LUNAR IMAGE DATA AT THE IMAGING NODE OF THE PLANETARY DATA SYSTEM. P.A. Garcia[1], L.R. Gaddis[1], C.E. Isbell[1], S.K. LaVoie[2], K. Becker[1], and Alice Stanboli[2] [1]U. S. Geological Survey, 2255 N. Gemini Dr, Flagstaff, AZ, 86001, pgarcia@usgs.gov, [2]Jet Propulsion Laboratory, California Institute of Technology, Oak Grove Dr, Pasadena CA, 91109

Introduction: Interest in lunar data has significantly increased in the past several years, making access to the image holdings of the Planetary Data System (PDS) more highly sought after. Here we provide information on the lunar image data available through the Imaging Node of the PDS (cohosted by USGS and JPL) and methods for accessing and obtaining these data.

The Imaging (IMG) Node [1] is one of several science discipline nodes of the PDS. IMG assists instrument teams in the generation of archives of large-volume planetary image data acquired from NASA space missions. After the archives are finalized, IMG provides access to them using a variety of methods. The goals of IMG are to preserve planetary image data for the future and to enable the planetary science community to perform scientific analysis using the data. The majority of PDS data are released as Experiment Data Records (EDRs) which contain raw spacecraft instrument data, with little or no processing applied. Some missions and instruments also create, release, and archive Reduced Data Records (RDRs). These contain instrument data to which a number of processing steps have been applied.

PDS Data Access Resources at IMG: Numerous resources for searching and locating data from various missions within our holdings are provided by IMG. Primary among these is the Planetary Image Atlas, which allows users to search data by mission, using a wide variety of instrument and geographic search parameters (pds-imaging.jpl.nasa.gov). PDS Map-A-Planet [2] at IMG (mapaplanet.org) can be used to generate custom image maps from various derived (i.e., calibrated, photometrically and geometrically corrected, and mosaicked) planetary map products. Users can create and order image maps and multiband cubes using multiple image formats, map projections, and options for stretching and gridding. Maps can be created interactively, or ordered for later download. Most image data at IMG can also be accessed at pdsimage2.wr.usgs.gov using File Transfer Protocol (FTP). This option is often preferred by those who wish to download large amounts of data.

Users may also choose to begin their data searches at the main IMG website at pds.jpl.nasa.gov. This site provides access to all IMG data holdings and allows searches of data across multiple missions and datasets with the availability of a large selection of search parameters.

Lunar Image Data at IMG: Image and ancillary data for several major NASA missions to the Moon are available at IMG web sites.

***Clementine*:** The Clementine spacecraft [3-6] carried four scientific imaging cameras: the Ultraviole**t**/Visible (UVVIS), Near-Infrared (NIR), High-Resolution (HiRES, 750 nm), and Long-wave Infrared (LWIR) cameras. The UVVIS camera obtained data of the Moon at five wavelengths: 415, 750, 900, 950 and 1000 nm. The NIR camera collected data at six wavelengths: 1000, 1250, 1500, 2000, 2600, 2780 nm. The Clementine 750 nm basemap mosaic is used as the primary image layer for the popular Google Moon site (http://www.google.com/moon/).

IMG sites deliver Clementine EDRs (volumes cl_0001-0088), 750nm Basemap mosaic (volumes cl_3001-3015), UVVIS Mosaic (volumes cl_4001-4078) and High Resolution Mosaics (volumes cl_6001-6022). Map-A-Planet provides access to the Clementine 750nm Basemap, UVVIS Mosaics, and NIR Mosaics. The NIR data (volumes cl_5001-5078), now in review for release to PDS, are also available at astrogeology.usgs.gov/Projects/ClementineNIR/.

Lunar Orbiter: Five Lunar Orbiter missions [7-14] were launched by NASA in 1966 and 1967 for the purpose of gathering data with which to study the Moon and prepare for Apollo landings. Lunar Orbiter images were acquired by the spacecraft during all five missions (LO-I to -V [7, 8]). The first three missions mapped potential Apollo landing sites. Lunar Orbiter IV photographed most of the near and far sides of the Moon at medium and high resolutions. Lunar Orbiter V acquired photography of the far side and collected requested images of 36 sites of special scientific interest.

A global LO mosaic recently completed by the U. S. Geological Survey [Becker et al, this volume] is comprised primarily of LO IV and V digital images that were scanned, cosmetically enhanced, mosaicked, and projected [9-14]. The nominal resolution of the LO mosaic is ~60 m/pixel. The new Lunar Orbiter mosaics are currently available through the Map-A-Planet website (mapaplanet.org) for the Near Side and lunar North and South Poles. The LO Far Side mosaic is now being staged for delivery. All LO mosaics are being formatted and documented as formal PDS archives.

Shaded Relief: Also available through Map-A-Planet are the USGS lunar airbrush shaded relief image [15] and airbrush with color-coded Clementine topography [16-18]. Shaded relief topographic maps of the Moon were created in the 1970s and 1980s using airbrush techniques to blend and merge LO photographic images.

***Lunar Prospector*:** 'Special Product' maps derived from NASA Lunar Prospector data [19, 20] at

the PDS Geosciences Node (pds-geosciences.wustl.edu/missions/lunarp/reduced_special.html) are available via Map-A-Planet. Five-degree maps of elemental abundance of O, Si, Ti, Al, Fe, Mg, Ca, U, and K (from the gamma ray spectrometer) will be provided.

Geodetically Corrected Lunar Data: Because PDS lunar data are available from IMG in georeferenced formats for use by common Geographic Information Systems (GIS), many PDS lunar datasets are available outside the PDS at the USGS 'Planetary Interactive GIS on the Web Interactive Analyzable Database' (PIGWAD) site. PIGWAD facilitates use of the PDS data by linking to data at other sites, such as Clementine topography and gravity [17], digital geologic (webgis.wr.usgs.gov/pigwad/down/moon_geology.htm) and aeronautical maps (www.lpi.usra.edu/resources/mapcatalog/LAC/), and planetary nomenclature (planetarynames.wr.usgs.gov). Coregistered and geometrically warped versions of the lunar shaded relief maps and mosaics from LO and Clementine UVVIS and NIR instruments that have been tied to the most recent lunar control network [21 and Archinal et al., this volume] also are available for viewing and download via PIGWAD.

Unified Planetary Coordinate Database: Many lunar image datasets are not available in PDS or have been archived in disparate geodetic coordinate systems, making it extremely difficult to correlate, combine, and analyze data from different missions and instruments. The Unified Planetary Coordinates (UPC) database [22] addresses this problem by providing access to many lunar datasets in a common coordinate system (e.g., planetocentric longitudes with 0 to 360 degree positive east latitudes). Lunar datasets to be supported by the UPC can be accessed via the Image Atlas and will include Lunar Orbiter, Apollo, and Clementine.

Summary: Providing straightforward access to the lunar image datasets which are available has proven to be a challenge. IMG addresses this challenge by providing a variety of methods and mechanisms for accessing these data. This work complements that of other PDS Nodes, such as Geosciences, that also maintain and distribute a variety of lunar datasets [Slavney et al., this volume; Williams et al, this volume].

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