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# Operational Concept for Interfaces Between EDOS and ECS for the Restoration of L0 Data for the ECS Project

Technical Paper

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# Abstract

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This document presents the operations concept for three interfaces to replace missing or corrupt Level 0 data in the ECS and EDOS archives.

If ECS operations at the GES DAAC requests a replacement L0 product or products, EDOS can fill the request by supplying a DTF-2 archive tape(s) containing EDOS PDSs (Production Data Sets). The DAAC operator can retrieve the required file(s) from the DTF-2 tape and restore the data to the ECS archive. To replace L0 data at the LaRC and NSIDC DAACs, EDOS supplies replacement PDSs via an FTP interface.

If EDOS should need a L0 product from any ECS archive, ECS would supply the product to EDOS via FTP.

**Keywords:** Archive, DAAC, EDOS, Level 0, L0, LZPF, PDS, backup, restore

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# 1. Introduction

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## 1.1 Purpose

This Technical Paper provides the operational concept for restoration of Level 0 data from the EDOS archive to the ECS (EOSDIS Core System) and restoration of Level 0 data to EDOS from the ECS archive. The paper was written with the help of Operations staff at the LZPF and the DAACs.

This Paper originated as part of the implementation of ESDIS Engineering Support Directive (ESD) #181, "DTF-2 Upgrade." It also fulfills two ECS Level 3 functional requirements, DADS1450 and DADS2307 (see Appendix A), which were stasured as post-EOC in the EOC requirements reconciliation.

## 1.2 Organization

This paper is organized as follows:

1. Introduction
2. Overview
3. Restoration of L0 Data to the ECS from the EDOS Archive
4. Restoration of L0 Data to EDOS from the ECS Archive

## 1.3 Review and Approval

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## 2. Overview

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Most L0 (Level 0) instrument data in the ECS archive was originally supplied by EDOS via the interfaces documented in the EDOS-EGS ICD, 423-ICD-EDOS/EGS. Missing or corrupt ECS L0 files usually can be restored from the EDOS archive.

The EDOS archive is being converted from D3 to DTF-2 tapes. If ECS operations at the GES DAAC requests a specific L0 product or products, EDOS can fill the request by supplying a DTF-2 archive tape(s) containing EDOS PDSs (Production Data Sets). The ECS operator can find and retrieve the required file(s) from the DTF-2 tape and restore the data to the ECS archive.

Only the GES DAAC has a DTF-2 tape drive available for reading EDOS tapes. EDOS supplies replacement PDSs to the LaRC and NSIDC DAACs via an FTP interface.

If EDOS should need a L0 product from any ECS archive, ECS would supply the product to EDOS via FTP. The EDOS operator could restore the file to the proper DTF-2 tape in the EDOS archive without having to re-index the archive or archive a tape containing large unused areas.

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## **3. Restoration of L0 Data to the ECS Archive from EDOS**

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The DAACs use DAAC-unique scripts to monitor ingest of EDOS PDSs and alert the operator when a break is found in the data sequence; that is, the time spans of the PDSs received are not contiguous or a received file is found to be incomplete (under the expected file size threshold).

Errors reported during ECS order fulfillment or information from users also may reveal missing or corrupt data in the ECS archive.

Specific address information needed to conduct the L0 restoration procedures -- such as FTP sites, e-mail addresses and telephone numbers -- should be documented in an Operations Agreement between EDOS and the DAACs, 510-OA-EDOS/SDPS.

### **3.1 DAAC Requests for EDOS Data**

The DAACs use an ESDIS-sponsored EOS Data Re-Order web tool to re-order L0 PDS(s) from EDOS. The tool allows the operator to specify each required PDS by APID(s) and Start and Stop time of the data and also conveys the request priority.

At the LZPF (EDOS Level 0 Processing Facility) in Greenbelt, Maryland, operators monitor the Re-Order Web tool for requests on a daily basis but not necessarily hourly. If a DAAC request is very urgent, the DAAC operator should alert the LZPF operator to that fact by telephone.

The EOS Data Re-Order Web tool provides for specifying priority for data requests. The priorities are 3 (low), 2 (medium) and 1 (high). The LZPF operators will follow those priorities in initiating re-order fulfillment. Priorities should not be changed once re-orders are in process. The volume of re-order requests is such that changing a priority has significant operational impact on the LZPF. High priority orders should always be marked as priority 1 at the time they are submitted in the web tool.

PDS(s) are available at the LZPF for 45 days after creation. After that, the LZPF must have the relevant archive tapes delivered from the DAF (Data Archive Facility) at White Sands in New Mexico before it can respond to the DAAC's request.

