PDS4 NEAR NLR Bundle Overview

(urn:nasa:pds:near.nlr)
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1. Introduction

This bundle contains the instrument data (raw and calibrated) returned from the NEAR Laser Rangefinder (NLR) and archived in the PDS. Documentation for the instrument, calibration, and data set are also included.

The NEAR mission operated in the years 1996-2001 with the goal of characterizing the S-type near-Earth asteroid 433 Eros to determine its composition and structure. At the end of orbital operations, the NEAR spacecraft touched down on the surface of Eros, obtaining some surface observations.

The Near Laser Rangefinder (NLR) was a laser altimeter that measured the distance from the spacecraft to the asteroid surface by sending out a short burst of laser light and then recording the time required for the signal to return from the asteroid. It used a chromium-doped neodymium/yttrium-aluminum-garnet (Cr-Nd-YAG) solid-state laser and a compact reflecting telescope. It sent a small portion of each emitted laser pulse through an optical fiber of known length and into the receiver, providing a continuous in-flight calibration of the timing circuit. The ranging data were used to construct a global shape model and a global topographic map of Eros with horizontal resolution of about 300 m. The NLR also measured detailed topographic profiles of surface features on Eros with a best spatial resolution of under 5 m. These topographic profiles enhanced and complemented the study of surface morphology from imaging. The shape models and topographic maps, already available in the PDS archive in the [data set id(s)] PDS3 data set(s), will be migrated to PDS4 in separate bundles.

2. Archive Contents and History

The NEAR NLR instrument data were originally archived in PDS in the PDS3 archiving standard.

Table 1. PDS3 NEAR NLR data sets included in this bundle

Data Description	PDS3 Data Set ID	Date archived	PDS node
NEAR NLR Raw Cruise Phase 1	NEAR_A_NLR_2_EDR_CRUISE1_V1_0	2001-08-31	SBN
NEAR NLR Raw Cruise Phase 2	NEAR_A_NLR_2_EDR_CRUISE2_V1_0	2001-08-31	SBN
NEAR NLR Raw Cruise Phase 4	NEAR_A_NLR_2_EDR_CRUISE4_V1_0	2001-09-01	SBN
NEAR NLR Raw Eros Orbit	NEAR_A_NLR_2_EDR_EROS_ORBIT_V1_0	2001-09-01	SBN
NEAR NLR Calibrated Eros Orbit	NEAR_A_NLR_5_CDR_EROS_ORBIT_V1_0/	2001-07-16	SBN

During 2022-2024, the PDS3 NEAR NLR holdings were migrated to the PDS4 archiving standard by the Small Bodies Node, using the On-Line Archiving Facility (OLAF). The data files are unchanged. This bundle contains the NEAR NLR raw and calibrated Eros Orbit datasets as well as the raw cruise data sets, which were in separate PDS3 data sets as shown in Table 1.

Additionally, it should also be noted that the keyword "Data Quality Index (DQI)" was not able to be fully understood by the migration team based on the documentation that was previously archived. Although no changes were made to this keyword in the labels, and it was migrated into PDS4 normally, this was something the team felt should be noted to any future data users.

Data, document, and metadata changes made during the migration of the data sets include:

- Metadata in the PDS3 labels were migrated to PDS4 labels.
- A new NEAR mission dictionary was created to support previous PDS3 keywords
- The PDS3 data sets shown in Table 1 were combined to create one NEAR NLR bundle
- Definitions documents were corrected to reflect the PDS4 label contents
- Some documentation was reworded to reflect the PDS4 bundle structure rather than the PDS3 structure.
- A new bundle overview document (the one you are currently reading) was created
- Previous data documentation was restructured to create a more human readable format

3. NEAR NLR Bundle Contents

The NEAR NLR bundle contains two data collections, a browse collection, and a document collection:

The **data_raw** collection contains the NEAR Laser Rangefinder (NLR) raw altimetry data which are separated into sub-directories, each subdirectory contains data from one mission phase **(cruise1,cruise2, cruies4, eros_orbit)**. All data in this collection is in FITS binary table format.

The **data_calibrated** collection contains the calibrated NLR data products and observation log file.

> The **topo** subdirectory level 2 data products contain the along-track profiles of NLR data in SI units, together with spacecraft position, orientation, and timing data. The radius of 433 Eros with respect to its center of mass is the primary profile parameter. The file naming convention is LyydddNv.TAB, where L=laser, and yyddd contains the two-digit year and the three-digit day of observation. The letter v stands for processing version.
>
> The **log.tab** data file contains the start times and basic parameters for the start of collection of each observation set by the NEAR NLR.

The **browse** collection contains plots of the data and observation parameters for each of the Level 2 time series profiles in the data collection. These can be used to browse through the calibrated data products. The file naming convention is similar to that of the actual data_calibrated products collection. This collection contains a JPEG plot representing each Level 2 time series along track profile found on the volume.

The **document** collection contains one main directory and three subdirectories. The main directory contains all documents about the whole bundle. The *data_raw* subdirectory contains all the documentation needed to understand the NEAR NLR raw data products. The *data_calibrated* subdirectory contains all the information regarding the NEAR NLR calibrated data products. The *instrument* subdirectory contains all of the documentation describing the NEAR NLR instrument. (See section 4)

4. The Document Collection

The document collection contains one main directory and three subdirectories.

Main Directory

The **near.nlr_bundle_overview.pdf** which is the document you are reading now.

The **references.txt** document contains the references in the NEAR NLR bundle.

The data_raw documents subdirectory

The **nlr_data_raw_collection_description.txt** describes the raw data products in the *data_raw* collection.

The **nlr_column_definitions.txt** document contains the column definitions of the raw data products.

The data_calibrated documents subdirectory

The **nlr_calibration_description.txt** document describes the NEAR Laser Rangefinder calibration.

The **data_calibrated_description.txt** describes all of the raw products in the *data_calibrated* collection.

The instrument documents subdirectory

The **nlr_instrument_description.txt** contains an overview description of the NEAR Laser Rangefinder taken from the PDS3 instrument catalog file archived with the data in 2002.

The **near_nlr_instrument_paper.pdf** is the published instrument paper on the NEAR Laser Rangefinder.