

# IN14B-03: A Unified Level of Service Model for NASA Earth Science Data Stewardship

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**What is Level of Service?**

The term Level of Service refers to the quantity and types of services applied to data during archival and preservation. Services include the activities related to data ingest, storage, documentation, distribution, ensuring usability and discoverability, user support, business, and preservation.

**How to Assign Data a Service Level**

The primary goals of this Level of Service model are to:

- Provide a framework for clearly communicating informed service level descriptions at NSIDC DAACs.
- Use consistent terminology so that data producers, interacting with multiple DAACs, can understand the process of what is being described.
- Present clear definitions and service level descriptions so that all data producers and users can understand how services are assigned and how to make suggestions of DAACs when relevant.
- List DAAC common data stewardship requirements for service level DAAC-specific services not included in the model and could need to be specified separately.
- Increase transparency, efficiency and cost-effectiveness of the data stewardship process.

**Service Categories/Requirements**

The intent of this Level of Service model is to specify the service requirements as opposed to suggesting how those requirements are to be met by DAACs. This focus is on DAACs to address how best to meet the requirements. (While many of the service categories (or data sets) with data publication or the act of creating, updating, and making data publicly available, not all service categories include this type of work.)

**The Importance of Communication**

The Level of Service model description document also contains guidance for what DAACs can say to communicate the levels of service to data producers and data users. DAACs can then individually address how to display the information, but the information content will match that of the model.

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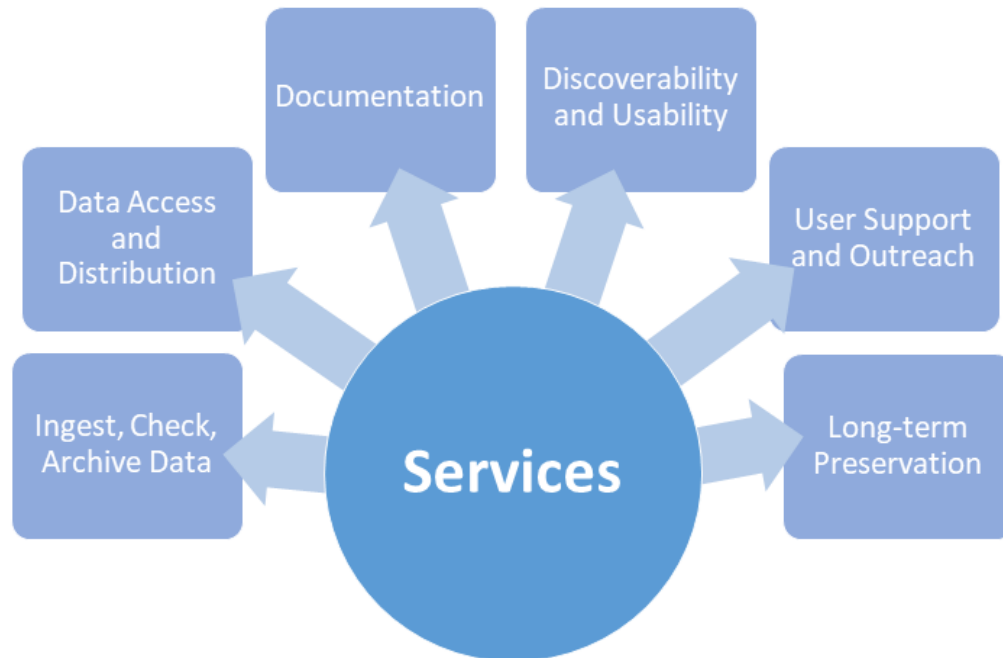
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## WHAT IS LEVEL OF SERVICE?

Data archived at NASA Distributed Active Archive Centers (DAACs) are provided long-term, quality data stewardship that includes more than just data ingest and storage.

However, each data product can not, and likely should not have all the same services applied. The goal is typically to apply the appropriate amount of services in order to optimize the data usability and access while balancing the resources and time/effort required.



The term Level of Service refers to the quantity and types of services applied to data during archival and preservation. Services include the activities related to data ingest, storage, documentation, distribution, ensuring usability and discovery, user support, outreach, and preservation.

The process of determining what services to provide a data product has historically been carried out independently at each of the NASA DAACs. Therefore, data producers interacting with different data centers often do not get the same services for similar data products. This can lead to confusion and frustration.

This Level of Service model has been designed to bring consistency to service determinations for data across all NASA DAACs and to improve communication of the DAAC roles and responsibilities, making it easier for data producers and data users to know what to expect with respect to data stewardship.

# HOW TO ASSIGN DATA A SERVICE LEVEL

The primary goals of this Level of Service model are to:

- Provide a framework for clearly communicating information about data stewardship at NASA DAACs.
- Use consistent terminology so that data producers interacting with multiple DAACs can understand the process no matter which data center they interact with.
- Present clear definitions and service level descriptions so that all data producers and users can understand how services are assigned and have realistic expectations of DAAC effort.
- List DAAC common data stewardship requirements by service level. DAAC-specific services are not included in the model and need to be specified separately.
- Improve enterprise-wide transparency, efficiency and cost-effectiveness of the data stewardship process.

