

# PDS4 NEAR Archive Overview

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## 1. Introduction

The PDS NEAR archive contains the primary raw and calibrated instrument data, derived data, and associated documentation for the NEAR mission. All the NEAR instrument bundles are not all archived yet, see Table 2 for which bundles are currently available and which are in progress.

NEAR was launched successfully on 17 February 1996 aboard a Delta II-7925. It made the first reconnaissance of a C-type asteroid during its flyby of the main-belt asteroid 253 Mathilde in June 1997 and orbited the unusually large near-Earth asteroid 433 Eros for about a year at a minimum orbit radius of about 35 km from the center of the asteroid. On February 12th 2001 the NEAR spacecraft touched down on the asteroid Eros. NEAR obtained new information on the nature and evolution of asteroids, improving our understanding of planetary formation processes in the early solar system, and clarifying the relationship between asteroids and meteorites. The NEAR spacecraft contained six scientific instruments. The Multispectral Imager (MSI), the Near-Infrared Spectrograph (NIS), the X-Ray Spectrometer (XRS), the Gamma-Ray Spectrometer (GRS), the NEAR Laser Rangefinder (NLR), and the Magnetometer (MAG).

## 2. Archive Contents and History

During 2001-2002, the NEAR mission instrument data were archived in PDS in the PDS3 archiving standard. Subsequently, higher level data products derived from the NEAR instrument data have also been archived in PDS.

*Table 1. PDS3 NEAR data sets archived in PDS*

<b>Data Description</b>	<b>PDS3 Data Set ID</b>	<b>Number of PDS3 datasets</b>	<b>Date archived</b>
<b>NEAR GRS data</b>	NEAR-A-GRS...	8	2012-02-27
<b>NEAR MAG data</b>	NEAR-A-MAG...	14	2012-02-15
<b>NEAR MSI data</b>	NEAR-A-MSI...	19	2011-06-29
<b>NEAR NIS data</b>	NEAR-A-NIS...	9	2012-02-15
<b>NEAR NLR data</b>	NEAR-A-NLR...	7	2011-07-05
<b>NEAR RSS data</b>	NEAR-A-RSS...	4	2012-02-27

<b>Data Description</b>	<b>PDS3 Data Set ID</b>	<b>Number of PDS3 datasets</b>	<b>Date archived</b>
<b>NEAR SPICE data</b>	NEAR-A-SPICE...	5	2002-06-06
<b>NEAR XRS data</b>	NEAR-A-XRS...	6	2012-02-24
<b>NEAR Collected Target Models</b>	NEAR-A-5-COLLECTED-MODELS-V1-0	1	2011-06-29

During 2022-2025, the PDS3 NEAR holdings were migrated to the PDS4 archiving standard by the Small Bodies Node, using the On-Line Archiving Facility (OLAF) and the OLAF PDS4 migration tools. No changes were made to the data files in the migration. Some documents were updated and corrected where needed, and new documentation was created to describe the PDS4 archive structure. Metadata was migrated from the PDS3 labels to PDS4 labels, and updated and corrected where needed. Some ancillary files have also been corrected. The PDS3 versions will continue to be available in the archive, except for historical purposes the PDS4 archive will generally be the preferred version since some errors have been corrected and the material organized in a more useable structure.

*Table 2. The migrated PDS4 NEAR bundles*

<b>Data Description</b>	<b>Bundle LID</b>	<b>Contents</b>	<b>Migration Status as of 2024-10-01</b>
<b>NEAR Mission</b>	urn:nasa:pds:near.mission	Mission-level information	Migration Completed
<b>NEAR MSI data</b>	urn:nasa:pds:near.msi	MSI raw and calibrated data	Migration in process
<b>NEAR NIS data</b>	urn:nasa:pds:near.nis	NIS raw and calibrated data	Migration in process
<b>NEAR GRS data</b>	urn:nasa:pds:near.grs	GRS raw and calibrated data	Migration Completed
<b>NEAR XRS data</b>	urn:nasa:pds:near.xrs	XRS raw and calibrated data	To be migrated
<b>NEAR MAG data</b>	urn:nasa:pds:near.mag	MAG raw and calibrated data	Migration completed
<b>RSS</b>		RSS raw, calibration, and derived data	Migration in process
<b>NEAR NLR data</b>	urn:nasa:pds:near.nlr	NLR raw, calibrated and derived data	Migration Completed

Data Description	Bundle LID	Contents	Migration Status as of 2024-10-01
<b>NEAR Target Collected Models</b>	urn:nasa:pds:near.msi, urn:nasa:pds:near.nlr, urn:nasa:pds:near.rss.	Derived data will either be migrated into the instrument bundle in which the data originated from unless the PDS3 dataset contained shapemodel or map data, these datasets will become their own bundle.	Migration in progress

The NEAR PDS3 archive also contained derived data outside of the primary instrument datasets. These data sets contained derived data for NLR, RSS, and MSI. During the PDS SBN migration these derived datasets were added to the primary instrument bundle of the instrument which the data came from. In addition to the derived data included in the instrument bundles there are also other derived data bundles that are continuing to be added to the PDS4 archive. To locate these derived data products please use the Small Bodies Data Ferret web application (<https://sbnapps.psi.edu/ferret/>).

