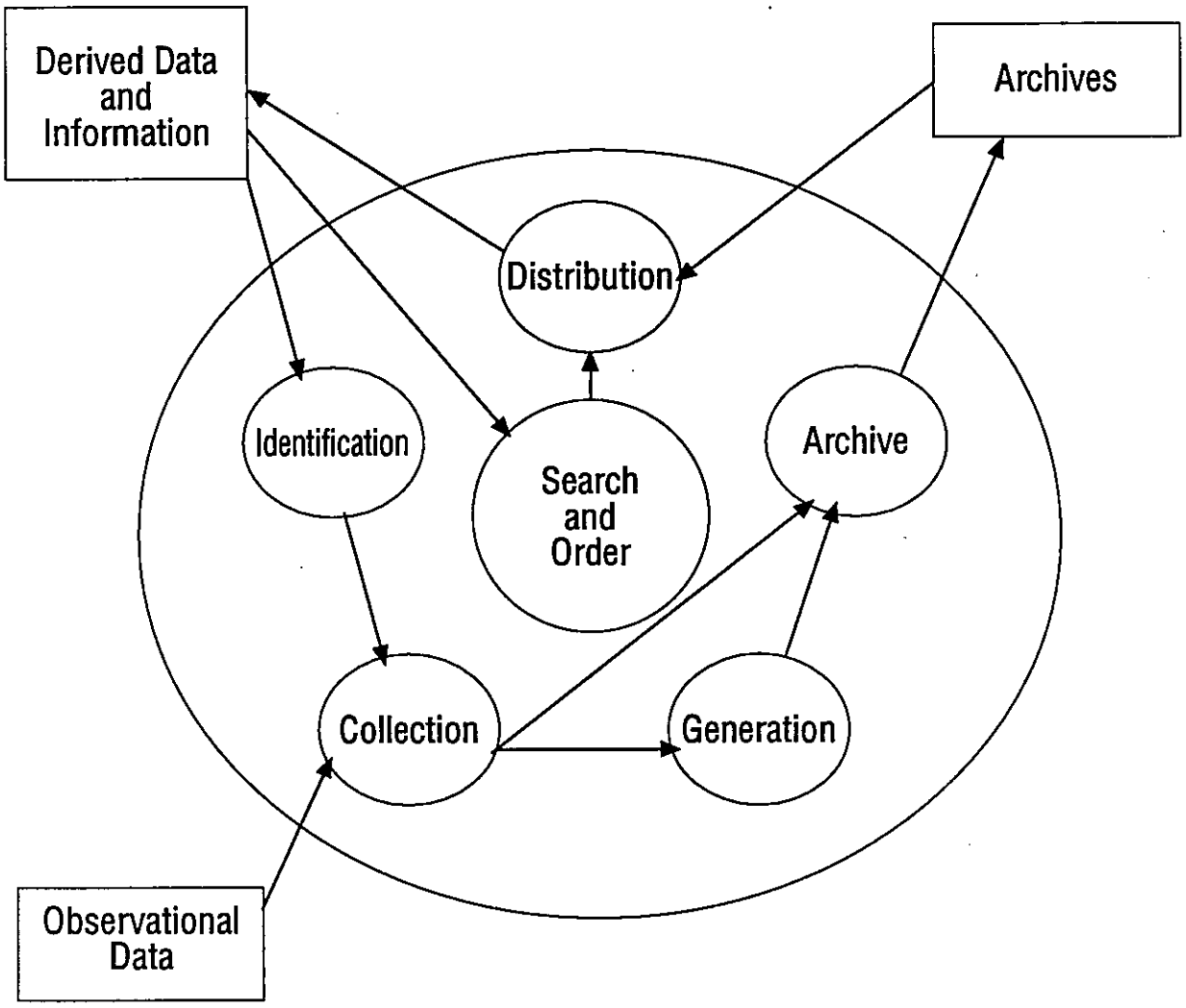


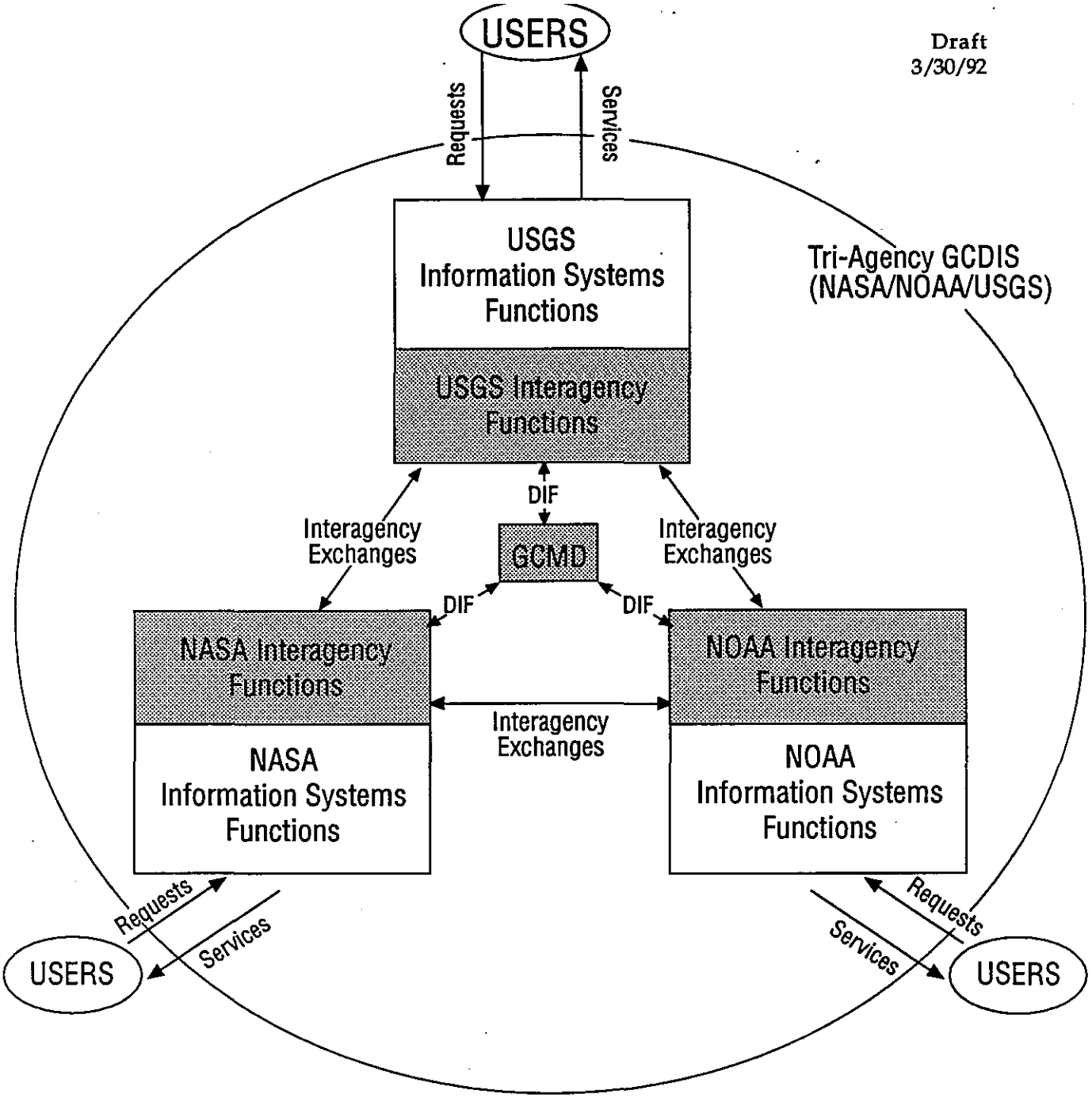
Figure 1. Global Change Data and Information System–Functional Model

these elements is given below and in Appendix A, with more detailed discussion relative to the tri-agency implementation provided in Section 3. The primary emphasis for the Implementation Plan is on areas that involve interagency participation:

- **Identification.** The identification element is heavily interactive with the user community, and includes assessment of data and information needs, priorities for new data set acquisitions, and types of products required.
- **Collection.** The collection element provides the connections with observational and other data-producing programs. Important considerations include identification of global change responsibilities within each agency; specification of how these responsibilities are met, including specific institutional responsibilities; and interagency agreements for data and information collection.
- **Generation.** The generation element encompasses the process for developing interagency global change data sets, and addresses generation, calibration, and validation of products. Both the collection and the generation elements include interagency coordination and sharing of information about data sets and products, as well as development of data collection and generation guidelines.
- **Archive.** The archive element addresses principal agency archive sites for GCDIS; agency global change data set responsibilities mapped to archives; and archive responsibilities such as purge policies, data preservation and documentation, transfer to permanent archive, and archive quality control.
- **Search and order.** The search and order element includes data site interoperability; directory, guide, and inventory concepts; user services; accounting and pricing; network connections; and use of browse products. A basic agreement in the tri-agency GCDIS is that agencies will implement interoperability across agency systems to allow search and order at the data granule level.
- **Distribution.** The distribution element addresses use of networks for distribution, distribution of browse products, distribution media, and data formats.

2.2.3. GCDIS Implementation Overview

Figure 2 presents a high-level diagram of the NASA/NOAA/USGS GCDIS implementation. Users are shown as initiating requests and receiving data and services, while the large circle indicates the overall tri-agency GCDIS. Each agency has a set of coordinated GCDIS responsibilities (shown as shaded rectangles) and an agency-unique set of responsibilities (shown as white background rectangles). The GCDIS functional elements are planned to be in



Interagency Exchanges

- Inventory search and order messages (including browse)
- Guide search messages
- User referrals
- Charging information
- Standard distribution formats

Interagency Functions

- Interagency data set identification and generation process
- Data submission guidelines
- Metadata guidelines
- DIF exchange w/ GCMD
- Guide access
- Granule-level search and order
- Distribution in standard formats and media
- User referral services
- Charging system

Agency Information System Functions

- Inter-site search and order of data and information
- Archive
- Data distribution
- Data collection
- Product generation
- Network connectivity

User Services

- Access to directory information from uniform source
- Access to guide/text information
- Uniform access to search and product requesting at the data granule level
- Access to data in standard formats
- Access to browse in standard formats
- Access to data on a variety of media and on-line
- Interagency user services referral

Figure 2. High-Level GCDIS Definition

place by 1995, with all agency GCDIS sites and systems integrated by 1998. A more detailed view of the tri-agency architecture is provided in Section 4.1.

Agency-Coordinated Implementation

NASA, NOAA, and USGS have agreed to work cooperatively in building interfaces to each other's systems in order to enhance user access to high-quality, long-term global change data sets. Major interface activities needed to support GCDIS are concentrated in the functional areas of data and information collection, search and order, and distribution.

Data and information search and order will be supported by each agency at several different levels. At the most general level, the agencies provide standard information describing their global change data holdings to the Global Change Master Directory (GCMD), which provides broad coverage of high-level descriptions of global change data sets for user searches. Each agency will also support interagency user requests for search of more extensive text information on data sets, and for search and order of data sets at the data granule level (defined as the smallest part of a data set that a user can request). Each agency will provide a single access point to coordinate GCDIS interagency requests and responses throughout the agency system. In the user services area, the agencies will participate in a joint User Services Working Group. This working group will develop and implement mutual referral services and provide a mechanism for relating user feedback into the development of the GCDIS system.

The agencies will coordinate data submission policies in order to support global change data collection activities and to provide guidance to producers of data. These policies will provide general guidelines as to the formats, metadata, documentation, and browse products needed for data submitted for long-term archival, and will be jointly developed by the participating agencies. Actual data submission will be the responsibility of each agency and the specific producers of data.

Each agency will support data distribution with a limited suite of standard formats and standard media which will be coordinated among the agencies. Distribution to users over the Internet will be supported for browse products and moderately sized data sets, and Internet connectivity to participating sites will be increased as required to support network access to such data sets. In accordance with the U.S. data policy, the agencies agree to support the objective of a uniform charging policy. In the near term, charging and delivery will be handled as an agency-specific activity; in the long term, a cross-agency charging mechanism should be established to simplify the process for users.

Agency-Unique Implementation

Agency-unique responsibilities for GCDIS include building, coordinating, and managing an agency search and order capability; archive of agency-held data and information; distribution of agency-held data and information to users and other agencies; active identification and collection of global change data; and generation of global change data products.

NASA is building its agency-unique architecture in EOSDIS, which will be a distributed system resident at eight DAACs (see Section 3.2.2). Each DAAC will have an Information Management System (IMS), a Data Archive and Distribution System (DADS), and a Product Generation System (PGS). The DAACs will have high levels of connectivity to the Internet, and will support data delivery to users via a suite of standard media (including electronic transmission) and in standard formats. Each DAAC will support cross-DAAC search and order of data at the granule level, and cross-DAAC requests for guide and text search. NASA expects to have these activities supported at all the DAAC sites by 1994, with two major upgrades to this system to follow by 1998.

NOAA has embarked on the Earth System Data and Information Management (ESDIM) Program to upgrade its environmental data systems. This program is building an integrated environmental data system distributed across NOAA data facilities (see Section 3.2.2). For GCDIS, NOAA will establish a single point of access with the data systems of NASA and USGS. This will include system management and tracking functions to ensure reliability and to provide consistent management for NOAA contributions to GCDIS.

USGS is currently prototyping the GLIS. As the USGS node of GCDIS, GLIS will provide access to data archives at EDC, as well as links to other USGS data centers and data systems of importance to GCDIS users. Of primary interest are access to USGS global change data systems at the USGS National Center in Reston, Virginia, such as the National Water Information System (NWIS), the National Digital Cartographic Database (NDCDB), and various other geologic data and information systems. Interoperability will be implemented between GLIS and EOSDIS by early 1993, to ensure ready access to data archives by both EOS and USGS science users. By 1995, GLIS will be prepared to participate fully in GCDIS, supporting 1995 objectives of data system interoperability, interagency exchange of search requests, and a prototype experiment for an interagency charging process.

2.2.4. Evolutionary Approach: 1992, 1995, 1998

The tri-agency GCDIS implementation follows an evolutionary path starting with the current agency capabilities and working toward a coordinated, interoperable system later in this decade. For purposes of illustration, this evolutionary approach is discussed here in terms of capabilities in "snapshot" years. These years are chosen as 1992 for the initial capability, 1995 for a functioning tri-agency GCDIS, and 1998 for full capability. Table 2 provides an overview of the status of the tri-agency GCDIS for the three snapshot years, organized to show the evolution of the key user services and features discussed in Section 1.4 and the GCDIS functional elements (see Figure 1) to which they relate. A summary of important aspects for each year is presented below.

Search and order is a focus for 1992. The NASA system of DAACs, the Satellite Data Services Division (SDSD) of the NOAA National Climatic Data Center (NCDC), and USGS EDC will provide a rudimentary integrated inventory search capability for key global change data sets. Directory information for NASA, NOAA, and USGS global change data sets will be available through the GCMD. Sample browse products will be available electronically. In addition, an interagency User Services Working Group and an interagency process for global change data set identification will be established. Key global change data sets for GCDIS will be identified and priorities established.

By 1995, the tri-agency GCDIS will evolve to incorporate a wide range of agency systems. The NASA systems will be composed of the EOSDIS DAACs (see Section 3.2.2). The NOAA systems will encompass the National Data Centers [i.e., NCDC, including the University of Wisconsin GOES archive, the National Oceanographic Data Center (NODC), and the National Geophysical Data Center (NGDC)]. USGS systems will include EDC, NDCDB, and NWIS. A prototype inventory search and order capability will be in place for the tri-agency system to allow searching and ordering of global change data and information at the granule level. A prototype guide search capability will also be available. High-priority data sets will have browse products, if appropriate, available via network access. Distribution of data and information, including browse products, will use a suite of standard formats and standard media. Distribution via electronic networks will be available for moderately sized data sets. A set of tri-agency guidelines will be developed for data submission, as will a set of interagency standards for metadata. A uniform tri-agency data policy will be established, and a prototype tri-agency charging system will have been demonstrated.

By 1998, a full interoperable tri-agency GCDIS will be in place. In addition to the systems identified in the 1995 snapshot, GCDIS will evolve to incorporate the appropriate NOAA Centers of Data (see Section 3.2.2), such as the

Table 2. Tri-Agency GCDIS: Evolution of Services and Features

Functional Element	1992	1995	1998
An ability to search for global change data products across heterogeneous systems and to order data products through a simplified "one-stop shopping procedure"			
Search, Order	Rudimentary inventory search and order (across NASA DAACs, NOAA SDSD, USGS)	Prototype inventory search and order (across interagency system)	Inventory search and order (across interagency system)
Global change data directory information employing a common agency-independent user interface			
Search, Order	Global Change Master Directory (GCMD) review of directory keywords	Ongoing	Ongoing
Search, Order	Population of GCMD with all NASA, NOAA, USGS global change data sets		
Guide or text information about data to assist the researcher in assessing data availability and suitability			
Search, Order		Prototype guide and text search	Guide search
Summary, reduced-resolution browse products and full-resolution data products in standard formats; receipt of data on a variety of standard media, including electronic delivery of moderately sized products			
Generation, Search, Order	Requirements for browse; sample browse products via networks	Browse data sets via networks for high-priority data sets	Browse products integrated into search and order
Distribution	Current media and formats	Suite of standard media formats; electronic delivery (moderately sized data sets)	

This table illustrates the evolution of key GCDIS user services and features (discussed in Section 1.4), and how they relate to GCDIS functional elements (discussed in Section 2.2.3).

Table 2. Tri-Agency GCDIS: Evolution of Services and Features (Continued)

Functional Element	1992	1995	1998
An interagency user referral service; coordination of data submission procedures for participating GCDIS centers			
Generation, Search, Order	Interagency user referral service	Ongoing	Ongoing
Collection, Distribution	Agency-specific guidelines for data submission	Interagency guidelines for data submission (available 1993)	
A process for identification and generation of key interagency global change data sets; agreement to standard methods for describing and documenting data			
Identification	Key NASA, NOAA, and USGS global change data sets identified		
Identification, Collection, Generation	Interagency global change data set identification and generation process		
Generation, Search	Agency metadata standards	Interagency metadata standards applied to key data sets	
Agreement to a common set archive responsibilities			
Archive	Agency-specific archive standards	Common archive standards established	
Uniform order validation, tracking, and billing			
Order, Distribution	Agency-specific data policies	Uniform interagency data policy	
Order, Distribution	Agency-specific charging systems	Prototype interagency charging system	Interagency charging system

National Meteorological Center (NMC) and the NESDIS Office of Satellite Data Processing and Distribution (OSDPD), and the USGS geological and geophysical data systems. A guide capability will be operational, and browse products will be integrated into the electronic search and order process. The tri-agency charging process will be in place.

2.3. USER INTERACTION SCENARIO

At present, users of environmental data are required to contact each agency separately to identify available data, to select the data, and to place an order for that data. Each agency has its own inventory mechanism, and there are often several different inventories within each agency. To show the planned advances to be made by GCDIS, Figure 3 illustrates current practices as compared to the practices expected under GCDIS in 1995 and 1998. Although the full capability of GCDIS will be in place for certain products in 1998, these capabilities will not extend to all GCDIS data and information products (see discussion in Section 3.3.1 for a complete explanation). Consider the steps a scientist must go through now to identify, order, and receive data for a hypothetical project with the following objective: To investigate the viability of developing an ocean analog of the Advanced Very High-Resolution Radiometer (AVHRR) vegetative index. The investigator intends to compare Coastal Zone Color Scanner (CZCS) images and *in situ* primary productivity measurements with AVHRR images.

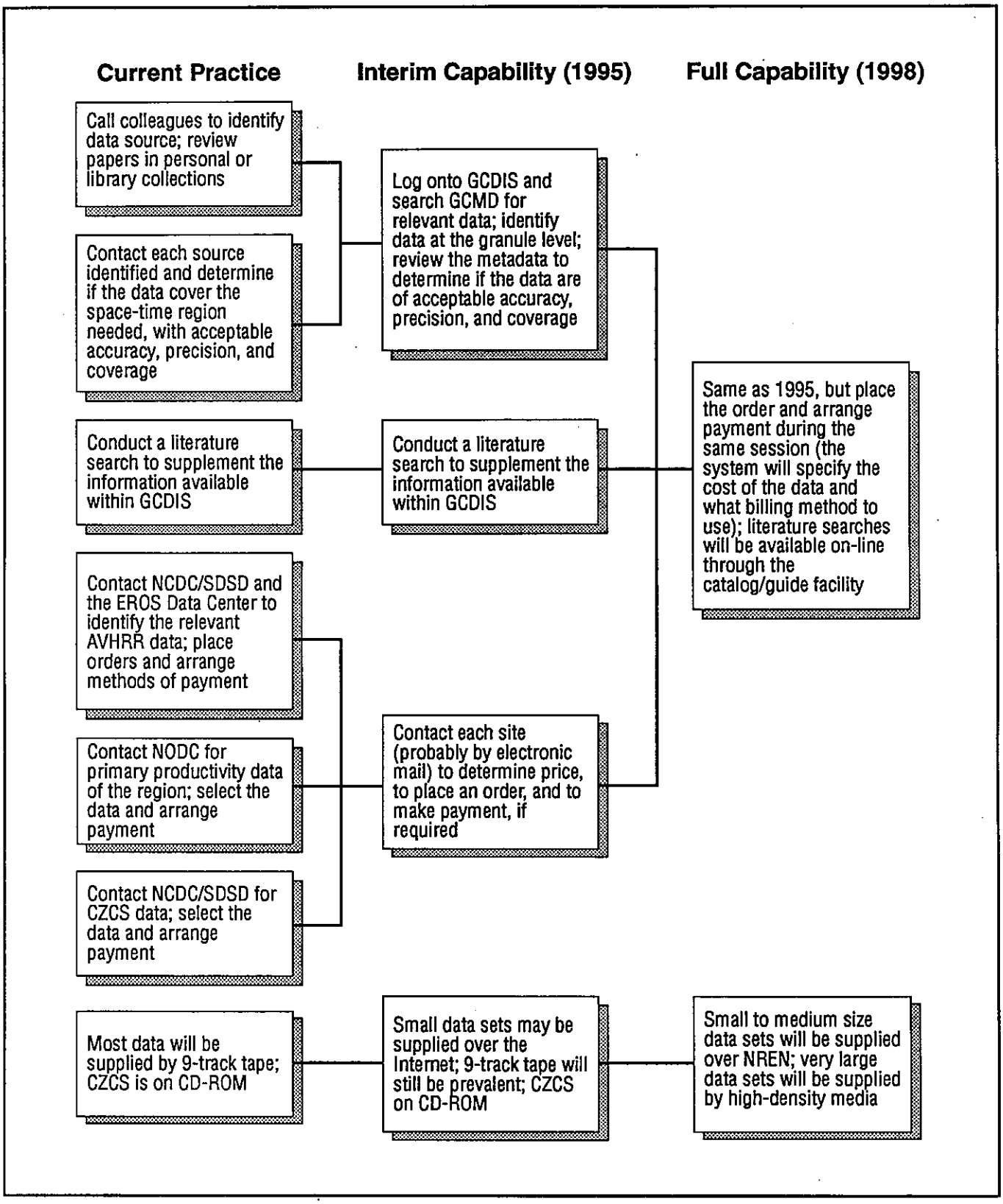


Figure 3. Hypothetical GCDIS User Services Scenario

3. FUNCTIONAL ELEMENTS OF GCDIS

3.1. DATA AND INFORMATION IDENTIFICATION, COLLECTION, AND GENERATION

The U.S. GCRP provides overall direction for collection of data to support global change research. Once data exist, GCDIS will provide services to support these data sets. Specific expert advice on which data sets to include in GCDIS will be sought from the NAS Committee on Geophysical Data (CGD) and Committee on Global Change (CGC). These committees will help establish and oversee a process to identify and review candidate data sets for inclusion in GCDIS, and will make recommendations to the GCDIS Oversight Council. As described below, existing interagency procedures and Federal data centers will serve as a base to fulfill other GCDIS requirements. The tri-agency GCDIS implementation will strengthen this existing infrastructure by developing interagency data management guidelines to promote system interoperability and adherence to standards.

3.1.1. Interagency Coordination

The agencies participating in GCDIS must coordinate the identification and generation of data and information to be included in GCDIS (these terms are defined in relation to GCDIS in Section 2.2.2). This coordination helps ensure that agency efforts avoid unnecessary duplication and that the resulting products can be used in a complementary fashion.

Coordination among the agencies takes place at the levels of projects, programs, and agency management. Project and program coordination ranges from informal meetings to cross-agency staffing. Formal arrangements are often documented in interagency agreements, such as those listed in Section 1.2. At the level of agency management, the GCDIS Oversight Council will conduct periodic meetings to guide the process of interagency coordination on the identification and generation of GCDIS data and information products. These meetings will be coordinated with other interagency liaison activities, such as the traditional semi-annual coordination meetings between NOAA and USGS.

3.1.2. Agency Data Responsibilities

NASA, NOAA, and USGS currently support a wide variety of institutions and activities that identify, collect, and generate Earth science data sets. These mechanisms, summarized below, will continue under GCDIS, and will evolve under individual agency management.

NASA

Supporting Earth science research is an intrinsic part of the NASA mandate. Authorizing legislation directs NASA to carry out a broad range of environmental observations and scientific investigations to understand the physics, chemistry, and biology of the Earth. To reach these objectives, NASA has initiated a series of missions to provide scientists with the data required to study the planet. These missions include space-based Earth observation satellites, airborne data collection campaigns, and ground-based field campaigns. NASA also sponsors scientific research to analyze the data acquired; many of these research programs generate higher level data products and model output that is of general interest within the scientific community.

NASA's space-based Earth science missions are described in greater detail in Appendix C (see Tables C-1 and C-2 for comprehensive mission lists). A data management plan has been developed for each of these missions to ensure that all science and supporting data are archived and readily accessible in a usable form.

NASA also supports Earth science research through aircraft missions [e.g., the Airborne Arctic Stratospheric Expedition (AASE)] and ground-based field campaigns [e.g., the Atmospheric Boundary Layer Experiment (ABLE), the First ISLSCP Field Experiment (FIFE), and the Boreal Ecosystem-Atmosphere Study (BOREAS)]. Responsibility for calibrating, validating, and analyzing these data generally rests with the campaign investigators. NASA often assumes responsibility for long-term archive of these data via the DAACs, as described below.

By 1998, many of NASA's Earth science data products will be generated through the system of DAACs described in Section 3.2.2. The DAACs will generate standard and special products from NASA's EOS and Earth Probes missions; they will also be involved in much of the data product generation related to other NASA Earth science satellite, aircraft, and ground-based missions.

NOAA

NOAA is responsible for acquiring, processing, archiving, analyzing, and disseminating environmental data from operational *in situ* and satellite sources for use by government, commerce, industry, the scientific and engineering communities, and the general public. Operational hydrometeorological data are received via the Global Telecommunications System (GTS), operational satellites, and the Shipboard Environmental Acquisition System (SEAS). Selected forecast model data generated

operationally by NMC are also preserved for other uses. Oceanographic data are gathered operationally via remote links (satellite or land-based telecommunications) from drifting and moored buoys, and tide gauges. Routine surveys of fish, oceanographic variables, and biological variables are conducted for fisheries management purposes. Land-based geodetic surveys are conducted routinely, which are of value to climate issues such as subsidence and sea level change. Other activities such as aeronautical charting are also of value for land use analysis purposes. Finally, NOAA conducts a variety of focused, process-oriented campaigns ranging from single cruise investigations to long-term medium-size studies such as the Equatorial Pacific Ocean Climate Studies (EPOCS) through large, intensive international expeditions such as the Tropical Ocean Global Atmosphere/Coupled Ocean-Atmosphere Response Experiment (TOGA/COARE). Some elements of NOAA's data collection responsibilities are established by the National Archives and Records Administration pursuant to the Federal Records Act of 1950 [Section 506(a)] as having enduring value to the Nation, and it is specified that they be permanently retained. New high-volume data streams also are scheduled to come on-line in the next several years. Most important of these are the Profiler and Next-Generation Weather Radar (NEXRAD) data.

USGS

Management responsibility for the Nation's natural ecosystems, energy and water resources, and public lands (including over 80 percent of Alaska) is vested in DOI. Within DOI, USGS provides geologic, topographic, and hydrologic information that contributes to wise management of the Nation's natural resources. To support the U.S. GCRP, USGS is addressing the collection, maintenance, analysis, and interpretation of short- and long-term land, water, biological, and other natural resource data and information.

USGS is developing advanced information systems to provide access to existing and future archives of Earth science data. To safeguard existing global change land data, scientific data management practices are applied to managing the national archive of Landsat data, AVHRR data over land, and associated derived products. Other land cover, soils, topographic, vegetation, and cartographic data sets are being addressed in priority order. To provide usable data products to the land science user, a global land data set development program for large areas (i.e., regional, continental, and global scales) is being conducted.

3.1.3. Process for Generating Interagency Global Change Data Sets

Several ongoing processes are in place for generating global change data sets. As described in the examples below, the agencies also play important roles in

international/interdisciplinary Earth science programs that generate global change data sets. On the interagency level, NASA, NOAA, and USGS have been involved with a process involving pathfinder data sets. Through its various functions and services, GCDIS will assist the agencies in supporting these programs.

International programs are coordinated by the World Meteorological Organization (WMO) through its World Climate Research Program (WCRP); by ICSU through the IGBP; and by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) through the Intergovernmental Oceanographic Commission (IOC). In many cases, U.S. agencies contribute to the support for large-scale international Earth science research activities. Such support may include archival and distribution of data sets generated by these programs. Typically, the responsibility for data analysis, calibration, validation, quality control, and generation of data products rests with the project investigators. Each scientific program listed below has its own scientific goals and approaches to data management:

- Global Land and Ice 1-km AVHRR Data Set Project
- International Global Atmospheric Project (IGAC)
- International Satellite Cloud Climatology Project (ISCCP)
- International Satellite Land Surface Climatology Project (ISLSCP)
- Joint Global Ocean Flux Study (JGOFS)
- Tropical Ocean Global Atmosphere (TOGA) experiment
- World Ocean Circulation Experiment (WOCE)
- Global Energy and Water Cycle Experiment (GEWEX).

One example of an interagency process for generating global change data sets is the Pathfinder Data Set Project. NASA, NOAA, and USGS are currently involved in this project, which has a goal of making very large, long time-series satellite data sets and products readily available for use in climate and global change research. Pathfinder activities use operational satellite data and *in situ* data to produce decadal time series of sea surface temperature, land vegetation greenness, and land use patterns, and profiles of atmospheric temperature and moisture. The pathfinder process has four steps:

1) **Selection of a base data set.** Selected archived data sets provide global coverage and are considered important for global change research. To date, the following data sets have been selected—AVHRR, TOVS, GOES, SSM/I, and Landsat MSS. Each data set is located in a national archive center.
2) **Transfer base archive to a readily accessible, working storage medium.** This step improves access to the data for generating higher level products and data sets.
3) **Science involvement.** Each pathfinder data set has a science working group (SWG) that consists of agency members and academia, and is

chaired by a representative from academia. Each SWG stresses "community consensus" to make recommendations on calibration, Earth location, algorithm selection, product and browse specification, product validation, data set distribution, and distribution media.

4) **Product generation.** A goal of the pathfinder process is to generate uniformly calibrated, Earth-located, well-documented, validated, and readily available global products for use by the global change research community. Some data sets will involve reprocessing of up to 12 years of data (e.g., AVHRR), and the products will serve as global reference data sets.

3.1.4. Guidelines for Data Collection and Generation

The agencies participating in GCDIS recognize that important data sets are collected as a result of agency-supported scientific research. These data represent a substantial investment, and there is a responsibility for maintaining the data for purposes that extend beyond their initial use.

