ADAPTATION & USE OF OPEN GEOSPATIAL© WEB TECHNOLOGIES FOR MULTI-DISCIPLINARY ACCESS TO PLANETARY DATA. E. Dobinson[1], D. Curkendall[1], L. Plesea[1] and T.M. Hare[2], [1]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, California 91109-8099, Elaine.R.Dobinson@jpl.nasa.gov, [2]U.S. Geological Survey, 2255 N. Gemini Dr., Flagstaff, AZ, 86001.

Introduction: We are adapting the fast-developing and well-supported open geospatial standards and technologies for the access, processing, and display of geospatial data to the planetary domain. In particular, we are implementing prototype Web Mapping Services (WMS) and Web Coverage Services (WCS) to present high level products derived from NASA's Mars and Lunar datasets to produce scientific composites of our knowledge of the planet.

The specific information technologies used for this work are the existing open methodologies for Earth data as defined by the Open Geospatial Consortium (OGC) [1]; we are extending and generalizing these standards for the planetary case.

Motivation: The basic motivation is that investigators need a unified methodology for accessing higher-level products that serve as substrate, background, and current known detail pertinent to their ongoing work. The goal and promise is that, when ultimately placed in operation at the relevant data archival sites, the data can continue to be distributively curated, while affording the user a single point of access, and that specialized access points (clients in OGC parlance) can be built by anyone. The nature of our work will lead to the broad publication of global multi-phenomenological maps of lunar and planetary bodies. These maps will be hierarchical and afford both synoptic and high-resolution views of each body published. The multiple views will make clear what differences exist, and, because they present the different phenomena as a composite, this capability should provide a basis to better understand planetary processes.

Approach: The main strength of the OGC approach resides in the existence of well-supported collaborative standards that allow individual development of components. Because these standards are well-supported by both the Geographic Information System (GIS) and Remote Sensing (RS) industries, when enough planetary data are present on the Internet in this form, many of the very powerful and complex commercial applications can be directly utilized for planetary science (Figure 1).

Our overall approach is to first develop baseline servers of lunar and planetary data, host multiple Level 3 (map projected) datasets on them, and deploy them for use in conjunction with our PIGWAD [2] and JMARS [3] use-case applications. In parallel, we will work with WorkGroup IV/9 -Extraterrestrial Mapping of the International Society for Photogrammetry and Remote Sensing (ISPRS) and with the OGC committees to support a NASA-led effort broadening the OGC standard to embrace the lunar and planetary case. With the servers in place, the use cases demonstrated, and a coherent set of standards adopted, we are confident that the critical mass will have formed, and additional servers and applications will begin to appear as they have in the Earth science field (Figure 2).

A prime application for our servers is the creation of geologic maps for Mars and the Moon [4]. Because of the wealth of new data now available for Mars and the Moon, the current geologic maps are in desperate need of updates. There is now a great deal of interest in the planetary community to begin the systematic geologic and structural remapping of these bodies. Depending on the mapping scale, there could be at least thirty quads per body requiring numerous researchers. Our project will directly contribute to the efficiency of this research and research projects like it. Investigators would be assured they would be working with the best data available already co-aligned and projected for ease of use. Once their derived maps are completed and reviewed, they could be added to the WMS catalog of available data sets whether they are raster or vector.

Conclusion: As the number and volume of datasets grow, we believe this method of direct access to online streamed data will not only help meet the needs of current planetary research projects, but will be a technology to carry us into the future. We also envision these techniques of data distribution to be a significant addition to the method currently used by the Planetary Data System (PDS). We plan to cooperate with the PDS, specifically the imaging and geosciences nodes, to accomplish this.

References: [1] OGC, http://www.opengeospatial.org/. [2] Hare T.M. and K.L. Tanaka, (2004) Expansion in geographic information services for PIGWAD, LPSC XXXV, abs. 1765. [3] Gorelick, N.S. et al., (2003), JMARS: A multimission data fusion application, LPSC XXXIV, abs. 2057. [4] Gregg, T.K.P., K.L. Tanaka, and R.S. Saunders (eds.), Abstracts of the Annual Meeting of Planetary Geologic Mappers, Washington, D.C., (2005), USGS Open-File Report 2005-1271, URL: http://pubs.usgs.gov/of/2005/1271/ .

Additional Information: This work is funded under the NASA AISR Program. The website portal can be found at http://webgis.wr.usgs.gov/ogc

