King

MEMORANDUM OF UNDERSTANDING

between

NATIONAL SPACE SCIENCE DATA CENTER

and the

PLANETARY DATA SYSTEM

DATED : January 13, 1994

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I. PROLOGUE

Effective data management is necessary to maximize the science output from NASA missions. Such data management provides scientists the ability to locate and access needed data, and to obtain information and software required to make the data useful. It has become a precept that data should be managed as close to the data producing science community as possible. To this end, NASA has established a number of Discipline Data Centers (DDC's) to augment the National Space Science Data Center (NSSDC) to facilitate data access and utilization in those respective disciplines. One of these is the Planetary Data System (PDS).

NSSDC is responsible for top-level data management functions that span all OSS programs and scientific disciplines and for selected discipline-specific responsibilities to be defined by mutual agreement between the NSSDC and the relevant OSS program division.

As a DDC within the NASA archive environment, the PDS has primary responsibility for the collection of lunar and planetary data (hereafter referred to merely as planetary data), the definition of its content, its validation and catalog management.

This Memorandum of Understanding identifies the roles of NSSDC and the PDS in preserving and facilitating access to data acquired by NASA planetary missions.

II. INTRODUCTION

A. PURPOSE

The purpose of this document is to describe the roles of the PDS and NSSDC in acquiring, archiving, and distributing planetary data. This document sets the general constraints on the interfaces between the two organizations. Additional mission specific details of the interfaces will be developed and specified in future documents which will govern the details of the interface between NSSDC and the PDS.

B. SCOPE

The scope of this document covers areas of operation where there is joint responsibility between the PDS and NSSDC or where, despite possibilities of ambiguity, there is a sole responsibility of one or the other. Other documents exist which describe the full range of operations of each organization.

C. AUDIENCE

The following groups are the intended audience for the document:

1. Staffs of the PDS and NSSDC.

2. Those who are preparing planetary science data such as Principal Investigators, planetary missions, data restorers.

3. Those who want to access planetary science data, including NASA planetary scientists and other domestic and foreign scientists.

4. NASA Headquarters personnel who manage and provide the operating funds for NSSDC and the PDS.

5. Managers of institutions participating in NSSDC or PDS activities.

6. Members of other data centers.

7. PDS and NSSDC advisory groups.

D. SUMMARY

The following are the key components of this MOU:

1. The PDS will serve as the point of entry for planetary data into the NASA archive environment.

2. The NSSDC shall maintain and coordinate broad data standards for data management and archiving which are appropriate to most or all disciplines and recommend, maintain and monitor implementation of minimum NASA data standards.

3. The PDS shall be responsible for establishing and maintaining data standards, data structures, and data formats which are appropriate for use by the Planetary Science community.

4. The PDS serves as the primary interface with the planetary data producers, obtaining the data and checking them for correctness of format and content. The data products are then passed on to NSSDC for "deep-archiving" along with appropriate catalog and ancillary information.

5. The NSSDC shall maintain and operate the NASA Master Directory (which is to be inclusive of all NASA Space and Earth science data regardless of the discipline data system where they reside.) The PDS shall support the

population of the Master Directory. In addition, the PDS shall maintain a multi-layered catalog residing at the Central Node and Discipline Nodes of the PDS.

6. The NSSDC shall maintain a deep archive of all planetary data designated for indefinite archiving in HQ/SL-approved Project Data Management Plans (PDMPs) (or equivalent documents), and shall assure the continued existence/readability of such data until/unless HQ/SL declares such data to be disposable.

7. The PDS is intended to serve Code SL-sponsored planetary scientists and has distribution responsibility primarily for digital data products.

8. NSSDC serves the non-SL community and, for special needs (e.g., analog products, large volume distributions, distributions from NSSDC's pre-PDS holdings, etc.), also the SL-funded community.

F. MOU REVIEW PROCEDURES

This MOU will be reviewed periodically by both NSSDC and the PDS to determine each organization's compliance with the MOU as it exists at the time. Any statements in the MOU in conflict with the current policy and procedures of either NSSDC or the PDS will be identified. The reasons for these discrepancies will be reviewed and either the MOU or the operational policies and procedures of NSSDC or the PDS will be changed to reflect a resolution of this discrepancy. These changes may be necessary if either organization is unable to comply with the MOU or the statements in the MOU no longer reflect current NSSDC and PDS policies and procedures.

Any conflicts or discrepancies related to the roles of the NSSDC and PDS shall be resolved by the Director of the NSSDC and the Project Manager for the PDS. In the event that resolution is not possible at this level, the matter will be elevated to NASA Headquarters where the appropriate program sponsors can resolve the issue.

