Near-Earth Asteroid Rendezvous Project Archive Generation, Validation, and Transfer Plan

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February 14, 1998

Near-Earth Asteroid Rendezvous Project
Archive Generation, Validation, and Transfer Plan

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1. Introduction.

This document defines the process of archiving data from the NEAR mission with the Planetary Data System (PDS), including the design, generation, validation, and transfer of the data archive to PDS. The archive will include raw and reduced data, navigation data necessary for the interpretation of the data, documentation, and software.

Section 2 gives an overview of the NEAR mission including the Ground Data System by means of which the data stream will be converted into science data products. Section 3 provides an overview of the steps necessary to produce the NEAR data archive, while Section 4 specifies the roles of each of the participants in the archiving process, and assigns responsibility for each of the archiving functions. Section 5 outlines the upper-level structure of the archive itself. Details of the archive structure down to the file level will be determined later as information about the data products from each instrument becomes available, and will be specified in the Software Interface Specification (SIS) documents. Section 6 provides the schedule for data archiving, and section 7 specifies the data release policy for the NEAR mission.

For reference, a list of the NEAR science data products expected from each instrument, a glossary of acronyms used in this document, and the data level definitions are given in the appendices.

2. Overview of the NEAR Mission.

2.1 Mission Overview

The Near Earth Asteroid Rendezvous (NEAR) spacecraft was launched on February 17, 1996, and is planned to rendezvous with the S-class near-earth asteroid 433 Eros. First detection of Eros by the NEAR instruments is expected to occur in the fall of 1998, and rendezvous maneuvers will begin on January 10, 1999, with the initial close approach to Eros. NEAR will remain in orbit to study the asteroid for the rest of the nominal mission which will end on February 6, 2000. Prior to reaching 433 Eros, NEAR will fly within 1200 km of the C-class main-belt asteroid 253 Mathilde on June 27, 1997.

The instruments aboard NEAR include the Multispectral Imager (MSI), the Near Infrared Spectrometer (NIS), the X-ray/Gamma-ray Spectrometer (XGRS), the Magnetometer (MAG), and the NEAR Laser Rangefinder (NLR). In addition, the Radio Science (RS) experiment will use the NEAR telemetry system to determine the mass and gravity field of the asteroid.

2.2 Ground Data System

The NEAR Ground Data System is the mechanism by which the raw spacecraft data stream will be converted to science data products. The Mission Operations Center (MOC), located at APL, will be responsible for monitoring the status of the spacecraft and payloads, commanding the spacecraft and payloads, and coordinating real-time mission planning. The MOC will receive telemetry packets from DSN and process them to level 0 through 0b, providing the level 0b data to the Science Data Center (SDC).
The Science Data Center (SDC), also at APL, will support the processing, analysis, and archiving of the science data. In particular, the SDC will support the Science Teams, providing easy access to all the data required by the teams, and coordinating archival of products produced by the teams to the Planetary Data System.

The SDC will accept and process telemetry, command history, and navigation data, creating the Experiment Data Records (EDRs), calibration files, and telemetry archive. Also, the SDC will coordinate with Mission Operations to collect science sequence priorities from the Science

Teams, and will coordinate with JPL to develop the asteroid kinematics model, gravity model, and shape model.

3. Archiving Functions.

3.1 Overview of the Archiving Functions

The archive will contain science data products from each of the instruments, navigation and geometry data from the SPICE kernels, software, and sufficient documentation of the data, software, and mission to enable future scientists to understand and use the archive. To produce this archive, a number of steps need to be carried out, including design of the archive structure and contents, generation of the archive components, validation, and final packaging and delivery. The science data products form the core of the archive, and a list of the expected data products from each of the instruments is given in Appendix A.

3.2 Archive Design

The dataset to be archived from the NEAR project is expected to be several tens of GB in size. The archive will be delivered using CDs or digital versatile disks (DVDs), as appropriate. The data will be ordered by time first, then by instrument, and further divided by type of data, if relevant. Figure 1 illustrates the structure of a typical volume of the archive. Data types and volumes for each instrument and archive component and for the total archive are shown in Table 1. The details of what components are included in the archive and how they are grouped into data sets, subdirectories, and files comprises the design of the archive. The upper level structure and contents of the archive are described in more detail in Section 5. The arrangement of the final details of the archive down to the file level will not be specified until more detailed information on the data products and other components are available. When the final detailed structure of the archive is established, it will be recorded in Software Interface Specification (SIS) documents.