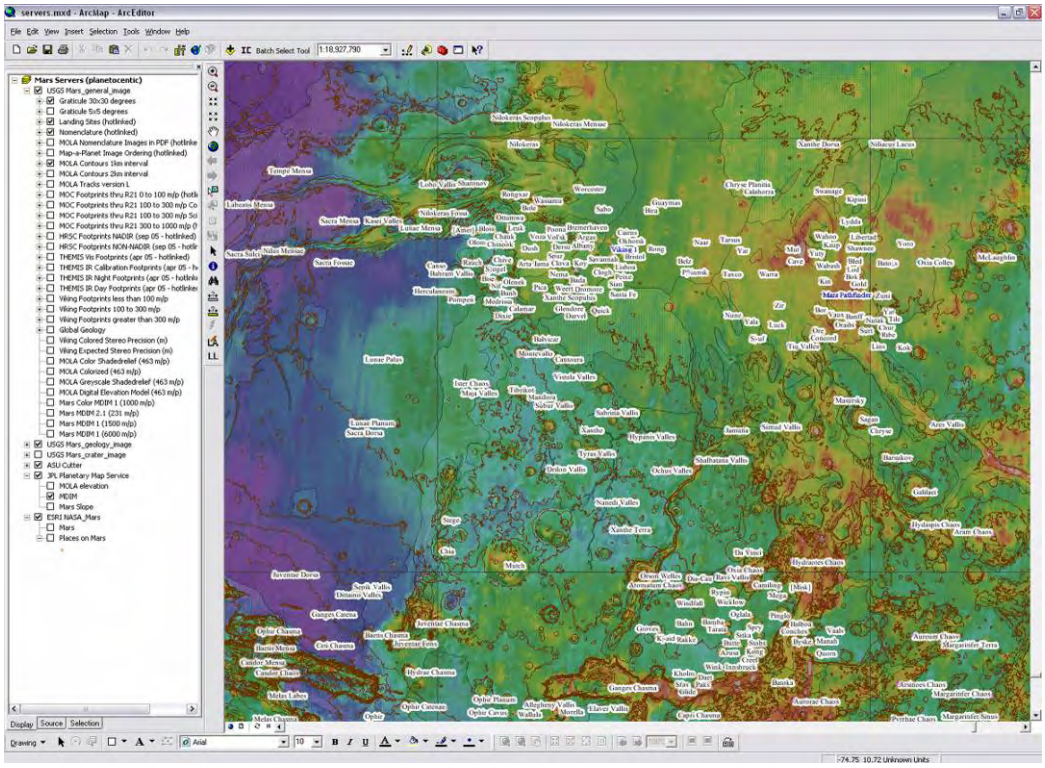

Figure 1. An example of the GIS application ArcMap, by Environmental Systems Research Institute (ESRI), with streamed data layers from JPL, USGS, ASU Mars servers. The layers displayed are a Mars image base from JPL's onMars server, thermal inertia data set from ASU's JMars server, and geology, MOLA 1 km contours, and nomenclature from the USGS server.

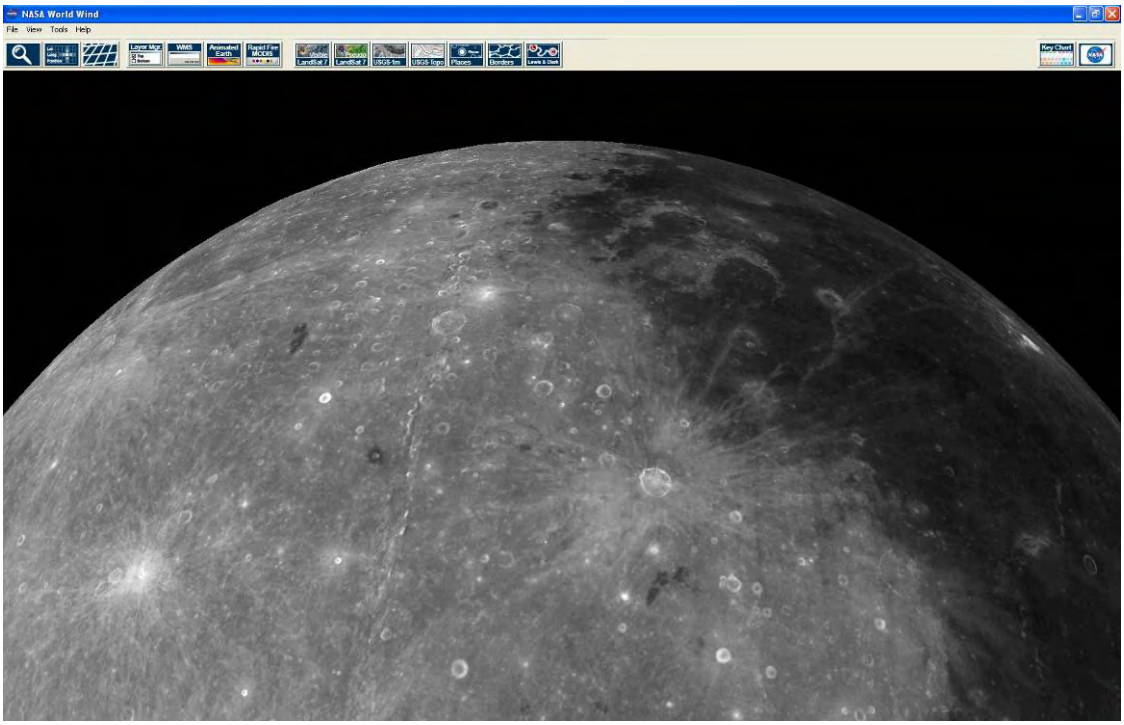

Figure 2. An example of the 3D globe application, World Wind, by NASA, using the Lunar Clementine base map from JPL's onMars WMS server. This application demonstrates the usefulness of WMS technologies for streaming very large planetary data sets into novel client applications. URL: http://worldwind.arc.nasa.gov/ .