III. ORGANIZATIONAL SCOPE

A. NSSDC

The NSSDC is sponsored by the Technology and Information Systems Office within NASA's Office of Space Science (Code STI) to have primary responsibility for the multi-disciplinary Master Directory and underlying information systems at NSSDC, for evolving and coordinating widely relevant data management and archiving (DMA) standards, and for providing a DMA infrastructure for use by

NASA science divisions in concert with their Discipline Data Centers (DDCs). In addition to normal management reviews, the work and priorities of NSSDC will be reviewed by an NSSDC User's Group to be constituted by both end-user scientists and by DDC officials.

B. PDS

The PDS is sponsored by NASA's Solar System Exploration Division (Code SL) to ensure the long-term usability of data, to stimulate research, to facilitate data access, and to support correlative analysis.

The PDS will serve as the primary interface to flight projects for product and catalog definition, standards usage, product generation and product validation. The PDS will establish a Management Council comprised of planetary scientists from various disciplines who will serve as a decision-making body on archive policies and procedures that affect the PDS.

IV. PROJECT INTERFACE

The PDS will serve as the point of entry for planetary data into the NASA archive environment. The PDS will maintain a Mission Interface which is responsible for negotiating individual Project Data Management Plans and Archive Plans with the projects which at least satisfy the OSS Policy on Science Data Management. In most cases, the PDS will have signature authority over the Project Data Management Plans and Archive Plans. In cases where the PDMP specifies certain products will be archived at NSSDC, then both NSSDC and PDS will sign the document.

All active mission data products that enter the NASA archive environment through the PDS Mission Interface will be validated and passed on to NSSDC for long term archive. These data products shall be specified in pre-launch PDMPs and Archive Plans signed by NASA Headquarters (Code SL) and may include raw science data, ancillary data, organized higher level data products agreed upon by the Project's Science Steering Group, and individual reduced data sets deemed important by individual investigators as well as all relevant documentation.

The PDS will also be the archive entry point for all data restored from past planetary missions.

PDS and NSSDC will agree on and document the terms covering the transmission of archive products from PDS to NSSDC such as media type, volume and frequency of delivery.

V. CATALOG

The PDS will maintain a catalog of their planetary data holdings. This catalog will be multi-layered with the high level catalog residing at the Central Node and the lower level, more detailed, catalogs residing at the Discipline Nodes. This multi-layered PDS catalog will be accessible by NSSDC.

NSSDC will maintain and make available to the general community appropriate information relevant to planetary data in its own information systems. NSSDC will maintain a multidisciplinary NASA Master Directory which will include limited information about PDS holdings. Appropriate descriptive information from the high level PDS catalog will be sent to NSSDC's Master Directory via the Directory Interchange Format (DIF). NSSDC will provide instructions to PDS in the appropriate use of the DIF Format and will review PDS entries in the Master Directory. NSSDC will also maintain electronic links into the PDS catalogs from the Master Directory. For each new data set sent to NSSDC, PDS will also send a completed data set description template to be used by NSSDC in populating the NSSDC Master Catalog at the data set level.

The NSSDC shall coordinate the Master Directory design evolution to meet mutual budget and system scope constraints.

All changes to be made to the Master Directory that will require the PDS to develop and/or modify their operational system shall first be coordinated with the PDS.

VI. DATA

Recognizing PDS budget constraints, the PDS shall strive to coordinate and share archive tasks with NSSDC and flight projects to do the best possible job with the available resources. Therefore, the management of planetary data will be a cooperative effort involving the PDS, NSSDC and flight projects. Each organization will have responsibilities concerning the preparation, storage, and distribution of the data.

A. DATA PREPARATION

1. **Mission Data:** As described in Section IV, the PDS is responsible for maintaining the Mission Interface. All NASA mission data will enter the NASA archive environment through the PDS under the Project Data Management Plans and Archive Plans negotiated with each of the projects. The PDS will verify the correct format, completeness, and continuity of the data and will monitor the validity and content of the incoming data. The PDS will also verify the correct format, completeness, and continuity of the catalog data. Part of the data preparation process includes populating

the PDS catalog with the new information. It will be the responsibility of the PDS to monitor project compliance to the negotiated Project Data Management Plans and report cases of non-compliance to NASA Code SL management as requested.

2. **Restored Data:** The restoration of old planetary data sets will be coordinated and overseen by the PDS. The normal procedure for data restoration will be initiated by a Discipline Node or proposal to the PDS for the establishment of a Data Node which will exist for a short period (a year or two) for the sole purpose of reformatting and documenting the data set. The restoration process will be sponsored by the appropriate Discipline Node and the resulting data set will be validated by a peer review process. As with mission data sets, the restored data sets will result in an update of the PDS catalog. The data flow will be into the PDS under the appropriate Discipline Node, even though the pre-restoration location of the data set may be NSSDC. In cases where NSSDC has the opportunity to restore planetary data sets, it is important that the PDS be involved in the selection of which data sets are to be restored, consistent with the priorities set by the PDS.