Figure 1. General structure of a typical volume of the NEAR archive.

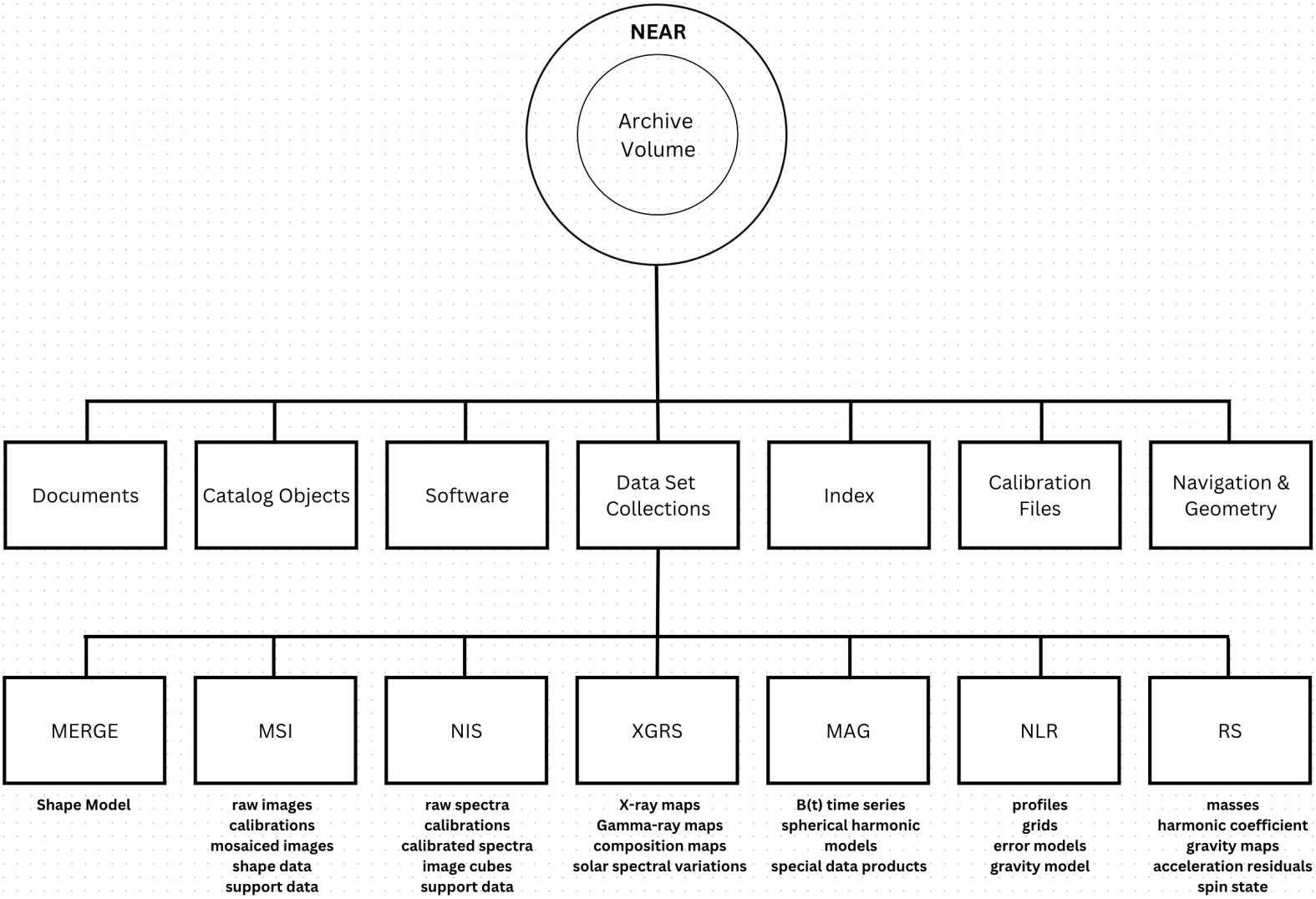

Table 1 Data Volumes for Archive Components		
Archive Component	**Data Type**	**Data Volume (MB)**
MSI	Raw Images Mosaicked Images Calibrations Shape Data Support Data	
NIS	Raw Spectra Calibrations Calibrated Spectra Image Cubes	
XGRS	Raw Data File X-ray Maps Gamma-Ray Maps Elemental Composition Maps	
RS	Raw Data (Doppler vs. Time) Doppler Residuals Gravity Maps Other	
NLR	Raw Time Tagged Data Altimetry Data Products Gravity and Dynamics	
MAG	Uncorrected B Components vs. Time B(t) Time Series Calibrated Spherical Harmonic Models	
MERGE	Shape models	
Navigation	Mission History File - Mission Wide SPICE Kernels	
Software	Calibration Algorithms Higher Level Software (as provided by Science Team)	
Documentation		
Total archive		–50-100 GB

3.3 Generation of the Archive

Responsibility for generating archive components is specified in Section 4. Science data products will be generated in PDS-compatible formats. This requires that each data file (data table or image file) be in a format approved by PDS and be accompanied by a PDS "label", actually a detached descriptive header file describing formally the content and structure of the

accompanying data file. Navigation and geometry data necessary to interpret the data (e.g. spacecraft ephemeris and attitude records, command histories, and spacecraft housekeeping files) will be extracted from the SPICE kernels and provided as ancillary archive components. The source code of all software to be provided with the archive will be collected and documented. In addition, files documenting the archive components will be prepared by the parties generating the data. In general, all information necessary to interpret and use the data are to be included in the archive.

The PDS provides for the documentation of the mission, spacecraft, instruments, and data products with special documenting files called "catalog objects". Since the catalog objects take the form of a template which must be filled out with prescribed information, they are also (misleadingly) referred to as "templates" even when they are already filled out. The required templates are the mission template, describing the NEAR mission as a whole, the "instrument host template" describing the spacecraft, one instrument template for each instrument, and one data set template for each data set. These templates should contain all information necessary to document the archive, and ideally should make it possible for scientists to make correct use of the data in the distant future when the mission personnel are not available to support them. The PDS will fill in the formal portions of the catalog objects, requiring only text descriptions of the mission, spacecraft, instruments, and data sets from NEAR.

