A New Planetary Data System Roadmap Study for 2017 – 2026

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Background: NASA established the Planetary Data System (PDS) in 1989 to deal with concerns that the data being returned by scientific satellites was in danger of being lost. The PDS, sponsored by NASA's Science Mission Directorate, archives electronic data products from NASA planetary missions. The PDS actively manages its archive to maximize usefulness, and the PDS has become a basic resource for scientists around the world.

All PDS-curated products are peer-reviewed, well documented, and available online to scientists and to the public without charge. Online search capabilities are also provided. The PDS uses ISO-based standards for describing and storing data that are designed to enable future scientists, who are unfamiliar with the original experiments, to analyze the data.

The PDS is organized as a federated data system (Figure 1) following the recommendations of the National Academy of Science Committee on Data Management And Computation (CODMAC). Scientist-led Discipline Nodes are organized around 6 broad areas:

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- **Atmospheres** (composition, structure, meteorology, and aeronomy) of planets;
- **Geosciences** (geology, geophysics, surface properties, and tectonics) of planets;
- **Small Bodies** (comets, asteroids, dwarf planets, and dust);
- **Planetary Plasma Interactions** (solar wind-planetary interactions, magnetospheres, ionospheres, plasma tori) of planets;
- **Ring-Moon Systems**; and
- **Cartography and Imaging Sciences** (pushbroom imagers, hyperspectral imagers, analysis tools) of solar system objects.

In addition, the PDS has two technical Support Nodes:

- The **Engineering Node** (systems engineering support, standards, technology investigations, coordination and development of system-wide software, and operations),
- NASA's **Navigation and Ancillary Information Facility** (SPICE, the observation geometry information system widely used by NASA planetary missions).

There is a small Project Office at Goddard, which manages funding and budgets, and establishes common policies across the PDS.

The PDS operates as a "living archive" of more than 1 petabyte of planetary data managed by subject-matter experts at the Discipline Nodes and used by scientists around the world. The PDS archive is constantly expanding to allow new mission data to be made available to the planetary science community. With the complex data provided by increasingly sophisticated spacecraft and instrumentation, there is a need to review the goals and objectives of the PDS.

PDS Roadmap Study: NASA's Planetary Science Division established this study to look ahead to the 2017-2026 time period. The study began in October of 2015 with the release of a Request for Information (RFI) asking for community input. The goal is to "develop a practical, community-developed pathway to implement the new long-term vision for the PDS, which continues to accomplish NASA's broad objective for the PDS; namely, preserving and making available all data products from planetary exploration research and missions".

A Roadmap Study Team (RST) consisting of individuals of differing backgrounds and interactions with the PDS was tasked to consider what steps the PDS should take during the next decade to progress. Initial examination began with the items in the RFI, namely, an examination of:

1. Tools, resources, workflows, tutorials, and interfaces
2. Making the archiving process seamless, less costly, and more efficient
3. The role of PDS relative to other archiving alternatives (e.g., journals), in providing the public access to NASA-generated data
4. Integration of PDS data products and services with those of other facilities, e.g., the U.S. Geological Survey's cartography program and the Minor Planets Center, and other products
5. The role the PDS should play in encouraging the development of higher-order data products
6. Appropriate improvements to the current search capabilities of the PDS

The Roadmap activity has included 19 telecons and 2 Face-to-Face meetings to date.

The Roadmap Team includes: Amitahba Ghosh (Tharsis Inc.), Anne Raugh (UMD), Denton Ebel (AMNH), Emily Law (JPL), Ernest Bowman-Cisneros (ASU), Flora Paganelli (APUS), Katherine Crombie (Indigo Information Services, LLC), Lisa Gaddis (USGS/Flagstaff), Matthew Tiscareno (SETI), Paul Ramirez (JPL), Renee Weber (MSFC), Ross Beyer (ARC/SETI), Thomas Stein (Wash U.), Thomas Morgan (GSFC), Ralph McNutt (APL), and Maria Banks (GSFC).

Results are centered on findings. These findings address: Progress relative to the goals of the last Roadmap; Changes in user expectations; Data discoverability and usability; Tools and file formats (including tools to translate PDS archive files to analysis-friendly formats); The implications of increased data volume, data complexity, and user numbers; Archiving laboratory data and data from samples; Including astromaterials data); Documentation and training; Data set citation, and information technology.

A draft Roadmap Report is expected by the end of April; The final by the end of May 2017.