USING THE PDS PLANETARY IMAGE LOCATOR TOOL (PILOT) TO IDENTIFY AND DOWNLOAD SPACECRAFT DATA FOR RESEARCH. M.S. Bailen, R.M. Sucharski, S.W. Akins, T. Hare, L. Gaddis. U. S. Geological Survey, Astrogeology Science Center, 2255 N. Gemini Dr., Flagstaff, AZ, 86001 (mbailen@usgs.gov).

Introduction: The Planetary Image Locator Tool (PILOT) is a web-based interface (http://pilot.wr.usgs.gov) that provides access to a search tool for several Planetary Data System (PDS) image catalogs indexed by the Unified Planetary Coordinates (UPC) database [1]. The PILOT interface complements other PDS data search tools (e.g., PDS Imaging Node's Planetary Image Atlas, http://pds-imaging.jpl.nasa.gov/search; PDS Geosciences Node's Orbital Data Explorer or ODE, http://ode.rsl.wustl.edu/) and takes advantage of recent PDS developments. PILOT includes (1) use of improved spatial and catalogued information for each image as derived by the UPC, (2) access to data from a powerful Geographic Information Systems (GIS) database, and (3) easy, quick access through a customized web portal and mapping interface.

Background: An enormous amount of digital image data have been collected recently for Mars, the Moon, and other planetary bodies [e.g., 2, 3]. Historic photographic data such as those from Lunar Orbiter and Apollo are being digitally restored [4-6]. Ongoing missions deliver a constant flow of new data. And future planetary surveys promise to exponentially increase the amount of image holdings. In many cases, these data exist in a variety of disparate coordinate systems, making it difficult for the scientific and mapping communities to correlate, combine, and compare data from different missions and instruments. The Unified Planetary Coordinates (UPC) database of the PDS Imaging Node was created to address these discrepancies [7,-9] and to preserve and serve the improved image geometry and position information resulting from additional mission and/or cartographic processing.

The UPC is a database containing improved geometric and positional information about planetary image data, computed using a uniform coordinate system and projected onto the most current coordinate system for a given planetary body. Positional and instrument 'metadata' are extracted from PDS image labels and used to calculate detailed geometric data for a given image. The database is populated with up-to-date spacecraft pointing information (e.g., SPICE kernels) which provides improved pointing for image corners and edges for potentially every pixel in an image. The UPC also benefits from image positional refinements resulting from geodetic research [e.g., 10], cartographic processing and mapping at the USGS. The USGS Integrated Software for Imagers and Spectrometers (ISIS, [e.g., 11]) system is the primary tool for computing, maintaining, and continually improving the UPC database. An ISIS camera model [12] for a given imaging instrument is required for ingestion of image data into the UPC. This is the primary reason why the UPC and its interface PILOT are complementary to existing PDS archive interfaces that serve all PDS image data. However, both the Planetary Image Atlas and the ODE benefit from use of the improved image geometry provided by the UPC.

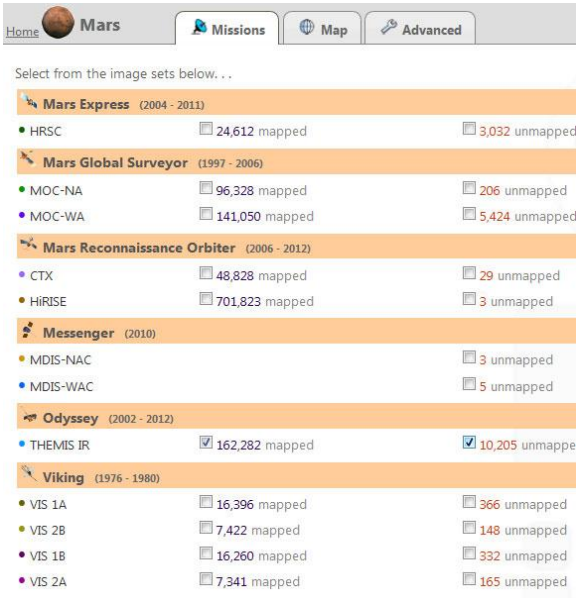

Figure 1: Selection form provided to choose mapped and unmapped image sets.