### **3.2 Data Not Recoverable**

Not all requests for archived PDSs can be filled. Some instrument data may never have reached EDOS owing to transmission or instrument problems, resulting in missing or incomplete data sets. The LZPF operator will notify the DAAC promptly via e-mail or telephone if data requested is not recoverable.

### 3.3 Replacement EDSs

There is a window of 4 hours after EDOS creates an EDS (Expedited Data Set) during which a DAAC may still be able to obtain a replacement EDS. Requests for EDS replacement must be telephoned promptly to the LZPF.

There is no archive tape for an EDS. The LZPF operator employs the standard EDOS to DAAC FTP procedure to forward the replacement EDS to the DAAC (see Section 3.5).

### 3.4 Physical Media Transfer

This section is applicable only to the GES DAAC as only that DAAC has a DTF-2 tape drive available in the ECS for reading EDOS tapes. Refer to Figure 3-1 for a summary of this process.

EDOS furnishes L0 replacement data to the GES DAAC on DTF-2 tapes. The LZPF hands the DTF-2 archive tape(s) containing the requested data off to the GES DAAC operator. The DAAC operator returns each tape to the LZPF as soon as the needed data has been archived in the ECS.

Each EDOS DTF-2 archive tape contains two tar files that include the requested PDSs. The GES DAAC operator untar's the DTF-2 tape(s) onto an ECS machine.

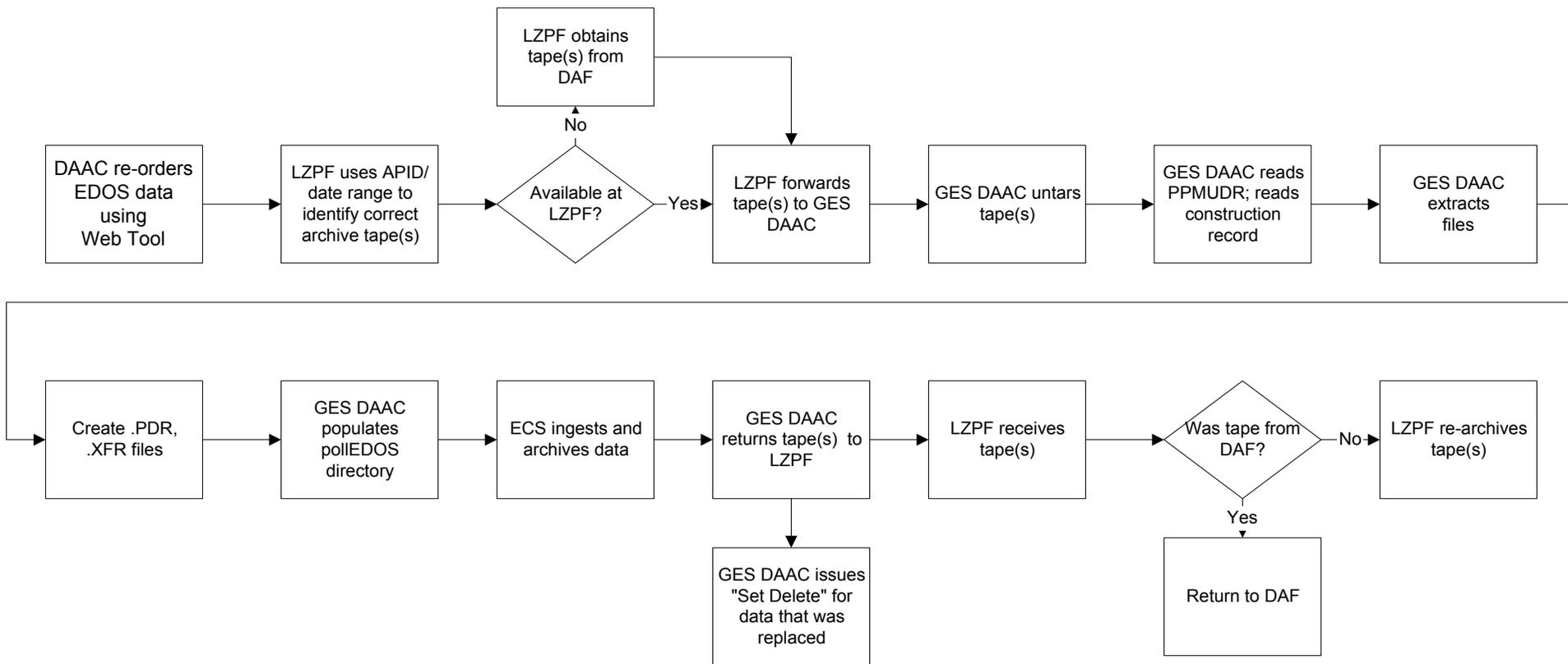
Note: The DTF-2 ingest procedure given in the ECS Mission Operation Procedures (DID 611) document cannot be used for restoring data from EDOS archive tapes.