To promote and simplify the migration of data sets from agency-sponsored investigators into an agency archive that supports GCDIS, the agencies have agreed to develop an initial set of guidelines for data submission by 1993 (including browse data products). The agencies also agree to employ these guidelines in their global change programs, and to update the guidelines as required. The guidelines will be developed under the auspices of the GCDIS Oversight Council and will be published as a document for use by project managers, research investigators, and others responsible for activities resulting in data to be handled by participating agencies under GCDIS. The guidelines will address format and content of data sets, and will describe at least the issues listed below:

- Data submission media and formats
- Metadata (directory and guide formats, keywords)
- Browse data products
- Validation and quality control
- Data product identifiers
- Data set documentation
- Spatial reference systems
- Scientific reporting units.

3.1.5. Near-Real-Time Data and Information Exchange

Access to data in near-real-time is a special data management arrangement that supports full and open sharing of global data sets for global change researchers. Normally, the access will not involve the GCDIS directory and

inventory search and order functions. The exchange process will be implemented through special direct access arrangements, will often be of a "standing order" nature involving non-retrospective data, and will be implemented through interagency agreements. Near-real-time data exchange is not directly available to the general global change research user; however, data exchange will support global change science requirements for participating GCDIS agency programs that require access to data in near-real-time. At a minimum, GCDIS will implement the following near-real-time data exchanges:

- NASA will provide NOAA with near-real-time access to EOS Prototype Operational Instrument (POI) data. Access to this data stream will support NOAA's responsibility to monitor the Earth's changing climate on a continuing, operational, long-term basis.
- NOAA will provide NASA with near-real-time access to Polar-Orbiting Operational Environmental Satellite (POES) and GOES data for use in EOS science research and routine generation of standard EOS products.

It is planned that NOAA will provide NASA with near-real-time access to National Weather Service (NWS) and NMC forecast and analysis model output products and ancillary data for use in climate research.

NASA, NOAA, and USGS will identify current and future requirements for near-real-time data exchanges in support of global change research by the end of 1992. Interim near-real-time data exchanges should commence by 1995, with full implementation by 1998.

3.2. DATA AND INFORMATION ARCHIVE

3.2.1. General Responsibilities of Archive Sites

U.S. data policy states that "...preservation of all data needed for long-term global change research is required." Each GCDIS agency has the responsibility to properly manage, store, and maintain data sets under its purview. The GCDIS Oversight Council will coordinate GCDIS archive and data purge responsibilities.

Safe storage and preservation of data sets are clearly part of the normal operations of each archive site. Each participating GCDIS agency will follow government media, storage, and handling standards as prescribed by the National Archive and Records Administration (NARA), the National Institute of Standards and Technology (NIST), and, where appropriate, World Data Center-A requirements. To fulfill responsibilities in this area, the GCDIS

Oversight Council will establish a coordinating group with representatives from the participating agencies, NARA, NIST, and industry.

Beginning in 1992, each GCDIS archive center will reassess its status with regard to requirements for proper data archive storage and maintenance. It is recognized that correction of deficiencies will be incremental, from identification in 1992 to full compliance by 1998, with ongoing compliance thereafter. An example list, intended to be illustrative of proper storage and maintenance requirements, includes provision of a clean environment; use of tested and certified media designed for long-term storage; provision for media backup and off-site storage; adequate security and internal controls to safeguard equipment, software, and media; fire and water protection; a routine, scheduled media maintenance program to include detection of media deterioration and migration; and maintenance of a data inventory.

Data purge policies are primarily the responsibility of the archiving agency. Interagency coordination is essential to prevent the loss of important data sets and will be a responsibility of the GCDIS Oversight Council (see Section 4.1). Existing NAS committees will provide advice in this area.

3.2.2. Principal Agency GCDIS Archives

NASA

The EOSDIS DAACs serve as the principal NASA GCDIS archives. Each of the DAACs focuses on particular areas of interest, and each DAAC carries out NASA's responsibilities for data generation, archive, distribution, and information management in those focus areas. Table 3 lists the EOSDIS-sponsored data centers and their corresponding areas of interest. Responsibility for long-term archive of EOS data will be assumed by NOAA and USGS. The mechanism for this transfer of responsibility is described in two of the memoranda of understanding listed in Section 1.2.

NOAA

NOAA's principal data archives are the three National Data Centers. Data center responsibilities are divided along general disciplinary lines as delineated in Table 4.

In addition to the NOAA National Data Centers, many important and unique Earth science data sets are maintained at NOAA's Centers of Data (see Table 5). These Centers of Data were established in response to needs for specialized data and information services, and are staffed by experts knowledgeable in the intricacies and nuances of individual data sets. Some Centers grew out of a

Table 3. EOSDIS-Sponsored Data Centers

Earth Science DAACs

Center	Areas of Interest	EOS and Other Missions/Instruments
GSFC Goddard Space Flight Center	Climate, meteorology, stratosphere, ocean biology, and geophysics; AVHRR and TOVS pathfinder data sets	MODIS-N, AIRS, MHS, AMSU, SeaWiFS, GLRS-A, HIRDLS, TOMS, and TMI
LaRC Langley Research Center	Clouds, radiation, aerosols, and tropospheric chemistry	CERES, ERBE, MOPITT, MISR, EOSP, SAGE, and TES
EDC EROS Data Center	Land processes	ASTER, HIRIS, SAR (land), Landsat (MSS and TM), and AVHRR
UAF University of Alaska–Fairbanks	SAR imagery of ice, snow, and sea surface	ERS-1, JERS-1, ERS-2, Radarsat, and ongoing role as ground station
CU University of Colorado	Polar oceans and ice	SMMR, SSM/I, and OLS
JPL Jet Propulsion Laboratory	Physical oceanography	TOPEX/Poseidon, NSCAT, STIKSCAT, and ALT
MSFC Marshall Space Flight Center	Hydrologic cycle; SSM/I pathfinder data sets	MIMR, TMI, TRMM PR, LIS, and SSM/I
ORNL Oak Ridge National Laboratory	Trace gas fluxes	Ground-based data relating to fluxes of trace gases (e.g., CO_2, CH_4)

Socio-Economic Data and Applications Center

CDRC CIESIN Data and Applications Center	Human dimensions of global change and policymaking applications	Socio-economic data

Table 4. NOAA's National Data Centers

National Data Center	Associated Data Centers	Center Responsibility
NCDC National Climatic Data Center		Climate data
	Satellite Data Services Division University of Wisconsin, Madison	Environmental satellite data GOES data
NODC National Oceanographic Data Center		Oceanographic data
NGDC National Geophysical Data Center		Solid Earth geophysics, solar-terrestrial physics, marine geology and geophysics, and paleoclimatology
	National Snow and Ice Data Center	Sea ice and glaciology

concentration of scientific expertise, while others grew out of a need to service specific requests in an area of data. At the Centers, environmental data sets are processed to provide value-added information to the raw observations. In addition, the Centers often perform extensive quality control on data sets, provide more complete documentation linking data sets to publications, generate specialized products, and/or integrate the data with similar data sets.

The Centers of Data service specialized requests for data sets and provide expert advice on data set use and history. They provide an important blend of data with expertise in interpretation and application of special data sets. The specialized knowledge is focused upon an individual type of measurement or phenomena and particular time scales. The Centers also provide an important function in the near-term stewardship of data, such as data from field research programs. Long-term responsibility for the archive of these data and information rests with the National Data Centers.

USGS

The principal USGS archive centers are at EDC and the USGS National Center in Reston, Virginia. EDC maintains archives of satellite remote-sensing data (e.g., Landsat and AVHRR), aircraft data [e.g., Side-Looking Airborne Radar

Table 5. NOAA's Centers of Data

Title	Location
Bathymetric/Geodetic Database	Rockville, Maryland
Climate Analysis Center	Camp Springs, Maryland
National Meteorological Center	Camp Springs, Maryland
National Marine Fisheries Service Headquarters	Silver Spring, Maryland
Northeast Fisheries Science Center	Woods Hole, Massachusetts
Southeast Fisheries Science Center	Miami, Florida
Southwest Fisheries Science Center	La Jolla, California
Northwest Fisheries Science Center	Seattle, Washington
Alaska Fisheries Science Center	Seattle, Washington
Joint Ice Center	Suitland, Maryland
Great Lakes Environmental Research Laboratory	Ann Arbor, Michigan
Center for Ocean Analysis Prediction	Monterey, California
Ocean Products Center	Camp Springs, Maryland
Equatorial Pacific Information Collection	Seattle, Washington
Particle Deposition Air Resources Laboratory	Silver Spring, Maryland
University of Hawaii	Honolulu, Hawaii
National Snow and Ice Data Center	Boulder, Colorado
National Tide and Water Level Database	Rockville, Maryland
Global Monitoring for Climate Change	Boulder, Colorado
Satellite Data Processing and Distribution	Suitland, Maryland
Pacific Marine Environmental Laboratory	Seattle, Washington
Environmental Research Laboratories	Boulder, Colorado
Atlantic Oceanographic and Meteorological Laboratory	Miami, Florida
NOAA Central Library	Rockville, Maryland

(SLAR) and aerial photography], and selected cartographic and thematic data. The National Center houses the USGS library and several data systems important for global change research, such as NDCDB, NWIS, the Mineral Resources Data System (MRDS), the Rock Analysis Storage System (RASS), and the National Coal Resources Data System (NCRDS).

World Data Centers

GCDIS is designed to permit extension to international data holders as well as other U.S. agencies and organizations. Access to international data will be provided initially through existing agency participation in the World Data Center system. This system, conceived and fostered by ICSU, is responsible for the archive and exchange of important environmental data among the nations of the planet. Data centers in the U.S. have responsibility for a broad range of climatologically important data. World Data Centers associated with the tri-agency GCDIS implementation are identified in Table 6. It is the intent that all GCDIS archive sites not already identified in Table 6 will pursue World Data Center status through ICSU (GCDIS archive sites are identified in this section and in Appendix B).

3.2.3. Agency Data Set Responsibilities

NASA, NOAA, and USGS are responsible for the management and long-term archival of substantial holdings of data sets related to global change. One of the goals of GCDIS is to assess which data sets will be made available to the research community, in what time frame, and at what level of service. Appendix B is a preliminary step towards this assessment. It also outlines the progressive improvements in levels of service associated with NASA, NOAA, and USGS global change data sets available through GCDIS.

Table 6. World Data Centers Associated with GCDIS

World Data Center-A Focus	Associated U.S. Center
Meteorology	National Climate Data Center
Oceanography	National Oceanographic Data Center
Solid Earth Geophysics Solar-Terrestrial Physics Marine Geology and Geophysics Glaciology Paleoclimatology	National Geophysical Data Center
Land Remotely Sensed Data	EROS Data Center

3.3. DATA AND INFORMATION SEARCH AND ORDER

To allow users to locate and use relevant data, GCDIS provides an interagency catalog system that appears to the user to be fully integrated over a distributed data environment. The GCDIS employs interagency interfaces that reduce the differences between agency implementations from the user's perspective. The GCDIS model allows each agency to have a high degree of autonomy with regard to linking its information systems to the GCDIS at an appropriate level. However, each participating agency that maintains a catalog for GCDIS data and information must demonstrate interoperability within GCDIS.

Definition of a flexible catalog system has been a primary objective of the Catalog Interoperability Working Group, the IWGDMGC Catalog System Subgroup, and the Catalog Subgroup of the Committee on Earth Observations Satellites (CEOS) Working Group on Data. The current catalog model includes directory, guide, and inventory components. The directory provides high-level descriptions of metadata or data set catalogs to support preliminary determination of the utility of a data set. A standard Directory Interchange Format (DIF) defines a common level of information to be included. The guide provides detailed information about a data set to assist the user in determining the value of the data. Information might include the platform and instrument that produced the data, the resolution, processing algorithms and information used in producing the data (e.g., calibration coefficients), and intended applications. Guide services are typically co-located with inventory services, but can also be co-located with the directory service if so desired. The inventory contains information needed to identify and retrieve individual data set granules, given the specification of search parameters such as date, satellite, spatial or spectral resolution, and geographic coverage. It may contain information extracted for the data set granules, such as cloud cover, as well as information to enable ordering. Inventory services are typically supported by systems directly linked to data archives.

3.3.1. Searching and Ordering Processes

Each GCDIS data set will have an associated directory entry in the GCMD. Ideally, each data set would also be associated with on-line guide and inventory information, making possible search and order of data without leaving GCDIS; however, practical considerations dictate that this level of service will not be available for all products. Inventory information and some degree of guide information are required to be available for all GCDIS data, but for some data sets they may be available to the user only as off-line information, by a separate connection with another system, or by a direct GCDIS link.

At the directory level, each agency provides DIFs describing its global change data holdings to GCMD, which serves as a coordinating node within the CEOS International Directory Network. GCMD provides a common directory of global change data sets and supports links to other agency-specific catalog systems where desired. Each of the agencies agrees to have DIFs submitted to GCMD for its global change data sets in 1992, and to update directory entries as required. GCMD maintenance and development will be overseen by the IWGDMGC, and will continue as an integral part of GCDIS.

Each agency will support interagency access to information at the guide level, although direct on-line availability through GCDIS may be generally available only in later years. During initial GCDIS development, the agencies will evaluate potential guide search systems such as hypertext, Metalog, and the NISO Z39.50 standard for information retrieval. User feedback will be solicited and a tri-agency interface protocol prototyped by 1995, to support interagency searching of guide information.

At the inventory level, each agency will support requests for data search and order at the data granule level. NASA is developing an interface protocol for inventory search and order. A "proof-of-concept" prototype, including the USGS EDC and the NOAA-affiliated National Snow and Ice Data Center (NSIDC), has been developed, and the NOAA SDSD will be included in 1992. During 1993, an initial protocol for GCDIS will be adopted by the agencies, and translation software will be developed where required.

Each agency will establish a single-point access to its entire GCDIS system for both guide and inventory level searches. For NASA, this will be provided by the EOSDIS Project through its IMS. NOAA's access point will be via SDSD in 1992, evolving into the NOAA Earth System Information Management System. The GLIS at EDC will provide the access point for USGS systems. In 1992, a rudimentary inventory search and order capability will be in place involving the EOSDIS DAACs, the NOAA SDSD, and the USGS GLIS. That capability will evolve into a prototype capability across the broader interagency system by 1995, and an operational capability by 1998.

The level of search and order service will vary with both data set and time. Table B-1 in Appendix B provides a listing of NASA, NOAA, and USGS global change data sets, by time period and archive site. Each data set listed is required to have inventory level information available to the user. The objective for all agency data sets considered to be key to global change research is to have a high level of search and order service, with on-line inventory information available across the entire GCDIS within a single user session. The time period by which this high level of service is planned for a data set is indicated in Table B-1 by the column entitled "Interoperable Search & Order." A lower level of service would provide on-line inventory information, but through a link from GCDIS or a separate electronic connection. The Table B-1

column entitled "On-line Inventory" indicates the time period by which this lower level of service is planned. This list is expected to evolve, both with changes in the scheduled availability of on-line inventory support and with changes in the perceived importance of particular data sets.

Availability of interagency electronic networking capability is essential to the distributed GCDIS implementation. For search and order, the primary requirement is for low- to medium-speed capability to support transmission of primarily textual material such as user query parameters, query results, and order request parameters. For this purpose, it is important that networks be reliable and accessible to all agencies and agency facilities.

3.3.2. Browse Products

Browse products assist users in identifying specific data set granules for ordering. GCDIS search and order implementation will focus on providing access to example or representative browse products that show important features of the data. This will also include summary statistics and other data characterization information.

The early phases of GCDIS will include prototype implementations of browse capabilities for imagery and non-imagery data products, both satellite and non-satellite. For example, these prototype implementations involve NASA Goddard Space Flight Center (GSFC) for CZCS and related image data sets, NOAA NCDC for graphical display of meteorological data, and USGS GLIS for AVHRR data. Initially, browse capability may be a separate part of the search and order process. In 1992, some sample browse products will be available, and by 1995 browse products will be available for high-priority data sets. By 1998, the agencies will integrate browse products into the electronic search and order process.

In the initial implementation of GCDIS, browse data will be distributed primarily on machine-readable media sent via the mail. Relatively small browse products will be available via network file transfer protocol (FTP), and analog browse products (e.g., photographs, tabular and graphical output) will continue to be ordered by users and distributed via the mail for those data centers that currently provide such services. By the 1998 time frame, it is expected that moderately sized browse products will be available via networks. This will require that networks provide medium- to high-speed capability to support interactive user browsing. The network capability required should be consistent with that required for electronic distribution of low-volume products (see Section 3.4).

3.3.3. Interagency Charging Process

The interagency charging process includes data pricing as well as order processing and billing (see Figure 4). In cases where GCDIS provides only on-line directory information for a product, the user will order the product through the distributing center as is done today. However, for those data and information products that the agencies agree to make available with on-line inventories (see Appendix B), the GCDIS should eventually provide full service. This discussion focuses exclusively on that set of products which have a full set of services, and how the charging process for such products would be handled among the three agencies.

The GCDIS agencies commit themselves to the goal of providing a fully integrated charging process. From the GCDIS user point-of-view, an order for one product or products from multiple agencies will be handled as though the only agency involved was the one the user first contacted. That contacted agency will be responsible for the following:

- Providing price information at the time of order
- Ensuring that the order is received and processed at each of the involved data centers
- Arranging for payment from the user
- Tracking the order until all parts of the order are delivered to the user
- Allocating the collected payment back to the data centers that provided products.

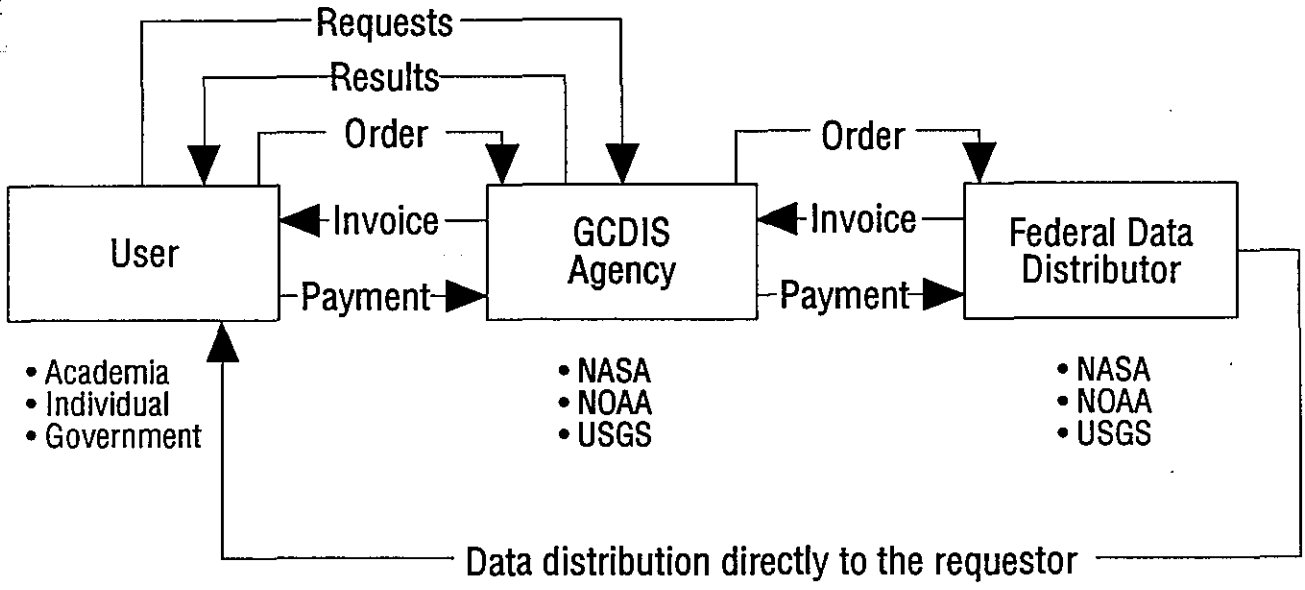


Figure 4. Conceptual Model of GCDIS Ordering and Billing

The three areas that require coordination between member agencies to meet the goal of an integrated charging process are described below:

- **Pricing.** The pricing of products should be coordinated among the agencies participating in GCDIS, with the goal of establishing consistent prices. At present, agency pricing policies for data and information often vary even within the agency. Special provisions have arisen over time for the pricing of data and information products depending on what funds were used to generate it, what use is intended for it, and who is the user. In some cases, the differences in practice are a matter of tradition; in others, special arrangements are prescribed by law or regulation. The agencies participating in GCDIS commit to coordination of pricing policies as they affect products available at the inventory level and the types of users expected to order through GCDIS.
- **Order processing.** Interagency order processing procedures must be arranged so that each agency participating in GCDIS can take an order and ensure that the order is received and processed at each of the involved data centers. After passing the order, each agency must be able to track it until all parts are delivered to the user. It may be that much of this process will be facilitated by automated techniques, but the key to success will be close cooperation among the order processing points within the data centers. Since interagency coordination is critical to meeting the goal, the agencies commit to active participation in a User Services Working Group to address order processing and related user services.
- **Billing.** Billing includes all aspects of funds collection, funds transfer, and interagency accounting associated with filling an order. Users should be able to use several payment options ranging from bank cards for infrequent users to corporate accounts for major users. Such arrangements already exist within the GCDIS agencies; the challenge is to have a similar set of payment options presented to the user at each of the agency points of entry into GCDIS. A related issue involves allocating payments back to the data centers that provided products. Existing procedures for standardized interagency billing and accounting will be used and augmented as necessary. In order to simplify billing, the agencies commit to implement a small set of payment options and to make arrangements for interagency funds transfer with appropriate accounting.

By 1995, a model interagency charging process should be demonstrated. As a way of focusing efforts in this area, the agencies plan a test case for implementing this service using AVHRR data from the three agency archives.

3.4. DATA AND INFORMATION DISTRIBUTION

The end result of GCDIS queries is the distribution of data and information from archives to the user. GCDIS capabilities will permit data sets to be delivered to users on a routine or *ad hoc* basis, on convenient media, and with good documentation. To achieve this end, GCDIS will integrate agency resources for product browse and network utilization, and will promote the use of standard media and formats among GCDIS agencies.

3.4.1. Network Distribution

Electronic distribution of GCDIS data will be provided through diverse communications services available to Federal agencies and the research community. Users may choose to access and download GCDIS data via the Internet, through public data networks such as Telenet and Tymnet, or through other international common carrier services. GCDIS may make use of the advanced Internet, FTS2000, and/or the National Research and Education Network (NREN) when they become available.

Network bandwidth effectively dictates the magnitude and type of electronically communicated data distribution to GCDIS users. Large volumes of data transfer (including browse data) cannot be accommodated with network capabilities available to the initial version of GCDIS. However, some network distribution of GCDIS data will be available in the initial version of GCDIS as prototype and pilot studies. GCDIS distribution of data products via networks, including the distribution of browse data products, will evolve in response to the prototypes and in response to ongoing upgrades in network services.

3.4.2. Distribution Media

GCDIS will support the distribution of data and information products through a variety of media. This requirement is based on recognition of two important facts. First, the global change research community is diverse, and has not endorsed a single, standard distribution medium. Second, rapid changes in technologies and standards present considerable risk in the commitment to one or more "standard media." Thus, GCDIS will place no limitation on the type of distribution media from its participating data centers. Although GCDIS will not limit the type of distribution media available from its participating centers, GCDIS will require that all participating data centers provide data to users on at least some minimum set of commonly available media by 1995. Candidates for this set of common GCDIS media include 6250 bpi magnetic tape, 8-mm tape cartridge (Exabyte), and CD-ROM.

GCDIS agencies will continue to evaluate and prototype various emerging technologies for data distribution. These technologies may include magneto-optical disk, digital optical tape, 4-mm digital audio tape, optical disks of various dimensions in both read-only and read/write formats, and others. Distribution media will be evaluated periodically by GCDIS to determine when additions to or deletions from the set of common GCDIS distribution media are needed.

3.4.3. Data Formats

As with distribution media, no single data distribution format has been endorsed by the global change research community. Some degree of data format standardization is essential in the GCDIS era, because a common "currency for exchange" is needed to circulate data and information among the research community.

GCDIS will permit participating agencies to continue their support of a variety of distribution formats; some of these conform to international standards, but many do not. However, standardization of distribution formats is a goal of GCDIS. Thus, GCDIS will adopt the following hierarchy for implementing data distribution formats:

- International data format standards will have the highest priority for implementation, and will be used when available and appropriate.
- National data format standards will have the second priority for implementation, and will be used as appropriate if international standards are not available.
- *Ad hoc* data formats will be used if international and national standards are not available; where appropriate, steps will be taken to formalize these *ad hoc* formats through U.S. national and international standards groups.

At its inception in 1992, GCDIS will begin to define a suite of data distribution standards for participating agencies. These will be evaluated periodically by GCDIS to determine when one or more need to be modified, or new formats need to be added to the common GCDIS set. Candidates for these formats are CEOS formats for satellite data, and the Spatial Data Transfer Standard (SDTS) for spatial data.

4. GCDIS ROLES AND RESPONSIBILITIES

4.1. GCDIS OVERSIGHT COUNCIL

A GCDIS Oversight Council will be established to manage the implementation of GCDIS. This body will consist of one principal contact from each participating agency, drawn from senior management, with the authority to execute the agency's role. GCDIS Oversight Council membership will include representatives only from agencies participating in the GCDIS implementation. In effect, the GCDIS Oversight Council will serve as a "board of directors" for GCDIS. It will be the focal point for interagency coordination, and for setting cooperative agency policies in the area of global change data management. The GCDIS Oversight Council will be fully coordinated with the CEES Subcommittee on Global Change Research and the IWGDMGC.

In 1992, the GCDIS Oversight Council will establish coordinating groups to address the following issues:

- Archive coordination, including data retention and data purge policies (Section 3.2.1)
- Data submission guidelines (Section 3.1.4)
- User services coordination (Section 2.2.3)
- Interface standards for GCDIS interoperability (Section 4.2).

The GCDIS Oversight Council may also wish to establish coordinating groups to address other issues. Examples of topics that may be important to the near-term implementation of GCDIS include the following:

- Interagency charging policy
- Distribution media and formats
- User feedback and validation
- Human sciences data and information issues
- Education activities
- Publication of data in scientific journals
- Guidelines for data and information brokerage
- Constraints on agencies for release of data (e.g., exclusive-use periods).

4.2. INTERAGENCY ARCHITECTURE

An important part of GCDIS interagency responsibilities is the definition of, and agreement to, an architecture. As discussed earlier (see Section 2.2), the approach adopted for the tri-agency GCDIS focuses on use of a common functional model and on building interfaces to each other's systems. This

approach allows each agency to retain as much autonomy as possible and to proceed on somewhat different time scales with its own internal systems. Definition of interagency interfaces becomes the focus, with translation at the interface being used where agency systems are dissimilar.

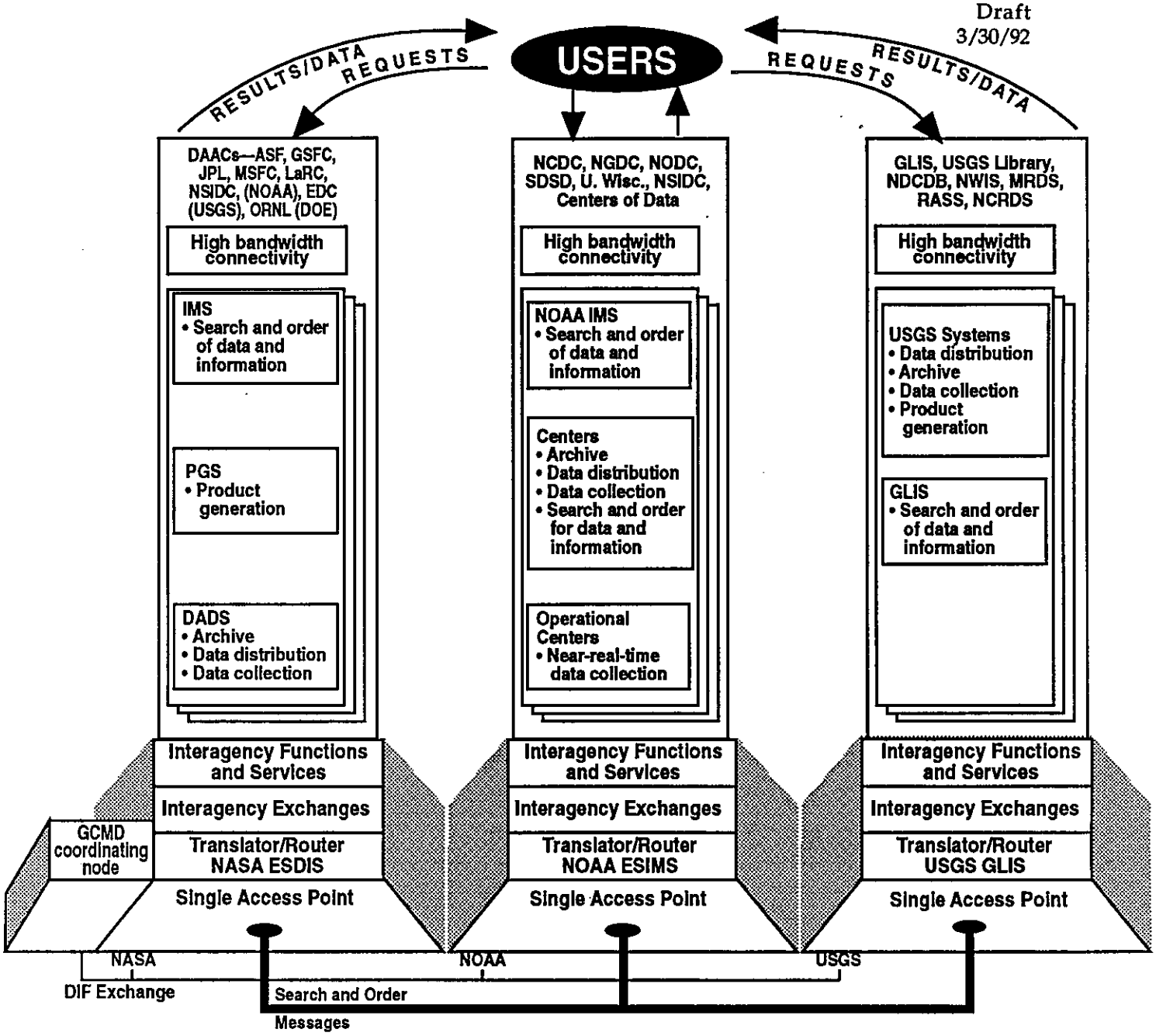
While Figure 2 presented a high-level definition of the tri-agency GCDIS implementation, Figure 5 shows a more detailed interface architecture. The plan is to have the functional elements in place by 1995, with the full range of sites and systems integrated by 1998. Figure 5 presents the GCDIS architecture as envisioned for 1998. Earlier discussions in Sections 2 and 3 detailed the evolutionary path necessary to arrive at this 1998 view. Important features of the interface architecture shown in Figure 5 are the single interagency access points for each agency and its systems, the common set of interagency GCDIS functions and services, the set of interagency exchanges required to meet user requests, and the heterogeneous set of agency systems. Implicit in this architecture is the ability for a user to enter GCDIS from any of the participating agency systems, and to obtain needed data and information from throughout the system. The interagency access points provide any necessary translation and routing of user requests. In 1992, the GCDIS Oversight Council will establish an interagency Interface Working Group, with specific lead points-of-contact from each agency, to define and develop interface protocols to implement the GCDIS architecture. One of the first tasks of this group will be to develop the interfaces necessary to connect the agency GCDIS single access points.