3.4 Validation of the Archive

Data validation falls into two types, validation of the data itself and validation of the compliance of the archive with PDS archiving requirements. The first type of validation will be carried out by the Science Teams, and the second will be overseen by the PDS, in coordination with the teams and the SDC. The delivery schedule of four separate delivery dates for different portions of the mission will facilitate validation by insuring that problems in the early deliveries are resolved by the time of the later deliveries and the final archive.

The formal validation of data content, adequacy of documentation, and adherence to PDS archiving standards is finalized with an external peer review. The peer review will be coordinated by the PDS. The peer review process may result in "liens", actions recommended by the reviewers or by PDS personnel to correct the archive. All liens must be resolved by the dataset provider: the SDC for level 1b and calibration data, the science teams for higher level data products and calibration algorithms. Once the liens are cleared, PDS will do a final validation prior to packaging and delivery.

3.5 Final Packaging and Delivery

The data delivery will take place in four stages, as specified in the timeline in Figure 2. Each subsidiary delivery will be made to PDS on a hard medium such CD-ROMS. The final data delivery will incorporate the entire archive, including the earlier data deliveries.

Figure 2: NEAR Mission Timeline and Associated Data Archive Activities

Launch 02/17/96		***Mathilde Encounter 06/27/97***		***Earth Flyby 02/98***		***C/A -200D 06/24/98***		***Eros C/A 10/10/99***			***Nominal Mission End 03/31/00***			***End SDC operations 10/01/00***		
Mission Activity		*		*		*		*			*			*		
Cruise Phase																
Encounter Phase																
Orbital Phase																
Archive	**Activity**															
Archive Plan	---------	--------->														
Data Delivery to PDS				* Mathilde		* Earth Flyby				* 1st Eros delivery			* Final delivery			
PDS Peer Review					*		*				*			*		
Lien Clearance															*	
Final Archive Acceptance																*
			1997			1998			1999			2000				

3.6 Further Information

An introduction to PDS archiving is available at http://pds.sbn.astro.umd.edu. More detailed information on data archiving in the PDS can be found in the PDS Data Preparation Workbook (DPW) and in the PDS Standards Reference (SR).

