NASA PLANETARY DATA SYSTEM. L. Kolokolova, University of Maryland, College Park, MD, 20742, USA (ludmilla@astro.umd.edu)

Introduction: The Planetary Data System (PDS) is a data system that NASA established at the end of 1980th with the main goal to preserve the data collected by Solar System missions managed by NASA for future generations of scientists. However, with time the role of the PDS extended and now it is the main data system that archives and distributes scientific data from NASA and non-NASA planetary missions, astronomical observations, and related laboratory measurements.

The Structure of the PDS. The PDS is an active archive that is divided into a number of science discipline "nodes" led by planetary scientists. The PDS consists of five science discipline nodes, three support nodes, and the Management Office located at the NASA Goddard Space Flight Center (Greenbelt, Maryland). In the talk I briefly characterize all PDS nodes which are the following:

Science Discipline Nodes

Atmospheres Node (University of New Mexico)
Geosciences Node (Washington University)
Planetary Plasma Interaction Node (UCLA)
Rings Node (SETI Institute)
Small Bodies Node (University of Maryland)
Comet Subnode (University of Maryland)
Asteroid/Dust Subnode (Planetary Science Institute)

Support Nodes

Engineering Node (Jet Propulsion Laboratory)
Navigation and Ancillary Information Facility (NAIF) Node (JPL)
Planetary Imaging Node (US Geological Survey, JPL)

Each PDS node has its own archive that can be reached through the node website, which, in turn, are linked to the main PDS website http://pds.nasa.gov. Also, Engineering Node maintains the Central Catalog that allows searching, accessing, and downloadding any data archived in PDS. Finally, so called Deep Archive exists at NSSDC (National Space Science Data Center) that keeps the data for the long-term preservation.

Specifics of the PDS datasets. We assume that future scientists will have no prior knowledge about the archive's contents, so it is vital to know how the spacecraft/telescope and its instruments worked, how the data were calibrated, and even what the data mean. It is more than likely that the people who worked with the data when they were gathered (and therefore knew it very well) will be long gone, so the archive must stand on its own. This is why the PDS insists that the archives be reviewed carefully by people who are independent of the mission or research project. Also, a specific of the PDS is that it requires the data presented in special formats. This relates to the fact that the data should be readable independently of the computer and its system and supported by the hard and software even in a distant future. This is why PDS does not consider, for example, word processing programs (e.g. Microsoft Word) as a "safe" format. However, it is assumed that the scientists of the future will be able to make sense of ASCII bytes. This is why ASCII files are the main type of the data and documents in the PDS archives. As for visual elements such as images or figures, the PDS allows these to be included preferably in FITS format, although some other presserving formats are also allowed. Each data table or image must be ac-companied by a special file called “label” which pro-vides information necessary to understand the data. Labels are also important in case you want to search (“google”) the data. To make the PDS archives searchable, PDS developed a special language ODL (Object Description Language) that allows describing specifics of the data using a set of definitive terms called keywords and providing them with some specific values.

International Planetary Data Alliance (IPDA). The idea of archiving space mission and other planetary data appeared to be of a great interest of other than NASA space agencies. A few years ago the European Space Agency (ESA) started to develop a planetary data system for their missions (PSA). They decide to adopt the PDS data model as a starting point. PDS in turn agreed to work with PSA to make sure that the data model served both communities. Already the data from ESA missions Huygens, Mars and Venus Express, Rosetta are archived in PSA using PDS standards. About two years ago other nations (Japan, China, Russia, and India) engaged in planetary science met with PDS and PSA representtatives. They formed the IPDA. The approach is the same as the ESA–NASA collaboration. The data stan-dards within the IPDA are based on the PDS that is the standard for all planetary data at the time of the IPDA founding. The IPDA is represented by a Steering Committee. Membership in the Steering Commit-tee is comprised of representatives from any space agency, scientific research institute, university or other organization approved by the Steering Commit-tee that indicate a willingness to participate fully in the IPDA activities and provide the commensurate level of support for defining and implementing the IPDA standards.

PDS and Virtual Observatories (VO). A virtual observatory is a collection of interoperating data archives and software tools which utilize the internet to form a scientific research environment in which astronomical research programs can be conducted. The same way as a real observatory consists of telescopes, each with a collection of unique astronomical instruments, the VO consists of a collection of data centres each with unique collections of astronomical data, software systems and processing capabilities. Now VO is basing their data search on the coordinates of the space objects; this is why moving objects are not included there. However, recent collaboration between NVO and PDS is directed to make PDS data available through VO.