4.3. INTERAGENCY USER VALIDATION

It is the firm conviction of the subscribing agencies that GCDIS must be developed in close cooperation with the potential users. Each agency has sought, and will continue to seek, the advice of a full range of users—from the novice to the sophisticated, encompasssing users from participating agencies, academia, and other sources.

To ensure that GCDIS meets the needs of users, a joint validation test will be conducted at the earliest possible time. The test will be designed to complement the individual science program data management activities, and to explore the appropriate relationship between GCDIS and the project data management. This test will be chosen from actual research programs to ensure that the demands placed on the system during the validation exercise are those that would occur in normal use. One consideration in the selection of the validation program is the fit of data needs of the program with the high-priority data sets identified for early inclusion in GCDIS.

To ensure the broadest possible test of GCDIS, the validation program should be one that draws on the data resources of all participating agencies, testing



Interagency Exchanges

- Inventory searching and order messages
- Guide/text search messages
- User referrals
- Charging information
- Standard distribution formats

Interagency Functions/Services

- Data set identification and generation process
- Data collection guidelines
- Metadata standards
- DIF exchanges with GCMD
- Interagency search and order
- Suite of standard distribution media and formats
- User referral service
- Charging system

Figure 5. GCDIS Interface Architecture

the implementations of all of the functions of each agency. As such, the test program should require data from, and generate data to be archived by, all three agencies. Objective measures will be used to ensure that user functions are implemented effectively. Factors such as value of the metadata, ease of payment methods, proper granule size, speed and responsiveness of the system, and utility of browse products will be observed and evaluated during the validation test. Users also will be surveyed to determine their subjective satisfaction with the system.

Programs such as GEWEX, TOGA, and STORM each have attributes necessary for the interagency validation and are candidates for the test. The selection of the actual program will be made by the GCDIS Oversight Council in coordination with leaders of the candidate programs. Coordination and test planning will begin upon selection of the research program with the validation exercise scheduled for 1995.

4.4. SCHEDULE AND MILESTONES

As noted earlier, the implementation of GCDIS follows an evolutionary path. This path is marked by a number of milestones that must be met to ensure the full and orderly development of the proposed system. These milestones are summarized here to highlight the phasing and extent of the systems development required:

- **1992 GCDIS milestones**
  - Establish GCDIS Oversight Council
  - Develop agency-specific GCDIS implementation plans
  - Identify key tri-agency global change data sets
  - Identify requirements for near-real-time data exchanges in support of global change research
  - Initiate process for obtaining World Data Center status at additional GCDIS archive sites
  - Assess status of GCDIS archive sites for compliance with NARA/NIST requirements
  - Populate GCMD with all NASA, NOAA and USGS global change data sets; update directory entries as required
  - Review GCMD directory keywords
  - Initiate rudimentary inventory search and order capability at individual agency sites
  - Identify sample browse data sets and make them available
  - Initiate interagency user referral service
- **1993 GCDIS milestones**
  - Develop guideline document for GCDIS data collection and generation
  - Develop initial interagency protocol for inventory search and order

- Initiate tri-agency charging system test case for AVHRR data
- Initiate planning for user feedback and validation experiment

- **1994 GCDIS milestones**
  - Publish GCDIS interagency interface control document
  - Establish common archive standards
- **1995 GCDIS milestones**
  - Operate all GCDIS functional elements at selected GCDIS sites
  - Conduct user feedback and validation experiment
  - Initiate near-real-time data exchange among participating agencies
  - Apply interagency metadata standards to key data sets
  - Demonstrate prototype inventory search and order capability across tri-agency GCDIS
  - Demonstrate prototype guide and text search across GCDIS data centers
  - Provide browse data sets for high-priority data sets
  - Demonstrate prototype interagency charging system
  - Promulgate uniform interagency data policy for billing and ordering
  - Provide data to users on at least some minimum set of mutually agreeable media at all participating data centers
  - Deliver moderately sized data sets (including browse) electronically
- **1998 GCDIS milestones**
  - Operate GCDIS functional elements across all agency sites and systems (including inventory and guide search)
  - Provide full implementation of near-real-time data exchanges
  - Fully comply with NARA/NIST standards at all GCDIS data centers
  - Operate full GCDIS search and order capability
  - Integrate browse products into the GCDIS electronic search and order process.

Appendix A.

GCDIS Functional Model

GCDIS FUNCTIONAL MODEL

The major functional elements of a general GCDIS model and the data and information flows among the elements are shown in Figure A-1. Principal data and information inputs to the system come from observing programs, process studies, modeling programs, and assessment activities. The major elements illustrated in the figure include the following, which are briefly discussed in the following paragraphs:

- Identification and collection
- Generation
- Archive
- Search and order
- Distribution.

IDENTIFICATION AND COLLECTION

This area includes both the process of identifying needed data and information, either new or existing, and the process of assembling these data and information into GCDIS. GCDIS includes capabilities to collect data produced by new observational systems, existing remote-sensing and *in situ* systems, and field process studies, as well as information from modeling and assessment programs. Data sets from research field programs will generally be collected after completion of the initial analysis phase. The collection process includes first level quality control on the data. It provides for the inclusion of metadata describing the data, such as data dictionaries, station histories, and quality control summaries. Data and associated information flows from this element to the generation element and/or to the archive element.

GENERATION

Data and metadata are used in generating summary and derivative global change products. The key to integrating the multitude of data sets is the development of common reference structures, storage and transmission formats, and information visualizations that encompass the documentation requirements of the individual data sets and their many potential uses. The different functional areas as well as the research users have varying requirements for the ways in which data and information are to be handled. Geographical queries, physical event sorts, data compaction and compression, and requests for information retrieval all have varying issues that affect the structure of the data and supporting information. Integrated data and information products flow from this element to the archive element.

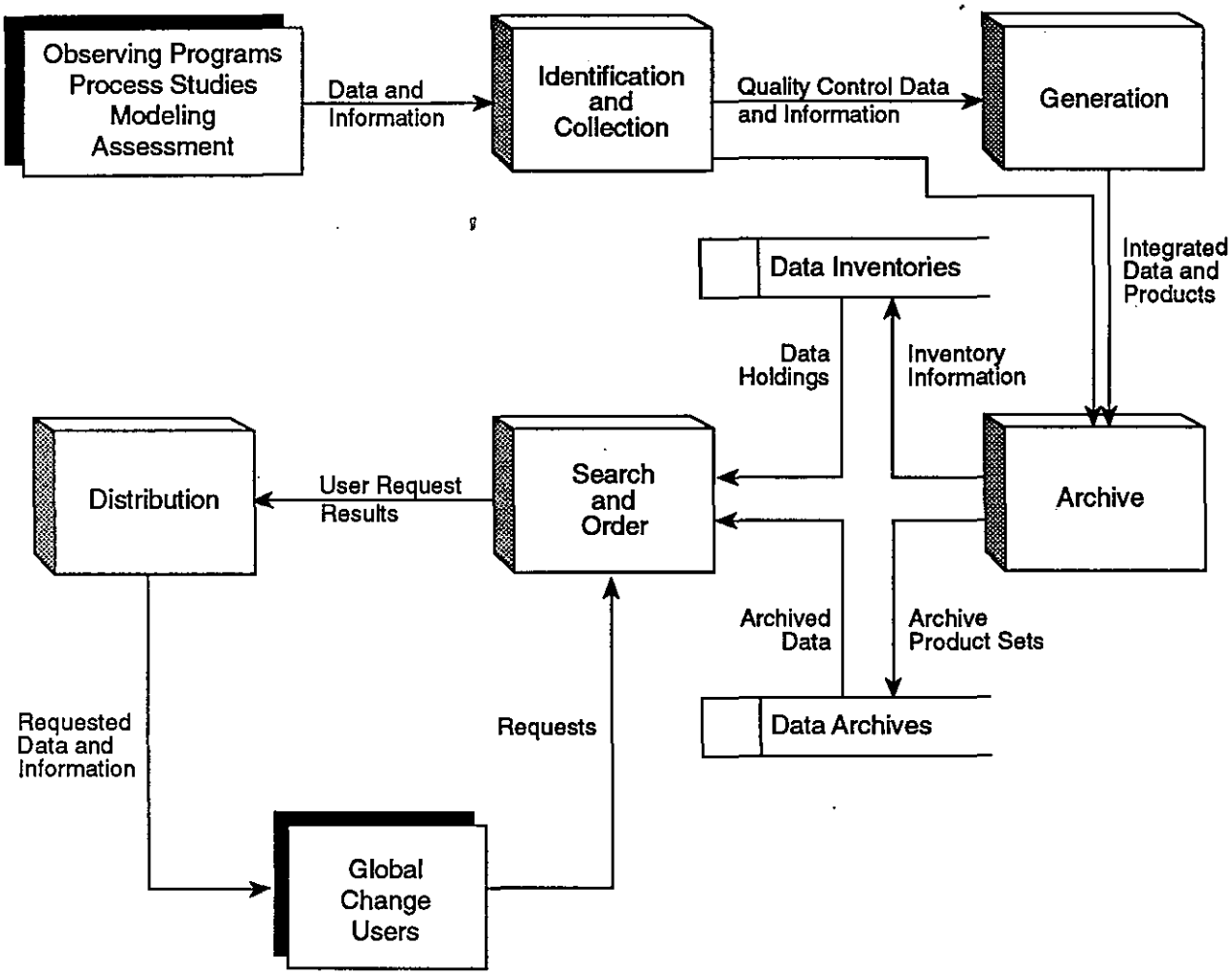


Figure A-1. GCDIS Functional Elements and Data Flows

ARCHIVE

The primary responsibilities of the archive element are those of ensuring the long term safety, accountability, and traceability of data and information. In addition to the long-term protection responsibilities, this element also includes an effective distribution infrastructure and provides for on-line and off-line storage of data sets. Metadata is integrated with the basic data sets and stored as complete product sets. Continuing rescue efforts are often required until normal maintenance procedures are current, then normal archive maintenance activities safeguard the data and information. The archive element provides the data and information by which the search and order element fulfills user requests.

SEARCH AND ORDER

GCDIS assists users with data and information search and retrieval, with a goal that interaction among the various agency systems be transparent to the users. Key global change data and information products will be identified to the granule level, and browse capability will be provided. Ordering for on-line and off-line products will be automated and streamlined. Improvements in procedures and facilities to handle face-to-face and telephone interactions will also be included. As a result of user interactions in the search and order element, archived data and information flow out to the users.

DISTRIBUTION

Many global change data holdings will be made available through implementation of interoperable catalogs. These capabilities will be used by global change researchers and clients to access GCDIS holdings of the participating agencies. Distribution on a suite of standard media and on a set of standard formats will be provided. This distribution capability includes electronic data delivery for moderately sized data sets.

Appendix B.

GCDIS Data Sets

GCDIS DATA SETS

As described in the main body of this plan, the tri-agency GCDIS will evolve steadily over the period between 1992 and 1998. The data centers and systems participating, the data sets available to users, and the level of search and order service associated with particular data sets will all be part of this evolution. Table B-1 presents an initial plan for agency GCDIS data set evaluation. The table is organized around the GCDIS snapshot years of 1992, 1995, and 1998, providing lists of GCDIS data sets by archive site, with the data sets grouped by snapshot year in which they become first available through GCDIS. Each data set listed is required to have directory and inventory level information available to the GCDIS user, although the inventory may be in an off-line form. The table also provides an indication of the progression in level of service associated with a data set. The column entitled "On-Line Inventory" shows the year by which an on-line inventory is planned to be available for a data set. This includes both the case where the inventory is available via a link from GCDIS and the case where the inventory is available only through a separate electronic connection. However, a higher level of service is the objective for all data sets considered to be key to global change research. This higher level requires on-line inventory information available across GCDIS within a single user session to allow search and order of individual data granules (i.e., the smallest part of a data set that a user can order). The column entitled "Interoperable Search & Order" indicates the year by which this high level of search and order service is planned to be available for a data set.

The data set listing is an attempt to address at least high- and medium-priority data sets. As mentioned in the text proper, this listing is meant to be a working document, evolving with changes in the perceived importance of particular data sets and in the scheduled availability of on-line search and order capability.

Table B-1. 1992 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Aerosol, NO2, and O3 L3 Profiles (SAGE I)	GSFC	1995	1995
Aerosol, NO2, H2O and O3 L3 Profiles (SAGE II)	GSFC	1995	1995
Airborne Gamma Radiation Snow Surveys (In situ)	NSIDC	1995	1995
Aircraft Photography (Multi-agency)	EDC	1992	1998
Aircraft Photography (NASA)	EDC	1992	1998
Alaska Land Cover and Terrain Databases	USGS/ Anchorage	TBD	TBD
Alaska National Wildlife Refuge Databases	USGS/ Anchorage	TBD	TBD
Alaska Radiocarbon Data Base	USGS/ Menlo Park	TBD	TBD
Albedo, Ozone, CPOZ (Nimbus-4 BUV)	GSFC	1995	1995
Angell's Global Temperature Deviations (In situ)	GSFC	1995	1995
Antenna Temperature, Ta (DMSP SSM/I)	MSFC	1992	1995
Arctic Drifting Station Data (1893-1973) (In situ)	NSIDC	1992	1995
Arctic Ice Dynamics Joint Exp.(AIDJEX) Sonar Ice Profile (In situ)	NSIDC	1995	1995
Arctic Ocean Drifting Buoy Data (In situ)	NSIDC	1992	1992
Arctic Sea Ice Limit (1901-1956) (In situ)	NSIDC	1995	1995
Atlas Dealiased Gridded Surface-Wind Vectors (Seasat Scatterometer)	JPL	1995	1995
Atlas Surface Wind Analysis Fields (Monthly and 5-Day Avg.; SSM/I)	JPL	1995	1995
Atlas Surface Wind Analysis Fields (SSM/I + in-situ)	JPL	1995	1995
AVHRR 1-km (HRPT & LAC from NOAA 9-11)	EDC	1992	1993
AVHRR High Resolution Picture Transmission (1 km)	NCDC/SDSD	1992	1995
AVHRR Level 1B GAC Imagery	NCDC/SDSD	1992	1995
AVHRR Level 1B LAC Imagery	NCDC/SDSD	1992	1995
AVHRR-GAC	GSFC	1995	1995
BANAT Aerosols (Nimbus-7 SAM II) (In situ)	GSFC	1995	1995
Baseline Surface Radiation Network (In situ)	GSFC	1995	1995
Brightness Temperature, Tb (Nimbus-7 SMMR)	MSFC	1995	1995
Brightness Temperature & Sea Ice Cunc. (Nimbus-5 ESMR)	NSIDC	1995	1995
Canadian Snowfall and Snow Depth (1943-1982) (In situ)	NSIDC	1995	1995
Carsey-Pihos Polar Gridded Data (Seasat SMMR)	JPL	1995	1995
CEARSX Data Set (In situ)	NSIDC	1995	1995
Climate Research Unit Temp. Dev. Analyses (In Situ)	GSFC	1995	1995
Cloud Data (C-MATRIX) (Nimbus 7 THIR)	GSFC	1995	1995
Cloud Data ERB Format (NCLE) (Nimbus 7 THIR)	GSFC	1995	1995
Cloud Data TOMS Format (BCLT) (Nimbus 7 THIR)	GSFC	1995	1995
COADS Monthly Summary Trimmed Data (In situ)	GSFC	1992	1995
Colorado R Snow Parm Atlas Disk (Nimbus 7 SMMR)	NSIDC	1995	1995
Core Research Center Info. System (samples from Rocky Mt. region)	USGS/ Denver	TBD	TBD
CZCS Data Products (Nimbus-7)	GSFC	1995	1995
Daily Mean Solar Flux (SMM ACRIM)	GSFC	1995	1995
Digital Seismic Reflection (Circum-Pacific & w. cont. U.S.)	USGS/ Menlo Park	TBD	TBD
DMA Digital Chart of the World	EDC	1992	1993
Doppler Radar (In-situ)	MSFC	1995	1995
Earthquake Data Base System	USGS/ Golden	TBD	TBD
East Anglia (Jones) Temperature Deviations (In situ)	GSFC	1992	1995
ECMWF (Surface & 14 levels) 2.5 deg. (In situ)	GSFC	1992	1995
ERB MATRIX Tapes (Nimbus-7)	GSFC	1992	1995
ERB Matrix Monthly Avg Sumry TP (EMST) (Nimbus 7)	LaRC	1992	1995
ERB Seasonal Tapes (Nimbus-7)	GSFC	1995	1995
ERB Solar Analysis Tape (Nimbus-7)	GSFC	1995	1995
ERB Solar Irradiance (Nimbus-7)	GSFC	1995	1995

Table B-1. 1992 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
ERB Solar Irradiance (Nimbus-7)	LaRC	1995	1995
ERB Summary MATRIX (Nimbus-7)	GSFC	1992	1995
ERBE S2 - Solar Incidence (ERBS)	LaRC	1995	1995
ERBE S2 - Solar Incidence (NOAA-9)	LaRC	1995	1995
ERBE S2 - Solar Incidence (NOAA-10)	LaRC	1995	1995
ERBE S4 - Monthly Averages (ERBS, NOAA-9,10)	LaRC	1992	1995
ERBE S4G - Monthly Averages (ERBS, NOAA-9,10)	LaRC	1992	1995
ERBE S8 - Processed Archival Tape (ERBS)	LaRC	1995	1995
ERBE S8 - Processed Archival Tape (NOAA-9)	LaRC	1995	1995
ERBE S8 - Processed Archival Tape (NOAA-10)	LaRC	1995	1995
ERBE S9 - Radiant Exitance and Albedo (ERBS, NOAA-9,10)	LaRC	1992	1995
ERBE S10 - Radiant Exitance and Albedo (ERBS, NOAA-9,10)	LaRC	1992	1995
ERBE Scan Earth RAD BDG ERBS S10 (ERBS)	LaRC	1995	1995
Federally Owned Landsat Data (MSS, TM)	EDC	1992	1993
FGGE II-B Restructured Data	GSFC	1995	1995
FNOC Analysis Fields (In situ)	GSFC	1992	1995
Full-Resolution Data (ERS-1 SAR)	ASF	1992	1995
Geochemical Data on Rocks, Soils, and Plants (worldwide)	USGS/ Denver	TBD	TBD
Geographic Names Information System (GNIS)	USGS/ Reston	TBD	TBD
Geosat Exact Repeat Mission Land/Ice Geophyical Data (Altimeter)	NSIDC	1995	1995
GGHYDRO (Cogley)	EDC	1992	1993
GISS Global Soils Data (In situ)	GSFC	1995	1995
Global Energy Budget Archive (In situ)	GSFC	1995	1995
GLORIA (side-scan sonar data of the U.S. EEZ)	USGS/Palo Alto	TBD	TBD
GPCP Precipitation Estimates (Geostat. VAS)	GSFC	1995	1995
Great Lakes Daily Ice Observations (1955-Present) (In situ)	NSIDC	1995	1995
Great Lakes Ice Charts (Aircraft/Shuttle)	NSIDC	1995	1995
Greenland (Dye-3) Ice Core Oxygen-18 vs. Depth Data (In situ)	NSIDC	1995	1995
Gridded Ozone Data (Nimbus-7 TOMS)	GSFC	1992	1995
Heat Budget Data (NOAA SR/AVHRR)	GSFC	1992	1995
High-Resolution Radiation Sounder, Level 1B	NCDC/SDSD	1992	1995
Hourly Surface Station Data (In situ)	GSFC	1995	1995
Hydrologic Unit Codes (USGS Water Resources Division)	EDC	1992	1993
Ice Concentration (Nimbus-7 SMMR)	GSFC	1992	1995
Ice Core Microparticle Analyses (In situ)	NSIDC	1995	1995
Icesheet Surface Elevation (Seasat Altimeter)	GSFC	1995	1995
Infrared Data (GMS VISSR)	MSFC	1995	1995
Infrared Data (GOES VISSR)	MSFC	1995	1995
Infrared Data (Meteosat)	MSFC	1995	1995
ISCCP B1 Radiance Data from GMS	NCDC/SDSD	1992	1995
ISCCP B1 Radiance Data from GOES VISSR/VAS	NCDC/SDSD	1992	1995
ISCCP B1 Radiance Data from METEOSAT	NCDC/SDSD	1992	1995
ISCCP B2 Radiance Data from GAC	NCDC/SDSD	1992	1995
ISCCP B3 Global Radiance Data	NCDC/SDSD	1992	1995
ISCCP B3 Radiance Data from GAC	NCDC/SDSD	1992	1995
ISCCP B3 Radiance Data from GMS	NCDC/SDSD	1992	1995
ISCCP B3 Radiance Data from GOES	NCDC/SDSD	1992	1995
ISCCP C1 Cloud data (3 hr averages)	GSFC	1992	1995
ISCCP C2 Cloud data (hourly & monthly)	GSFC	1995	1995
ISCCP Snow and Ice Data Set	NCDC/SDSD	1992	1995
ISCCP Snow/Ice Data	GSFC	1992	1995
ISCCP Stage B3 Cloud data	GSFC	1995	1995
ISCCP Stage C1 Cloud Analysis	LaRC	1992	1995

Table B-1. 1992 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
ISCCP Stage C2 Cloud Analysis	LaRC	1995	1995
ISCCP TOVS Sounding Data Set (TIROS-N/NOAA TOVS)	GSFC	1995	1995
ISCCP TOVS Sounding Data Set	NCDC/SDSD	1992	1995
JPL-UCLA-AES Dealiased Surface-Wind Vectors (Seasat Scatterometer)	JPL	1995	1995
Landsat 1, 2, 3 MSS (CCT-X)	EDC	1992	1993
Landsat 1, 2, 3 MSS (WBVT)	EDC	1992	1996
Landsat 3, 4, 5 MSS(HDT)	EDC	1992	1993
Landsat 4, 5 TM (HDT)	EDC	1992	1994
Landslide Bibliography (National Landslide Information Center)	USGS/ Golden	TBD	TBD
Lean-Foukal Monthly Mean Solar Flux (Model)	GSFC	1995	1995
Levitus Climatologies (In situ)	GSFC	1995	1995
LLP Lightening Ground Station (In situ)	MSFC	1995	1995
Map Archive Tapes LAMAT (Nimbus-7 LIMS)	GSFC	1995	1995
Mauna Loa Carbon Dioxide (In situ)	GSFC	1992	1995
Microwave Sounding Unit, Level 1B	NCDC/SDSD	1992	1995
Mineral Resources Data System (MRDS)	USGS/ Reston	TBD	TBD
MIZEX Data Set (In-situ)	NSIDC	1995	1995
MIZEX-W Sea Ice Concentration (Nimbus 7 SMMR)	NSIDC	1995	1995
Monthly Radiosonde (Balloon)	GSFC	1995	1995
Multichannel Sea Surface Temperatures (NOAA AVHRR)	GSFC	1992	1995
National Coal Resources Data System (NCRDS)	USGS/ Denver	TBD	TBD
National Coal Resources Data System (NCRDS)	USGS/ Reston	TBD	TBD
National Digital Cartographic Data Base (Digital Line Graph, Digital Elevation, Land Use/Land Cover)	USGS/ Reston	1992	1994
National Uranium Resource Evaluation (NURE) database	EDC	TBD	TBD
National Water Information System I (Daily Values File, Water Quality File, Ground Water Site Inventory, Unit Values File, Site-Specific Water Use File, Aggregated Water Use File)	USGS/52 locations	TBD	TBD
National Water Storage and Retrieval System (WATSTORE) [Master Water Data Index, Daily Values File, Water Quality File, Ground Water Site Inventory Peak Flow File, Basin Characteristics File]	USGS/ Reston	TBD	TBD
Navy-NOAA Weekly Ice Concentration & Extent (In situ)	NSIDC	1995	1995
NDVI (AVHRR 1-km, Africa biweekly composite)	EDC	1992	1993
NDVI (AVHRR 1-km, Eurasian 10-day composite)	EDC	1992	1993
NDVI (AVHRR 1-km, US biweekly composite)	EDC	1992	1993
NDVI (Global Vegetation Index Experimental composite)	EDC	1994	1994
NGDC Solar Activities Indices (In situ)	GSFC	1995	1995
NMC Grid Point Data Set (In situ)	GSFC	1992	1995
NMC Wind Data (In situ)	GSFC	1992	1995
NMC/CAC Arctic & Antarctic Sea Ice (1973-1982) (In situ)	NSIDC	1995	1995
NOAA/NESDIS S. Hemispehere Snow Data (In situ)	NSIDC	1995	1995
NODC Ocean Data: Salinity, Subsurface Temp. (In situ)	GSFC	1995	1995
North Slope-Alaska Lake Inventory	USGS/ Anchorage	TBD	TBD
Northern Hemisphere Sea Ice Conc. (In situ)	NSIDC	1992	1995
Ocean Products (DMSP SSM/I)	MSFC	1992	1995
Ozone and Reflectivity Data (Nimbus-7 TOMS)	GSFC	1995	1995
Ozone HDSBUV (Nimbus-7 SBUV)	GSFC	1995	1995
Pacific Ocean Pseudo Wind Stress (In situ)	GSFC	1995	1995
Param of Land and Ocean (PARM-LO) (Nimbus 7 SMMR)	GSFC	1995	1995
Permanent Ship Observations (In Situ)	GSFC	1995	1995
Phytoplankton Pigment Conc. (Nimbus 7 CZCS)	JPL	1995	1995

Table B-1. 1992 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Pigment and Radiance (Nimbus 7 CZCS GAC)	JPL	1992	1995
Prabhakara's Monthly Water Vapor (Nimbus-7 SMMR)	GSFC	1995	1995
Radiation Budget ERBE-S4 (ERBS)	GSFC	1992	1995
Radiometric Age Data Bank (isotopic age data for U.S.)	USGS/ Reston	TBD	TBD
Rand Corp Mean Monthly Global Snow Depth (In situ)	NSIDC	1995	1995
Raw Image Data (Landsat MSS, TM)	ASF	1992	1995
Relational World Data Bank II	EDC		1992
1993			
Research Cruise Digital Data Base (Pac. Ocean geophysical data)	USGS/Menlo Park	TBD	TBD
River Discharge Rate (In situ)	GSFC	1995	1995
Rock Analysis Storage System (RASS)	USGS/ Denver	TBD	TBD
SAGE I Monthly Aerosol Profile (AEM-2)	LaRC	1995	1995
SAGE I Monthly NO2 Profile (AEM-2)	LaRC	1995	1995
SAGE I Monthly O3 Profile (AEM-2)	LaRC	1995	1995
SAGE I Ozone Profiles on Data Tapes (AEM-2)	LaRC	1995	1995
SAGE II Aerosol Profil Arch. Tape (ERBS)	LaRC	1995	1995
SAGE II Met, Ephem, Raw Arch Tape (Merdat) (ERBS)	LaRC	1995	1995
SAGE II Monthly Aerosol Profile (ERBS)	LaRC	1995	1995
SAGE II Monthly H2O (ERBS)	LaRC	1995	1995
SAGE II Monthly NO2 Profile (ERBS)	LaRC	1995	1995
SAGE II Monthly O3 Profile (ERBS)	LaRC	1995	1995
SAGE II Nitrogen Dioxide (Sunsets Only) (ERBS)	LaRC	1995	1995
SAGE II Ozone Num Density + Max Radio (ERBS)	LaRC	1995	1995
SAGE II Water Vapor (ERBS)	LaRC	1995	1995
SAM II Beta & Aerosol Number Density - BANAT (Nimbus 7)	LaRC	1995	1995
SBUV CPOZ (Nimbus-7)	GSFC	1995	1995
SBUV Ozone (Nimbus 7)	GSFC	1995	1995
Scientific Committee on Antarctic Research (SCAR) Aerial Photography	EDC	TBD	TBD
Scientific Committee on Antarctic Research (SCAR) Aerial Photography	USGS/ Reston	TBD	TBD
Sea Ice Conc., Type (25 km) (DMSP SSM/I)	NSIDC	1992	1992
Sea Ice Drift: Bering Air-Sea_ice (1981-1982,1983,1985,1987) (In situ)	NSIDC	1995	1995
Sea Surface Temp. (2 x 2 Deg Gridded Monthly; Nimbus-7 SMMR)	JPL	1995	1995
Sea Surface Temp. (Miami MCSST; AVHRR)	JPL	1992	1992
Sea Surface Temperature (NOAA AVHRR)	JPL	1995	1995
Sea Surface Temperatures - 18 km MCSSTs--Miami (NOAA 7-11 AVHRR)	GSFC	1992	1995
Sea Surface Temperatures - CAC (In situ)	GSFC	1992	1995
Sea Surface Temperatures - Miami Multi Channel (NOAA AVHRR)	GSFC	1992	1995
Sea-Surface Height (Geosat Altimeter)	JPL	1992	1992
Seismic Data Analysis System (Nat. Earthquake Info. Service)	USGS/ Golden	TBD	TBD
SMMR Parmap Data on Tape (Nimbus 7)	NSIDC	1995	1995
Snow Depth (Nimbus-7 SMMR)	GSFC	1992	1992
Snow Water Equivalent (25 km) (DMSP SSM/I)	NSIDC	1995	1995
Solar Flux (NOAA 9-10 ERBE)	GSFC	1992	1995
Southern Hemisphere Ice Limits (In situ)	NSIDC	1995	1995
Stratospheric Sounding Unit, Level 1B	NCDC/SDSD	1992	1995
Surface Wind (DMSP SSM/I)	JPL	1995	1995
Surface Wind Analysis (DMSP SSM/I + in-situ)	JPL	1995	1995
Surface Wind Stress (Seasat Scatterrometer)	JPL	1995	1995
Surface Wind Vector (Aver of SASS1; Seasat Scatterrometer)	JPL	1995	1995
Surface Wind Vector (JPL/UCLA/AES; Seasat Scatterrometer)	JPL	1995	1995

Table B-1. 1992 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Surface Wind Vector from SASS1 (Atlas et al.; Seasat Scatterrometer	JPL	1995	1995
Surface Wind Vector from SASS2 (Atlas et al.; Seasat Scatterrometer)	JPL	1995	1995
TOGA Data (In situ)	JPL	1995	1995
Wentz Co-located Sigma-Naught (Seasat Scatterometer)	JPL	1995	1995
Wentz Geophys. Tapes (SSM/I)	JPL	1992	1992
Wentz Ocean Products (SSM/I)	JPL	1992	1992
Wentz, Atlas, Freilich Dealiased Surf. Wind Vectors (Seasat Scatt.)	JPL	1995	1995
World Monthly Surface Station Data (In situ)	GSFC	1992	1995
World Ocean Ferromanganese Crust Data Base	USGS/ Woods Hole	TBD	TBD
Zlotnicki-Fu Interp. Along Track (Geosat Altimeter)	JPL	1992	1992