		Data Product Category					
		Science Mission Product	NASA- Funded Data Products	Facility Created Product	NASA Research Community Product	NASA Applied Science Product	non-NASA Research Community Product
<b>Data Processing Level</b>	Raw Data (L0)	basic	n/a	n/a	n/a	n/a	n/a
	Calibrated Data (L1A/L1B)	standard	basic	n/a	basic	n/a	n/a
	Swath Data (L2)	comprehensive	standard	standard	standard	standard	standard
	Gridded Data (L3/L4)	comprehensive	comprehensive	comprehensive	comprehensive	standard	standard
	Auxiliary/ Ancillary Data	standard	basic	basic	basic	basic	basic
	NRT Data	comprehensive	n/a	comprehensive	standard	standard	n/a

To utilize the Level of Service model, one needs to know two common data characteristics: the NASA data processing level and the data product category. The NASA data processing level identifies the nature of the data, from raw instrument data (Level 0) to gridded variable data products (Level 3) to model output (Level 4). A description of NASA data processing levels (<https://science.nasa.gov/earth-science/earth-science-data/data-processing-levels-for-eosdis-data-products>) is freely available online.

The NASA data product category descriptions are related to the funding mechanisms behind the data production. There are six categories

- Science Mission Products
- NASA-funded Data Products
- Facility Created Products
- NASA Research Community Products
- NASA Applied Science Products
- Non-NASA Research Community Products


The table identifies which of three service levels apply to data of a given processing level and data category. The terms are basic, standard, and comprehensive. Currently these terms are in use at NSDC DAAC for their Level of Service model.

# SERVICE CATEGORIES / REQUIREMENTS

The intent of this Unified Level of Service model is to specify for DAACs the service requirements as opposed to suggesting how those requirements are to be met. This leaves room for DAAC personnel to decide what is the best way for them to meet the requirements.

While many of the service categories list below deal with data publication (or the act of accepting, archiving, and making data publicly available), not all service categories involve this type of work.

Documentation, Discoverability and Usability, User Support and Outreach include services that continue beyond the time of data publication and focus on the DAAC work that may not necessarily be associated with any one data product. The requirements listed by category below only apply to upcoming/future datasets at this time. How to handle already published and supported data has not yet been determined.

<ul style="list-style-type: none"> <li>✓ Obtain data from producer via download or delivery</li> <li>✓ Confirm file number and file size</li> <li>✓ Confirm accurate data transfer using checksums for delivered data</li> <li>✓ Confirm data access (can read files without read error)</li> <li>✓ Apply a standardized file name to meet ESDIS or DAAC policies</li> <li>✓ Place data in a standardized data directory structure</li> <li>✓ Check file format for consistency and usability</li> <li>✓ Produce an archive copy of data product and routinely verify replacement</li> <li>✓ Perform technology updates to continue safe data storage and access</li> <li>✓ Provide ingest metrics to the ESDIS Metrics System (EMS)</li> </ul>	 <p>Basic Service Level Requirements</p>	Ingest
<ul style="list-style-type: none"> <li>✓ Place data on public server within the expected time frame</li> <li>✓ Confirm access to data via HTTPS</li> <li>✓ Obtain DOI that redirects to a landing page with product information</li> <li>✓ Provide data distribution metrics to EMS</li> </ul>		Distribution / Access
<ul style="list-style-type: none"> <li>✓ Create collection metadata and verify data file metadata accuracy</li> <li>✓ Construct and confirm data product citation</li> <li>✓ Construct simple user guide describing the data product</li> <li>✓ Create data product landing page and check for accuracy</li> </ul>		Documentation
<ul style="list-style-type: none"> <li>✓ Confirm that published metadata comply with accepted standards</li> <li>✓ Publish required collection and file (granule) metadata in CMR</li> <li>✓ Provide necessary data search and access capabilities</li> <li>✓ Confirm that data product can be located by search</li> <li>✓ Confirm that a user can access the landing page, the data product user guide and any producer documentation or publications via landing page</li> </ul>		Discoverability / Usability
<ul style="list-style-type: none"> <li>✓ Publicly announce data product publication (via web and social media)</li> <li>✓ Assist data users with data access and user question responses via a user forum and/or question management software</li> <li>✓ Maintain and keep website and data landing page information current</li> </ul>		User Support / Outreach
<ul style="list-style-type: none"> <li>✓ Maintain a permanent DOI and landing page</li> <li>✓ Archive final version of data product</li> <li>✓ Verify integrity of data product backup and confirm successful replacement of public copy at regular intervals</li> <li>✓ Provide permanent access to metadata and /product history</li> <li>✓ Maintain data product metadata to adhere to ESDIS standards</li> <li>✓ Locate and add new data validation publications to metadata/landing page/preservation materials</li> <li>✓ Adhere to any ESDIS metadata changes (CMR)</li> </ul>		Preservation

The basic level services are listed above. The basic level requirements are designed to provide for a minimal level of data stewardship that makes the data findable and accessible. The additional requirements for standard and comprehensive services build on this set of baseline requirements, bringing greater quality data care and support.