4. Roles and Responsibilities.

This section describes the roles and responsibilities of the personnel and organizations involved in generating, validating, transferring and distributing the NEAR archive. The NEAR project and NEAR science teams are responsible for archive generation and validation; the Planetary Data System (PDS) has the responsibility of ensuring that the archive meets PDS standards (including peer review of the data), advising the project and science teams on archive related issues, maintaining active archives of NEAR products for access by the science community and being the interface with NSSDC for "deep archiving" of NEAR data.

4.1 Responsibilities of the NEAR Project

The NEAR archive consists of products generated by the NEAR project and by the individual science teams. The Project Science Team has the overall responsibility of setting observing priorities for the spacecraft instruments in order to meet the fundamental science goals of the NEAR project. The ensemble data from these observations constitute the raw science data, the fundamental element of the archive.

a) Science Data Center

The SDC is responsible for generating and validating the level 1b science data files, calibration files, spacecraft ephemeris and spacecraft attitude records, a history of all commands and spacecraft housekeeping files, the asteroid shape and kinematic models, and the source code and associated documentation of software used to generate the data products. The software is quite important so that a future user can redo the calibration without recourse to the science teams.

The SDC will prepare the Software Interface Specification (SIS) documents, which are an invaluable documentation of the archive structure and content both for internal use and for future users of the archive.

The SDC is also responsible for clearing all liens generated by the review process on products produced by the SDC.

b) Science Teams

The team leader of each science team is responsible for delivering to the SDC a complete and validated archive of all files necessary for final data calibration, and all higher level data products (levels 2 and 3) produced by the team, along with source code for software and associated documentation.

The team leader of each science team is also responsible for clearing all liens generated by the review process on products produced by his/her team.

c) Archive Production

The NEAR project has the responsibility of producing (premastering of CD-ROMS) the final archive volumes and distributing these volumes to the NEAR community.

4.2 Responsibilities of the PDS

The Small Bodies Node (SBN) is the lead node for interfacing with the NEAR mission and will be supported by the PPI node (magnetometer data), radio science subnode (radio science data), imaging node (imaging data), and NAIF node (SPICE data). Specific functions of PDS are:

a) Archive Generation Activity: Support the generation of the archive by advising the project/science teams on PDS archive standards, requirements and documentation needs. PDS/SBN will also support the data validation activity to ensure that the formal peer review process, a requirement for data ingestion into PDS, proceeds with a minimum of problems.

b) Conduct a formal peer review of the archive. This is a PDS mandated step before any data can be ingested into PDS.

c) Offer support to NEAR Project Science Teams and SDC in the resolution of liens that arise in the course of the peer review.

d) Produce archive volumes for distribution to the NASA supported science community.

e) Provide the data archive volumes to NSSDC.

4.3 Responsibilities of NSSDC

NSSDC is responsible for "deep" archiving of NEAR data for long-term preservation and for filling large data orders to the science community per the Memorandum of Understanding, dated January 13, 1994, between the PDS and NSSDC.

5. NEAR Archive Structure.

5.1 Overview of the Archive Structure

The NEAR archive will be broken down into data set collections, one for each instrument and one for data sets deriving from more than one instrument (the MERGE data set collection). A typical volume will contain data from a specified time interval. The top level directory of a volume will thus contain directories for each of the data set collections and directories for each of the additional components of the archive, as required by PDS. The directories in the top level directory of the volume are given in Table 2.

Table 2
Top-Level Components of a NEAR Archive Volume

Directories	Contents
DOCUMENT	Text files serving as documentation for the archive.

CATALOG	The catalog objects (templates) required by PDS to document the mission, spacecraft, instruments, and data sets.
SOFTWARE	Software to be included with the archive.
CALIB	Calibration files. Calibrations may also be included within individual data sets.
GEOMETRY	Data necessary to describe the observing geometry, such as spice kernels.
INDEX	Index files to enable the user to find the data of interest.
MSI	The MSI data set collection.
NIS	The NIS data set collection.
XGRS	The XGRS data set collection.
MAG	The magnetometer data set collection.
NLR	The NLR data set collection.
RS	The radio science data set collection.
MERGE	The collection of data sets originating from more than one instrument.