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
1-Minute Average Elevation Topography Data for the U.S.	NGDC	1995	1995
1 Degree Geoid Undulations - Ohio State University Geodetic Data available from NGDC	NGDC	1995	1998
3-Minute Average Elevation Topography Data for the US at NGDC	NGDC	1995	1998
5 Channel Clear Sky Radiance (NOAA 7, 9, 11 AVHRR)	GSFC	1995	1995
7-Day Brightness Composite Images from NOAA Series Radiometer Data (AVHRR-GAC)	NCDC/SDSD	1995	1998
15-Minute Precipitation Data File for North America	NCDC	1995	1995
A Dust Climatology of the Western United States	NCDC	1995	1998
AA Indices - Geomagnetic Indicies from NGDC	NGDC	1995	1998
Acoustic Doppler Current Profiles from the Gulf of Mexico (1984)	NODC	1995	1998
Adiabatic Charts (WBAN-31)	NCDC	1995	1998
Adjusted Values of Earth's Magnetic Field From Mathematical Modelsavailable from NGDC	NGDC	1995	1998
Advanced Visible and Infrared Imaging Spectrometer (AVIRIS, NASA Airborne)	EDC	1995	1995
Aeromagnetic Survey Data - Various US Areas - from NGDC	NGDC	1995	1998
Aeronautical Meteorological Bulletins (AIRMET)	NCDC	1995	1998
Aerosol Monthly Fields	NCDC/SDSD	1995	1995
Aerosol Optical Thickness	NCDC/SDSD	1995	1995
Aerosol Weekly Fields	NCDC/SDSD	1995	1995
African Historical Precipitation Data	NCDC	1995	1995
Age Profile Data (DSDP), Available at NGDC	NGDC	1995	1998
Age Profile Data (DSDP), Available at NGDC	NGDC	1995	1998
Agricultural Advisory Forecast	NCDC	1995	1998
Air Stagnation Bulletins and Charts	NCDC	1995	1998
Air Weather Service Climatological Brief	NCDC	1995	1998
Airborne Expendable Current Profiler and Water Chemistry Measurements for the Gulf of Mexico Physical Oceanography Program (GOMPOP) (1985)	NODC	1995	1998
Aircraft Reports	NCDC	1995	1998
Airport Climatological Summaries (CLIM 90)	NCDC	1995	1998
AirSAR (NASA Airborne Radar)	EDC	1995	1995
Alaskan (NPRA) Digital Seismic Reflection Profile Data from NGDC	NGDC	1995	1998
Albedo - 9 km Daily Composite (NOAA 7,9,11 AVHRR)	GSFC	1995	1995
All-Sky Camera Auroral Images available from NGDC	NGDC	1995	1998
Along Track Scanning Radiometer (ERS-1)	NSIDC	1995	1995
Altimeter Data Over Ice Sheets (ERS-1)	NSIDC	1995	1995
Altimetry CD-ROM (Geos-3, Seasat, Geosat)	JPL	1995	1995
Analog Gravity Data Base - Gravity Station Observation Data from NGDC	NGDC	1995	1998
Analog Marine Geophysics Underway Data - Seismic, Bathymetry, Magnetics and Gravity - from NGDC	NGDC	1995	1998
Analog Total Electron Content (TEC) data from NGDC	NGDC	1995	1998
Annual Climatological Summary	NCDC	1995	1998
Antarctic Inspection Cruise (January & February 1983)	NCDC	1995	1998
Antarctic Inspection Cruise (January & February 1983)	NODC	1995	1998
Antenna Temperature, Ta (DMSP SSM/T,T2)	MSFC	1995	1995
Area Forecast	NCDC	1995	1998
ASOS Weather Observations	NCDC	1995	1998
Atlantic and Indian Ocean Heat Budget Files	NODC	1995	1995
Atlantic Coast (26N-39N) Chlorophyll-a and Phaeophytin Data; 1986	NODC	1995	1998
Atlas of Climatic Charts of the Oceans	NCDC	1995	1998
Atmospheric Absorption/Emission, AFGL Programs	NCDC	1995	1998
Atmospheric Handbook Data Tables	NCDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Atmospheric Transport and Dispersion (ATAD) model with NAMER Wind/Temperature data (TD-9743)	NCDC	1995	1998
Aurora, Radio Auroral Radar Observations from NGDC	NGDC	1995	1998
Auroral Electrojet (AE) Indices from NGDC	NGDC	1995	1998
Auroral Optical Imagery from the Defense Meteorological Satellite Program (DMSP) from NGDC	NGDC	1995	1998
Auroral Spectrogram Data from NGDC (Aurora-Other Optical)	NGDC	1995	1998
Auroral Zone Magnetic Activity from Auroral Electrojet Index (AE) 2.5 Minute, 1.0 Minute, and Hourly Data	NGDC	1995	1998
Australian Meteorological Data (In situ)	GSFC	1995	1995
Average Circulation in the Troposhere over the Tropics	NCDC	1995	1998
AVHRR 1-km (global HRPT & LAC from NOAA 12-13)	EDC	1995	1995
AVHRR 1-km Derived Data (from global 1-km AVHRR data)	EDC	1995	1995
Balloon Cosmic Ray Measurement Data from NGDC	NGDC	1995	1998
Barograph Forms/Charts	NCDC	1995	1998
Bay and Stream Chemistry of Lake Michigan (1970-72)	NODC	1995	1998
Benthic Biological Census in Moriches and Cape Cod Bay (1965-70)	NODC	1995	1998
Benthic Organism Data (F132) from Field Samples	NODC	1995	1998
Biological and Chemical (Nutrient, Chlorophyll-A, Primary Productivity) Data from the Atlantic, Summer 1988 (NOAA)	NODC	1995	1998
Biological and Chemical Data for the California OCS II Program (1986)	NODC	1995	1998
Biological and Nutrient Data from the Global Change Expedition of 1988	NODC	1995	1995
Biological Data from the first US-PRC cruise (1986)	NODC	1995	1998
Biological Data from the first US-PRC cruise (1986)	NODC	1998	1998
Biological, Chemical, and Physical Data from the OCS Benchmark Study in the North Atlantic (1977)	NODC	1995	1998
Bird, Mammals, and Fish Sightings in the Hawaiian Islands (1950-63)	NODC	1995	1998
BLM South Texas Outer Continental Shelf Ichthyoplankton Data (1975-76)	NODC	1995	1998
Brazilian Physical and Chemical Station Data (1975 and 1977)	NODC	1995	1998
British Surface Physical, Chemical, and Station Data (1958-63)	NODC	1995	1998
Bulletin of Volcanic Eruptions from NGDC	NGDC	1995	1998
Bumblebee Buoy Data from the North Pacific Ocean (1964-73)	NODC	1995	1998
Buoy Observations	NCDC	1995	1998
Bureau of Mines Coal Analysis Data from NGDC	NGDC	1995	1998
Canadian Biological and Hydrographic Data for the West Coast of North America and the Arctic Ocean	NODC	1995	1998
Canadian Surface STD Data from the U.S. Atlantic Coast, GulfofMexico, and the Lesser Antilles (1970)	NODC	1995	1998
Canadian Temperature, Salinity, and Oxygen Measurements from the Gulf of St. Lawrence and Saguenay River (1968)	NODC	1995	1998
Carbon/Carbonate Data (DSDP) from NGDC	NGDC	1995	1998
Carbon/Carbonate Data (DSDP) from NGDC	NGDC	1995	1998
Ceiling-Visability-Wind Tabulations	NCDC	1995	1998
Chelton Monthly Wind Vectors (Scatterometer)	JPL	1995	1995
Chemical and Physical data from the U.S. Atlantic Coast (1957)	NODC	1995	1998
Chemical, Physical, and Biological data from the Southeastern U.S. Coast (1971-72)	NODC	1995	1998
Chinese Meteorological Data for TOGA (1986-87)	NODC	1995	1998
Chlorophyll and Nutrient Data for the Northeast Monitoring Program (1980-85)	NODC	1995	1998
Chlorophyll and Phaeophytin Data from the U.S. South Atlantic Coast	NCDC	1995	1998
Chlorophyll and Phaeophytin Data from the U.S. South Atlantic Coast	NODC	1995	1998
Chlorophyll Data from Bigelow Laboratory	NODC	1995	1998
Chlorophyll Data from Bigelow Laboratory	NODC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Chlorophyll-A and Associated Data (Phaeopigments; Temperature and Salinity) for Biscayne Bay, Florida; March 1986-February 1987	NODC	1995	1998
Climate Summary of the U.S. (Beginning 1930)	NCDC	1995	1998
Climates of the World	NCDC	1995	1998
Climatic Atlas	NCDC	1995	1998
Climatic Diagnostics Database	NCDC	1995	1998
Climatic Guide for Six U.S. Cities	NCDC	1995	1998
Climatic Study of the Near Coastal Zone	NCDC	1995	1998
Climatic Summaries for NOAA Data Buoys	NCDC	1995	1998
Climatic Summary of the U.S. (CLIM)	NCDC	1995	1998
Climatic Summary of the U.S. (1931-1952)	NCDC	1995	1998
Climatography of the U.S. NO81,1 (Degree Days)	NCDC	1995	1998
Climatography of the U.S. No. 81,2 (Monthly Precip Probability)	NCDC	1995	1998
Climatography of the US No. 20 - selected weather observing regions (cities)	NCDC	1995	1998
Climatography of the US No. 60 - State Weather Observing Regions	NCDC	1995	1998
Climatography of the US No. 84 Daily Normals - temperature and precipitation	NCDC	1995	1998
Climatography of the US No. 85 Divisional Normals of Temperture and Precipitation	NCDC	1995	1998
Climatography of the USA No. 81 Monthly Normals by State	NCDC	1995	1998
Climatological Data National Summary	NCDC	1995	1998
Climatological Data	NCDC	1995	1998
Climatological Record Book	NCDC	1995	1998
Climatological Summary, U.S. Resort Areas (CLIM21)	NCDC	1995	1998
Climatological Atlas of the World Ocean - Subsurface Ocean Climatology (Salinity, Temperature, Oxygen; Potential Density, Specific Volume)	NODC	1995	1998
Climatological Data - Daily, Monthly, Seasonal and Annual data by drainage basin	NCDC	1995	1998
Climatological Data for Arctic Stations	NCDC	1995	1995
Cloud Motion Vectors	NCDC	1995	1998
Cloud Cover, Type, Height (Polar Regions, By Orbit)	NSIDC	1995	1995
Cloud Motion Vectors from Geostationary Operational Environmental Satellites (GOES)	NCDC/SDSD	1995	1998
Clouds - 9 km daily (NOAA 7,9,11 AVHRR)	GSFC	1995	1995
Co-located Geosat Altimeter and Buoy Data	JPL	1995	1995
Coastal Current Measurements from Current Meter Data (Resultants)	NODC	1995	1995
Coastal Zone Color Scanner (CZCS) Compressed Earth Imagery Gridded Data Sets (CGDS)	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level 1 Oceanic Imagery on Microfilm	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level 1 Oceanic Imagery on Microfilm	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level 1; Calibrated Radiance Tapes (CRT) from SDSD	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level I Imagery	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level I Imagery	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level II Digital Data	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level II Photographic Print Imagery	NCDC/SDSD	1995	1998
Coastal Zone Color Scanner (CZCS) Level II Photographic Print Imagery	NCDC/SDSD	1995	1998
Columbia River Estuary Data Development Program (CREDDP): Biological Data (1975-81)	NODC	1995	1998
Columbia River Estuary Data Development Program (CREDDP): Sediment and Bathymetry Data	NODC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Columbia River Estuary Data Development Program (CREDDP): Tides, Currents, Winds, River Flow, Conductivity, Temperature, & Related Data	NODC	1995	1998
Columbia River Estuary Data Development Program (CREDDP): Velocity, Conductivity, Temperature & Related Data (VCDT) (1980)	NODC	1995	1998
Composite Moisture Index Chart	NCDC	1995	1998
Comprehensive Ocean-Atmosphere Data Set (COADS)Character-Formatted Long Marine Reports	NCDC	1995	1998
Compressed (Low-Resolution) Conductivity-Temperature-Depth/Salinity--Temperature--Depth (CTD/STD) Data	NODC	1995	1995
Conductivity/Salinity/Temperature/Depth (CTD/STD) Observations	NODC	1995	1995
Constant Pressure Chart with Winds	NCDC	1995	1998
Constant Pressure Prognostic Charts (6 Levels)	NCDC	1995	1998
Cooperative Summary of the Month (TD-3220) - Summary of Weather Observations from Cooperative Weather Stations	NCDC	1995	1998
Coral and Invertebrates in the North Pacific Ocean (1967-68)	NODC	1995	1998
Cosmic Ray Ionization Chamber Data from NGDC	NGDC	1995	1998
Cosmic Ray Meson Telescope Count Data from NGDC	NGDC	1995	1998
Cosmic Ray Neutron Monitor and Supermonitor Data from NGDC	NGDC	1995	1998
Cosmic Ray Neutron Monitor Data from NGDC	NGDC	1995	1998
CTD and Optic Data from the Northeast Atlantic (1989)	NODC	1995	1998
CTD Data from the Greenland Sea (1986)	NODC	1995	1998
CTD Data from the Spring Removal Experiment (SPREX) near the Georgia Coast	NODC	1995	1998
CTD from South Atlantic (R/V Knorr, 83-84; AJAX Expedition) Norwegian Sea (R/V Hudson, 82)	NODC	1995	1995
CTD, XBT, Bottom Pressure, Current Meter, Thermosalinograph, and Drifter Data from the Northern California Coastal Circulation Study	NODC	1995	1998
Current and Pressure Data from Drifting Buoys in the Chukchi Sea (1982)	NODC	1995	1998
Current Meter and CTD Data from NOS Circulation Studies:Yaquina Bay (Pacific Coast, Oregon); Wallops Bay, Grays Harbor (Washington)	NODC	1995	1998
Current Meter Data from the Florida Straits (1970)	NODC	1995	1998
Current profiles from the Ametek-Straza (June 1984)	NODC	1995	1998
Current, Temperature, Salinity, and Pressure Measurements from Current Meter Moorings in the Gulf of Alaska (1989)	NODC	1995	1998
CZCS Compressed Earth Imagery Gridded Data Sets	NCDC/SDSD	1995	1995
CZCS In-situ comparison data set:Chlorophyll-a,Phaeopigments, and Nutrients (1978-80)	NODC	1995	1998
CZCS Level 1; Calibrated Radiance Tapes	NCDC/SDSD	1995	1995
CZCS Level II Digital Data	NCDC/SDSD	1995	1995
Daily Means and Extremes of Temp, Precip, and Snowfall	NCDC	1995	1998
Daily Solar Radiation Data with Cloudiness Data CD-480	NCDC	1995	1998
Daily Heat Budget Parameter Images	NCDC/SDSD	1995	1998
Daily Heat Budget Parameter Images	NCDC/SDSD	1995	1998
Daily River Stages	NCDC	1995	1995
Daily Solar Radio Flux Data	NGDC	1995	1995
Daily Surface Radiation Budget Maps (SRB)	LaRC	1995	1995
Daily Vegetation Index Tapes from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1995
Daily Weather Observations - Daily Cooperative Data (TD-3200)	NCDC	1995	1998
Daily Zurich Sunspot Numbers from Ground Observatories from NGDC	NGDC	1995	1998
Danish Temperature, Salinity, and Current Data (1972)	NODC	1995	1998
Database of Significant Earthquakes from NGDC	NGDC	1995	1998
Decadal Heat Budget Data from NOAA Series Radiometer Data (1974-1986)	NCDC/SDSD	1995	1995
Decadal Heat Budget Data from NOAA Series Radiometer Data (1974-1986)	NCDC/SDSD	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Deep Sea Drilling Program (DSDP) Digital Well Log Data Available at NGDC	NGDC	1995	1998
Deep Sea Drilling Program (DSDP) Digital Well Log Data Available at NGDC	NGDC	1995	1998
Deep Sea Drilling Project (DSDP) Hardrock Data from NGDC	NGDC	1995	1998
Deep Sea Drilling Project (DSDP) Hardrock Data from NGDC	NGDC	1995	1998
Defense Mapping Agency (DMA) 1-DEG Elevations (DEM) from NGDC	NGDC	1995	1998
Defense Mapping Agency (DMA) 1-DEG Geoidal Heights Derived from Satellite Altimeter Data - NGDC	NGDC	1995	1998
Defense Mapping Agency (DMA) and misc. 5 Min. Average Elevation Data included from NGDC	NGDC	1995	1998
Department of Defense/Defense Mapping Agency Land Gravity File	NGDC	1995	1998
DIFAS Data Stream (In-situ)	NSIDC	1995	1995
Digital Marine Sediment Grain Size Data Base from NGDC	NGDC	1995	1998
Digital Total Electron Content (TEC) Data from NGDC	NGDC	1995	1998
Digitized Isopleths World Vol IX-Various Climate Parameters	NCDC	1995	1998
Digitized Radar Reflectivity Data from RADAP II Sites in the Central and Eastern United States	NCDC	1995	1998
Digitized Strong Motion Accelerograph Data from NGDC	NGDC	1995	1998
Direct and Standard Year Earth Radiation Data (TD-9723)	NCDC	1995	1998
Discrete Frequency Solar Radio Emissions and Events from NGDC	NGDC	1995	1998
DMSP Electron and Ion Data	NGDC	1995	1995
DMSP SSM/I Level IB	NCDC/SDSD	1995	1995
DMSP SSM/I Sensor Data Records	NCDC/SDSD	1995	1995
DMSP SSM/I Temperature Data Records	NCDC/SDSD	1995	1995
DMSP SSM/T Level IB	NCDC/SDSD	1995	1995
Drake Passage Bottom Pressure Gauge Data, 1976-82; Texas A&M	NODC	1995	1998
Drift Bottle Data from the Gulf of Mexico (1962-63)	NODC	1995	1998
Drifter Data from the Northwest Atlantic (1974-80)	NODC	1995	1998
Drifting Buoy Data from the Hawaii-Tahiti Shuttle Experiment (1979-1980)	NODC	1995	1998
DSDP Density-Porosity and Gamma Ray Attenuation Porosity Evaluator (GRAPE) Data from NGDC	NGDC	1995	1998
DSDP Density-Porosity and Gamma Ray Attenuation Porosity Evaluator (GRAPE) Data from NGDC	NGDC	1995	1998
DST Geomagnetic Indices from NDGC	NGDC	1995	1998
Earth Topography (ETOP) 5 Minute Gridded World Elevation Data from NGDC	NGDC	1995	1998
Earthquake Data Base / Hypocenter Data Files from NGDC	NGDC	1995	1998
Earthquake Intensity Data Files from NGDC	NGDC	1995	1998
Echo Sounding Correction Tables (Regional Ocean Density) from NGDC	NGDC	1995	1998
Effect of Contaminants on the Biota of the San Francisco Bay (1986-87)	NODC	1995	1998
Emery Water Vapor Corrections (DMSP SSM/I)	JPL	1995	1995
Emery Water Vapor Corrections (NOAA TOVS)	JPL	1995	1995
Energetic Particles Measurements from Geostationary Operational Environmental Satellites (SMS/GOES)	NGDC	1995	1998
Engineering Weather Data Manual	NCDC	1995	1998
Environmental Information Summaries	NCDC	1995	1998
Environmental Baseline in Long Island Sound (1972-73)	NODC	1995	1998
Epifauna Abundance on the United States North Atlantic Slope and Rise (1983-86)	NODC	1995	1998
Equatorial Atlantic Oceanographic Data Sets (SEQUAL/FOCAL)	NODC	1995	1998
ERS-1 Altimeter Data	JPL	1995	1995
Estimating Storage Days for Soils Treatment Systems	NCDC	1995	1998
Estimating Water Equivalent Snow Depths	NCDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Expendable Bathythermograph (XBT) Data Ocean Temperature Profile Data	NODC	1995	1995
FGGE IIB, International Format, WDC-A	NCDC	1995	1995
FGGE, WDC-A, GENERAL	NCDC	1995	1998
FIRE Azores (Jan '92 thru Dec '92) (In situ)	GSFC	1995	1995
Fire Weather Forecast	NCDC	1995	1998
First Global GARP Experiment (FGGE) Operational Year Global Ocean Data Base	NODC	1995	1998
Fischer Porter Charts	NCDC	1995	1998
Fish and Invertebrate Histopathology of the Gulf of Mexico (1976-77)	NODC	1995	1998
Fish and Station Data from the United States Atlantic Coast (1961-72)	NODC	1995	1998
Forecast and/or Advisory	NCDC	1995	1998
Free Fall Current Profiler Measurements from the Florida Straits (1968-70)	NODC	1995	1998
Freon Measurements and Other Water Sample Measurements from the Northeast Atlantic-South of the Azores (1987)	NODC	1995	1998
Full-Resolution Data (JERS-1 SAR)	ASF	1995	1995
GATE, General	NCDC	1995	1998
GATE-SMS Satellite	NCDC	1995	1998
Geochemistry of Manganese Nodules - Monget and Scripps	NGDC	1995	1998
Geodynamics Satellite (GEOS-3) G-Tapes of Altimeter Data	NCDC/SDSD	1995	1998
Geodynamics Satellite (GEOS-3) G-Tapes of Altimeter Data	NCDC/SDSD	1995	1998
Geodynamics Satellite (GEOS-3) I-Tapes of Altimeter Data	NCDC/SDSD	1995	1998
Geodynamics Satellite (GEOS-3) I-Tapes of Altimeter Data	NCDC/SDSD	1995	1998
Geomagnetic Activity Indices (Q Indices) from NGDC	NGDC	1995	1998
Geomagnetic Activity Indicies (K Indices) from NGDC	NGDC	1995	1998
Geomagnetic Component Mean Hourly Values at NGDC	NGDC	1995	1998
Geomagnetic Component Values at 1.0-Minute Intervals	NGDC	1995	1998
Geomagnetic Component Values at 2.5 Minute Intervals	NGDC	1995	1998
Geomagnetic Data (Past and Present Declination) from NGDC - Geomagnetic Data Services for Surveyors	NGDC	1995	1998
Geomagnetic Electrokinetograph Current Measurements from the North-Pacific near Japan	NODC	1995	1998
Geomagnetic Kp, Ap, Cp, C9 Indices from NGDC	NGDC	1995	1998
Geomagnetic Magnetograms from NGDC	NGDC	1995	1998
Georges Bank Chlorophyll and Phaeophytin Measurements (1978-1982)	NODC	1995	1998
GEOSAT Exact Repeat Mission Land/Ice Geophysical Data Records	NGDC	1995	1998
GEOSAT Exact Repeat Mission Land/Ice Geophysical Data Records	NGDC	1995	1998
GEOSAT Geophysical Data Records for the Exact Repeat Mission	NODC	1995	1998
GEOSAT Wind/Wave Data From the Geodetic Mission	NODC	1995	1998
Geosat Crossover Difference Data (1985-87)	NODC	1995	1998
GEOSECS - Geochemical Ocean Sections Study Data	NODC	1995	1998
Geothermics: Data and Publications from NGDC	NGDC	1995	1998
German Surface Physical and Chemical Oceanographic Data (1965)	NODC	1995	1998
German Surface Physical Oceanographic Data in the Northeast Atlantic (1974-76)	NODC	1995	1998
German Surface Temperature and Salinity Data from the North Atlantic Ocean (1938-74)	NODC	1995	1998
German XBT, Station, and Surface Physical and Chemical Data (1963-66)	NODC	1995	1998
GFDL Atmospheric Circulation Tape Library	NCDC	1995	1998
Global Atmospheric Background Monitoring (BAPMON)	NCDC	1995	1998
Global Spectral Ocean Wave Model (GSOWM)	NCDC	1995	1998
Global 10-Minute Terrain Elevation	NGDC	1995	1995
Global Area Coverage (GAC) Microfilm Mosaics of Earth Imagery from NOAA Series Radiometer Data (AVHRR)	NCDC/SDSD	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Global Area Coverage (GAC) Microfilm Mosaics of Earth Imagery from NOAA Series Radiometer Data (AVHRR)	NCDC/SDSD	1995	1998
Global Digital Topographic Data	EDC	1995	1995
Global Geomagnetic Observations for Secular Changes and Annual Means - NGDC	NGDC	1995	1998
Global Heat Flow, Temperature Gradient and Thermal Conductivity Data from NGDC	NGDC	1995	1998
Global Photographic Displays of Sea Surface Temperature (Quality Control Image (Global/Climatic))	NCDC/SDSD	1995	1998
Global Photographic Displays of Sea Surface Temperature (Quality Control Image (Global/Climatic))	NCDC/SDSD	1995	1998
Global SST Anomalies from COADS	NODC	1995	1995
Global Surface Current Data	NODC	1995	1995
Global XBT Data from TOGA	NODC	1995	1995
GOES VAS Atmospheric Sounding	NCDC/SDSD	1995	1995
GOES VAS Cloud Motion Vectors	NCDC/SDSD	1995	1995
GOES VAS Digital Earth Imagery	NCDC/UW	1995	1995
Gravity Survey Data for Various Areas of the Western U.S. from NGDC	NGDC	1995	1998
Great Lakes Operational Ice Analysis Charts	NCDC/SDSD	1995	1998
Grid and Earth Location Dataset (GELDS) for AVHRR	NCDC/SDSD	1995	1998
Grid and Earth Location Dataset (GELDS) for AVHRR	NCDC/SDSD	1995	1998
Grid and Earth Location Dataset (GELDS) for TOVS	NCDC/SDSD	1995	1998
Grid and Earth Location Dataset (GELDS) for TOVS	NCDC/SDSD	1995	1998
Gridded Aeromagnetic Data for New Mexico - (NURE data) from NGDC	NGDC	1995	1998
Gridded Atmospheric and Oceanic Data	NCDC	1995	1998
Gridded Depths for the North Pacific Ocean from NGDC	NGDC	1995	1998
Gridded Gravity Data for the United States from NGDC	NGDC	1995	1998
Gridded Sea Ice Surf. Energy Fluxes	NSIDC	1995	1995
Gridded, Averaged Earth Radiation Parameters from NOAA SR and AVHRR	NCDC/SDSD	1995	1998
Gridded, Averaged Earth Radiation Parameters from NOAA SR and AVHRR	NCDC/SDSD	1995	1998
Guide to Marine Pollution Related Data	NODC	1995	1998
Gulf of Mexico CTD and Station Data, February 1990; Texas A & M	NODC	1995	1998
Gulf of Mexico Imagery from GLORIA Side Scan Sonar System	NGDC	1995	1998
H-Alpha Spectroheliograms Other Than Flares from NGDC	NGDC	1995	1998
Handbook of Federal Systems and Services for Marine Pollution Data and Information	NODC	1995	1998
Hawaii-Tahiti, Norpax	NCDC	1995	1998
Heat Budget Seasonal	NCDC	1995	1998
Heat Budget-10 Year	NCDC	1995	1998
Heat Budget-Monthly Mean	NCDC	1995	1998
Heat Budget Monthly	NCDC	1995	1995
Helium and Tritium Data for the North Atlantic Survey and North Atlantic Tracer Section	NODC	1995	1998
Helium and Tritium data from the North Atlantic (1979-81)	NODC	1995	1998
Hemispheric Geomagnetic Activity Indicies (KM, KN, KS Indices) from NGDC	NGDC	1995	1998
Herring Surveys (F057) Population Density and Distribution	NODC	1995	1998
High Altitude Meteorological Data (Rocket)	NCDC	1995	1998
High Altitude Meteorological Data	NCDC	1995	1995
High Density Aeromagnetic Surveys of the US 1975 - Present	NGDC	1995	1998
High Resolution Infrared Sounder (Level 1b)	NCDC/SDSD	1995	1995
High Resolution Picture Transmission (HRPT) Hardcopy Earth Imagery from NOAA Series Satellites	NCDC/SDSD	1995	1998
Historical Climate Series 2-1,2-2,2-3 (Historical Indexes)	NCDC	1995	1998
Historical Climate Series, Cooperstown NY and Yellowstone WY	NCDC	1995	1998
Historical Climatology Series 3.1-11 (ATLASES)	NCDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Historical Climatology Series 6-1 (Climate Data by State)	NCDC	1995	1998
Historical Drought Data (NCDC)	NCDC	1995	1998
Historical Extreme Wind U.S., Atlantic, Gulf Mex, GR Lakes	NCDC	1995	1998
Historical Possible and Measured Sunshine Data	NCDC	1995	1998
Historical Climatological Series - Degree Days Weighted by Population	NCDC	1995	1998
Historical Climatology Series 4-; Areal Weighted Data	NCDC	1995	1998
Historical Seismograph Station Bulletins from NGDC	NGDC	1995	1998
History of Cooperative Stations	NCDC	1995	1998
HITRAN Data Base	LaRC	1995	1995
Horizontal Vector Wind Fields (UARS HRDI)	GSFC	1995	1995
Hourly Precipitation Data Maxes	NCDC	1995	1998
Hourly Solar Radiation Data with Meteorological Data	NCDC	1995	1998
Hourly Precipitation Data File for North America	NCDC	1995	1995
Hourly Precipitation Data	NCDC	1995	1995
Hurricane Tropical Storm Bulletin	NCDC	1995	1998
Hurricane and Seasonal 16mm Movies from Geostationary Operational Environmental Satellites (GOES)	NCDC/SDSD	1995	1998
Hurricane and Seasonal 16mm Movies from Geostationary Operational Environmental Satellites (GOES)	NCDC/SDSD	1995	1998
Hydrocarbon and Trace Metal Studies in the Gulf of Mexico and Caribbean Sea (1971)	NODC	1995	1998
Hydrographic and Chemical Data from the Kurishio Current (1987)	NODC	1995	1998
Hydrographic and Meteorological Data from FOCAL STD Data from the Arctic Ocean (1974)	NODC	1995	1998
Hydrographic Data from the Caribbean Sea	NODC	1995	1998
Hydrographic Data in Tampa Bay and Adjacent Waters (1961-72)	NODC	1995	1998
Hydrologic Bulletins	NCDC	1995	1998
Hydrological Data from the NSTS Santa Barbara Experiment (1979-80)	NODC	1995	1998
Hydrological Data from the NSTS Torrey Pines Experiment	NODC	1995	1998
Ice Margin Ocean SSTs (By Orbit) (NOAA AVHRR)	NSIDC	1995	1995
Ice Motion Vector (ERS-1, JERS-1 SAR)	ASF	1995	1995
Ice Surface Temperature (By Orbit) (NOAA AVHRR)	NSIDC	1995	1995
Ice Surface Temperature (Gridded) (NOAA AVHRR)	NSIDC	1995	1995
Ice Type Classification (ERS-1, JERS-1 SAR)	ASF	1995	1995
Ice Type Fraction (ERS-1, JERS-1 SAR)	ASF	1995	1995
Igneous Geochemical Data (IGBA) from the International Geological Correlation Program (IGCP) at NGDC	NGDC	1995	1998
IGOSS Depth, Temperature, and Salinity (TESAC)	NODC	1995	1998
IGOSS Depth, Temperature, and Salinity (TESAC)	NODC	1995	1998
IGOSS Depth, Temperature, and Salinity (TESAC)	NODC	1995	1998
IGOSS Depth, Temperature, and Salinity (TESAC)	NODC	1995	1998
IGOSS Temperature Data from the TOGA area (1985-86)	NODC	1995	1998
Index of Original Surface Weather Records (by State)	NCDC	1995	1998
Initial Wind Wave Sea Height Chart	NCDC	1995	1998
Input Data for Solar Radiation Information Systems	NCDC	1995	1998
Input for Solar Systems	NCDC	1995	1998
International Aeromagnetic Survey Data from NGDC	NGDC	1995	1998
International Gravity Data - Antarctic Gravity Data from NGDC	NGDC	1995	1998
International Ice Patrol TIROS Drifter Iceberg Tracking Data from NGDC	NGDC	1995	1998
International Magnetospheric Study (IMS) 10 Second and 1 Minute Geomagnetic Values	NGDC	1995	1998
International Reference Ionosphere Model	NGDC	1995	1998
International Reference Ionosphere Model	NGDC	1995	1998
Interplanetary Scintillations - Solar Wind Speed Data from NGDC	NGDC	1995	1998
Interstitial Water Chemistry from DSDP, Available at NGDC	NGDC	1995	1998
Interstitial Water Chemistry from DSDP, Available at NGDC	NGDC	1995	1998