### **The NEAR Mathilde and C/Hyakutake data**

The NEAR spacecraft flew by asteroid 253 Mathilde on June 25-27, 1997. The Multi-Spectral Imager (MSI) and the Radio Science (RSS) instruments acquired data during the flyby of Mathilde. The MSI instrument also acquired visual images of comet C/Hyakutake (1996 B2) on March 23, 1996, from 14:50:19.1 to 15:44:41.1 UTC, equivalent to mission elapsed times 3089211 and 3092473, respectively. This data can also be found using the Small Bodies Data Ferret web application (<https://sbnapps.psi.edu/ferret/>).

### 3. NEAR Mission Bundle Contents

The NEAR Mission bundle contains information pertaining to the mission and archive as a whole. It has three collections:

The **document collection** contains:

- The *near\_archive\_overview.pdf* (this document) describes the contents of the NEAR archive bundle.
- The *near\_mission\_description.txt* is the NEAR mission summary document.
- The *near\_mission\_overview.pdf* is NEAR mission description publication.
- The *spacecraft\_description.txt* document describes the NEAR mission spacecraft.
- The *acknowledgment.txt* document contains the permission acknowledgment from Johns Hopkins APL Technical Digest for Cheng et al. (1998) and the CDHS paper, Stott et al. (1998).
- The *pds\_archive\_plan.pdf* document contains the defined plan for archiving data from the NEAR missions with the Planetary Data System (PDS).

- The *cdhs\_paper.pdf* document provides an overview of the Command and data handling system for the NEAR mission.
- The *msi\_observation\_overview.pdf* document contains the NEAR MSI observation overviews, detailed descriptions, and guides.
- The *near\_coordinate\_system.txt* document contains the coordinates for Eros PDS archive holdings for the NEAR mission.
- The *fits\_standard.pdf* document provides all the information on the FITS data standard that was used during the NEAR primary instrument PDS3 dataset archiving.
- The *near\_mission\_eros\_orbital\_phases.pdf* document contains information about the Eros orbital phases.
- The *references.txt* list contains the reference list for the NEAR mission archive.

The **xml\_schema collection** contains copies of each of the PDS4 data dictionaries referenced by the archive. These dictionaries are also available at the PDS Dictionary Collection on the PDS website. The dictionaries define the metadata used in the PDS4 labels. See these if needed to understand the specific meanings of the label metadata.

The **context collection** contains the context files specifying the mission, spacecraft, telescope, instrument, and target context objects which are referenced in the PDS4 labels. See these if needed to determine the identity of the mission, observing system, or target bodies referenced in the labels.

## 4. Other NEAR Bundles

The NEAR instrument data bundles each contain a **document collection** and one or more **data collections**, and **calibration collections**. See the bundle overview document in the document collection of each bundle for a detailed description of the bundle contents and structure.

## 5. Using the NEAR PDS4 Archive

See the PDS4 documentation set at the PDS website (<https://pds.nasa.gov/datastandards/documents/>) for detailed information about the PDS4 archiving standard. Here are some basic concepts to get you started.

**Labels:** All PDS4 data products have detached .xml files called labels to describe their format, context, and content. The labels contain metadata to facilitate discovery, display, and analysis of the data products.

**Collections:** Data and documentation products (files and their labels) are grouped into collections. In the NEAR archive, data products are grouped into collections by processing level.

**Bundles:** Collections are grouped into bundles. In the NEAR archive, the raw and/or calibrated data from each instrument is in its own bundle. And there is a Mission bundle with mission-level products.

**Documentation:** Look in the document collection of the Mission bundle for mission-level documentation. Look in the document collection of the individual instrument for instrument-level information.

**Tools:** Data archived in PDS4 are standard image arrays, binary tables, ascii tables, and csv tables which can be read and manipulated with widely available software. For PDS-provided tools which work with the data via the PDS4 labels, see the Tools Registry at the PDS website (<https://pds.nasa.gov/tools/tool-registry/>).