5.2 The Volume Documentation Files

PDS requires a number of volume documentation files for each archive volume, including aareadme.txt, a text file describing the contents of the volume, and voldesc.cat, a machine-readable file with a catalog of all the files residing on the volume. Each of the directories under the top level directory also requires one or more volume documentation files to document the contents of that directory. The details of these files are specified in the PDS Standards Reference.

5.3 The Data Set Collections

The list of expected data products from each of the NEAR instruments, as provided by the science teams at the May 1995 Science Team Meeting, is given in Appendix A. The data products from each instrument will comprise a data set collection, and within each of these data set collections, the individual data products will be grouped into data sets. As an example, a suggested grouping of the MSI data products into data sets is presented in Table 3. Similarly, the data products from each of the other instruments will also be grouped into data sets.

Table 3
The MSI Data Set Collection

Data Sets	Data Products
Raw images	Raw images
Calibration files	Calibration files
Mosaicked images	Global color map Global B/W map Regional high-res maps
Shape data	Control point network Shape model (1x1 degree, resolution –20m) Grid overlays for selected images Global digital image mosaic (6m/pix) with topographic overlay (8pix/deg)
Support data	Mission history file Updated pointing for all images Improved rotational elements

6. Schedule for Archive Generation, Validation, and Delivery.

The principal archive elements, namely the science data products defined in Appendix A, will be generated during the course of the mission, as will many ancillary products such as SPICE files. The general guideline for Discovery missions is that they deliver data and calibration files to PDS at six-month intervals.

The timeline for archive delivery to PDS is shown in Figure 2. The final archive delivery is to be made 90 days after the end of the nominal mission in order to allow time for PDS review and lien resolution before the end of SDC operations. There are three additional PDS data delivery dates planned: Mathilde encounter data (December 31, 1997, six months after the encounter); Earth encounter data (August, 1998, six months after Earth encounter); and one intermediate delivery of Eros data (12/31/99). The final archive delivery will include updated versions of each of the preliminary deliveries.

Following the delivery of data to PDS is a several-month-long period in which the data will be peer reviewed by PDS. Any liens that are identified by the peer review process will be rectified by the Project and the appropriate science teams before they cease operation (expected to be 30 days after the end of mission for science teams and 10/01/2000 for the SDC) The NEAR

project is responsible for resolving all liens against the final archive delivery. Final acceptance of the data by PDS will occur only after all liens have been cleared. The early delivery of data to PDS, such as the Mathilde encounter data, will help to identify early in the mission any potential problems that can be addressed before the final archive is generated, thus avoiding liens on the data that require significant resources to correct.

7. NEAR Data Release Policy.

There are no proprietary data rights for the NEAR Mission. Most uncalibrated (level 1b) data, particularly image data, will be publicly released by the NEAR project over Internet in close to real time. The full NEAR Project Data Policy is given in Appendix D.

Fully reduced, calibrated and corrected data products (levels 2 and 3) will be produced under the direction of the science teams for delivery to PDS per the schedule given in Section 6. The Team Leaders are responsible for coordinating all scientific investigations involving the use of calibrated data (levels 2 and 3) from their respective instruments and ensuring that all science data products are delivered in a timely fashion.

Appendix A. NEAR Science Data Products

Data products listed by the science teams at the May 1995 NEAR Science Team Meeting, with additional fundamental (level 1) data suggested for archiving by the PDS.

Multispectral Imager (MSI)

Validated raw images in PDS format with ancillary information.
Complete pre-flight calibration files with documentation.
Complete in-flight calibration files with documentation.
"Best" final calibration files, calibration algorithms, and optimum parameters.
Mosaicked images:
- global B/W map.
- global color map.
- regional high-res maps.

Mission history file (objectives of sequences, anomalies, etc.)
(an observing log indicating what has changed and why.)
Support data:
- A) Updated pointing (all images).
- B) Improved rotational elements.
- C) Control point network.
- D) Shape model (1x1 degree, R–20m)
- E) Grid overlays for selected images.
- F) Global digital image mosaic (6m/pix) with topographic overlay (8pix/deg).

Near-Infrared Spectrograph (NIS)

Validated raw 62-channel data, in PDS format, with ancillary information.
Complete pre-flight calibration files with documentation.
Complete in-flight calibration files with documentation.
"Best" final calibration files, calibration algorithms, and optimum parameters.
Individual I/F calibrated spectra in PDS format with ancillary information.
Mosaicked map-projected image cubes (format TBD, but compatible with MSI).
Mission history file (objectives of sequences, anomalies, etc.)