After untarring the tape, the GES DAAC operator identifies candidate PDSs from creation dates in the PPMUDR (PDS Physical Media Unit Delivery Record) file. The file names on the tape do not contain data Start/Stop times (see EDOS-EGS ICD, Section 8, for file naming convention). However, the file creation dates in the file names help narrow down the search. The operator selects files whose creation dates indicate they are likely prospects and then reviews construction records for the candidate files to identify the correct PDS(s) by data time range (start and stop times, items 11 and 12 in the construction record; see EDOS-EGS ICD, Table 8.1.2.7-1).

The EDOS archive tape may contain both nominal and reprocessed PDSs but creation times in file names differentiate between the versions. ECS ingests the latest version whenever there is more than one version.

The operator copies the required files to the ECS Ingest polIEDOS directory; that is, the directory in which the ECS software for EDOS ingest routinely looks for EDOS Delivery Records and data. The operator uses a DAAC-unique script to create the Delivery Record and a signal file for the PDS and places the Delivery Record, followed by the signal file, in the polIEDOS directory, thus initiating the standard ECS ingest process for EDOS data, including EDOS-specific preprocessing. The Delivery Record file and signal file and their file names must conform to the specifications in the EDOS-EGS ICD (see Sections 8.1.2.11, 8.1.3.1 and 3.5).

Once an EDOS PDS has been replaced in the ECS archive, the DAAC operator issues "set delete" for the replaced data and metadata.

