

MEMORANDUM OF UNDERSTANDING
between
NATIONAL SPACE SCIENCE DATA CENTER
and the
PLANETARY DATA SYSTEM

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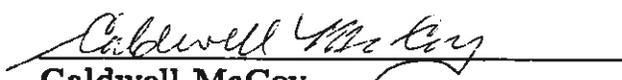
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I. PROLOGUE

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) in facilitating data access and utilization in those respective disciplines. One of these is the Planetary Data System (PDS).

NSSDC has been charged with archiving and disseminating data across the spectrum of disciplines covered by NASA's Office of Space Science and Applications. The trend towards Discipline Data Centers, and a distributed data environment, is resulting in the evolution of NSSDC's role. In this environment, NSSDC will selectively delegate to the Discipline Data Centers major aspects of its responsibility to facilitate data access.

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. The role of NSSDC as the lead organization in NASA's distributed data system and the role of the PDS as one of the Discipline Data Centers in the second layer of this system are recognized. This document sets the general constraints on the interfaces between the two organizations. Additional details of the interfaces will be developed and specified in future documents.

B. SCOPE

The scope of this document covers areas of operation where there is joint responsibility between 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 the 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 high-level management and system engineering functions (standards, data structures, data formats) are guided by NSSDC; the PDS, in turn, will address planetary-specific data issues and apply the functions.
2. The PDS serves as the primary interface with the planetary data producers, obtaining the data and checking them for correctness of format and content. They are then passed onto NSSDC for archiving along with appropriate catalog and ancillary information.
3. NSSDC maintains the highest level catalogs and directories for all NASA data. It also maintains the deep archive for planetary science data. Straightforward distributions requiring the duplication of entire volumes (such as tapes) are done by NSSDC.
4. The PDS maintains more detailed catalogs and data distribution files. Requests for special presentations of the data are satisfied by the PDS.
5. PDS is intended to serve Code EL-sponsored planetary scientists.
6. NSSDC serves the remainder of the community of scientists interested in planetary science data.
7. For purposes of data access, NSSDC is considered to be a node of the PDS, although it does not derive its funding from the PDS.

E. REFERENCES

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- [2] *Data Management and Computation - Volume 2: Space Science Data Management Units in the 1980's and 1990's*, Committee on Data Management and Computation, Space Science Board, Assembly of Mathematical and Physical Sciences, National Research Council, in press.

- [3] *Solar-Terrestrial Data Access, Distribution, and Archiving*, Joint Data Panel of the Committee on Solar and Space Physics, Commission on Physical Sciences, Mathematics, and Resources, National Research Council, National Academy Press, Washington, DC, 1984.
- [4] Kieffer, Hugh H., *Planetary Data Workshop, Volumes 1 and 2*, NASA Conference Publication 2343, NASA, Washington, DC, 1984.
- [5] Devirian, Michael, *Program Plan for the Pilot Planetary Data System*, NASA Internal Document, May 11, 1983.
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- [8] PDS System Design Team, *Planetary Data System User Requirements Document*, JPL D-3493, May 27, 1986.
- [9] PDS System Design Team, *Planetary Data System Functional Requirements Document*, JPL D-3454, October 21, 1986.
- [10] PDS System Design Team, *Planetary Data System Final Version System Model*, JPL Internal Document, May 23, 1986.
- [11] Policy Concerning Data Obtained from Space Science Flight Investigations, *NASA Management Instruction 8090.3A*, May 2, 1978.
- [12] Green, J. L., et al., *Guidelines for the Development of the Project Data Management Plan*, in preparation, 1986.
- [13] Thieman, J. R., and J. H. King, NASA/NSSDC Central Online Data Directory (CODD), in *Proceedings of the Tenth International CODATA Conference*, in press, 1986.

F. MOU REVIEW PROCEDURES

This MOU will be reviewed yearly by both NSSDC and PDS to determine each organization's compliance with the MOU as it exists at that time. Any statements in the MOU in conflict with the current policy and procedures of either NSSDC or PDS will be identified. The reasons for these discrepancies will be reviewed and either the MOU or the operational policies and procedures of the NSSDC or 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.

III. MANAGEMENT

The NSSDC will have primary responsibility for the high-level management of NASA's data. A NSSDC Management Council will be established which is representative of science, NASA management, NSSDC, and DDC interests. The group will promote

integration, coordination, collaboration, and interoperability; provide control authority for the system; and guide the development of data system policies, procedures and standards. Recommendations from the Management Council will be implemented by the NSSDC and coordinated by NSSDC across the DDC's, of which PDS is one. Development activities may be delegated to the PDS as appropriate.

As a DDC within the NASA distributed data system environment, the PDS will have sole responsibility for the collection of planetary data, the definition of its content, its validation and catalog management. NSSDC will have responsibility for the long term archive for planetary data. NSSDC and PDS will share responsibility for distribution and access of data as described in later sections of this MOU.

The terms of the MOU are considered to be in effect upon signoff. However, as both organizations are in a state of evolution, the start-up procedure must recognize the limitations in the ability of either organization to fully meet the terms of the agreement until FY1990.