X-ray/Gamma-ray Spectrometer (XGRS)

Cruise and approach phases:
- Verification of detector operation.
- Calibrations of the XGRS detectors.
- Identification of natural and induced activities.
- Cross-calibration of solar monitors.

Eros orbital phase:
- Near-real-time X-ray maps:
  - Relative abundances of Mg, Al, and Si for quiescent sun.
  - Relative abundances of Mg, Al, Si, S, Ca, and Fe for active sun conditions.
- Near-real-time gamma-ray maps:
  - Natural radioactivity (most likely K) distribution.
  - Global composition for selected elements.
- Longer-term data products:
  - Elemental composition maps derived from X-ray data with spatial resolution from 5 to 100 km.
- Elemental composition maps derived from gamma-ray data over quadrants of Eros. X-ray solar spectral variation as a function of solar activity.

Computer models used for identifications available both before and after encounter. (software)

Fundamental (level 0/1) data also to be archived:
- Detector Count Rates

Natural Radioactivity Rates
EDR's from Solar Monitors

Radio Science and Navigation (RS)

Mass of Mathilde and uncertainty.
Mass of Eros and uncertainty.
Harmonic coefficients and associated uncertainties from gravity model.
Harmonic coefficients and associated uncertainties from shape model.
Gravity maps.
Accelerations (mgal) and uncertainties at reference surface.
Geoid potential and associated uncertainties.
Vertical Bouguer (difference) map at reference surface.
Line-of-sight acceleration residuals remaining after gravity model.
Spin state of Eros.
Principal axes directions and moments of inertia.
Orbit determinations and ephemerides for satellites of Eros.
Limit upon outgassing acceleration acting upon Eros.
Fundamental (level 0) data also to be archived:
Frequencies vs. time
Doppler shifts relative to ephemeris model vs. time
Ephemeris Model

NEAR Laser Rangefinder (NLR)

Raw type target data (level 1).

Altimetry data products:

Profiles:
EDRs with approximate horizontal resolution 10m.
CDRs with 10m horizontal resolution. (Precision orbits, higher vertical and horizontal integrity than EDRs.)

Grids:
One month in 50km orbit will provide a 3 km grid.
Six months in 35km orbit will provide a 300 m grid.

Spherical harmonic topographic model and error model:
A 120th degree and order model (300m resolution) with variance-covariance matrix.

Reference surface:
Global surface from the altimetry referenced to center of mass.

Gravity and dynamics data products:

Spherical harmonic gravity model:
An approximately 15th degree and order gravitational field model.
Grids:
Geoid and gravity anomaly maps of Eros for use in geophysical and geologic investigations.

Error model:
The variance-covariance matrix of the gravity model, an error map and error spectrum for the gravity field.

Tracking data and precision orbits:
Archive the validated Doppler tracking data in a PDS-compatible format and the precision orbits with a radial accuracy of 5-10 m.

Spin axis and rotation period:

The rotation period and spin axis direction at regular intervals.
Simple descriptive model developed for comparison with imaging results.

Magnetometer (MAG)

Raw B field components (field 1).
Time series (B(t)) in spacecraft coordinates.
Time series in celestial coordinates (J2000 inertial).
Time series in Eros-centered (non-inertial) spherical polar coordinate system.
Spherical harmonic models of Eros "global" field - wire models/graphics ("hairy asteroid").
Spherical harmonics descriptions of magnetic "anomalies".
Special data products (time series, spectra, etc.) for solar wind interaction characterization and boundary detection, i.e., BP filter data, FFT's, etc.
Special data products to support joint investigations (GRS, gravity, etc.)
Fundamental (level 0) data also to be archived:
Raw magnetic field strengths
Corrections applied for spacecraft interaction with B-field

Auxiliary Data Products

Instrument and dataset descriptions to be incorporated into templates according to PDS guidelines.