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Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Intertidal Organisms and Habitats (F030) - From In-Situ Data	NODC	1995	1998
Ionograms from Bottomside Vertical Ionosondes - Film products from NGDC	NGDC	1995	1998
Ionograms from Bottomside Vertical Ionosondes - Paper products from NGDC	NGDC	1995	1998
Ionosphere Back and Forward Scatter Observation Data from NGDC	NGDC	1995	1998
Ionosphere Incoherent Scatter Radar Data - Analog products from NGDC	NGDC	1995	1998
Ionosphere Vertical Sounding Scaled data - Paper products from NGDC	NGDC	1995	1998
Ionospheric Absorption - Continuous Wave (CW) Field Strength (A3) Data from NGDC	NGDC	1995	1998
Ionospheric Absorption - Pulse Reflection Method (A1) Data from NGDC	NGDC	1995	1998
Ionospheric Absorption - Riometer Method (A2) Data from NGDC	NGDC	1995	1998
Ionospheric Drift Data from NGDC	NGDC	1995	1998
Ionospheric Incoherent Backscatter Radar Observations from NGDC	NGDC	1995	1998
Ionospheric Vertical Sounding Digital Master System	NGDC	1995	1995
ISCCP Stage B3 GLOBAL Cloud Data	LaRC	1995	1995
Isostatic Gravity Anomaly Data for the Conterminous U.S. from NGDC	NGDC	1995	1998
Israeli Eastern Mediterranean Cruises; Hydrographic and Surface Meterological Data (1975-1977)	NODC	1995	1998
Istanbul Hydrographic and Bathymetric Data from a Water Supply and Sewage Study (1965-68)	NODC	1995	1998
ISY CD-ROM (Nimbus 7 CZCS)	JPL	1995	1995
Japanese DNP Cruises for 1987	NODC	1995	1998
Japanese Geomagnetic Electrokinetograph (GEK) Current Measurements in the Philippine Sea, 1978-1987	NODC	1995	1998
JGOFS data from ROME (Role of Organics in the Marine Environment) and SUW (Subtropical Underwater) Cruises (1978-80)	NODC	1995	1998
Kurishio Current Study (1987)	NODC	1995	1998
Land Surface Synoptic (Observations)	NCDC	1995	1995
Landsat 6 Enhanced TM (HDT)	EDC	1993	1993
Landsat Pathfinder Processed Data	EDC	1995	1995
Last Spring and First Fall Freeze Dates	NCDC	1995	1998
Levitus Quality-Controlled NODC Station Data; Temperature, Salinity, and Oxygen at Standard Levels	NODC	1995	1995
Light Transmission in the Baltimore Canyon(1981-82)	NODC	1995	1998
Lightning Statistics Derived from Storm Data	NCDC	1995	1998
Lightning Product (OLS)	MSFC	1995	1995
Lithologic Data from Pacific Ocean DSDP Cores, Available at NGDC	NGDC	1995	1998
Lithologic Data from Pacific Ocean DSDP Cores, Available at NGDC	NGDC	1995	1998
Local Climatological Data, Annual	NCDC	1995	1998
Local Forecast Product	NCDC	1995	1998
Low-Resolution Data (ERS-1 SAR)	ASF	1995	1995
Low-Resolution Data (JERS-1 SAR)	ASF	1995	1995
Magnetic Field Data from Geostationary Operational Environmental Satellite (GOES) Magnetometer	NGDC	1995	1998
Mapped Global Area Coverage (GAC)-Polar Stereographic	NCDC	1995	1998
Mapped Mercator, GAC Earth Imagery from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1995
Mapped, Mercator, Global Area Coverage (GAC) Earth Imagery from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1998
Marine Atlas Data	NCDC	1995	1998
Marine Climatological Summaries	NCDC	1995	1998
Marine Coastal Weather Log	NCDC	1995	1998
Marine Forecasts and Warnings	NCDC	1995	1998
Marine Bacteria Data (F009)	NODC	1995	1998

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Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Marine Birds of Coastal Alaska and Puget Sound (F031, F033, F034, F037, F038, F040, F041)	NODC	1995	1998
Marine Chemistry (F069) from In-Situ Samples	NODC	1995	1998
Marine Chemistry for the Southern Ocean - Southern Ocean Atlas Data	NODC	1995	1998
Marine Core Curator's Data Base	NGDC	1995	1995
Marine Fish and Shellfish Surveys (F123)	NODC	1995	1998
Marine Geophysics Underway Data Base	NGDC	1995	1998
Marine Mammals of Coastal Alaska (F025, F026, F027) - Activity and Pathology Data	NODC	1995	1998
Marine Meteorological and Sea Surface Data, Equatorial Pacific; Joint U.S./P.R.C TOGA Cruise (1985-89)	NODC	1995	1995
Marine Meteorological Data from the Yellow and East China Sea (1968-82)	NODC	1995	1998
Marine meteorology of the Eastern Pacific (1970- 72)	NODC	1995	1998
Marine Minerals Data Base from NGDC	NGDC	1995	1998
Marine Pollution in the New York Bight	NODC	1995	1998
Marine Toxic Substances and Pollutants (F144) from In-Situ Samples	NODC	1995	1998
Mariners Weather Log	NCDC	1995	1998
Max and Min Temperature Chart (12 Hour)	NCDC	1995	1998
MEDS (Marine Environmental Data Service, Canada) Archive of Drifting Buoy Data; 1986-88	NODC	1995	1998
Meteorological and Chemical/Biological Oceanographical Data from TOGA (December 1985-February 1986)	NODC	1995	1998
Meteorological and CTD Data from the Southern Arabian Sea (1979)	NODC	1995	1998
Meteorological and Oceanographic Data from the Gulf Offshore Weather Observing Network (GOWON) (F192)	NODC	1995	1998
Meteorological and Oceanographic Data from TOGA-TAO (1986-88)	NODC	1995	1998
Meteorological and Oceanographical Data from the Gulf of California (1970)	NODC	1995	1998
Meteorological Fields, Gridded (In situ)	NSIDC	1995	1995
Microbenthos from the Mid-Atlantic Outer Continental Shelf (1976)	NODC	1995	1998
Micropaleontology and Geochemistry of Ocean Sediment Cores Data Base from CLIMAP (18K bp) Program	NGDC	1995	1995
Microwave Sounding Unit (Level 1b)	NCDC/SDSD	1995	1995
Miscellaneous Publications	NCDC	1995	1998
Mixing Height Study	NCDC	1995	1998
MMS/GOMPOP (Minerals Management Service/Physical Oceanography Program) Physical and Chemical Data (1985-86)	NODC	1995	1998
Monthly Climatic Data for the World	NCDC	1995	1998
Monthly Marine Observations, 148 Characters	NCDC	1995	1998
Monthly and Annual North American Comparative Climatic Data	NCDC	1995	1998
Monthly Heat Budget data from the NOAA Series Advanced Very High Resolution Radiometer (AVHRR)	NCDC/SDSD	1995	1998
Monthly Heat Budget data from the NOAA Series Advanced Very High Resolution Radiometer (AVHRR)	NCDC/SDSD	1995	1998
Monthly Mean Heat Budget Files from TIROS/NOAA Series Scanning Radiometer (1974-1978)	NCDC/SDSD	1995	1995
Monthly Mean Heat Budget Files from TIROS/NOAA series Scanning Radiometer (1974-1978)	NCDC/SDSD	1995	1998
Monthly Surface Radiation Budget Maps (SRB)	LaRC	1995	1995
Moored Buoy Data for the Bering Sea (1975-82)	NODC	1995	1998
Moored Current Meter Data from the Gulf of Mexico	NODC	1995	1998
Moored Ekman (Profiling) Current Meter Data from the Mouth of the Amazon; September-October 1970	NODC	1995	1998
Multi-channel Common Depth Point (CDP) Seismic Reflection Data from NGDC	NGDC	1995	1998

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Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
N-Summary	NCDC	1995	1998
N.H. Polar Gridded Subset (NOAA AVHRR 1.1 Km 2/Wk)	NSIDC	1995	1995
NASA Global Atmospheric Sampling Program (GASP)-GC	NCDC	1995	1998
National Thunderstorm Frequencies for the Contiguous U.S.	NCDC	1995	1998
National Buoy Data Center Sea Surface Temp. Data (In situ)	GSFC	1995	1995
National Geodetic Survey (NGS) Land Gravity Parameters from NGDC	NGDC	1995	1998
National Meteorological Center Hemispheric Meteorology Pepmerge Grid and Analysis (TD-9606)	NCDC	1995	1998
National Petroleum Reserve Alaska 1981 Stacking Velocities from NGDC	NGDC	1995	1998
National Petroleum Reserve Alaska Data Base	NGDC	1995	1998
National Petroleum Reserve Alaska Shot Point Location Data from NGDC	NGDC	1995	1998
National Petroleum Reserve Alaska Time, Velocity and Depth Siesmic Data from NGDC	NGDC	1995	1998
National Status and Trends Program (NSTP)/Mussel Watch and Benthic Surveillance Programs/Contaminants and Biological Response - NOAA (1984-85)	NODC	1995	1998
National Water Information System II:Daily Values File (surface- and ground-water data), Water Quality File, Ground Water Site Inventory, Unit Values File, Site-Specific Water Use File, Aggregated Water Use File	USGS/ Approx. 100 distributed locations	TBD	TBD
Natural Hazards Photos available at NGDC	NGDC	1995	1998
Navy Climatological Brief	NCDC	1995	1998
NCAR World Weather Records	NCDC	1995	1998
NCDC GTS AFGWC Upper Air (TD-6203)	NCDC	1995	1998
NCDC GTS Upper Air (TD-6202)	NCDC	1995	1998
NCDC U.S. Upper Air (TD-6201)	NCDC	1995	1998
NDVI (AVHRR 1-km, global vegetation index)	EDC	1995	1995
NDVI (AVHRR 1-km, N. America periodic composite)	EDC	1993	1993
NDVI - 9 km 8 Day Composite (NOAA 7,9,11 AVHRR)	GSFC	1995	1995
Nearshore Sediment Transport Study - the Torrey Pines Experiment and the Santa Barbara Experiment	NODC	1995	1998
New data sets resulting from USGS research under USGCRPL (observations, process studies, and model outputs)	USGS/TBD	TBD	TBD
New Mexico Geothermal and Geophysical Maps from NGDC	NGDC	1995	1998
NEXRAD Level II (Digital Base Data)	NCDC	1995	1998
NEXRAD Level III (Derived Products)	NCDC	1995	1998
NGDC Digital Archive of N(h) Profiles from Ionosondes	NGDC	1995	1998
NMC Global GTS AIREP (OBSERVATIONS)	NCDC	1995	1998
NMC Global GTS Surface Marine (Observations)	NCDC	1995	1998
NMC Global GTS Surface Land (Observations)	NCDC	1995	1995
NMC Global GTS Upper Air (Observations)	NCDC	1995	1995
NMC History Data (In situ)	GSFC	1995	1995
NMC Satellite Winds	NCDC	1995	1998
NMC SIRS Obs	NCDC	1995	1998
North America Surface Chart/Map	NCDC	1995	1998
North Atlantic Atlas Contours, Vol 1	NCDC	1995	1998
North American Geothermal Gradient Map from NGDC	NGDC	1995	1998
North American Station Normals (TD-9641) - Heating and Cooling Degree Days by Station	NCDC	1995	1998
North Atlantic Continental Margin (CONMAR) Sediment Data at NGDC	NGDC	1995	1998
Northeast (Coastal US) Monitoring Program (NEMP); Temperature, Salinity, Nutrient, Chlorophyll and Phaeopigment Data (1980-85)	NODC	1995	1998
Northern Hemisphere Chart	NCDC	1995	1998
Northern Hemisphere Data Tabulations	NCDC	1995	1998
Northern Hemisphere Extratropical Cyclone Movements	NCDC	1995	1998
Northern Hemisphere Snow and Ice Charts	NCDC/SDSD	1995	1998

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Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Northern Hemisphere Snow and Ice Charts	NCDC/SDSD	1995	1998
Northern Sarasota Bay Station Data	NODC	1995	1998
NOS Hydrographic Survey Data and Data Base	NGDC	1995	1995
NS-001 (NASA Airborne scanner)	EDC	1994	1994
Nutrient data from the Northwest Atlantic Ocean and Eastern Pacific (1970-71)	NODC	1995	1998
Nutrient, Phytoplankton, and Microbiology of the Long Island Sound (1966-67)	NODC	1995	1998
Nutrient-chlorophyll data for Long Island Sound (1952-59	NODC	1995	1998
NWRF Rawinsonde Global	NCDC	1995	1998
NWS Profiler Data (Wind profiles--6-min. Average)	NCDC	1995	1998
NWS Profiler Data (Wind profiles--60-min. Average)	NCDC	1995	1998
Oblique Incidence Ionospheric Soundings from NGDC	NGDC	1995	1998
Observed 24 Hour Precipitation Chart	NCDC	1995	1998
Observed Snow Cover Charts	NCDC	1995	1998
Ocean Height (Geosat Altimeter)	JPL	1995	1995
Ocean Station Data from the Gulf of Guinea (1987)	NODC	1995	1998
Ocean Surface Currents Based on Ship Drift	NODC	1995	1998
Ocean Wind Speed (Geosat Altimeter)	JPL	1995	1995
Ocean Wind Time Series from Buoys	NODC	1995	1995
Oceanographic Station Data-Samples at Discrete Depths	NODC	1995	1995
Oceanographic Temperature-Depth Profiles from Mechanical Bathythermographs	NODC	1995	1995
OLS Analog Images	NSIDC	1995	1995
OLS Vis/IR Digital Data (0.6 km)	NSIDC	1995	1995
OLS Vis/IR Digital Data (2.7 km)	NSIDC	1995	1995
Optical Observations of the Solar Corona from NGDC	NGDC	1995	1998
Original Monthly Record of Observations WB 1001	NCDC	1995	1998
Ozone Data	NCDC	1995	1998
Ozone Data (Meteosat TOMS 2)	GSFC	1995	1995
Pacific Basin Tsunami Marigrams (Tide Gage Records) from NGDC	NGDC	1995	1998
Pacific Ocean Analyses from a General Circulation Model (1990)	NODC	1995	1998
Pacific Sea Surface Temperature Data (Namias-Born)	NCDC	1995	1995
Paleomagnetic Data for Sediments and Hardrocks (DSDP) from NGDC	NGDC	1995	1998
Paleomagnetic Data for the USSR - Available from NGDC	NGDC	1995	1998
Paleontology Data (DSDP), Available at NGDC	NGDC	1995	1998
Paleontology Data (DSDP), Available at NGDC	NGDC	1995	1998
Palmer Drought Crop Moisture Index Maps	NCDC	1995	1998
Palmer Drought Tapes	NCDC	1995	1998
Parameterized Spectral Ocean Wave Model	NCDC	1995	1998
Pathology of Marine Organisms Data (F144, F013)	NODC	1995	1998
Pelagic birds of Alaska	NODC	1995	1998
PETROS Data Base of Major Element Chemical Analyses of Igneous Rocks	NGDC	1995	1998
Physical and Chemical Characteristics of the Water Column - Water Physics and Chemistry (F004)	NODC	1995	1998
Physical and Chemical Data for the Deep Ocean Mining Environmental Study (DOMES): Pacific Ocean (1978-79)	NODC	1995	1998
Physical and Chemical Data from San Francisco Bay; 1969; USGS	NODC	1995	1998
Physical and Chemical Data from the GEOSECS Indian Ocean Expedition (1977-78)	NODC	1995	1998
Physical and Chemical Data Log Sheets for the Gulf of Alaska (1982)	NODC	1995	1998
Physical and Fauna Data from the California Cooperative Fisheries Oceanic Investigations in the Northeast Pacific (1951-60)	NODC	1995	1998
Physical Oceanographic Data from NRIO/Durban Cruises (1966-79)	NODC	1995	1998

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Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Physical Oceanographic Data from the Marine Science Floating Laboratory Program (1970)	NODC	1995	1998
Physical Oceanographic Data from the Sequal Program	NODC	1995	1998
Physical, Chemical, and Biological Data From the Tasman Sea (1972-77)	NODC	1995	1998
Phytoplankton Data (F028) - Abundance, Distribution and Productivity	NODC	1995	1998
Pilot Chart Global Sums, Atlas, Marsden Squares	NCDC	1995	1998
Pilot Report by State/Area	NCDC	1995	1998
Pilot Balloon Data	NCDC	1995	1995
Plankton, Station, and Sea Surface Temperature Data from the South Pacific (1965-67)	NODC	1995	1998
Plotted Unanalyzed Maps, Surface	NCDC	1995	1998
Plotted Unanalyzed Maps, Upper Air	NCDC	1995	1998
Point Elevation Data on 30-Second Grid	NGDC	1995	1995
Polar Stereo Mapped Global Area Coverage (GAC) Earth Imagery from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1998
Polar Stereo Mapped Global Area Coverage (GAC) Earth Imagery from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1998
Polar Stereographic Hemispheric Quadrant Images from NOAA Series Radiometers (AVHRR-GAC)	NCDC/SDSD	1995	1998
Polar Stereographic Hemispheric Quadrant Images from NOAA Series Radiometers (AVHRR-GAC)	NCDC/SDSD	1995	1998
POLYMODE SOFAR Float Deployment, University of Rhode Island (1975-81)	NODC	1995	1998
Post 1976 Hourly Solar Radiation and Meteorological Data (TD-9736)	NCDC	1995	1998
Precipitable Water Plot	NCDC	1995	1998
Precipitation Frequency for the Eastern and Central U.S.	NCDC	1995	1998
Precipitation Frequency of the Western United States	NCDC	1995	1998
Precipitation Intensity Atlas	NCDC	1995	1998
Precipitation Data; 5 minute to 3 hour Short Duration Maximum Precipitation (TD 9649)	NCDC	1995	1998
Precipitation: Hourly, Daily, and Monthly Accumulated Values	NCDC	1995	1995
Precision Orbit Determination (TOPEX GPS Receiver)	JPL	1995	1995
Preliminary Local Climatological Data	NCDC	1995	1998
Pressure Change Charts (12 Hour)	NCDC	1995	1998
Pressure and Trace Gas Profiles (UARS HALOE)	GSFC	1995	1995
Pressure and Trace Gas Profiles (UARS MLS)	GSFC	1995	1995
Primary Productivity (F029) from In-Situ Data Samples	NODC	1995	1998
Primary Productivity and Nutrient Data from the Northeast Pacific Ocean (1965)	NODC	1995	1998
Primary Productivity in the Mozambique Channel (1963-64)	NODC	1995	1998
Primary Productivity in the Tropical Atlantic (1968)	NODC	1995	1998
Primary Productivity, Zooplankton, and Surface Physical and Chemical Data from the Indian Ocean (1959-66)	NODC	1995	1998
Processed FGGE Drifting Buoy Data (1978-81)	NODC	1995	1998
Profiling Current Meter Data from the Florida Straits (1977)	NODC	1995	1998
Project Magnet; Airborne Magnetic Survey Data	NGDC	1995	1998
RADAP-2 Data by Oklahoma Climatological Survey	NCDC	1995	1998
Radar Plan Position Indicator Scope	NCDC	1995	1998
Radar Summary Chart	NCDC	1995	1998
Radar Weather Observation	NCDC	1995	1998
Radiance Measurements from TIROS-N/NOAA Tiros Operational Vertical Sounder (TOVS)	NCDC/SDSD	1995	1998
Radiance Measurements from TIROS-N/NOAA Tiros Operational Vertical Sounder (TOVS)	NCDC/SDSD	1995	1998
Radiances and Pigment Concentration from NIMBUS-7 CZCS	NCDC/SDSD	1995	1995
Radiances and Pigment Concentration from NIMBUS-7 CZCS	NCDC/SDSD	1995	1995

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Radiances and Pigment Concentration from the Nimbus-7 Coastal Zone Color Scanner(CZCS)	NCDC/SDSD	1995	1998
Radio Emissions from Jupiter - UC Boulder Jovian Dekametric Emission Data from NGDC	NGDC	1995	1998
Radiosonde Summary (SU)	NCDC	1995	1998
Raw (Unfiltered) Current Meter Observations (Velocity, Temperature, Pressure) in the Yellow Sea, January-June 1986	NODC	1995	1998
Raw Image Data (AVHRR)	ASF	1995	1995
Rawindesonde Over Polar Regions (In-situ)	NSIDC	1995	1995
Record Climatological Observations (COOP)	NCDC	1995	1998
Research Cooperator Solar Radiation	NCDC	1995	1998
Revised Uniform Standard Summary Weather Obs (RUSSWO)	NCDC	1995	1998
River Forecast Provided by the National Weather Service	NCDC	1995	1998
Robinson-Bauer Numerical Atlas of Monthly Surface Layer Temperatures & Monthly Deep Temperatures/Salinities: Version VIII	NODC	1995	1998
Rocketsonde Observations	NCDC	1995	1998
RSMAS Surface Physical and Chemical Oceanographic Data (1960-66)	NODC	1995	1998
Russian Zooplankton and Primary Productivity Data from the Caribbean Sea (1970)	NODC	1995	1998
Russian Zooplankton Biomass and Moored Current Meter Data for the Gulf of Mexico and Florida Straits (1964-65)	NODC	1995	1998
RUSSWO -- A to F Summary	NCDC	1995	1998
SAGE I Aerosol,NO2,O3 Maps (AEM-2)	LaRC	1995	1995
SAGE I,II Cloud Occurrence (AEM-2, ERBS)	LaRC	1995	1995
SAGE II Aerosol,NO2,O3,H2O Maps (ERBS)	LaRC	1995	1995
Salinity Data from the Northwest Atlantic Ocean (1969)	NODC	1995	1998
Salinity-Temperature-Depth Data for the Gulf of Mexico	NODC	1995	1998
Sampling and Analysis of Marine Zooplankton (F124)	NODC	1995	1998
Satellite Derived Snow Cover Mapped by River Basin Charts	NCDC	1995	1998
Satellite Sea Surface Temperature - Regional Charts (1 Degree Isotherms at 50 KmResolution)	NCDC	1995	1998
Satellite Sea Surface Temperature Global Charts (1-Degree Isotherms at 100-km Resolution	NCDC	1995	1995
Satellite Sea Surface Temperature Local Charts (1 Degree Isotherms at 14 km Resolution)	NCDC	1995	1998
Satellite Sea Surface Temperature Monthly Mean Charts (2.5-Degree Isotherms at 100-km Resolution)	NCDC	1995	1995
Savannah River Experiment, Meteorological Tower Observations	NCDC	1995	1998
SBUV Ozone Products	NCDC/SDSD	1995	1995
SBUV-2 Historical Instrument File	NCDC/SDSD	1995	1995
Scripps Archive NIMBUS-7 Coastal Zone Color Scanner Level 0 Radiance	NCDC/SDSD	1995	1998
Scripps Edited Deep Data for World Oceans (Excluding Arctic)	NODC	1995	1998
Sea Surface Temperature 7/8 Day Observations	NCDC	1995	1998
Sea Bottom Pressure Gauge Data	NODC	1995	1995
Sea Ice Conc., Type (25 km Grid) (Nimbus-7 SMMR)	NSIDC	1995	1995
Sea Level Data from the IGOSS Pilot Project in the Pacific	NODC	1995	1998
Sea level data and significant wave height from the GEOSAT Exact Repeat Mission	NODC	1995	1998
Sea level data and significant wave height from the GEOSAT Exact Repeat Mission	NODC	1995	1998
Sea level data and significant wave height from the GEOSAT Exact Repeat Mission	NODC	1995	1998
Sea level data and significant wave height from the GEOSAT Exact Repeat Mission	NODC	1995	1998
Sea Surface Temp. (AVHRR Pathfinder)	JPL	1995	1995
Sea Surface Temp. - 9km Global Ocean Day/Night Daily (AVHRR)	GSFC	1995	1995