Mapped Vs. Unmapped Imagery: The PILOT web interface now reports both the images that have successfully generated a footprint geometry ("mapped") with associated photometric keywords (e.g. Mean Ground Resolution, Incidence Angle, Phase Angle, Emission Angle, and Solar Longitude) but also the images which have failed to process ("unmapped"). Unmapped images are often simply those data acquired for calibration, limb views, or other images that don't intersect a planetary body. By reporting the number of both mapped and unmapped images (Figure 1), the user sees information on the completeness and quality of a data set as well as the number of products acquired during different phases of a mission.

PILOT also now supports more detailed interrogation of planetary image data served. For example, for a given target and mission, histograms are now produced for select photometric keywords to provide additional information about the quality and variance of the data. For unmapped imagery, depending on when in the processing that footprint failures occurred, start times, browse, and thumbnail images may be available to support detailed examination of data at a level previously not straightforward through PDS data searches.

Refined Selection Method: PILOT has been improved to allow easy access to greater sets of search results by displaying multiple and numerous thumbnails in a large scroll panel. This new presentation gives the user the ability to quickly sort through their data and select desirable imagery. Action buttons are clickable for each image and real-time sorting is provided. Selected imagery are now tracked in an additional field with options to download or process. The refined selection method will enable PILOT to work seamlessly with future USGS Astrogeology Science Center web-based applications like the upcoming ISIS-based, Map Projection on the Web [13] or MPOW service.

Filtering by Filter: A new search feature (Figure 2) has been added to PILOT which allows users to constrain image sets based on filter and wavelength information. This feature directly supports science and cartography research that depends on the ability to sort through specific wavelengths for identifying desired instrument data products. Users are now allowed to select one or more filters to constrain their search. Filter names are taken from the mission standard names found in the label.

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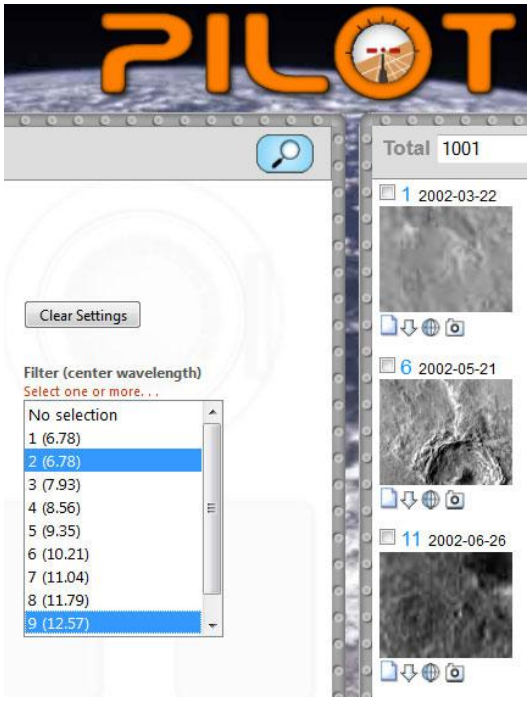

Figure 2: Viewing filter/wavelength data and browse images in PILOT for Mars Odyssey THEMIS IR data.

References: [1] Akins, S. et. al., 2009, LPS XL, abs. # 2002. [2] McEwen, A. et al., 2007, JGR 112, E05S02. [3] Robinson, M.S. et al., 2010, Space Sci. Rev, 150, 81-124. [4] Becker, T. et al., 2008, LPS XXXIX, abs. #2357; [5] Wingo, D. et al., 2009, LPS XXXX, abs. #2517; [6] Lawrence, S.J. et al., 2008, NLSI LSC abs. #2066. [7] Becker, K. et al., 2005, LPS XXXVI, abs. # 1369. [8] Becker, K. et al., 2007, LPS XXXVIII, abs. # 2031. [9] Akins, S. et. al., 2009, LPSC XL, abs. # 2002. [10] Archinal, B., et. al., 2010, LPSC XLI, abs. # 2609. [11] Anderson, J.A. et al., 2004, LPS XXXV, abs. #2039. [12] Anderson, 2008, LPS XXXIX, abs. #2159. [13] Hare, T.M. et al., this volume.