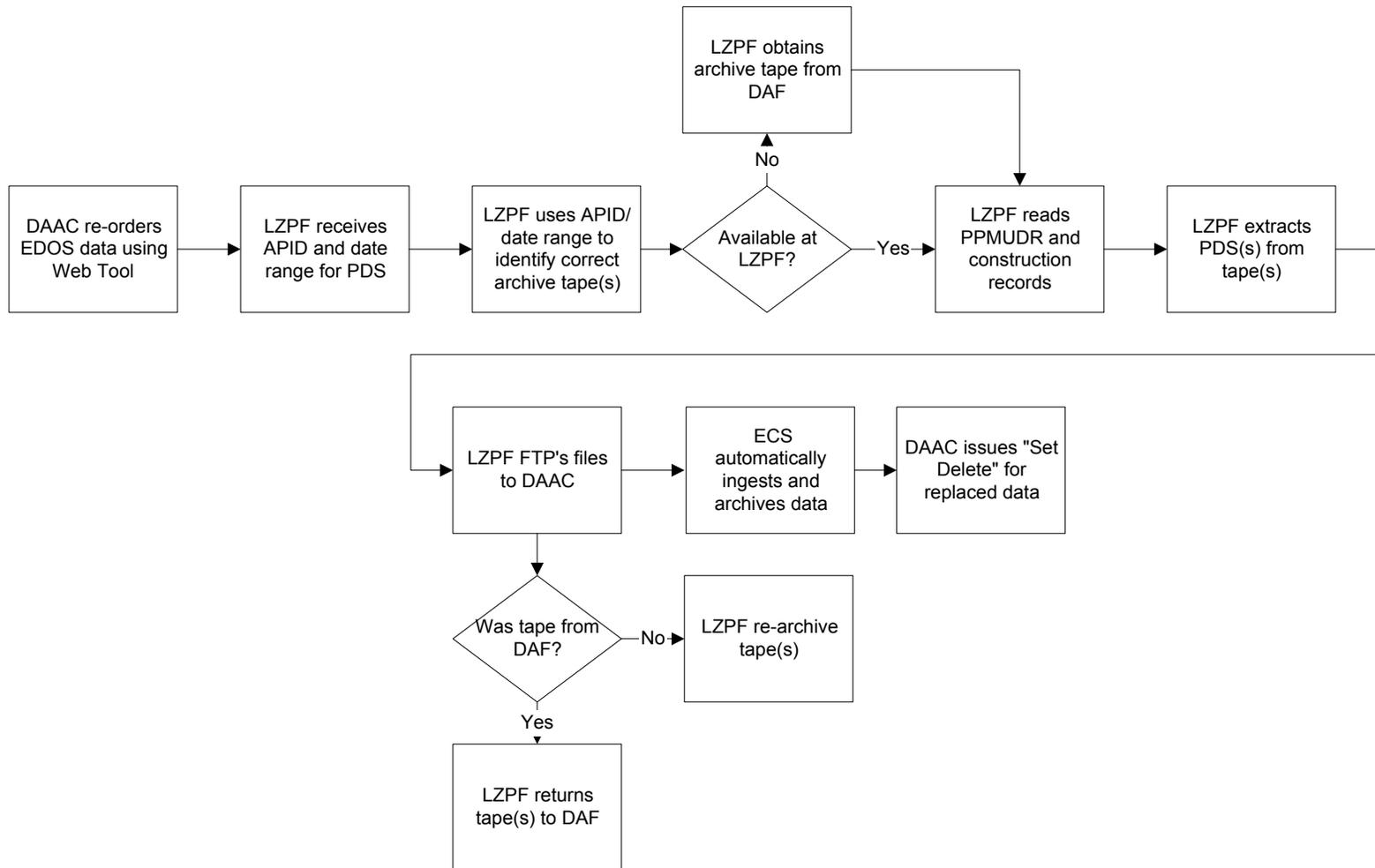


**Figure 3-1. Restoration of L0 Data to the ECS from DTF-2 Tape**

### **3.5 FTP Transfer**

The LaRC DAAC and the NSIDC DAAC also use the EOS Data Re-Order web tool for ordering replacement PDSs from EDOS (see Section 3.1), but these DAACs do not have DTF-2 tape drives. Refer to Figure 3-2 for a summary of the FTP transfer process.

The LZPF operator retrieves the data to fill these requests for replacement data manually. The operator identifies the PDS(s) needed for these requests, locates the correct archive tape(s), untar's the tape, identifies candidate PDSs from creation dates in the PPMUDR file, then reads the construction records for those files to find the required data date ranges and identify the correct PDSs. The EDOS operator then transfers the PDSs to ECS using the standard EDOS-DAAC FTP interface as documented in the EDOS-EGS ICD (see Sections 8.1.2.11, 8.1.3.1 and 3.5). ECS ingest is automatic, but the DAAC operator must track ingest of replacement PDSs and issue "set delete" for the replaced data and metadata.



**Figure 3-2. Restoration of L0 Data to the ECS via FTP**

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## 4. Restoration of L0 Data to the EDOS Archive from the ECS

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EDOS supplies L0 Production Data Sets (PDSs) to the ECS archives at three DAACS, GES, LaRC, and LP. It is envisioned that from time to time, EDOS will need to obtain L0 files from ECS to restore lost or corrupted data to their archive. This situation has never actually occurred. It is possible that some missing or corrupt files will be discovered as a result of the conversion of the EDOS archives from D3 to DTF-2 tape.

L0 data may be needed to restore the EDOS archive at either the LZPF or the DAF, depending on whether the 45-day window for retaining tapes at the LZPF has elapsed. The LZPF notifies the DAAC that archives the L0 data by a telephone or e-mail message. Particularly if multiple PDSs are required, the preferred request vehicle is e-mail.

Note: The EOS Re-Order Web Tool does not support requests from EDOS to the DAACs.

The EDOS message identifies each requested Production Data Set by APID and time span of the data (Start and Stop time, construction record items 11 and 12), provides a host and directory path to which the DAAC operator can write the data, and indicates priority of the request as high, medium or low.

If the request is for one or two files, the ECS Operator searches ECS metadata for a match, acquires the data from the Science Data Server and copies it to the FTP directory designated in the request from EDOS.

In the event that a large block of data is requested by EDOS, the ECS operator should enter an ECS FtpPush order for the data, in which case EDOS will receive a standard ECS distribution notice listing the data in the shipment with ECS file names.

The Operations Agreement between EDOS and the DAACs, 510-OA-EDOS/SDPS, should include DAAC contact e-mail and telephone numbers for EDOS to use to request L0 data from a DAAC.

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## Appendix A. ECS Requirements for EDOS Backup and Restore

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- DADS1450 The ECS shall, upon detection that L0 data has been lost, generate a request for a replacement product from EDOS, dispatch the request, and ingest the replacement product.
- DADS2307 The ECS shall fulfill requests for L0 data from EDOS with L0.

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# Abbreviations and Acronyms

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APID	Applications Process Identifier (CCSDS)
DAAC	Distributed Active Archive Center
DAF`	Data Archive Facility (EDOS)
ECS	EOSDIS Core System
EDOS	Earth Observing System (EOS) Data and Operations System
EDS	Expedited Data Set (EDOS)
EOSDIS	EOS Data and Information System
ESDT	Earth Science Data Type
FTP	File Transfer Protocol
GES DAAC	Goddard Space Flight Center (GSFC) Earth Sciences DAAC
L0	Level 0 (Data)
LaRC	Langley Research Center
LZPF	Level 0 Processing Facility (EDOS)
NSIDC	National Snow and Ice Data Center
PDR	Product Delivery Record
PDS	Production Data Set (EDOS)
PPMUDR	PDS Physical Media Unit Delivery Record

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