B. DATA STORAGE

Most planetary data will be stored in more than one location. The location of the deep archive for the long-term preservation of planetary data will be NSSDC. The NSSDC shall maintain a deep archive of all planetary data designated for indefinite archiving in HQ/SL-approved Project Data Management Plans (PDMPs) (or equivalent documents), and shall assure the continued existence/readability of such data until/unless HQ/SL declares such data to be disposable. When practical, affordable and necessary, NSSDC will create a duplication set from the PDS-provided archive set; this duplication set will be used in creating data copies for requesters, thereby minimizing use of the archive set.

The concept for the PDS Discipline Nodes includes the provision for the maintenance of a working set of all data considered to be relevant to that particular discipline at the Discipline Node. The working data sets will be used to support ongoing research carried out by and through the Discipline Nodes. The research effort will, from time to time, result in new, derived data sets which will be cataloged and submitted to NSSDC for archiving. Information on data sets which are at Data Nodes and are in the process of being restored will be available through the PDS. The data sets themselves need not be stored elsewhere in the PDS or NSSDC while they are in preparation.

A complete set of non-machine-readable planetary data will be archived, maintained, and distributed by NSSDC. The PDS will catalog these holdings and will arrange for the validation, submission, and documentation of these non-digital products, but it will not store or distribute them.

C. DATA DISTRIBUTION

The distribution of planetary data will be a function shared by NSSDC and the PDS. The only exception to this rule will be the distribution of pre-PDS data archived at NSSDC. NSSDC shall be primarily responsible for storing and distributing these products. NSSDC will be responsible for the distribution of partial or complete data sets from requests which are considered 'standard' in the sense that the request may be fulfilled by the straight-forward duplication of one or more tapes or disks. Distribution of all non-machine-readable planetary data products (such as photo products and videos) will be the sole responsibility of NSSDC.

The PDS will have distribution responsibility for filling requests for small amounts of digital data (i.e. a single or partial tape or disk volume), or for requests which require manipulation of the data or the assistance of scientific expertise within the PDS in the preparation of the distribution. The distribution of all data being stored at Data Nodes will be the responsibility of the PDS.

These distribution guidelines hold regardless of the source of the request of the data, whether from a Code SL-supported scientist (initiated from within the PDS) or from another individual (The non-Code SL-supported scientist will initiate his request in NSSDC). Both the PDS and NSSDC will keep each other informed of the status of all requests and provide periodic statistical summaries of all planetary data requests.

Neither NSSDC or the PDS is capable of easily fulfilling requests which involve large amounts of data or large quantities of expert support for the manipulation of data. The NSSDC has well-established charging methods which will be implemented for large requests of planetary data. This holds even if the request is initiated by a scientist supported by NASA Code SL. The PDS does not currently have a charging mechanism for requests which involve large resource expenditures to fulfill. Therefore, it is anticipated that an exchange of services between NSSDC and the PDS can be arranged to satisfy occasional resource-intensive requests.

Both the PDS and NSSDC will fulfill requests using NSSDC standard media as appropriate, including magnetic tape, optical disks, or electronic distribution under standard protocol.

As the PDS releases new products for archive on CD-ROM, they shall provide NSSDC with an initial set of 50 CD-ROMs to seed their archive collection.

VII. USER SUPPORT SERVICES

The PDS is chartered to service primarily the planetary scientists supported by NASA Code SL, although when resources permit the PDS will serve non-Code SL

scientists and other planetary users in the U.S. and foreign community. All users can access planetary data through the NSSDC.

Both NSSDC and the PDS will supply users access to catalogs of the planetary data and will support the browse and query of these catalogs.

Planetary data analysis support is the responsibility of the PDS. As such the PDS Discipline Nodes will have data, hardware and software tools, and data management capability to support the analysis of planetary data. The Discipline Nodes will provide the technical and scientific expertise required to use the PDS and to answer questions concerning the data.

VIII. TECHNOLOGY DEVELOPMENT

It is in the interest of both the PDS and NSSDC to continue to develop data management, storage, presentation, computation, and communication technologies as well as standards to better serve the scientific community. Lead roles should be negotiated by NSSDC and PDS (or other DDC's) for particular types of developments for which a DDC is especially suited; and these should be put to use in the overall NASA Distributed Data System as appropriate.