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Sea Surface Temperature (SST) 250 Km Monthly Mean Data from NOAA Series AVHRR - Available from NCDC	NCDC	1995	1998
Sea Surface Temperature (SST) data from NOAA Series AVHRR - 7-8 Day Observation File at NCDC	NCDC	1995	1998
Sea Surface Temperature 14 Km Analysis (Local-Scale) from NOAA Series AVHRR Data	NCDC	1995	1998
Sea Surface Temperature 50 Km (Regional Scale) and 500 Km Analysis (Climate Scale) from NOAA Series Radiometers	NCDC	1995	1998
Sea Surface Temperature and Thermocline Depth (1970)	NODC	1995	1998
Sea Surface Temperature Derived from TIROS-N AVHRR	NCDC/SDSD	1995	1995
Sea Surface Temperatures at Gulf of Alaska Light Stations (1959-67)	NODC	1995	1998
Sea Surface Temperatures derived from TIROS-N/NOAA Advanced Very High Resolution Radiometer (AVHRR)	NCDC/SDSD	1995	1998
Sea Surface Temperatures over the Northwest Atlantic and Northeast Pacific from Aircraft (1969)	NODC	1995	1998
Seabed Oxygen Consumption (F050) from In-Situ Sources	NODC	1995	1998
SEASAT Altimeter - Geophysical Data Record - Sensor File	NCDC/SDSD	1995	1998
SEASAT Altimeter - Geophysical Data Record - Sensor File	NCDC/SDSD	1995	1998
SEASAT Altimeter Geophysical Data Record - Geophysical File	NCDC/SDSD	1995	1998
SEASAT Altimeter Geophysical Data Record - Geophysical File	NCDC/SDSD	1995	1998
SEASAT Altimeter	NCDC/SDSD	1995	1995
SEASAT Altimeter Sea Surface Height, Satellite Height with respect to the Reference Ellipsoid, Wind Speed, Wave Height, and Automatic Gain Control (Level 2.5)	NCDC/SDSD	1995	1998
SEASAT SAR	NCDC/SDSD	1995	1995
SEASAT SASS Backscatter Coefficient, Wind Speed and Wind Direction Level 2.0	NCDC/SDSD	1995	1998
SEASAT SASS Level 1.5 Backscatter Coefficient	NCDC/SDSD	1995	1998
SEASAT SASS Level 2.5 Wind Speed and Wind Direction	NCDC/SDSD	1995	1998
SEASAT SASS	NCDC/SDSD	1995	1995
SEASAT Scanning Multichannel Microwave Radiometer (SMMR) Geophysical Data Record - Geophysical Files and Sensor Files	NCDC/SDSD	1995	1998
SEASAT Scanning Multichannel Microwave Radiometer (SMMR) Geophysical Data Record - Geophysical Files and Sensor Files	NCDC/SDSD	1995	1998
SEASAT Scanning Multichannel Microwave Radiometer (SMMR) Geophysical Data Record Geophysical File	NCDC/SDSD	1995	1998
SEASAT Scanning Multichannel Microwave Radiometer (SMMR) Geophysical Data Record Geophysical File	NCDC/SDSD	1995	1998
SEASAT Scatterometer (SASS) Geophysical Data Record - Basic Geophysical Record	NCDC/SDSD	1995	1998
SEASAT Scatterometer (SASS) Geophysical Data Record - Basic Geophysical Record	NCDC/SDSD	1995	1998
SEASAT Scatterometer (SASS) Geophysical Data Record - Geophysical File	NCDC/SDSD	1995	1998
SEASAT Scatterometer (SASS) Geophysical Data Record - Geophysical File	NCDC/SDSD	1995	1998
SEASAT Scatterometer (SASS) Geophysical Data Records - Sensor File and Geophysical File	NCDC/SDSD	1995	1998
SEASAT Scatterometer (SASS) Geophysical Data Records - Sensor File and Geophysical File	NCDC/SDSD	1995	1998
SEASAT SMMR	NCDC/SDSD	1995	1995
SEASAT SMMR Sea Surface Temperature, Water Vapor, Liquid Water in the Atmosphere, Rain Rate and Wind Speed (Level 2)	NCDC/SDSD	1995	1998
SEASAT SMMR Sea Surface Temperature, Wind Speed, Water Vapor, Atmospheric Liquid Water and Rain Rate (Level 2.5)	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar (SAR) Digital Correlation Images	NCDC/SDSD	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
SEASAT Synthetic Aperture Radar (SAR) Digital Correlation Images	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar (SAR) Images - Digital Correlation	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar (SAR) Images - Digital Correlation	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar (SAR) Images - Optically Correlated Swaths	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar (SAR) Images - Optically Correlated Swaths	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar (SAR) Raw Signal Tapes	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar (SAR) Raw Signal Tapes	NCDC/SDSD	1995	1998
SEASAT Synthetic Aperture Radar Slant Range Imagery	NCDC	1995	1998
SEASAT VIRR Visible Reflectance and Thermal Infrared Emission Level 1	NCDC/SDSD	1995	1998
SEASAT Visible and Infrared Radiometer (VIRR) Imagery	NCDC/SDSD	1995	1998
SEASAT Visible and Infrared Radiometer (VIRR) Imagery	NCDC/SDSD	1995	1998
Seasat (Synthetic Aperture Radar)	EDC	1995	1995
Seasat Altimeter Level 1.0 Waveform, Satellite Height, Wave Height and Automatic Gain Control	NCDC/SDSD	1995	1998
Seasat Altimeter Satellite Height and Satellite Height With Respect To the Reference Ellipsoid (Level 1.5)	NCDC/SDSD	1995	1998
Seasat Altimeter Sea Surface Height, Satellite Height With Respect To the Reference Ellipsiod, Automatic Gain Control and Wind Speed (Level-2.0)	NCDC/SDSD	1995	1998
Seasat Scanning Multichannel Microwave Radiometer Level 1.0 Uncalibrated Sensor Data Records	NCDC/SDSD	1995	1998
Seasat Scanning Multichannel Microwave Radiometer Level 1.5 Calibrated Sensor Data Records	NCDC/SDSD	1995	1998
Seasat Scatterometer Level 1 Signal Power (Gain)	NCDC/SDSD	1995	1998
Seasonal Heat Budget Data from NOAA Series AVHRR	NCDC/SDSD	1995	1995
Seasonal Heat Budget Data from the NOAA series Advanced Very High Resolution Radiometer	NCDC/SDSD	1995	1998
SeaWiFS Compressed 10 km 8 day comp.	GSFC	1995	1995
SeaWiFS Compressed 10 km monthly comp.	GSFC	1995	1995
SeaWiFS Compressed 10km daily mosaic	GSFC	1995	1995
SeaWiFS Compressed 20 km 8 day comp.	GSFC	1995	1995
SeaWiFS Compressed 20 km monthly comp.	GSFC	1995	1995
SeaWiFS Compressed 20km daily mosaic	GSFC	1995	1995
SeaWiFS HRPT -11 fields	GSFC	1995	1995
SeaWiFS HRPT	GSFC	1995	1995
SeaWiFS Local Area Coverage, LAC	JPL	1995	1995
SeaWiFS Recorded GAC	GSFC	1995	1995
SeaWiFS Recorded LAC	GSFC	1995	1995
Sediment and Optical Measurements from the Amazon Shelf Sediment Study (1990)	NODC	1995	1998
Sediment Chemistry Data from DSDP, Available at NGDC	NGDC	1995	1998
Sediment Chemistry Data from DSDP, Available at NGDC	NGDC	1995	1998
Sediment Description Data from DSDP, Available at NGDC	NGDC	1995	1998
Sediment Description Data from DSDP, Available at NGDC	NGDC	1995	1998
Seismic Reflection Data For Various Areas of the United States from NGDC	NGDC	1995	1998
Select Topographic and Bathymetric Data (RAND 1-DEG) from NGDC	NGDC	1995	1998
Selected Magnetic Observations from Low Altitude Satellites - NGDC	NGDC	1995	1998
Selected North American Imagery from Geostationary Operational Environmental Satellites (GOES) Film Loops	NCDC/SDSD	1995	1998
Selected North American Imagery from Geostationary Operational Environmental Satellites (GOES) Film Loops	NCDC/SDSD	1995	1998
Selected Pioneer Spacecraft Interplanetary Electric Field Data from NGDC	NGDC	1995	1998
Selective Guide to Climatic Data Sources	NCDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Ship Search	NCDC	1995	1998
Ship Drift Data in the North Atlantic and Indian Ocean	NODC	1995	1998
Significant Meteorological Information (SIGMET)	NCDC	1995	1998
SIO Southeast Asia Sediment Descriptions (SEATAR) from NGDC	NGDC	1995	1998
SIR B (Radar)	EDC	1995	1995
SOFAR Subsurface Drifter Data (700 & 2000 m) from the Gulf Stream Recirculation Experiment (GUSREX); 1980-82; Location, Temperature, Pressure	NODC	1995	1998
Solar Backscater Ultraviolet Radiometer, Level 1B	NCDC/SDSD	1995	1995
Solar Brightness and Magnetic discontinuities collected by the Solar Observing Optical Network	NGDC	1995	1998
Solar Calcium Plage Regions - Solar Activity Indicies from NGDC	NGDC	1995	1998
Solar Flare Data from NGDC	NGDC	1995	1998
Solar Flare Data on Magnetic Tape from NGDC	NGDC	1995	1998
Solar Geophysical Data - Solar Observational Data from NGDC	NGDC	1995	1998
Solar Magnetic Fields (Sunspots and Whole Disk) from NGDC	NGDC	1995	1998
Solar Maps, Prominences and Filament Data from NGDC	NGDC	1995	1998
Solar Radiation Charts/Tape	NCDC	1995	1998
Solar Radiation Energy Resource Atlas of the US	NCDC	1995	1998
Solar Radiation Monthly Summaries from NCDC (1977-1980)	NCDC	1995	1998
Solar Radio Emission East-West Scans from NGDC	NGDC	1995	1998
Solar Radio Events Data from NGDC	NGDC	1995	1998
Solar Radio Flux Data from NGDC	NGDC	1995	1998
Solar Spectral Irradiances (UARS SOLSTICE)	GSFC	1995	1995
Solar Spectral Irradiances (UARS SUSIM)	GSFC	1995	1995
Solar Spectral Irradiances - Daily Avg. (UARS SOLSTICE)	GSFC	1995	1995
Solar Spectral Irradiances - Daily Avg. (UARS SUSIM)	GSFC	1995	1995
SOLDAY Daily Solar Radiation and Meteorological Parameters (TD-9739)	NCDC	1995	1998
SOLMET - Unedited Hourly Solar Radiation (TD-9794)	NCDC	1995	1998
SOLMET Hourly Solar Radiation, Plus SFC Meteorological Obs	NCDC	1995	1998
Sounding Data (4x5 deg., Susskind Temp./H_20 TIROS-N/NOAA TOVS)	GSFC	1995	1995
South China Sea Coastal Station Temperature and Salinity Data (1959-76)	NODC	1995	1998
South China Sea Coastal Wave Data (1960-1986)	NODC	1995	1998
Southern Hemisphere Constant Pressure Charts	NCDC	1995	1998
Southern Hemisphere SFC/1000 500MB Thickness Charts	NCDC	1995	1998
Southern California Outer Continental Shelf Project (BLM): Benthic and Intertidal Sediments (1975-78)	NODC	1995	1998
Southern California Outer Continental Shelf Project (BLM): Benthic Sediment Micro/Macrofauna, Biotic/Abiotic Mussel Data (1975-78)	NODC	1995	1998
Southern California Outer Continental Shelf Project (BLM): Benthic Water Column POC, DOC, ATP and Salinity/Temperature/Depth (1975-78)	NODC	1995	1998
Southern California Outer Continental Shelf Project (BLM): Benthic Water Column, Sediment, and Fauna Hydrocarbons (1975-78)	NODC	1995	1998
Southern California Outer Continental Shelf Project (BLM): Intertidal Biology (Rocky/Sandy) (1975-78)	NODC	1995	1998
Southern California Outer Continental Shelf Project (BLM): Trace Metals, Rocky/Sandy Fauna, Sediments (1975-78)	NODC	1995	1998
Spectral Ocean Wave Model	NCDC	1995	1998
Spectral Ocean Wave Model, Synoptic Sort	NCDC	1995	1998
Spencer's MSU Mid-Trop. Temp (NOAA TOVS/MSU)	GSFC	1995	1995
SPREX and CORE Temperature Data from Southeast United States	NODC	1995	1998
SSM/T Sounding Data Polar Subset - Trop. temp./H2O (DMSP SSM/T)	NSIDC	1995	1995
SST-Monthly Mean	NCDC	1995	1998
Stability Array (STAR)	NCDC	1995	1998
Stability Array (STAR)	NCDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Stacked Normalized Vegetation Index (weekly composites) Derived from NOAA-Series AVHRR Data	NCDC/SDSD	1995	1995
Stacked Normalized Vegetation Index Tapes from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1995
Stacked Normalized Vegetation Index Tapes from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1998
STACS Pegasus Current Meter Data in the Florida Current, 1982-85; Velocity and Temperature as a function of Depth	NODC	1995	1998
State Forecast Product	NCDC	1995	1998
STD and CTD Data for Beaufort Inlet and Delaware Bay	NODC	1995	1998
STD Data from the Arctic Ocean (1974)	NODC	1995	1995
Storage Gage Precipitation Data	NCDC	1995	1998
Storm Data	NCDC	1995	1998
Stratospheric Sounding Unit (Level 1b)	NCDC/SDSD	1995	1995
Stratospheric Temperatures (Balloon Radiosonde)	GSFC	1995	1995
Sudden Ionosphere Disturbance (SID) Data from NGDC	NGDC	1995	1998
Summary 6 Hourly (Observations)	NCDC	1995	1998
Summary of Constant Pressure (WBAN-33)	NCDC	1995	1998
Summary of Hourly Observations (CLIM 82)	NCDC	1995	1998
Summary of Meteorological Observations Surface (SMOS)	NCDC	1995	1998
Summary of Synoptic Met. Obs, Coastal Marine Areas	NCDC	1995	1998
Summary of Synoptic Meteorological Observations, Great Lakes	NCDC	1995	1998
Summary of the Day (Form 5670)	NCDC	1995	1998
Summary of the Day, Hydrology Format	NCDC	1995	1998
Summary of Winds Aloft (WBAN-22)	NCDC	1995	1998
Summary of the Day - 1st Order (TD 3210) Meteorological Data	NCDC	1995	1998
Summary of the Day - 1st Order Weather Summaries from NCDC	NCDC	1995	1998
Summary of the Day/Month Observations (Global CEAS)	NCDC	1995	1998
Sun Spot Number Data	NGDC	1995	1995
Surface Airways Hourly (Observations)	NCDC	1995	1998
Surface Marine Observations -- 1970's Decade	NCDC	1995	1998
Surface Pre-Edit (SPE)	NCDC	1995	1998
Surface Prognostic Charts	NCDC	1995	1998
Surface Airways Observations (Hourly)	NCDC	1995	1995
Surface Current and Meteorological Data from Drifting Buoys	NODC	1995	1995
Surface Global Summary of the Day/Month (TD-9618)	NCDC	1995	1998
Surface Marine Observations	NCDC	1995	1998
Surface Marine Observations-- Buoy Reports	NCDC	1995	1995
Surface Temperature and Salinity Observations for the Equatorial Atlantic	NODC	1995	1998
Surface Wind; Atmos Water (Nimbus-7 SMMR)	JPL	1995	1995
Survey of Sediment Toxicity in San Francisco Bay (1990)	NODC	1995	1998
SV/T/D Data From the Northeast Pacific, Gulf of Mexico, and the Caribbean (1969-70)	NODC	1995	1998
Swept Frequency Solar Radio Emissions from NGDC	NGDC	1995	1998
Temperature and Acoustic Doppler Current Profiler Data; North Carolina Frontal Eddy Dynamics Experiment (FRED) (1987)	NODC	1995	1998
Temperature and Pressure Data from Buoys in the Northwest Atlantic, Gulf of Mexico, and South Atlantic Ocean	NODC	1995	1998
Temperature and Salinity Data for the Central California Coast (1984-85)	NODC	1995	1998
Temperature and Salinity Data from the Mississippi Delta Bight (1975-77)	NODC	1995	1998
Temperature and Salinity Data from Western Long Island Sound Ecological Surveys	NODC	1995	1998
Temperature and Sound Velocity Data in the Northeast Pacific Ocean (1969-70)	NODC	1995	1998
Temperature and Trace Gas Profiles (UARS CLAES)	GSFC	1995	1995

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Temperature and Trace Gas Profiles (UARS ISAMS)	GSFC	1995	1995
Temperature and Wind Profiles (UARS WINDII)	GSFC	1995	1995
Temperature Data for Moored Subsurface Current Meters over the Mid-Atlantic Slope and Rise	NODC	1995	1995
Temperature Data from a Circulatory Survey at Coos Bay (1982)	NODC	1995	1998
Temperature Measurements from the Gulf of Mexico Physical Oceanography Program (GOMPOP) (1985-86)	NODC	1995	1998
Temperature, Salinity, and Nutrient Data from Long Island Sound	NODC	1995	1998
Temperature, Salinity, and Oxygen Data from the South Atlantic Ocean near Argentina and the Drake Passage (1938-54)	NODC	1995	1998
Temperature, Salinity, and Sound Velocity Data from the Northwestern Pacific Ocean (1971)	NODC	1995	1998
Temperature, Salinity, and Water Level Data from the Mississippi and Atcharfalya Rivers (1985-87)	NODC	1995	1998
Temperature, Wind, and Current Data from Moored Buoys in the TOGA area (1977-78)	NODC	1995	1998
Terminal Forecast	NCDC	1995	1998
Test Reference Year (TRY)	NCDC	1995	1998
The Alpine Experiment	NCDC	1995	1998
The Delaware Day Data Base: Chemical, Hydrographic and Biological Water Quality DAta (1978-85)	NODC	1995	1995
Thematic Mapper Simulator (TMS) Data (NASA Airborne)	EDC	1995	1995
Thermal Analysis Charts of the Cyclonic Gulf Stream Frontal Zone	NCDC	1995	1998
Thermal Infrared Multispectral Scanner (TIMS, NASA Airborne)	EDC	1994	1994
Thermodynamic Radiosonde	NCDC	1995	1998
Thickness Analysis Forecast	NCDC	1995	1998
Thunderstorm Beginning and Ending Times	NCDC	1995	1998
Tide and Current Data from Drake Passage-Antarctica (1975-76)	NODC	1995	1998
Tide Observations from the Yellow and East China Sea	NODC	1995	1998
Tide, Sea Temperature, and Winds for the Balboa Canal Zone (August-1969)	NODC	1995	1998
Time Bias Corrected Divisional Temperature/Precipitation Drought Index, and Temperature/Precipitation Normals for North American Climatic Divisions	NCDC	1995	1998
Time Series Coastal Ocean Wave and Current Data Collected for the Atlantic Remote Sensing Land/Ocean Experiment (ARSLOE, F181), North Carolina	NODC	1995	1998
Time Series Directional Ocean Current Data--Current Meter Data (Components)	NODC	1995	1995
Time Series of Meteorology and Wave Spectra (F191) Data from NOAA Buoys	NODC	1995	1998
TIROS Series Satellite Particle Detector Magnetic Field and Charged Particle Data from NGDC	NGDC	1995	1998
TOGA Global Blended SST Data	NODC	1995	1995
TOGA Global Blended SST data	NCDC	1995	1998
TOGA/NODC Sea Level Height (In situ)	GSFC	1995	1995
Tomales Bay Water Quality	NODC	1995	1998
TOPEX/POSEIDON Altimeter Data	JPL	1995	1995
Topside Vertical Incidence Soundings - Ionograms from NGDC	NGDC	1995	1998
TORNADO DATA	NCDC	1995	1998
Total Solar Radiation - Active Cavity Radiometer Irradiance Monitor (ACRIM) data from NGDC	NGDC	1995	1998
TOVS Data, Polar Subset (NOAA TOVS)	NSIDC	1995	1995
TOVS Level 2 Products	NCDC/SDSD	1995	1995
TOVS Sounding Product	NCDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Trace Constituents from the GEOSECS Expedition in the Atlantic, Pacific, and Indian Ocean (1972-78)	NODC	1995	1998
Trace Metal and Ancillary Data from the Puget Sound (1979-86)	NODC	1995	1998
Transient Tracer Data in the North Atlantic (1981)	NODC	1995	1998
Triple Register Charts	NCDC	1995	1998
Tropical Storm Guide	NCDC	1995	1998
Tropical Strip Surface Chart, Eastern Hemisphere	NCDC	1995	1998
Tropical Strip Surface Chart, Western Hemisphere	NCDC	1995	1998
Tropical Strip Upper Air Chart	NCDC	1995	1998
Tropical Storm Tracks for the North Atlantic, East, North, and Western-Pacific	NCDC	1995	1998
Troposheric Corrections	JPL	1995	1995
Tsunami Damage Photos available at NGDC	NGDC	1995	1998
Tsunami Data Base from NGDC - Includes Earthquake Information	NGDC	1995	1998
Turbidity Data	NCDC	1995	1998
Typical Meteorological Year	NCDC	1995	1998
U.S. Atlantic Coast Chlorophyll and Phaeophytin Data (1986)	NODC	1995	1998
U.S. Climate Summaries: Surf. Temp & Press; winds; H20 (Station)	GSFC	1995	1995
U.S. Hourly & 15 min Precipitation (Station Rain Gauge)	GSFC	1995	1995
U.S. Navy Hindcast Climatic Atlas Spectral Ocean Wave Model	NCDC	1995	1998
U.S. Outer Continental Shelf Miscellaneous Marine Well Borehole Data from NGDC	NGDC	1995	1998
U.S. Soil Temperatures	NCDC	1995	1998
Underway Data from the Bering Sea (1978-79)	NODC	1995	1998
Unedited Solar Radiation	NCDC	1995	1995
Upper Air Monthly Statistics	NCDC	1995	1998
Upper Air Standard Levels	NCDC	1995	1998
Upper Air Weather Observation	NCDC	1995	1998
Upper Air Observations (RAWINSONDE) Global Coverage	NCDC	1995	1995
Upper Air Observations (RAWINSONDE)	NCDC	1995	1995
USGS 30-Second Average Elevation Data from NGDC	NGDC	1995	1998
Vegetation Index (new) - Hardcopy Images Derived from NOAA Series Radiometer DAta (AVHRR)	NCDC/SDSD	1995	1998
Vegetation Index (new) - Hardcopy Images Dervied from NOAA Series Radiometer DAta (AVHRR)	NCDC/SDSD	1995	1998
Vegetation Index (old) - Harcopy Images Derived from NOAA Series Radiometer Data(AVHRR)	NCDC/SDSD	1995	1998
Vegetation Index (old) - Harcopy Images Derived from NOAA Series Radiometer Data(AVHRR)	NCDC/SDSD	1995	1998
Vegetation Index (old) from NOAA Series Radiometers (AVHRR) - Weekly Composites Combined on Tape (Stacked)	NCDC/SDSD	1995	1998
Vegetation Index (old) Weekly Composites from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1998
Vegetation Index Daily and Weekly Data Derived from NOAA - Series AVHRR	NCDC/SDSD	1995	1995
Vegetation Index Derived from NOAA-Series Radiometers (AVHRR)-- Weekly Polar Stereographic Arrays	NCDC/SDSD	1995	1995
Vegetation Index from NOAA Series Radiometers (AVHRR) -- Weekly Composites Combined on Tape (Stacked)	NCDC/SDSD	1995	1995
Vegetation Index Weekly Composites from NOAA Series Radiometers (AVHRR)	NCDC/SDSD	1995	1995
Vegetation Index--Weekly Mercator Arrays Derived from NOAA Series AVHRR Data	NCDC/SDSD	1995	1995
Vegetation Index–Weekly Plate Carree Arrays Composite from NOAA-Series AVHRR Data	NCDC/SDSD	1995	1995
Vertical Soundings from Digital Ionosondes available from NGDC	NGDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Visible and IR Earth imagery on hardcopy from Geostationary Operational Environmental Satellites (GOES)	NCDC/SDSD	1995	1998
Visible and IR Earth imagery on hardcopy from Geostationary Operational Environmental Satellites (GOES)	NCDC/SDSD	1995	1998
Visible and IR Earth imagery on microfilm from Geostationary Operational Environmental Satellites (GOES)	NCDC/SDSD	1995	1998
Visible and IR Earth imagery on microfilm from Geostationary Operational Environmental Satellites (GOES)	NCDC/SDSD	1995	1998
VISSR Cloud Motion Vectors (Winds)	NCDC	1995	1998
VISSR Hard Copy Imagery	NCDC	1995	1998
Visual Aurora Observations from NGDC	NGDC	1995	1998
Volcano Photos available at NGDC	NGDC	1995	1998
Volcanoes of the World Data from NGDC	NGDC	1995	1998
Vorticity Chart	NCDC	1995	1998
Warren's Cloud Climatology (SOBS In Situ)	GSFC	1995	1995
Water Transparency of the Atlantic Ocean (1954-1967)	NODC	1995	1998
Wave Information Study (Input)	NCDC	1995	1998
Wave Data from the FNOC Spectral Ocean Wave Model (50 WM) (TD-9782)	NCDC	1995	1998
Wave Product (ERS-1, JERS-1 SAR)	ASF	1995	1995
Weather Depiction Analysis Chart	NCDC	1995	1998
Weather Duration	NCDC	1995	1998
Weekly Weather and Crop Bulletin	NCDC	1995	1998
Weighing Rain Gage Recorder Charts	NCDC	1995	1998
Well Velocity Data - Texas Panhandle Borehole Seismic Data	NGDC	1995	1998
West Coast Time Series Coastal Zone Color Scanner Pigment Concentration from the NIMBUS-7	NCDC/SDSD	1995	1998
West Coast Time Series CZCS Pigment Concentration from NIMBUS-7	NCDC/SDSD	1995	1995
West Coast Time Series TirosN/NOAA AVHRR Imagery Level 3	NCDC/SDSD	1995	1998
WHOI (IES) Inverted Echo Sounder and CTD Data (1983-89)	NODC	1995	1998
WHOI Drifting Buoys, NW Atlantic (1974-80)	NODC	1995	1998
WHOI Drifting Buoys, NW Atlantic (1974-1980)	NODC	1995	1995
Wind and Temperature Aloft Forecast	NCDC	1995	1998
Wind Gust Recorder Charts	NCDC	1995	1998
Wind Index Summary	NCDC	1995	1998
Wind and Wave Data from JONSWAP 69 and JONSWAP 73 (Joint North Sea Wave Project)	NODC	1995	1995
Wind Energy Resource Information (WERIS TD-9797) from NCDC	NCDC	1995	1998
Wind Profiler Winds	NCDC	1995	1998
Wind Stress Climatologies (Model Analyses)	GSFC	1995	1995
Wind, Ceiling, and Visibility Data at Selected Airports	NCDC	1995	1998
Wind-Wave Data from the GEOSAT Primary Mission	NODC	1995	1998
World Airfield Summaries, Microfiche	NCDC	1995	1998
Winds Aloft Charts	NCDC	1995	1998
World Monthly Weather Records from 1741 to Present	NCDC	1995	1995
World Monthly Weather Records, Upper Air	NCDC	1995	1998
World Weather Records	NCDC	1995	1998
World Wide Consolidated Tropical Cyclones	NCDC	1995	1998
Worldwide Airfield Summary, Print Image	NCDC	1995	1998
Worldwide Gravity Station Data from NGDC	NGDC	1995	1998
Worldwide Ocean Water Color/Water Transparency Data (1985-90)	NODC	1995	1995
Worldwide Ocean Water Color/Water Transparency Data from In Situ Measurements	NODC	1995	1995
X-Ray Mineralogy Data From DSDP, Available at NGDC	NGDC	1995	1998
X-Ray Mineralogy Data From DSDP, Available at NGDC	NGDC	1995	1998

Table B-1. 1995 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
X-Ray Flux from Geostationary Operational Environmental Satellite (GOES) Space Environment Monitoring	NGDC	1995	1998
XBT Data from SEQUAL and POST SEQUAL (1982-85)	NODC	1995	1998
XBT Data from the Mediterranean Sea (1963)	NODC	1995	1998
XBT Data from the USS HEWITT (Nov 1990)	NODC	1995	1998
Zone Forecast Product	NCDC	1995	1998
Zooplankton and Primary Productivity off the U.S. Northwest Pacific Coast (1961-65)	NODC	1995	1998
Zooplankton and Station data from the Northeast Pacific Southeast of Baja California (September 1967)	NODC	1995	1998
Zooplankton Data from East China Sea and South of Japan (1967-68)	NODC	1995	1998
Zooplankton Data from the Tropical Atlantic (1963)	NODC	1995	1998
Zooplankton off the Southern Coast of Africa (1968)	NODC	1995	1998

Table B-1. 1998 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Advanced Spaceborne Thermal Emission and Reflectance (ASTER) Level 1 Data (U.S. Archive)	EDC	1998	1998
Aeronautical Data and Information	NOS/NGS/ ACD	1998	1998
Airborne Gamma Radiation Snow Surveys	NSIDC	1998	1998
Airborne NASA M2S Data	EDC	TBD	TBD
Airborne NASA OCI Data	EDC	TBD	TBD
Airborne Research Data System (ARDS) Polar Ice Sounding and Geomagnetics	NSIDC	1998	1998
Arctic Drifting Stations 1893 - 1973	NSIDC	1998	1998
Arctic Ice Dynamics Joint Experiment (AIDJEX) Sonar Ice Profile	NSIDC	1998	1998
Arctic Ice Dynamics Joint Experiment (AIDJEX) Wind, Current and Camp Position Data from NSIDC	NSIDC	1998	1998
Barnes MMR (Aircraft)	EDC	TBD	TBD
Bench Mark Descriptions and International Great Lakes Datum Elevations	NOS/OMA/ POD	1998	1998
Bench Mark Sheets with Tidal Datum References	NOS/OMA/ POD	1998	1998
California Commercial Fisheries Catch Data Files	NMFS/SWFC /PFEG	1998	1998
California Commercial Fisheries Catch Data Files	NMFS/SWFC /PFEG	1998	1998
California Sea Survey Data Files	NMFS/SWFC /PFEG	1998	1998
California Sea Survey Data Files	NMFS/SWFC /PFEG	1998	1998
California Wetfish Market Sample Data	NMFS/SWFC /PFEG	1998	1998
California Wetfish Market Sample Data	NMFS/SWFC /PFEG	1998	1998
Catch Data from the Southeastern U.S.	NMFS/SEFC	1998	1998
Central California Recreational Fisheries Data Files	NMFS/SWFC /PFEG	1998	1998
Central California Recreational Fisheries Data Files	NMFS/SWFC /PFEG	1998	1998
CERES Data (EOS AM-1)	LaRC	1998	1998
CERES Data (TRMM)	LaRC	1998	1998
CERES, Level 1B	NCDC/SDSD	1998	1998
CERES, Level 2	NCDC/SDSD	1998	1998
Chesapeake Bay Streamflow	CS/NCOPO	1998	1998
Chesapeake Bay Surface Salinities	CS/NCOPO	1998	1998
Climate Analysis Center's Climate Dial - Up Service	NWS/NMC/ CAC	1998	1998
Cloud Type, Amount, & Height (ADEOS OCTS)	JPL	1998	1998
Compilation and Evaluation of Historical Tsunamis in the Pacific using USGS/NEIC Earthquake Data, NGDC Tsunami Data, and a Modified Imamura-Iida Scale	NWS/PTWC	1998	1998
Current Predictions	NOS/OMA/ POD/EOPB	1998	1998
Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS) Imagery	NSIDC	1998	1998
Digital Shoreline Data	NOS/CGS	1998	1998
Domestic Fisheries Landings	NMFS/OREI	1998	1998
Electrically Scanning Microwave Radiometer (ESMR) Brightness Temperatures and Derived Sea Ice Concentrations from NSIDC	NSIDC	1998	1998
Environmental Atlases and Supporting Data Bases	NOS/OMA	1998	1998

Table B-1. 1998 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
EOS Derivative Data Sets	EDC	1998	1998
ERS-2 Data	ASF	1998	1998
Estuarine Circulation Data	NOS/OMA/ POD	1998	1998
Geodetic Products and Services	NOS/CGS	1998	1998
GEOSAT Exact Repeat Mission Land/Ice Geophysical Data Records	NSIDC	1998	1998
Glacier Photo Collection and Index from the National Snow and Ice Data Center (NSIDC)	NSIDC	1998	1998
Great Lakes Aerial Photos National Snow and Ice Data Center (NSIDC)	NSIDC	1998	1998
Great Lakes Environmental Research Laboratory (GLERL) Great Lakes Air Temperature/Degree Day Climatology	NSIDC	1998	1998
Great Lakes Environmental Research Laboratory (GLERL) Great Lakes Ice Concentration Data Base	NSIDC	1998	1998
Great Lakes Ice Charts National Snow and Ice Data Center (NSIDC)	NSIDC	1998	1998
Great Lakes Surface Ice Reports from NSIDC	NSIDC	1998	1998
Great Lakes Water Levels	NOS/OMA/ POD	1998	1998
Greenland Snow Pit and Core Stratigraphy Data from the National Snow and Ice Data Center (NSIDC)	NSIDC	1998	1998
Hydrograph of Monthly Mean Levels of the Great Lakes	NOS/OMA/ POD	1998	1998
Hydrographic Surveys	NOS/CGS/ NCD	1998	1998
International Ice Patrol Iceberg Data 1960 - Present	NSIDC	1998	1998
Landsat 7	EDC	1997	1998
LIS Data (TRMM)	MSFC	1998	1998
MISR Data (EOS AM-1)	LaRC	1998	1998
Model Output	EDC	TBD	TBD
Moderate Resolution Imaging Spectrometer (MODIS) Level 2 Land Products	EDC	1998	1998
MODIS-N Data (EOS AM-1)	GSFC	1998	1998
MODIS-N Snow/Ice Products (EOS AM-1)	NSIDC	1998	1998
Mojave Field Experiments	EDC	TBD	TBD
Monitoring of Porpoise Stocks Data Files	NMFS/SWFC	1998	1998
MOPITT Data (EOS AM-1)	LaRC	1998	1998
MR Data (TRMM)	MSFC	1998	1998
Multi Beam Bathymetric Maps	NOS/CGS/ NCD	1998	1998
National Marine Pollution Information System	CS/NOPPO	1998	1998
Navy-NOAA Joint Ice Center Weekly Sea Ice Concentration and Extent - Arctic and Antarctic	NSIDC	1998	1998
NESDIS S. Hemisphere Snow Cover, 1974-1980	NSIDC	1998	1998
New data sets resulting from USGS research under USGCRPL (observations, process studies, and model outputs)	USGS/TBD	TBD	TBD
NGS Integrated Data Bases	NOS/CGS	1998	1998
NOAA Weather Wire Service	NWS/OM	1998	1998
Northeast Fishery Permits System	NMFS/NEFC	1998	1998
Northeast Monitoring Program --Ocean Pulse	NMFS/SWFC	1998	1998
Northeastern U.S. Commercial Fisheries Landings Data Files	NMFS/SWFC	1998	1998
Northeastern U.S. Fisheries Bottom Trawl survey	NMFS/NEFC	1998	1998
Northern Hemisphere Sea Ice Concentration 1956 - 1977 from NSIDC	NSIDC	1998	1998
Ocean Color Data (COLOR SeaWiFS II)	GSFC	1998	1998
Pacific Billfish Catch and Effort Data File	NMFS/SWFC	1998	1998
Pacific Billfish Tag Release and Recovery Data File	NMFS/SWFC	1998	1998
Phytoplankton Biomass (ADEOS OCTS)	JPL	1998	1998
Radarsat Data	ASF	1998	1998

Table B-1. 1998 Tri-Agency GCDIS

Data Set	Archive Site	On-Line Inventory	Inter-operable Search & Order
Radiometer (SE590)	EDC	TBD	TBD
Rain (Precipitation; ADEOS OCTS)		JPL	1998
Recreational Fisheries Statistics Survey	NMFS/NEFC	1998	1998
Scanning Multichannel Microwave Radiometer (SMMR) Brightness Temperature (Tb) Grids on CD-ROM from NSIDC	NSIDC	1998	1998
Sea Surface Temperature (ADEOS OCTS)	JPL	1998	1998
Sea Surface Temperatures derived from TIROS-N/NOAA Advanced Very High Resolution Radiometer (AVHRR)	NCDC/SDSD	1998	1998
Sea Surface Water Temperature and Density	NOS/OMA/ POD	1998	1998
SIR C (Radar)	EDC	1997	1998
Southeast Fisheries Center Charterboat Catch per Effort	NMFS/SEFC	1998	1998
Southeast U.S. Domestic Fishery Catch Effort	NMFS/SEFC	1998	1998
Southeast U.S. Turtle Sightings Aerial Survey Data Files	NMFS/SEFC	1998	1998
Southeastern U.S. Commercial General Canvass Landings Data	NMFS/SEFC	1998	1998
Southeastern U.S. Commercial Shrimp Landings and Effort Data	NMFS/SEFC	1998	1998
Special Sensor Microwave/Imager (SSM/I) Sea Ice Data on CD-ROM at NSIDC	NSIDC	1998	1998
Spectra (Beckman)	EDC	TBD	TBD
Spectra (FTIR)	EDC	TBD	TBD
Station Profiles of Hourly Output of NMC/RAFS Weather Prediction Model	NWS/NMC	1998	1998
Sunphotometer (Field, Reagan 1,2)	EDC	TBD	TBD
Sunphotometer Optical Depth (Airborne)	EDC	TBD	TBD
The National Weather Service Family of Services	NWS/OSO	1998	1998
Tide Predictions	NOS/OMA/ POD/EOPB	1998	1998
Tides, Hourly Heights	NOS/CGS	1998	1998
Tides, Monthly Mean Summaries	NOS/OMA/ POD	1998	1998
Tides, Times and Heights of High and Low Waters	NOS/OMA/ POD	1998	1998
TOGA CD-ROM (In-situ)	JPL	1998	1998
Topographic Surveys	NOS/CGS/ NCD	1998	1998
Total Oceanic Commercial Fisheries Catch and Effort Data Files	NMFS/SWFC	1998	1998
Total Oceanic Commercial Fisheries Catch Data Files	NMFS/SWFC	1998	1998
Total Oceanic Commercial Fisheries Length-Frequency Data Files	NMFS/SWFC	1998	1998
TRMM Data	GSFC	1998	1998
U. S. Fisheries Imports and Exports	NMFS/OREI	1998	1998
U.S. River Runoff at Ocean Sites	NMFS/PFEG	1998	1998
West Coast Upwelling Indices Data Files	NMFS/SWFC /PFEG	1998	1998
West Coast Upwelling Indices Data Files	NMFS/SWFC /PFEG	1998	1998
Wind Vectors (ADEOS NSCAT)	JPL	1998	1998
Wreck and Obstruction Data	NOS/CGS/N CD	1998	1998

Appendix C.

Agency-Specific Roles and Responsibilities

AGENCY-SPECIFIC ROLES AND RESPONSIBILITIES

C.1. NASA

NASA's program of Earth science research and applications focuses on atmospheric, oceanographic, and land sciences and on space-based studies of the Earth as an integrated system. The overall NASA Earth science program includes satellite and other remote-sensing efforts to address long-term observational needs; related process studies; scientific modeling; data and information services to support the research; and advanced observational techniques.