Since considerable definition, development, and implementation of both NSSDC and the PDS have preceded this agreement, areas of inconsistency in data management are recognized. Coordination of continuing development activities, incorporation of new technologies, and negotiation will be employed to merge or accommodate differences in approach into an integrated system.

IV. PROJECT INTERFACE

The PDS will serve as the point of entry for planetary data into the NASA distributed data system. The PDS will maintain a Mission Interface which is responsible for negotiating individual Project Data Management Plans with the projects under the guidelines for the Project Data Management Plan written by the NSSDC and PDS-specific guidelines. Both the PDS and NSSDC will have signature authority over the Project Data Management Plans. All mission data will enter the distributed data system through the Mission Interface with the validated data products being passed on to NSSDC for archiving. These data products 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 entry point for all past data from planetary missions through the use of Data Nodes formed to restore old data sets.

The PDS may assist the projects and the JPL Space Flight Operations Center (SFOC) in the development of Project Data Bases. This will facilitate the transfer of high level data sets residing therein into the PDS and the NSSDC for archiving after the data have become non-proprietary.

V. CATALOG

The PDS will maintain a catalog of the planetary data holdings. This catalog will be multi-layered with the high level catalog residing in the Central Node of the PDS and

lower level catalogs residing in the Discipline Nodes of the PDS. This multi-layered PDS catalog will be accessible by the NSSDC. The PDS catalog structure and content will be consistent with the standards for cataloging to be established by the NSSDC such that the PDS catalog may be pointed to from the Central Outline Data Directory (CODD) within NSSDC. The user interface of the catalogs will be consistent between the two organizations. It should be recognized that the PDS has invested heavily in planetary catalog structure development and the developing NSSDC cataloging standards should integrate the PDS efforts and attempt to accommodate the existing PDS structure to the optimum extent.

VI. DATA

The management of planetary data will be a cooperative effort involving both the PDS and the NSSDC. Each organization will have responsibilities consistent with their respective charters. This section describes the distribution of these responsibilities between the PDS and NSSDC 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, consistent with guidelines established for the Project Data Management Plan by the NSSDC. All NASA mission data will enter the NASA distributed data system through the PDS under the Project Data Management Plans negotiated with each of the projects. The PDS Central Node will verify the correct format, completeness, and continuity of the data and the appropriate Discipline Node will monitor the validity and content of the incoming data by a peer review process. The target schedule for the complete validation process by the PDS is one month from receipt of data by the PDS for raw (Experiment Data Records) data and three months from receipt of data by the PDS for higher level data products. Part of the data preparation process includes validating catalog information and populating the PDS catalog with the new information. It will be the responsibility of the PDS to enforce the negotiated Project Data Management Plan and report cases of non-compliance to NASA Code EL 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 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 the same process as for mission data described in paragraph 1 of this section. As with mission data sets, the restored data sets will result in an update of the PDS catalog at the time of data acceptance. The NSSDC may act as a Data Node for a particular data set, perhaps under an independent funding source (different from the PDS). 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 the NSSDC. In cases where the 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 PDS requirements for safety, longevity and reliability in the archive procedures will be negotiated with NSSDC within the framework of NSSDC resources. Under current plans, the NSSDC will, in addition to the archive data set, maintain a duplication data set from which copies will be made for the users of planetary data.

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 the Central Node for transmission to the NSSDC for archiving. Data sets which are at Data Nodes and are in the process of being restored will be identified in the PDS catalog, but will not be stored elsewhere in the PDS or in NSSDC.

A complete set of non-machine-readable planetary data will be archived, maintained, and distributed by the 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 them.

C. DATA DISTRIBUTION

The distribution of planetary data will be a function shared by NSSDC and the PDS. 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 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 residing in 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 EL-supported scientist (initiated from within the PDS) or from another individual. (The non-Code EL-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 the 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 EL. The PDS does not currently have a charging mechanism for requests which involve large resource expenditures to fulfill. It is anticipated that 1) a charging method will be established within the PDS, 2) distribution of large requests will be handled by proposal to the PDS, or 3) 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.

VII. USER SUPPORT SERVICES

The PDS is chartered to service primarily the planetary scientists supported by NASA Code EL. Only the Code EL supported planetary scientists will access the PDS directly. All other users will access planetary data through NSSDC. As discussed in Section VI.C, NSSDC will directly handle the straightforward data duplication requests for planetary data. Regardless of the requestor, the PDS will service requests which are non-standard and require manipulation or assistance from PDS expertise. When the request is from a non-Code EL supported scientist the 'non-standard' request will be passed from the NSSDC to the PDS. Both the 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. It is the responsibility of NSSDC to lead in the coordination of the technology studies and developments being carried out in the PDS (or other Discipline Data Centers) to assure conformance to standards. This is intended to ensure efficient use of NASA's funding for technology developments. Lead roles should be delegated by NSSDC to the PDS (or other DDC's) for particular types of developments for which the PDS is especially suited; and these should be put to use in the overall NASA Distributed Data System as appropriate. This is particularly true of ongoing PDS work in the area of Optical Disk (CD-ROM) formats.