# THE IMPORTANCE OF COMMUNICATION

The Level of Service model description document contains example statements for how a DAAC can communicate the levels of service to data producers and data users. DAACs can then individually choose how to display the information, but by using the examples, the information content will match that of the model.

A good example of how to effectively communicate level of service to data producers and data users is currently in use at the National Snow and Ice Data Center (NSIDC) DAAC. This example clearly and succinctly outlines the Level-of-Service model in use at NSIDC DAAC with visual cues and simplified, non-jargon text. The lists shown below match the NSIDC service model in use. (see references for more information).

Use of this type of material helps data producers and data users develop reasonable service expectations for data in terms they can understand.

The image displays three vertical panels representing different levels of service: BASIC, STANDARD, and COMPREHENSIVE. Each panel has a green header with the level name and a circular icon containing a scale and the word 'SERVICE'. The panels are organized into three columns.

- BASIC SERVICE:** Includes all **Basic** services:
  - DATA**
    - File sizes, checksums, and number of files have been verified.
    - File names are descriptive and consistent.
    - File format and structure are appropriate for expected data use.
    - Key metadata—geospatial, temporal, and science variable information—are provided and well-defined.
    - Data can be accessed via all supported methods.
    - Data are backed up and versioned.
  - DOCUMENTATION**
    - Data discovery and usage metadata are available.
    - Links are provided to supporting documentation describing data content and methodologies.
    - Data set landing page and data citation, including Digital Object Identifier (DOI), are available.
  - USER SUPPORT**
    - Assistance with data access.
    - Assistance with basic data usage questions and referral to external documentation or data provider for more complex questions.
- STANDARD SERVICE:** Includes all **Basic** services **plus**:
  - DATA**
    - Data usability has been verified in select data analysis tools.
  - DOCUMENTATION**
    - User guide is provided with the following content: detailed descriptions of science variables, geospatial and temporal information, and data quality.
  - USER SUPPORT**
    - Assistance with data usage questions.
    - Guidance on use of data in select data analysis tools.
- COMPREHENSIVE SERVICE:** Includes all **Standard** services **plus**:
  - DATA**
    - Data customization services—subsetting, reformatting, and/or reprojection—are available for select data.
  - DOCUMENTATION**
    - Comprehensive user guide is provided with the following content: detailed descriptions of science variables, geospatial and temporal information, data quality, and data methodologies.
  - USER SUPPORT**
    - Assistance with complex data usage and methodologies questions.
    - Guidance on use of data customization services for select data.

The unified Level of Service model description document provides the content for this type of approach in the form of several lists that matches the requirements of the Unified Level of Service model.

# CV

Deborah Smith leads the Airborne Data Management Group within IMPACT (Interagency Implementation and Concepts Team) located at the University of Alabama in Huntsville NSSTC offices. She works to improve airborne data access and discovery, usability and value.

Deborah acknowledges the significant contributions made to this topic by Amanda Leon and Shannon Leslie at NSIDC DAAC, Eric Toler at PO.DAAC, Helen Conover at GHRC, and others. Deborah also recognizes the many discussions with Kaylin Bugbee and Amanda Leon as extremely necessary to the success of this work.

The following document was important to the request for development of this Level of Service model:

SE-TIM Session: Dataset Level of Service: What is it? Where do we want to go with it?, by Amanda Leon and Eric Tauer, August 29, 2018

## ABSTRACT

During the past year, the Interagency Implementation and Concepts Team (IMPACT) reviewed existing service models in use at various NASA data centers in an effort to produce a unified, cohesive, and comprehensive Level of Service Model for all of NASA Distributed Active Archive Centers (DAACs). NASA DAACs are responsible for ensuring NASA Earth Science data are accurately and securely ingested, distributed, supported, and preserved. The term "Service" as used here refers to the spectrum of data management activities and outputs provided by DAACs in support of the data cared fo by each data cente. The unified Level-of-Service (LoS) model described in this presentation utilizes both the NASA-defined data product category and the data processing level to easily identify an appropriate level-of-service to be applied to a data product throughout the full data life cycle. This LoS model is to be used by DAACs when appraising incoming data in order to determine the appropriate and required services to provide. The LoS model utilizes a 3-level system in which services build upon previous levels and thereby require greater commitment and effort both on the part of the DAAC personnel and the data producer at the highest level. The LoS model description also contains examples of ways to communicate with data producers and data users what services can be expected, thereby bringing more consistent user experiences across the enterprise. In this presentation, we will outline the features of the LoS model and describe how it relates to the FAIR data practices and the NOAA Maturity Matrix model.

## REFERENCES

Achieving Scalable Data Management Through a Dataset Level of Service Model, Amanda Leon et al., AGU Fall Meeting 2018, IN41F-0895

SE-TIM Session: Dataset Level of Service: What is it? Where do we want to go with it?, by Amanda Leon and Eric Tauer, August 29, 2018

SWITCH TEMPLATE