Mission to Planet Earth is NASA's contribution to the U.S. GCRP, and it is aimed at characterizing the Earth as a system in order to understand the global environment through studying long-term natural and human-related changes. Mission to Planet Earth is an evolutionary program, aimed both at providing important information on global change today and at providing more comprehensive and detailed information over the next two decades. The first phase involves a series of satellite observational programs either underway now or scheduled prior to 1998. Table C-1 summarizes the NASA Phase 1 satellite programs and their mission objectives. The second phase and cornerstone of Mission to Planet Earth is the Earth Observing System (EOS), a long-term, interdisciplinary and multidisciplinary research program to study global-scale processes. Beginning in 1998, the EOS will provide long-term observations from a suite of instruments on a series of low-Earth orbit satellites.

EOS has three major components: A Scientific Research Program, a Space Measurement System, and an EOS Data and Information System (EOSDIS). The Scientific Research Program focuses on the utilization of EOS data. It includes funding for postgraduate fellowships in the area of global change, for interdisciplinary investigations performing integrated studies of the Earth to enhance the capability to predict global change, and instrument investigations to focus on utilization of data from particular instruments. The Space Measurement System provides global Earth science data on a long-term, sustained basis. It uses instruments on a series of EOS observatories and on platforms launched and operated by international partners, primarily the European Space Agency (ESA) and the National Space Development Agency (NASDA) of Japan. Table C-2 summarizes the series of NASA EOS satellites and their mission objectives. The EOS program includes three intermediate-sized satellites (EOS-AM in 1998, EOS-PM in 2000, and EOS-CHEM in 2002) and three smaller satellites (EOS-COLOR in 1998, EOS-AERO in 2000, and EOS-ALT in 2002). These observatories are planned to be replaced periodically, approximately at five year intervals, to provide the consistent long-term collection of global measurements. The third major component is

Table C-1. Mission to Planet Earth: Phase 1

NASA Satellites (Launch Status)	Mission Objectives
ERBS (Operating) Earth Radiation Budget Satellite	Radiation budget, aerosol, and ozone data from 57° inclination orbit
TOMS/Meteor-3 (August 1991) Total Ozone Mapping Spectrometer	Ozone mapping and monitoring (joint with U.S.S.R.)
UARS (September 1991) Upper Atmosphere Research Satellite	Stratospheric and mesospheric chemistry and related processes
TOPEX/Poseidon (July 1992) Ocean Topography Experiment	Ocean surface topography and ice sheet altimetry (joint with France)
LAGEOS-2 (September 1992) Laser Geodynamics Satellite	Satellite laser-ranging target for monitoring crustal motions and Earth rotation variations (joint with Italy)
SeaWiFS (August 1993) Sea-Viewing Wide Field Sensor	Purchase of ocean color data to monitor ocean productivity
TOMS/Earth Probe (December 1993) Total Ozone Mapping Spectrometer	Ozone mapping and monitoring
NSCAT (1995) NASA Scatterometer	Surface vector winds over the ocean
Landsat-7 (1997) Land Remote-Sensing Satellite	High spatial resolution visible and infrared imagery to monitor land surface
TRMM (February 1997) Tropical Rainfall Measuring Mission	Precipitation and related variables, plus radiation budget in lower latitudes (joint with Japan)

the comprehensive data and information system, EOSDIS, which integrates all of NASA's Earth science data. EOSDIS is implemented with a full and open data policy to ensure the Earth science research community's access to the necessary processed and calibrated Earth science data, both EOS and non-EOS.

C.1.1. EOS Data and Information System (EOSDIS)

The EOSDIS will receive, process, archive, and distribute all EOS data and products and will archive and distribute data and products from all other NASA Earth science research satellites and field measurement programs and

Table C-2. Mission to Planet Earth: EOS

NASA Satellites (Launch Status)	Mission Objectives
EOS-AM Series (1998) Earth Observing System Morning Crossing	Global change measurements, including visible and near infrared imagery (nadir and bidirectional), radiation budget, measurement of CO and CH_4 (includes Canadian and Japanese instruments)
EOS-COLOR (1998) EOS Ocean Color Mission	Purchase of ocean color data to monitor ocean productivity
EOS-PM Series (2000) Earth Observing System Afternoon Crossing	Global change measurements, including visible and near infrared imagery (nadir and bidirectional), radiation budget, and measurement of hydrologic cycle (includes ESA and EUMETSAT instruments)
EOS-AERO (2000) EOS Aerosol Mission	Global aerosols and stratospheric chemistry
EOS-ALT (2002) EOS Altimeter Mission	Ocean and sea ice altimetry
EOS-CHEM (2002) EOS Chemistry Mission	Atmospheric chemistry and ocean-surface scatterometry

archive or ensure access to other data essential for the interpretation of these measurements. EOSDIS is NASA's element in the global change information system GCDIS and thus is planned to be interoperable with other participating agency data and information systems. EOSDIS will also be fully interoperable with its ESA and Japanese counterpart systems. Thus EOSDIS will provide global change researchers with access to the full range of Earth science data, either directly or through links with other agency and international data and information systems.

EOSDIS is being implemented with a distributed, open architecture. The system provides a range of functions including mission and instrument planning, schedule, and control; resource management; communications; investigator computational facilities to support research; generation of standard and special data products; archiving of data and research results; and effective distribution of all information holdings. A pictorial representation of the EOSDIS architecture is shown in Figure C-1 and illustrates the interrelation of these elements. The EOSDIS approach to networking is also illustrated in Figure C-1. A high speed internal network links the DAACs

and other system elements to support internal operations such as operational data transfers between DAACs to support product generation, internal IMS operations, and system coordination and scheduling. EOSDIS connectivity for research users is provided by external networks utilizing gateways between EOSDIS and general science networks via the NASA Science Internet. In addition, EOSDIS relies on the NASA Space Network with its Tracking and Data Relay Satellite System (TDRSS) for primary communication between the ground and the EOS satellites.

NASA's responsibilities for EOS product generation and for Earth science data archive, distribution, and information management are handled by the DAACs. The DAACs provide institutional commitments to these responsibilities to ensure that data will be availability indefinitely in an accessible manner. As indicated earlier in Table 3, each DAAC is oriented around particular science focus areas. Each DAAC has responsibility for data and products from specific EOS sensors and non-EOS data that serve as EOS precursors. The DAACs are located at sites having a critical mass of in-house scientific expertise in the focus areas, an existing management and technical infrastructure, and a long-term institutional commitment to the processing and archiving of Earth science data. Each DAAC includes a Product Generation System (PGS), a Data Archive and Distribution System (DADS), and elements of a distributed Information Management System (IMS) in a functionally integrated environment.

Each DAAC-hosted IMS provides an "Earth science view" of all EOSDIS data, spanning all DAACs. From any point of access to EOSDIS, a user can see the same view of the whole EOSDIS data base and be able to search across that data base in a single step. The IMS provides a full set of catalog information, ranging from high level directory information to continuously updated inventories of available data products. It allows users to search across multiple inventories and multiple DAACs to find combinations of data meeting the same criteria, such as spatial and temporal coverage, and to place a request for the desired data.

The PGS element handles the generation of EOS Standard Products (using algorithms developed by EOS investigators), quick-look products, metadata, and browse data sets, including reprocessing and the retrospective generation of products using new or improved algorithms. It performs all required data navigation and calibration procedures and provides configuration management for applications software. The PGS supports EOS Investigator responsibilities for data Quality Control review and may be required to

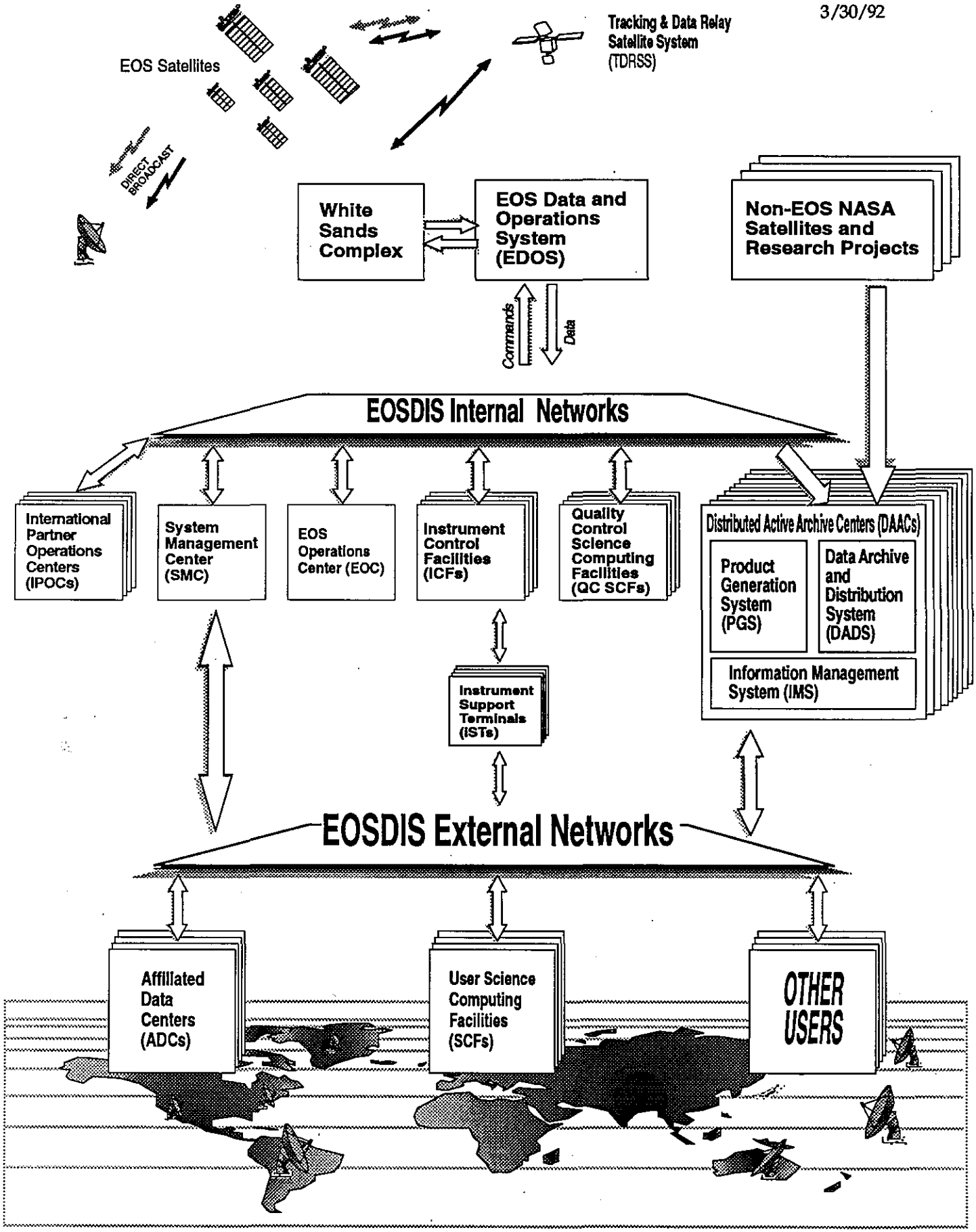

Figure C-1. EOSDIS Architecture

generate real-time Quick-Look Products to support Instrument Teams for sensors within the DAAC's responsibility.

DADS functions are to archive and distribute EOS and other NASA Earth science data and information, including data and derived products at all levels of processing, ancillary and correlative data, metadata, algorithms, models, and documentation. Researcher's results and supporting documentation will be available for archive and distribution when they are accepted for publication in the open literature. The DADS acquires various forms and levels of data through numerous paths including electronic networks, high-speed computer-computer links, magnetic tapes and optical media, and the EOSDIS high-speed communications system. Data products come from the PGS, from investigators, and from other data systems and are stored on archive quality media. The DADS distributes data in response to standing or specific user requests accepted by the IMS, and data distribution is via electronic networks and physical media, depending on the requested volume and timeliness requirements. Products may be available in multiple formats, and the DADS will have format translation software.

DAAC operations are coordinated through the EOSDIS Project to ensure that EOSDIS as a whole functions as a single system. For example, IMS functions require coordination to enable a consistent view to users regardless of their DAAC access point. Similarly, individual DAAC PGS product generation and delivery schedules will be coordinated to ensure that data and product transfers occur as needed to support Standard Product generation and validation. Each DAAC participates in a coordinated user services working group and provides user support to facilitate user access to all IMS and DADS services. The DAAC user services staff will be conversant with the data and products and with their applications. Each DAAC also provides assistance to EOS investigators developing and maintaining algorithms for EOS products in migrating algorithms into the PGS.

The development of EOSDIS is evolutionary with extensive involvement of its users in all phases. The system is being implemented in a progressive manner, building on existing data systems and services, providing improved access to Global Change data sets, and incorporating additional capabilities and new technologies as needed, with continuous review and assessment of the system against user requirements and experience. Standards, concepts, and technical approaches that gain user acceptance are incorporated into the evolving EOSDIS. Major system milestones in the progressive EOSDIS implementation have been defined, each representing an EOSDIS Version, and the first three are:

- 1991—Continue current user services provided by existing discipline-oriented Earth sciences data centers while bringing the centers under a single management structure

- 1994—An operating prototype (Version 0) interconnecting existing Earth science data systems via electronic networks, interoperable catalogs, and common data distribution procedures
- 1998—Fully operational, physically distributed EOSDIS (Version 1) presenting an integrated view to users and providing researchers with the complete set of capabilities needed for EOS science and mission operations

Version 0 includes implementation of a working prototype IMS capability providing researchers with an "Earth science view" of NASA's existing and near-term pre-EOS Earth science data. It provides interoperable linkages between the DAACs for IMS functions, including evolution toward a common user interface. Version 1 and subsequent Versions will be built around the EOSDIS Core System (ECS) which provides a core set of basic function capabilities (command and control, product generation, archive, search, and distribution) that are supplemented by additional elements, such as investigator computing facilities and software tools and DAAC-unique extensions to ECS services

The development of the EOSDIS science data and information base follows an evolutionary path similar to that of the system. It is guided by a Science Data Plan developed and maintained under the leadership of the EOSDIS Project Scientist. The first edition of the plan, scheduled for completion in mid-1992, focuses on the early years of EOSDIS, particularly the Version 0 timeframe, but the plan will gradually evolve as science needs drive data requirements and as longer term science needs are more clearly understood. The plan documents data requirements of both the EOS investigators and the NASA Earth science research and applications program and indicates whether data must be brought into EOSDIS and whether arrangements must be made to gain access. It also documents NASA's current Earth science data holdings and known future data acquisitions.

C.1.2. Data and Information Policy

The EOS data policy is designed to be consistent with the National Data Policy and to further the EOS objectives of acquiring a comprehensive global, long-term data set; maximizing data utility for scientific purposes; and simplifying access to and analysis of EOS data. A common data policy will cover Japanese, European, and US missions referred to as the International Earth Observing System (IEOS). IEOS includes EOS, POEM, ADEOS, TRMM, and NOAA polar orbiting operational flights starting with NOAA-N, and their follow-ons. In the interests of establishing a common policy spanning the entire

international suite of data to be generated over the EOS lifetime, the policy adopts the following tenets:

- Data from EOS instruments will be acquired according to priorities recommended by the IWG and the EO-ICWG, and confirmed by NASA Headquarters.
- Where EOS sensors make site-specific observations, EOS will be an "acquire-on-demand" system. Data will only be taken in cases where there is an identified user who has requested and will analyze the data.
- All acquired EOS data will be processed at least to a level which is generally useful to researchers without a detailed knowledge of the instrument and archived at level 0 or at a higher level from which level 0 may be recovered.
- Raw data from instruments designated as having operational potential will be made available to NOAA at the point of receipt as soon as they are received on the ground.
- Routine processing and reprocessing of EOS data by the EOS Project to standard products at levels 1 and above will be done according to science requirements and using algorithms approved by the IWG.
- Following the post-launch checkout period, all level 1 standard products will be processed and made available by EOSDIS within 48 hours of observation; levels 2 and 3 standard products will be made available within 24 hours of the time its precursor data sets are available. Modifications to these schedules will be accommodated once the processing requirements for each product are understood.
- EOS data and products will be available to all users; there will be no period of exclusive access.
- All data requests for approved research, non-commercial operational, and applications demonstration purposes will incur a modest charge consistent with the actual marginal costs of filling the request. This system will ensure reasonable allocation of EOSDIS resources, while not discouraging full use of EOS data.
- EOSDIS will provide the capability for archiving and making available all science data products, models, algorithms, and documentation generated as part of the EOS mission. All products derived from EOS data provided for research purposes at the cost of reproduction and distribution and upon which refereed articles are based, including models, algorithms, and associated documentation, must be made available to the research community.
- EOSDIS will include and make available information about the data, such as quality assessments, supporting literature references, and catalog and directory entries.
- EOSDIS project management, in consultation with the IWG, will establish protocols and standards to encourage and facilitate data software exchange and interoperability.

Four general categories of users are expected to access EOS data: research users, including U.S. government-sponsored and other researchers; non-commercial operational and environmental monitoring public sector agency users, such as NOAA and EUMETSAT; applications demonstrations (limited proof of concept resulting in a published technical report); and other, primarily commercial, users.
Research users will be designated through an Announcement of Opportunity or similar mechanism based on a brief proposal describing the research activity. Designated research users, whether funded by NASA's EOS programs or through other channels, must sign a "research agreement" and are granted access to the data appropriate for the proposed research from EOS and its foreign partner programs at no more than the marginal cost of filling the user's order. The "research agreement" includes a brief description of the proposed research, and confirms that the data are to be used in a study or investigation 1) that aims to establish facts or principles; 2) where the data may not be sold, and may be reproduced or provided only to other researchers covered by a research agreement or for whom the researcher takes responsibility; 3) where the results of the research will be submitted for publication in the scientific literature; and 4) where detailed results, including data, algorithms, and models, will be made available to the research community at the time they are accepted for publication. Researchers already selected by NASA on the basis of a research proposal will not need to write an additional proposal for data. Funding for those scientific investigations selected by NASA as part of its research program will include finds to cover the marginal costs of providing enough data through EOSDIS to enable the proposed research to be done. Those given research access to data through a data only proposal are expected to obtain the funding to cover their data system charges from other sources.

Operational and environmental monitoring is non-commercial routine use of data to carry out a mandate of environmental observation and prediction as part of an agency's responsibilities to provide for the general welfare. Such users include those government agencies affiliated with the parties that conduct environmental monitoring and/or operational observations and can include larger agencies to which the parties belong, such as the WMO. Operational agencies may obtain real- time access through their own direct readout facilities and/or via relay satellites, or as available from the appropriate data and information systems. Operational users may be asked to report periodically on their activities.

Applications demonstrations are limited proof of concept studies to demonstrate new techniques or to test the feasibility of operational applications. Results of applications demonstrations must be published as technical reports and provided back to the data system which provided the data. Requests for data for applications demonstrations use must include a brief proposal describing the intended use. Selected users will be required to

sign an agreement confirming that the data will be used only for the proposed applications demonstration, that the data will not be used for commercial purposes, and will not be reproduced or provided to third parties without permission, and that the results will be published and provided back to the data system.

Commercial arrangements will be established for each sensor or data set, consistent with applicable laws, to serve users who do not fit into one of the above categories. Procedures will be in place prior to EOS launch for commercial distribution of all EOS data on a non-discriminatory basis for "other" users.

The data exchange principles described above will be included in each of the bilateral Memoranda of Understanding NASA will have with its international partners, and a joint implementation plan is being developed to define the implementation of these principles in the participating agencies.

C.1.3. Science Community Guidance

The EOSDIS Program depends heavily on active oversight and participation by scientists. The EOSDIS Advisory Panel is the primary source of science guidance, and its members are drawn primarily from the EOS Investigator Working Group (IWG). The Panel provides science guidance from an interdisciplinary and multidisciplinary viewpoint and takes into account data and information system requirements for all EOS instruments, whether flown on EOS observatories or international partner platforms. Within the NASA Program and Project offices, scientific oversight is provided by the EOS Program and Project Scientists. EOSDIS Program Scientists provide each DAAC with science oversight and advocacy at NASA Headquarters. An EOSDIS Project Scientist at Goddard Space Flight Center provides a focus for science oversight at the overall Project level. In turn, each DAAC has a Project Scientist to provide science guidance and oversight to the DAAC's activities and to be a focus for interface with the science user community served by the DAAC. Each DAAC has a User Working Group to provide a wider base of science user oversight and guidance. Each DAAC User Working Group also provides a member on the EOSDIS Advisory Panel to facilitate science guidance is coordinated across EOSDIS. In addition, science user reaction to EOSDIS will be actively sought through the life of the program.

C.1.4. International Links

EOSDIS DAACs are long-term institutions that process, archive, and distribute EOS and related data and products. International partners operate data centers that perform analogous functions for other Earth science data.

Where there is a mutual need for significant access for data between EOSDIS and international data centers, the EOS Program establishes a working agreement with the International Partner. In that manner, the National Space Development Agency of Japan supports data and products from the Japanese ASTER instrument, to be flown on EOS-AM, and supports access by EOS users to data from NASDA instruments flown on the NASDA observatories. EOSDIS provides level 0 ASTER data to NASDA and receives level 1 and some higher level products from NASDA. The European Space Agency (ESA) supports access by EOS users of data from ESA instruments on the ESA observatories. Interoperability between the IMS functions of EOSDIS and those of both NASDA and ESA will be established to allow effective user access to data across all three systems.

C.2. NOAA

C.2.1. The NOAA Mission

NOAA is dedicated to the long term stewardship of the marine and air resources of the Earth. NOAA's fundamental mission is to observe, describe and predict the natural variability of the global Earth system--the ocean, the atmosphere, and features of the solid Earth and near space environment--and to detect any changes on the Earth system caused by human activity. Because of NOAA's Earth science capabilities, the agency has also been assigned national responsibility for:

- Conservation of marine living resources and protected species, and associated services to the fishing industry
- Oversight of atmospheric and hydrological resources
- Marine environmental assessment, management, and resource restoration
- Production of comprehensive environmental science data
- Leadership in research and education in the Earth sciences to serve the economy.

Management of environmental data and information resources is of particular importance to the National Oceanic and Atmospheric Administration (NOAA), an agency in the Department of Commerce. NOAA routinely measures and collects large amounts of environmental data and information in its own work, and is also officially charged with maintaining environmental records for the Nation. NOAA is the steward of a treasury of Earth Systems data and information that covers the past centuries. This comprehensive treasury contains answers to urgent environmental questions facing the Nation.

NOAA has responsibility for basic and applied research and technology development regarding the state and use of resources of the oceans and inland waters, including the seabed, the upper and lower atmosphere, the earth, the sun, and the near space environment. NOAA's mission is to observe, communicate, process, correlate, analyze, store, retrieve, and use environmental data. NOAA has in its treasury of data the most comprehensive, long-term, up-to-date description of the earth's system that exists today.

C.2.2. Earth System Data and Information Management (ESDIM)

NOAA has initiated the Earth System Data and Information Management (ESDIM) program to integrate common elements of data and information management through the modernization of its technological infrastructure, with careful consideration of the research and operational needs of all NOAA programs. The ESDIM program is structured as an agency-wide effort and involves the contributions and cooperation of all of NOAA's Line and Major Cross-Cutting Program Offices. The ESDIM program will make maximum use of NOAA's vast resources and experience and to build on existing systems and near-term agency-wide data management capabilities and structure, by molding them into a broad, coordinated system, with the "look-and-feel" of a centralized system.

The agency's data management effort has four strategic objectives:

- Rescue critical NOAA data and information currently at risk of being lost
- Improve access to NOAA data and information for research scientists and other users
- Build the capability to meet the environmental data and information needs of the next century
- Upgrade the quality of NOAA data set holdings.

To meet these objectives, the NOAA will undertake an ambitious agency-wide, end-to-end data system modernization to provide the long-term systematic growth of its scientific data and information management resources. Using the philosophy of building upon existing resources, NOAA will improve user access through a NOAA End-to-End Environmental Data System. This concept of a distributed system will interoperability link NOAA's total data holdings. The functions to be performed by the system include data assimilation, data integration, data synthesis, data analysis, data retrieval, distribution, and communications. In addition, NOAA will promote agency -wide programs of data quality assurance and the development of standards and uniform formats and procedures for data and information exchange agency-wide, and throughout Global Climate Change

programs. This will result in serving both operational users as well as producing science quality data for retrospective users.

Internationally, NOAA will coordinate its activities with counterpart environmental science agencies to develop uniform data standards and formats. This cooperation can be led through NOAA's activities and responsibilities for operating World Data Centers and should include participation in the preparation of the International Master Directory.

NOAA's Data System Modernization constitutes a long-term program with many interrelated elements. The implementation of the ESDIM program will require the following:

> Rescue Data and Information at Risk—Immediately migrate high-demand NOAA satellite data from deteriorating tapes to more stable media, and begin digitizing endangered analog and tabular data presently on deteriorating media. Develop a long-term archive maintenance program.

The key to integrating the multitude of data sets is the development of common reference structures, storage and transmission formats, and information visualizations that encompass the documentation requirements of the individual data sets and the many uses that they experience. Each functional area (data collection, data processing, data transmission, and data archive) and the data researchers have unique requirements for the ways in which the data are to be handled. Geographical queries, physical event sorts, data compaction/compression, and requests for information retrieval all have unique issues that impact the structure of the data and supporting information.

> Increase User Access to Data—Provide more powerful and robust tools for user access to data and information at the National Data Centers and other sources of NOAA data. Provide on-line data set browse and visualization capabilities. Permit on-line data ordering and provide streamlined distribution capabilities.

The GCDIS development is first and foremost in response to the research community needs, but is constrained by the pace at which we can insert new technology and ability of the organization to assimilate the changes. The this latter issue of technology has driven early demonstration activities at the Satellite Data Services Division of NCDC. The similarities to NASA EOSDIS development has allowed and easy transfer of technology and capabilities. This progress will provide the corner stone of NOAA's GCDIS involve in the first Phase. NOAA through its ESDIM Program will vigorously pursue the

transfer of these capabilities to its in-situ data holdings. So that they will be available in the later phases. It is the intention to have all of NOAA's in- situ and satellite data holding included in the final phase.

The timing for bringing a specific data set or information on a specific data set to the GCDIS umbrella will be determined by the user community. NOAA proposes to involve the researchers in System Validation Phase and will work closely with them to identify specific data sets of interest to particular experiments. At the present time NOAA is looking at three research experiments that would provide meaningful exercise of the GCDIS system capabilities and result in timely feedback. STORM, GWEX, and WOCE all meet the initial criteria for involvement. NOAA will follow up with the scientific committees and groups responsible for carrying out these activities. Recognizing the thrust of an individual experiment, NOAA's GCDIS data mangers will identity lists of data sets that they believe are required by the researchers. Working closely with the key individuals involved with the experiment, they will finalize the list and work to provide those specific data and information for use by the researchers through GCDIS. They will continue interactions with the researchers to gather system performance information and subjective feedback on the use of the GCDIS capabilities. This information will be provided to the system developers to be use in modification of the systems.

In summary, NOAA plans to include all of its high priority environmental data holdings in GCDIS. Details of these holdings area viable in the NOAA directory. NOAA will begin with those satellite products currently available at NCDC's SDSD. Listing Attached. Additional data holdings will come on line through the urging of the researchers, coupled with the system capabilities upgrades of the modernization program.

Every Data Center has an applied science group to manipulate and use the data for scientific studies. This assures that the data are useful, are adequately and correctly documented, and will be a major part of the quality assurance process for the data. The science groups produce data products associated with the mission of their data center. Examples of this include the Global Climate Laboratory at NCDC, the Product Development Branch at NODC, and the Paleoclimatology Office at NGDC.

C.2.3. Climate and Global Change Information Management Project

An Information Management Project has been organized under NOAA's Climate and Global Change (C&GC) Program. The project focuses on data management and directly supports NOAA C&GC research activities. NOAA C&GC science project managers are involved in the review process for information management activities. Nationally, the Information

Management Project is linked to elements of the Committee on Earth and Environmental Sciences, and the IWGDMGC. The Project also works closely with the NOAA-wide Earth System Data and Information Management program for large-scale data systems support. The objectives of the NOAA C&GC Information Management Project are to:

1) Provide the organization focus through which data producers, data managers and data users actively participate in the design, implementation and review of the C&GC information management system
2) Assist in the construction of the data and information (metadata) sets required by C&GC researchers
3) Provide data users with easy access to the C&GC data and information
4) Manage the long-term C&GC data and information archive.

The development of the information management component of the C&GC program was initiated in 1989 with the knowledge that it would have to evolve with the science elements of the program. Planning in the Information Management Project is based on demonstrated data management successes in programs such as TOGA. The information management component also builds on existing operational systems and NOAA-wide data systems modernization to carry out a data and information management program in support of a science program. The Information Management Project consists of the following sub-elements:

- Information management planning
- Data archaeology
- Data access and archive management
- Pathfinder data sets.

Information Management Planning

The objective of the information management planning is to provide long-term data and information planning for the NOAA C&GC Program. This includes a number of planning activities within NOAA, supported by activities that encourage interagency cooperation in climate and global change research. Guidance from the external scientific community i sought on an ongoing basis.

Current planning activities include support for the IWGDMGC, support for the NOAA Data Center Advisory Panels (external science community), and support for workshops and other supporting activities to assist in long-term planning

Data Archeology

The objective of the data archeology element is to find, rescue, digitize and assemble data sets for climate and global change research. Examples of current data archeology projects include the following data sets:

- Global atmospheric trace constituents
- Historical oceanographic data
- Dobson total ozone data
- Historical water level data from tide stations
- Fishery, biological and environmental data
- Comprehensive Ocean-Atmosphere Data (COADS)
- Global aerosol data
- WOCE subsurface float data
- Environmental-Plankton time series
- Climate aerological reference data set.

Data Access and Archive Management

The objective of the data access and archive management element is to make readily available to the climate and global change research community high-priority data that now exist in the NOAA data centers, other national and international centers and repositories of data and other known sources. Many of the data sets involved in this element will be distributed on media such as CD-ROMs, which support mass distribution of large-volume data sets. The following are examples of Data Access and Archive Management projects under the NOAA C&GC Information Management Project:

- Historical climate network data on CD-ROM
- World ocean temperature/salinity profile data on CD-ROM
- Vegetation index on CD-ROM
- Climate data sets from model outputs on CD-ROM
- Development of NOAA Earth System Data Directory
- Data browse and visualization for C&GC data sets
- Data center enhanced data documentation prototyping
- Catalog interoperability prototyping
- Workstation software tools for C&GC researchers
- Metadata prototyping.

Pathfinder Data Sets

The Pathfinder element of the C&GC Information Management Project will provide the initial components for an integrated data management system to

support both the C&GC program and NASA's EOSDIS Program for efficient access to quality data and information.

The production and distribution of Pathfinder data sets will provide critical long-term data sets for climate and global change researchers, as specified by the NOAA-NASA Pathfinder Science Working Groups. NOAA-NASA Pathfinder data sets have be identified for AVHRR, TOVS, GOES, and SSM/I data. In-situ data will be used, where appropriate, in the processing. This activity is also described in Section 3.1.3, "Process for Generating Interagency Global Change Data Sets."

Other projects under the Pathfinder element include project management and planning, development of a prototype on-line AVHRR image browse at NCDC/SDSD, and development of long-term visible and infrared calibration of AVHRR data.

C.2.4. Policy on Management of Environmental Data and Information

Effective February 1, 1992, NOAA issued an interim policy (directive) on Management of Environmental Data and Information. The policy will remain in effect for one year, at which time it will be reevaluated to determine how well the policy meets the needs of NOAA. Presented below are extracts from the full policy directive.

Purpose

The purpose of the policy is to establish within NOAA a common basis for management of all unclassified, worldwide environmental data and information needed to accomplish its mission, and to insure these resources under NOAA's stewardship are available to meet current operational and research requirements, are available to others for their uses, and are available for future users.

