

ASTROPEDIA ANNEX: A PDS IMAGING NODE REPOSITORY FOR GEOSPATIAL PLANETARY RESEARCH PRODUCTS. T.M. Hare¹, L.R. Gaddis¹, M.S. Bailen¹, S.K. LaVoie², ¹USGS Astrogeology Science Center, Flagstaff, AZ 86001, ²Jet Propulsion Laboratory, Pasadena, CA. thare@usgs.gov.

Introduction: The Imaging Node (IMG) of the NASA Planetary Data System (PDS) archives and delivers digital image collections from planetary missions [e.g., 1]. Included among these collections are nearly 500 TB of digital image archives, ancillary data (calibration files and software, geometric data, etc.), software, tutorials and tools, and technical expertise to support users of this collection. The *Astropedia Annex* is a new data portal in development by IMG to support scientists who use PDS image data to create derived geospatial products registered to a solid planetary body. Examples of geospatial derived products are cartographic and thematic maps of moons and planets, local and regional geologic feature maps, topographic and perspective views of planetary landing sites, and tabular data containing unit information derived from planetary data. Many of these products have been developed as a result of NASA data analysis programs, often years after active missions (and their accumulating archives) have ended.

Astropedia: The USGS Astrogeology Science Center hosts an online data portal (<http://astrogeology.usgs.gov/astropedia>; [2]) called Astropedia that provides a search interface to the decades of image and derived products created by Astrogeology scientists and cartographers. Many of these products have been derived from PDS data collections and are in the form of cartographic maps, digital image mosaics [3, 4], and Geographic Information System (GIS) projects and layers [5]. The goals of Astropedia are to provide quick and easy access to derived data products, a robust search interface supported by thorough metadata labeling of each

product, cross-references to ancillary data and other related products, downloads in a variety of image formats, and interaction through a Web Map Services (WMS) interface that is easily maintained. The Astropedia data portal can be searched using multiple methods including target information, geospatial coordinates, mission or instrument keywords, author and organization, as well as descriptive information available from the metadata.

The metadata standard used for Astropedia was created by the U.S. Federal Geographic Data Committee (FGDC); this standard has been modified slightly to support planetary data [6, 7]. These same standards, along with existing PDS3 standards [8], are being used to help develop updated image and file labels for PDS 4 products, the next generation archive in development by PDS [9, 10]. Planetary data products such as published USGS maps and Lunar Mapping and Modeling Project (LMMP) results are already required to have associated FGDC records [11].

FGDC geospatial metadata, sometimes called “data about data,” is documentation that describes the rationale, authorship, attribute descriptions, spatial reference, errors and other relevant information about a given set of data. Every data product served by Astropedia has extensive associated metadata that follows the FGDC metadata standard. Use of these metadata standards will improve search and retrieval of data and allows us to greatly expand both the holdings and accessibility of planetary derived data products. The new *Astropedia Annex* portion of this system represents a repository for non-Astrogeology

users to submit their derived geospatial products for inclusion in the PDS data holdings.

Approach: Astropedia is built on an open-source infrastructure that includes the PostgreSQL database with the PostGIS add-ons [12] to support geographic objects, Alfresco Document Management System (DMS) as a data repository [13], Openlayers for web-based interactive mapping [14], and the WMS Mapserver to serve planetary geospatial data. A web-based search form enables quick access to the Astropedia catalog. The interface provides a keyword-based search form and an interactive mapping tool that allows geographic selection of planetary targets in Simple Cylindrical, North, and South Polar Stereographic projections.

Astropedia Annex Requirements: The *Astropedia Annex* of the PDS Imaging Node will accept submission of geospatial products with PDS planetary data heritage. Submitted products must have extensive metadata that meets PDS standards and using the joint PDS and FGDC planetary metadata standards. Data submissions and metadata development will be conducted through a forms-based Web site that guides users through the process and specifies which data entries are required. Examples of required metadata entries are originator name and contact information, geographic coordinates, target body, descriptive caption, publication date, lineage and source information, validation and review status, quality and completeness assessments, linkages to other products, and literature citations. The information entered will be converted to xml format for ingestion and retrieval through the Astropedia content catalog. These detailed metadata can readily be viewed for any product and will facilitate easy access through the existing Astropedia search interface.

Geospatial products submitted to Astropedia Annex are required to be validated and reviewed prior to publication. Products that have already been published in professional science journals will be considered reviewed. Other products will require documentation of peer review by at least three researchers; IMG staff will assist with these reviews as needed. All data will be validated by PDS staff prior to public release in the Astropedia Annex.

References: [1] Gaddis, L. et al., this meeting; [2] Bailen, M., T.M. Hare, S.W. Akins, and C. Isbell, 2012, *Astropedia – A Data Portal for Planetary Science*, 43rd LPS, #2478. [3] Eliason, E., C. Isbell, E. Lee, T. Becker, L.Gaddis, A. McEwen, M. Robinson, *Mission to the Moon: The Clementine UVVIS Global Lunar Mosaic*, 1999, PDS Volumes USA_NASA_PDS_CL_4001 through 4078, Produced by USGS and distributed by PDS. [4] Gaddis, Lisa, Chris Isbell, Matt Staid, Eric Eliason, Ella Mae Lee, Lynn Weller, Tracie Sucharski, Paul Lucey, Dave Blewett, John Hinrichs, and Donovan Steutel, 2007, *The Clementine NIR Global Lunar Mosaic*, PDS Volumes USA_NASA_PDS_CL_5001 through 5078, produced by USGS and distributed by PDS. [5] Becker, T., L. Weller, L.Gaddis, D. Cook, B. Archinal, M. Rosiek, C. Isbell, T. Hare and R. Kirk, 2009, *Lunar Orbiter Mosaic of the Moon*, 29th LPS, #2357. [6] Federal Geographic Data Committee, 2011, *Preparing for International Metadata*, Federal Geographic Data Committee, Washington, D.C., URL: <http://www.fgdc.gov/>. [7] Hare, T.M., J.A. Skinner, C.M. Fortezzo, and M.S. Bailen, 2011, *FGDC Geospatial Metadata for the Planetary Domain*, LPSC 42, #2154. [8] *Planetary Data System Standards Reference*, v. 3.8, JPL D-7669, Part 2, URL: <http://pds.nasa.gov/tools/standards-reference.shtml>. [9] Crichton, D., R. Beebe, S. Hughes, T. Stein and E. Grayzeck, 2011, *EPSC Abstracts*, 6, #1733. [10] Hughes, J.S., D.J. Crichton, and C.A. Mattmann, 2009, *A framework to manage information models---the Planetary Data System case study*, 40th LPS, #1139. [11] Law, E. et al., this meeting. [12] <http://postgis.refractive.net/>. [13] <http://www.alfresco.com/>. [14] <http://openlayers.org/>.