Appendix B. Glossary of Terms and Acronyms

Acronyms:

APL	-	The Johns Hopkins University Applied Physics Laboratory.
C&DH	-	Command and Data Handling.
DPW	-	The PDS Data Preparation Workbook.
EDR	-	Experimental Data Record.
GSE	-	Ground Support Equipment.
JPL	-	Jet Propulsion Laboratory.
MAG	-	Magnetometer, a NEAR instrument.
MOC	-	Mission Operations Center
MSI	-	Multi-Spectral Imager, a NEAR instrument.
NAIF	-	Navigation and Ancillary Information Facility, a discipline node of PDS.
NASCOM	-	NASA Communications.
NEAR	-	Near Earth Asteroid Rendezvous mission.
NIS	-	Near-Infrared Spectrometer, a NEAR instrument.
NLR	-	NEAR Laser Rangefinder, a NEAR instrument.
NSSDC	-	National Space Science Data Center.
PDS	-	The Planetary Data System.
PPI	-	Planetary Plasma Interactions, a discipline node of the PDS.
RS	-	Radio Science, a NEAR experiment package.
SBN	-	Small Bodies Node, a discipline node of the PDS.
SDC	-	NEAR Science Data Center, based at JHU/APL.
SIS	-	Software Interface Specification.
SPICE	-	A system of providing navigation and geometry data. S = Spacecraft, P = Planet, I = Instrument, C = C-matrix, and E = Events.
SR	-	The PDS Standards Reference.
XGRS	-	X-ray Gamma-ray Spectrometer, a NEAR instrument.

Terms:

Catalog object	-	A PDS-required file formally documenting the details of a mission, spacecraft, instrument, or data set.
Label	-	An attached or detached header which formally describes the structure and content of a data file.
Lien	-	An action recommended by reviewers or PDS personnel to correct the archive.
Template	-	Same as a catalog object
Volume	-	A single CD-ROM or other volume of a storage medium.

Appendix C. Data Level Definitions

Level:	Description:
0	The raw telemetry data as received at the ground receiving station or ground test GSE, organized by contacts or ground test.
0a	The telemetry data as produced by the C&DH system on the spacecraft and passed to the telemetry subsystem. NASCOM headers and trailers have been separated. Level 0a contains transfer frame packets organized by contacts or ground tests.
0b	The transfer frame packets for virtual channel 2 and sub-packets for virtual channels 0 and 3, plus radiometric tracking data, all organized by contacts or ground test.
1	Level 0b data that have been cleaned and merged, time ordered, and in packet format. Cleaned and merged means that duplicate data have been deleted, missing packets are padded out, and the data are organized by days. The actual format of these data is the same as level 0b. This is the level that should be passed to the instrument GSE's for their processing.
1a	The level 1 data that have been separated by instrument.
1b	The level 1a data that have been sorted by instrument data types and instrument modes. Data are in scientifically useful form, e.g. as images or individual spectra. These data are still uncalibrated,
2	Level 1b with calibration and corrections applied to yield data in scientific units.
3	Higher level data products developed for specific scientific investigations.

Appendix D. NEAR Project Data Policy

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S1P 94-151
November 28, 1994

To: Thomas B. Coughlin

From: Andrew F. Cheng

Re: NEAR Project Data Policy

This is a summary of the data analysis and release policies for the Near Earth Asteroid Rendezvous (NEAR) Project. It is meant to cover the pre-flight, post-launch, and data analysis activities of the NEAR Science Team and Instrument Scientists. A list of these individuals is attached. Data policies were reviewed and discussed at a full meeting of the NEAR Science Team held at APL on November 10-11, 1994. Subsequently, a draft Data Policy was circulated for comment among all Team members. Based upon the reviews and comments from Science Team members and Instrument Scientists, I am issuing the following Data Policy for the NEAR Project.

Ground Rules

- Selected uncalibrated data, including imaging, will be publicly released over the INTERNET in close to real time.
- Fully reduced, calibrated and corrected data products will be published and forwarded to the Planetary Data System as soon as they have been generated and validated.
- The Project strongly encourages shared data analyses, under the direction of the teams whose data are being used, among members of different instrument teams.
- The Team Leaders are responsible for coordinating all scientific investigations involving the use of data from their respective instruments.

Guidelines

- In the interest of a systematic and orderly data analysis, the Team Leaders must approve of all scientific investigations involving the use of data from their respective instruments.
- Likewise, the Team Leaders must approve of all plans to release or to publish calibrated data from their respective instruments. In this context, 'to publish' includes not only journal articles but also abstracts and presentations.
- In case of differences of opinion, the issues will be brought before the Project Scientist for resolution.

Distribution

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