Scope of Policy

a) Specifically, the data policy pertains to all data acquired by NOAA units including data obtained from contractors, cooperators, and other government agencies (both domestic and foreign) and provides for a central focus and coordination mechanism. The policy defines certain responsibilities and procedures for all NOAA activities and is applicable to data exchange programs with non-NOAA groups and reimbursable programs managed by NOAA for other agencies. The policy applies to NOAA- funded research and grants that involve the collection and

archiving of environmental data, including coastal ocean, open ocean, Great Lakes, estuarine, atmosphere, hydrologic (rivers and streams), solar and solid Earth sources.

b) The policy includes worldwide data and information acquired under exchange agreements, and including space-based and surface-based systems, regardless of transmission media.

c) The policy includes both real-time and retrospective data. The policy recognizes that the management of data must be continuous from the initial planning through the acquisition stage, through various uses of the data to their final disposition (i.e., over the data life cycle). Data can be expected to be reprocessed, reformatted, and reanalyzed for various applications throughout its life cycle.

d) The policy is in consonance with the Policy Statements for Data Management For Global Change Research approved by the Committee on Earth and Environmental Sciences (CEES) and forwarded to the Office of Science and Technology Policy.

Specific Data Policies

Unclassified and/or unrestricted environmental data and information produced, sponsored, collected, or obtained (by domestic or foreign exchange, purchase, or gift) by NOAA or other Federal or Federally supported activities are public property. It is, therefore, the policy of NOAA to make available those worldwide environmental data and information under NOAA's stewardship on the basis of exchange, loan, cost of reproduction, or free depending on the specific limitations described below. NOAA will continue to endorse a policy of free (full) and open exchange of environmental data with the international community.

1) All data and information products in NOAA not subject to confidentiality regulations shall readily be provided to NOAA users at the cost of reproduction when costs are extensive, otherwise free whenever possible or when special arrangements are mode.

2) NOAA will provide data to researchers from other Federal and non-Federal groups for the cost of reproduction.

3) Research or experimental data needed to support time-critical NOAA operations shall be made available for those operations in real-time or non real-time depending on the requirement. Time critical operations include warning and forecasting operations, hazardous materials response activities, and others as defined by the Under Secretary.

4) New NOAA programs in their initial planning stage which focus on needs for either operational or episodic measurements shall ensure that the requirements of all NOAA Program and Line Offices are considered. NOAA Program Managers of replacement systems shall give strong consideration of the impact of the new system on data continuity and requirements for calibration or comparison with the old system. NOAA shall institute a review process through the NOAA Program Development Board (PDB) in the event of unresolved issues or requirements. For major systems acquisitions, any exception to including validated data requirements will be outlined in a decision memorandum to the Deputy Under Secretary before full-scale implementation begins.

5) Data sets may be held in temporary or specialized data centers (for indefinite periods of time) prior to submitting them to the NOAA Data Centers. However, some of the same data management requirements as imposed on the National Data Centers will apply to these specialized data centers or Centers of Data; i.e., all NOAA Program Managers shall ensure that the following conditions are met: data integrity and appropriate metadata are maintained; all other users are provided access in a timely manner; the data's existence is documented in the NOAA Earth Systems Data Directory and the proper transfer of the data to a designated national data archive is completed prior to the demise of the temporary or specialized data center.

6) NOAA components may produce and use supporting data sets which need not be placed in data management centers; e.g., flight recordings, photos, voice recordings, etc. Such data sets are to be documented in the NOAA Earth Systems Data Directory.

Other Policy Statements

Other sections of the interim directive address NOAA Administrative Policy for Data Management Programs, NOAA Policy Concerning Data Management Responsibilities of All NOAA Organizations and Cooperators, and NOAA Policy for Planning and Budget Requirements.

C.2.5. NOAA Science Community Guidance

NOAA has a long tradition of consultation with the broader science community for guidance and review of its activities. This tradition is deepest in the research laboratories which contain many of the Centers of Data. Here, members of the academic community have reviewed the work of the laboratories since the beginning of NOAA and in many cases even in the predecessor agencies. The National Data Centers have been reviewed at

various times during the past, and now have routine reviews by outside advisory committees which include representatives of the research and academic communities. A second type of guidance is solicited from the science community for special issues. The recent workshop on the COADS data set is an example of the value of outside advice to guide the development of a critical science database. The Data Continuity Workshop was convened to gather advice on another critical issue: that of maintaining science-level continuity in NOAA's environmental databases, especially operational databases of value to the study of long-term climate changes. Finally, science guidance is often sought during the proposal review process. Typically mail reviews and/or expert review panels including representatives from the academic community are sought during the proposal evaluation process. Together these activities provide the opportunity for scientific input at all stages from the policy formulation stage through the solicitation and review of specific proposals to the evaluation of programs and organizations.

C.2.6. International Links

NOAA is a major participant in the collection and exchange of global in-situ and space-based observations. NOAA's responsibilities for international in-situ data collection and data management include the operation of seven World Data Centers at the three NOAA National Data Centers. NOAA is also a major participant in providing and receiving data from the international Global Telecommunications Systems (GTS) and the International Oceanographic Commission (IOC) Ship of Opportunity program.

NOAA is also a major participant in international space-based working groups and coordinating bodies. These activities cover broad areas of cooperation and include payload planning, data management, calibration and validation, and mission operations. Coordination among international space programs is performed in the Committee on Earth Observations Satellites (CEOS), CEOS Working Group on Data, CEOS Working Group on Calibration, and CEOS Catalogue Subgroup. NOAA space activities are also coordinated within the Earth Observations-International Coordination Working Group (EO-ICWG), the International Polar Orbiting Meteorological Satellite Group (IPOMS), and the Coordination Group for Meteorological Satellites (CGMS).

C.3. USGS

C.3.1. USGS Role

As the Nation's largest earth science research and information agency, the USGS collects and analyzes scientific information need to address questions concerning our global environment. Virtually all of the USGS Geologic,

Water Resources, and Mapping programs may be relevant to the USGCRP, including:

- Geologic Framework and Process, as well as Offshore Geologic Surveys, Mineral Resource Surveys, Geologic Hazards Surveys, and Energy Geologic Surveys
- Hydrologic Data Collection, Water Data Coordination, Water Summary, Hazardous Waste Hydrology, Water Quality Assessment, Acid Rain, Regional Aquifer Systems Analysis, and Hydrologic Process research including surface-water and ground-water hydrology, geochemistry, sediment transport and geomorphology, water chemistry, and ecology
- Map and Digital Data Production, Mapping Coordination, and Research and Technology, including Advanced Cartographic Systems.

Except for a relatively small amount of focused global change research and participation in the NASA Earth Observing System (EOS) program, data and information management at the USGS is not separately funded but accomplished within the mission programs. Consequently, USGS support of the data and information needs of the USGCRP will draw primarily on facilities created for the USGS mission programs outlined above. However, the USGS is intent on improving internal data and information management independently of the USGCRP, and these efforts will support the needs of the USGCRP.

C.3.2. USGS Data and Information Program

Data Set Identification, Collection, and Generation

The USGS is identifying, collecting, and generating a number of key data and information products using its focused global change funding; these products will be made available through the GCDIS. Advice on the identification, collection, and generation of other data and information of particular interest to the global change research community will be sought through (1) the process to be established by the GCDIS Oversight Council, (2) the Interagency Working Group on Data Management for Global Change, and (3) the USGS Earth Resources Observation Systems (EROS) Data Center's participation in the EOS program.

The USGS has a number of institutional mechanisms in its mission programs that help focus agency resources on the data and information of greatest interest to the user community. For example, the USGS (acting on behalf of the Department of the Interior) chairs the interagency Federal Geographic Data Committee (FGDC) to promote the coordinated development, use, sharing, and dissemination of surveying, mapping, and

related spatial data. Fourteen departments and independent agencies (including NASA and NOAA) are members of the FGDC. The objectives of the committee include providing guidance and promoting cooperation among Federal, State and local government agencies, and the private sector. The FGDC was established through the revised OMB Circular A-16 which assigned leadership responsibilities to various Federal Departments for various types of spatial data. Geologic and base cartographic data are assigned to the USGS, and NOAA has responsibility for geodetic data. The intent of the revised OMB Circular is to reduce wasteful duplication of effort and foster development of a national spatial geographic data infrastructure.

Under OMB guidance, the USGS coordinates the water data acquisition and information sharing activities of all Federal agencies, including the quality and quantity of streams, lakes, reservoirs, estuaries, and ground water, plus water use and sedimentation. Input is solicited from 16 national organizations involved in water-related issues as part of this process. USGS is also active in the identification of data that may be available from the U.S. defense community through the Civilian Applications Committee.

Global Land Data Set Development Activities

A major USGS global change data management initiative is to organize, produce, and distribute regional, continental, and global land data sets that will support the requirements of the global change science community. These data sets, integrated with related earth science data and supplemented by co-registered, satellite-acquired data sets (Landsat, AVHRR, etc.), will enable scientists to quantify fundamental land surface attributes that are needed to model land surface processes, detect and monitor land surface change, and map land cover. Development of these data sets will provide well-structured, consistent land data sets that will form the historical record of land observations during the pre-EOS era.

1-km AVHRR Data of Land Areas—The EROS Data Center presently acquires and archives daily coverage of AVHRR 1-km data for much of the North American continent through its real-time reception of High Resolution Picture Transmission (HRPT) data. The Data Center also acquires and archives significant global land coverage of 1-km data through capture of the NOAA tape-recorded Local Area Coverage (LAC) data stream of foreign land coverage. The USGS is participating with NASA, NOAA, the European Space Agency (ESA), and several foreign countries in a prototype project to acquire and archive daily AVHRR 1-km data for the land area of the Earth beginning in 1992.

Composited AVHRR Data Sets—Major emphasis is being placed on producing AVHRR 1-km composited data sets that provide calibrated and

registered spectral data and a vegetation greenness index. Each composited data set includes the maximum Normalized Difference Vegetation Index (NDVI) greenness value for the compositing period, the data corresponding to AVHRR bands 1-5, the solar and satellite view angle geometry, and the calendar date for each of the composited pixels. These data sets were produced for the conterminous U.S. in 1990 and published on CD-ROMs. A companion CD-ROM contains co-registered related land data sets of the conterminous U.S. In 1991, periodic composited data sets at 1-km resolution were produced for: the conterminous U.S. (biweekly compositing periods); Alaska (selected biweekly periods); North American continent (a prototype example was developed with the Canada Center for Remote Sensing); and eastern Europe/western Asia (10-day periods). Production efforts are being coordinated with other processing centers to insure consistent land data sets on a global scale and to achieve maximum production efficiency.

Earth Science Data Sets—The development/refinement of related earth science data sets will provide a broadened or improved base of land cover information for integrated evaluation with satellite-acquired land data sets. Generally, these activities are associated with developing new digital data sets (such as digitizing maps of selected parameters), improving the consistency and/or accuracy of existing digital land data, and producing derived digital data products from existing digital land data (such as slope and aspect derivations from digital elevation data). Major activities include the development of data sets of continental-scale digital elevation data, conterminous U.S. land cover data, and global soils data, as described below:

- Digital Elevation Data—The USGS is creating a digital elevation data set for the North American continent. Using the North American segment of the five-minute resolution ETOPO-5 global digital elevation data set (distributed by NOAA's NGDC) as a base image, large areas are replaced with higher resolution digital elevation data from existing raster data sets covering various parts of the continent. The primary high-resolution data source is the Defense Mapping Agency Level-1 Digital Terrain Elevation Data which exists for most of North America. This data set will have approximately one-half kilometer resolution.
- Land Cover Characterization—Techniques are being developed for stratifying land surface features of the conterminous U.S. using AVHRR-derived multi-temporal parameters (such as greenness and albedo) and related land data. The objective is to identify seasonally-distinct land cover regions that can provide a useful stratification for summarizing the spatial and temporal properties of the land surface, and which can also serve as a useful context for monitoring and reporting land surface change. Once developed for the conterminous U.S., the stratification techniques will be evaluated for use on other continents.

- Soils Data—The USGS is cooperating with the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) to improve global soils data bases by using geographic information systems to integrate existing soils maps with related attribute data. The USGS is digitizing and re-projecting the United Nations Food and Agriculture Organization global soils maps (published at 1:25,000,000 and 1:5,000,000 scale) and linking the USDA Soil Taxonomy codes to the map units. The USGS will also support an SCS effort to develop a soils data base at 1:1,000,000 scale. These data bases will be used to make improved interpretations of the physical, chemical, and biological properties of soils.

Data Archive

USGS data and information products resulting from USGCRP focused global change research and data management activities, and all other USGS data and information products identified as key to global change research, will be archived according to guidelines to be established by the GCDIS Oversight Council. Other USGS mission program data and information products that contribute to the USGCRP will have varying archival procedures, consistent with the requirements of the specific mission program. Descriptions of the applicable archival procedures will be communicated to the GCDIS Oversight Council to solicit advisory input from the global change research community.

The primary USGS archive for global change data is the EROS Data Center located near Sioux Falls, South Dakota. Other major USGS archive sites with responsibility for global change and/or mission program-related earth science data currently include: Reston, Virginia (the USGS National Center); Denver and Golden, Colorado; Menlo Park, California; Woods Hole, Massachusetts; and Anchorage, Alaska. The major USGS water resources data holdings are maintained in a distributed network of 52 sites across the U.S., which will grow to over 100 sites by 1994.

<u>EROS Data Center</u>

The EROS Data Center is carrying out the majority of USGS global change data management activities and will be the EOS Land Processes Distributed Active Archive Center (DAAC). The Center was established in the early 1970's to receive, process, and distribute data from the experimental Landsat satellites. It houses the world's largest collection of space- and aircraft-acquired imagery of the Earth, including over 2 million images acquired from Landsat and other satellites and over 8 million aerial photographs. The central U.S. location provides the Center with the capability to receive real-time digital data of most of the North American continent from Earth-

orbiting satellites. The Center is also a central clearing-house for information concerning the holdings of foreign Landsat ground reception stations and data acquired by other countries Earth-observing satellites. To support the Data Center's mission, the facility operates one of the Department of the Interior's largest computer complexes. In addition to computers to support scientific processing and analysis of data, over 100 locations in Federal, State, and commercial offices are linked to the Center's computers for data inquiries. More than 60,000 inquiries and orders are received annually, resulting in the distribution of over 250,000 products to scientists and resource managers around the world. The EROS Data Center is in the final phase of gaining recognition by the International Council of Scientific Unions as a World Data Center for Land Remotely Sensed Data.

EOS Land Processes Distributed Active Archive Center (DAAC)

Through agreements between NASA and the USGS, the EROS Data Center will play a major role in the archiving, processing and distribution of EOS land-related data. The Data Center will be the NASA EOS Data and Information System (EOSDIS) Land Processes DAAC for archiving and distributing land data from MODIS and ASTER, and (if the instruments are approved) SAR and HIRIS. The EROS Data Center, together with NASA and other organizations, is participating in extensive planning and coordination to prepare for the implementation and operation of EOSDIS. Planning and systems engineering activities include: supporting NASA development of data processing, archiving and information management systems; definition of specifications and production procedures for standard and derivative products; coordination of data system requirements for the critical land remote sensing instruments; integration of EOS and non-EOS data systems and related archives and products; coordination of interfaces between the Land Processes DAAC and the other elements of the EOSDIS network; and expansion of existing EROS Data Center facilities to house the DAAC.

As part of the EOSDIS program, the EROS Data Center is: (1) beginning implementation of Version 0 data archiving, processing, and distributing capabilities with existing precursor (non-EOS) data sets (including AVHRR, Landsat, AVIRIS, and TIMS); (2) making non-EOS land data sets (such as global topographic data sets) available to the EOS science community; (3) participating with the EOS science and instrument teams to ensure delivery of land-related products required for EOS investigations; (4) establishing a science advisory group to guide science requirements and evaluate EOS data products; and (5) beginning to link the USGS Global Land Information System, GLIS, to the Version 0 Information Management System.

Landsat Data Archiving and Preservation

By the launch of the first EOS polar platform in 1998, Landsat data will provide a 25-year baseline of information about land surface conditions and changes during the 1970's, 1980's, and 1990's that is not available from any other data source. As the operator of the National Satellite Land Remote Sensing Data Archive, the USGS archives Landsat Multispectral Scanner (MSS) and Thematic Mapper (TM) data acquired by the U.S. (approximately 800,000 scenes). The USGS has embarked on a major program to convert the Landsat data archive to next-generation durable storage media because approximately half of these data are more than 10 years old and are stored on deteriorating magnetic tape. Procurement of a conversion system was initiated in FY 1990. The conversion of Landsat MSS data acquired between 1979 and the present will begin in mid-1992 and will continue for 12-15 months. Landsat TM data conversion will begin in late 1992 and will be completed in 18-24 months.

Landsat MSS data acquired from 1972-1978, which are the oldest and have the highest probability of data loss, will be converted last pending the development of a new system capable of processing the Wide-Band Video Tape medium upon which these data are recorded. A study is underway to better understand the condition of these tapes and to assess the probability of successfully converting them. Pending a positive study outcome and availability of funding, a system could be developed by 1994 and data conversion could be completed by 1996.

At the conclusion of the Landsat data conversion activity, approximately 75 Terabytes of Landsat data will be converted from 60,000 tapes to approximately 2,000 data cassettes, reducing storage space requirements by a factor of 10.

Search and Order

Search and order of USGS global change-related data and information products listed in Appendix B will be supported as described elsewhere in this document. Other USGS data and information products will be supported by various search and order capabilities and will be identified in the Global Change Master Directory (GCMD), although at varying levels of aggregation. Except where access is specifically restricted by law, all products will be made available to global change researchers at least as conveniently as they are made available for other users. In cases where the global change research community identifies a requirement for improved access to particular USGS data and information, the USGS will work to provide automated links to appropriate metadata systems from the GCDIS (to the extent feasible with mission program funds). For example, it is the intent of the USGS to provide

a linkage between the GCDIS and the USGS National Water Information System through the Global Land Information System.

Global Land Information System (GLIS)

The Global Land Information System (GLIS) is an on-line land data directory, guide, and inventory system being developed by USGS to respond to the land data information and access needs of the global change research community. In addition to being a USGS component of the GCDIS, GLIS will support on-line search and order to the granule level for certain data and information products beyond those listed in Appendix B, some of which may also be of interest to global change researchers. The goal of GLIS is to provide earth science data users with a single interactive source for information about, and access to, data pertaining to the Earth's land surface that can be used in regional, continental, and global scale earth science research and global change studies.

Data set information in GLIS is maintained in three levels of detail. The directory level contains summary descriptions of entire data sets. Data directory textual searches are based on discipline, project, sensor key words, geographic location, and other data set parameters. The guide level contains detailed descriptions of data sets, including information about sensor specifications, extent of coverage, processing history, data quality, and product availability. The inventory level contains detailed information about individual data elements (granules), such as the time and location of a Landsat scene or AVHRR pass. Spatial queries can be made by specifying geographic points, bounding rectangles, polygons, or geographic names. GLIS also provides features for graphical presentation of user-specified geographic search areas, geographic coverage of available data, and browse images.

An operational GLIS prototype became available for general user access in May 1991. It contains references to regional, continental, and global land science data sets, a complete inventory of USGS-held 1-km AVHRR data, and AVHRR image data browse capability for IBM PC-compatible and 32-bit workstation platforms. A prototype Landsat data inventory and image browse capability is targeted for January 1992, with implementation of the first operational release of GLIS in September 1992. The operational system will include a complete AVHRR worldwide inventory query and image data browse capability, references to many additional global land source and derivative data sets, and a full Landsat worldwide inventory query capability. An operational Landsat image data browse capability will be available in April 1993.

As the USGS node of the national GCDIS, a route for user access to GLIS will be through the GCMD. Direct access to GLIS will also be provided via wide-

area networks such as the NASA Science Internet and the National Science Foundation Network, as well as via low-speed modem interfaces.. GLIS will provide network paths or linkages back to the GCMD and to and from other earth science information systems such as the NASA Pilot Land Data System and early implementations of the EOS Information Management System (IMS). GLIS will also provide a path to much broader information services by linking to the Wide Area Information Servers (WAIS) that includes the USGS Earth Science Data Directory among the available sources. The USGS version of WAIS, in turn, will provide a mechanism for users to link into GLIS and the GCDIS.

Distribution

USGS data resulting from focused global change programs will be distributed according to guidelines established by the interagency GCDIS. Other USGS mission program data and information products will continue to be distributed in a manner that is consistent with the requirements of the specific mission program. In addition to the digital media which are the current focus of the interagency GCDIS, USGS information is disseminated in many other forms. About 125,000 different maps, books, and reports, as well as almost 10 million aerial and space images, are made available through the USGS Earth Science Information Centers, the EROS Data Center, the National Water Information Clearinghouse, the Geologic Inquiries Group, the Mineral Information Office, and various other outlets at the Federal and State levels. Advice on improving the distribution of USGS products to better serve the global change research community will be sought through the processes to be established by the GCDIS Oversight Council.

C.3.3. Data and Information Policy

The U.S. Data Management for Global Change Research Policy Statements are being applied to data and information practices within the USGS on an agency-wide basis. The process of applying these principles will require changes to be made in different ways within different component organizations of the USGS. For example, mechanisms must be found to encourage the publication of data and to limit periods of exclusive use of data. The issue of documenting data will also be challenging, especially as it involves the need to ascribe some measure of the quality of the data. Even the requirement for formal archival procedures will be new to some research organizations.

The USGS will work closely with the GCDIS Oversight Council to develop ways to put the data and information policy into practice. The USGS has drafted a Data Management Handbook that may be useful in developing the

GCDIS Project and Program Manager Guidelines. Interagency coordination on the pricing of data and information products may also benefit from the USGS experience in establishing such an agency-wide policy. The USGS will also continue to be an avid supporter of using national and international standards to the greatest extent possible. For example, the USGS is heavily involved in CD-ROM standards and in the establishment of the Spatial Data Transfer Standard, both of which should have broad implications for global change data.

C.3.4. Science Community Guidance

The USGS has several mechanisms to obtain scientific review and oversight of its programs, including programs that deal with global change data management. USGS Divisions have scientific advisory committees that periodically review their programs. For example, the Mapping Science Committee of the National Academy of Sciences recently reviewed the programs of the USGS National Mapping Division; it recommended that the Division produce a wider variety of non-standard spatial data products to support diverse user requirements within and beyond the Federal Government, such as the USGCRP. The USGS global land data set development activities are responsive to this recommendation. The USGS Global Change Peer Review Committee provides guidance to USGS on its global change research programs. The Committee includes representatives from the academic community with expertise in a variety of global change research disciplines, remote sensing, and spatial data handling and processing.

An EOSDIS DAAC Advisory Committee is being established at the EROS Data Center to provide science community guidance to the Center as its relationship in support of NASA's EOS program is developed.

C.3.5. International Links

The USGS currently has more than 70 international bilateral agreements under which cooperative research is undertaken, and approximately 20 additional agreements are multinational, regional, or worldwide in scope. Examples of international programs that are related to global change include: remote sensing data collection from Landsat, SPOT, and AVHRR systems; surveying and mapping to produce base, topographic, geologic, and other thematic maps; surveying and mapping in polar regions to assess changes in glaciers, ice sheets, and climate; research, assessment, and modeling for climate-change and atmospheric deposition programs; research, assessment, and modeling of surface-and ground-water resources in various countries and regions; and activities to mitigate geologic and hydrologic hazards,

predictive investigations and monitoring of volcanic eruptions, and global research on geophysics, seismicity, and earthquakes.

Links to other countries exist through projects described in Section C.3.2.1, such as the global AVHRR 1-km data base (with ESA and countries with ground stations) and the North America NDVI mapping program (with Canada). Other international programs with which the USGS is involved include: the Global Energy and Water Cycle Experiment (GEWEX); the Continental International Project (GCIP), a part of the World Climate Research Program; the Land Cover Change Pilot Study of the International Geosphere-Biosphere Program (IGBP) Working Group on Data and Information Systems; and two International Space Year projects -- development of a CD-ROM Encyclopedia of Global Change, and a project on the Global Consequences of Land Cover Change.

The USGS actively participates on the Working Group on Data and the Catalog Subgroup of the Committee on Earth Observation Satellites (CEOS), an international group whose members include NASA, NOAA, and the space agencies of Australia, Brazil, Canada, France, Germany, India, Italy, and Japan. These groups address common areas of interest such as data formats, catalog interoperability, networks, and data management. The USGS also contributes to the Landsat Ground Station Operators Working Group (LGSOWG), an international group that addresses data management issues related to the Landsat program.

An agreement between UNEP, NASA, and the USGS was reached in early 1991 to establish and operate a North American UNEP/GRID facility at the EROS Data Center. The facility serves a function similar to that being carried out at GRID-Nairobi, GRID-Geneva, and GRID-Bangkok, which is to: (1) collate, store, retrieve, analyze, and distribute environmental data sets; (2) provide support to environment-related projects requiring geographic information system and image processing technologies; and (3) support training in such technologies, particularly for Third World experts and institutions. The network of GRID facilities in Africa, Asia, Europe, and now in North America has been established to provide the world community with access to timely, usable environmental data and to the necessary data processing and telecommunication technology to make best use of such data for global science applications. GRID-Sioux Falls has worked with remotely sensed data to support UNEP's environmental assessment efforts in the Persian Gulf region following the Gulf War.

The USGS is also a member of the International Consortium of Geological Surveys for Earth Computing Science and in the International Union of Geological Sciences Subcommittee on Global Data in Information Management.

Appendix D.

Acronym List

ACRONYM LIST

AASE	Airborne Arctic Stratospheric Expedition
ABLE	Atmospheric Boundary Layer Experiment
ADC	Affiliated Data Center
AIRS	Atmospheric Infrared Sounder
ALT	Altimeter
AMSU	Advanced Microwave Sounding Unit
ASF	Alaska SAR Facility
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AVHRR	Advanced Very High-Resolution Radiometer
BOREAS	Boreal Ecosystem-Atmosphere Study
CDDIS	Crustal Dynamics Data Information System
CDMS	Cryospheric Data Management System
CD-ROM	Compact Disk Read-Only Memory
CEES	Committee on Earth and Environmental Sciences
CENDI	Commerce, Energy, NASA, National Library of Medicine, Defense Information
CEOS	Committee on Earth Observations Satellites
CERES	Clouds and Earth's Radiant Energy System
CGC	Committee on Global Change
CGD	Committee on Geophysical Data
CIESIN	Consortium for International Earth Science Information Networks
COARE	Coupled Ocean-Atmosphere Response Experiment
CODATA	Committee on Data
CU	University of Colorado
CZCS	Coastal Zone Color Scanner
DAAC	Distributed Active Archive Center
DADS	Data Archive and Distribution System
DIF	Directory Interchange Format
DOC	Department of Commerce
DoD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
EDC	EROS Data Center
EDOS	EOS Data and Operations System
EOC	EOS Operations Center
EOS	Earth Observing System
EOSDIS	EOS Data and Information System
EOSP	Earth Observing Scanning Polarimeter
EPA	Environmental Protection Agency
EPOCS	Equatorial Pacific Ocean Climate Studies
ERBE	Earth Radiation Budget Experiment

ERBS	Earth Radiation Budget Satellite
EROS	Earth Resources Observation System
ERS	Earth Remote-Sensing Satellite
ESA	European Space Agency
ESDIM	Earth System Data and Information Management
ESDIS	Earth Science Data and Information System
FCCSET	Federal Coordinating Council on Science, Engineering, and Technology
FIFE	First ISLSCP Field Experiment
FTP	File Transfer Protocol
GCDIS	Global Change Data and Information System
GCMD	Global Change Master Directory
GCRP	Global Change Research Program
GEWEX	Global Energy and Water Cycle Experiment
GLIS	Global Land Information System
GLRS	Geoscience Laser Ranging System
GOES	Geostationary Operational Environmental Satellite
GSFC	Goddard Space Flight Center
GTS	Global Telecommunications System
HIRDLS	High-Resolution Dynamics Limb Sounder
HIRIS	High-Resolution Imaging Spectrometer
ICF	Instrument Control Facility
ICSU	International Council of Scientific Unions
IGAC	International Global Atmospheric Project
IGBP	International Geosphere-Biosphere Program
IMS	Information Management System
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
IPOC	International Partner Operations Center
ISCCP	International Satellite Cloud Climatology Experiment
ISLSCP	International Satellite Land Surface Climatology Project
IST	Instrument Support Terminal
IWGDMGC	Interagency Working Group on Data Management for Global Change
JERS	Japan's Earth Resources Satellite
JGOFS	Joint Global Ocean Flux Study
JPL	Jet Propulsion Laboratory
LAGEOS	Laser Geodynamics Satellite
Landsat	Land Remote-Sensing Satellite
LaRC	Langley Research Center
LIS	Lightning Imaging Sensor
MHS	Microwave Humidity Sounder
MIMR	Multifrequency Imaging Microwave Radiometer
MISR	Multi-Angle Imaging Spectro-Radiometer
MODIS-N	Moderate-Resolution Imaging Spectrometer-Nadir
MOPITT	Measurements of Pollution in the Troposphere

MRDS	Mineral Resources Data System
MSFC	Marshall Space Flight Center
MSS	Multispectral Scanner
NARA	National Archive and Records Administration
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NCDC	National Climatic Data Center
NCDS	NASA Climate Data System
NCRDS	National Coal Resources Data System
NDCDB	National Digital Cartographic Database
NESDIS	National Environmental Satellite, Data, and Information Service
NEXRAD	Next-Generation Weather Radar
NGDC	National Geophysical Data Center
NIST	National Institute of Standards and Technology
NMC	National Meteorological Center
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NODS	NASA Ocean Data System
NREN	National Research and Education Network
NSCAT	NASA Scatterometer
NSF	National Science Foundation
NSIDC	National Snow and Ice Data Center
NWIS	National Water Information System
NWS	National Weather Service
OLS	Optical Line Scanner
ORNL	Oak Ridge National Laboratory
OSDPD	Office of Satellite Data Processing and Distribution
OSTP	Office of Science and Technology Policy
PGS	Product Generation System
PLDS	Pilot Land Data System
POES	Polar-Orbiting Operational Environmental Satellite
POI	Prototype Operational Instrument
PR	Precipitation Radar
QC	Quality Control
Radarsat	Radar Satellite
RASS	Rock Analysis Storage System
SAGE	Stratospheric Aerosol Gas Experiment
SAR	Synthetic Aperture Radar
SCF	Science Computing Facility
SDSD	Satellite Data Services Division
SDTS	Spatial Data Transfer Standard
SEAS	Shipboard Environmental Acquisition System
SeaWiFS	Sea-Viewing Wide Field Sensor
SLAR	Side-Looking Airborne Radar
SMC	System Management Center

SMMR	Scanning Multispectral Microwave Radiometer
SSM/I	Special Sensor Microwave/Imager
STIKSCAT	Stick Scatterometer
SWG	Science Working Group
TES	Tropospheric Emission Spectrometer
TGDDIS	Trace Gas Dynamics Data Information System
TIROS	Television Infrared Observing Satellite
TM	Thematic Mapper
TMI	TRMM Microwave Imager
TOGA	Tropical Ocean Global Atmosphere
TOMS	Total Ozone Mapping Spectrometer
TOPEX	Ocean Topography Experiment
TOVS	TIROS Operational Vertical Sounder
TRMM	Tropical Rainfall Measuring Mission
UAF	University of Alaska-Fairbanks
UARS	Upper Atmosphere Research Satellite
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
U.S.	United States
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WCRP	World Climate Research Program
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment