

**EXPANSION IN GEOGRAPHIC INFORMATION SERVICES FOR PIGWAD.** T. M. Hare and K. L. Tanaka, U.S. Geological Survey, 2255 N. Gemini Dr., Flagstaff, AZ, 86001; thare@usgs.gov.

**Introduction:** GIS usually refers to Geographic Information Systems, although other common applications include Geographic Information Sciences and Geographic Information Services. This year the Planetary Interactive GIS on-the-Web Analyzable Database (PIGWAD) website focused on the latter. The PIGWAD task, funded by NASA's Planetary Cartography and Geologic Mapping Working Group, has been busy supporting the planetary community in working with GIS applications and dealing with the vast amount of planetary data now available.

**Growth Rate:** We have seen the use of GIS tools for planetary research steadily grow over the past few years, however this year, a noticeable increase in the growth rate was achieved. We anticipated this increase because more universities offer GIS training, more tools are available, many tools have matured, and the amount of digital planetary datasets has risen requiring a solution that can handle multiple and diverse datasets. The emergence of many standards has also helped this growth and the ability to share data across different applications. Some of these standards include:

1. Standard Interchange Formats
2. Open File Formats
3. Data Converters
4. Direct Read Application Programming Interfaces
5. Integration of Standard GIS Web Services

**Services:** Using planetary datasets in a GIS can be extremely challenging. Although some datasets are released from the Planetary Data System (PDS) in a map projected (level 2) format that can be readily ingested into a GIS (with a little help), most images are only released in a raw (level 0) format [1]. To help new and advanced GIS users, we have written many GIS tools and tutorials and we offer our time to answer questions on datasets, procedures or even feasibility. Although most of our experience is with Environmental Systems Research Institute (ESRI) software, we are familiar with other GIS, remote sensing and photogrammetry applications.

Because many planetary GIS users have similar questions, we started a Planetary GIS Discussion site. This site allows planetary researchers an outlet for their GIS-related questions on topics like GIS applications, planetary datasets, and working with ISIS [1]. This site has been extremely popular for planetary researchers, and we strive to answer the questions in a timely manner. Supporting this task has been time consuming but rewarding. We hope as more users become familiar with the technology, we can rely on the community to help answer more of the questions in the near future. At the beginning, many of the questions were posted by us based on previously received emails. There are now about thirty active planetary science users, but the discussion pages have been visited more than 15,000 times in the first 6 months of their posting.

**On-Line Mapping Update:** This year we have added Europa, Io and Ganymede as newly available on-line mapping services [2]. Polar projections have also been added for these new services in addition to our other supported bodies, Venus, Mars, and the Moon. We will continue to use the on-line mapping solution called ArcIMS, by ESRI, however, we have also enabled all services to be compliant with the OpenGIS® Consortium (OGC) specification called WMS or Web Mapping Server [2]. This helps to open the mapping services to interact with many more web sites and stand-alone mapping clients. There have been several stand alone OGC clients made recently available. Some examples include:

1. MapLab's MapBrowser [3].
2. Chameleon [3].
3. Degree [4].
4. Geoserver [5].

PIGWAD's on-line mapping services are better utilized in stand-alone applications like these or other more robust GIS applications. However, for viewing the mapping services through a web browser, we have made available three levels of client software. This year we introduced a new beginner level called

ArcExplorer Web (figure 1). This software is written in JavaScript and is compatible with nearly all browsers and machine types. The ArcExplorer Web viewer allows you to view and query the datasets and has the benefit of loading multiple mapping services into a single interface. This would also include mapping services streamed from multiple locations.

The intermediate level interface, called ArcIMS HTML, uses Java technology and allows the user to do advanced queries, selections, accurate measurements and linking [2].

The advanced interface, called Maplicity, allows the most customization. You can do all the above plus features generally only found in stand-alone GIS viewers [2]. We have also worked with Telemorphic, the creators of Maplicity, to supply our users with an accurate scale for planetary bodies (figure 2). Prior to this fix, the tool was hard-wired for Earth.

**Future:** We will continue to provide GIS services to the planetary community and provide upgrades to our servers and on-line services. This year we will also focus on converting paper-only published geologic maps. We will continue to strive to work with other facilities to incorporate web-streaming technologies such that all our services may be compatible. Lastly, we always encourage community input into how PIGWAD develops to meet the needs of planetary scientists.

[Any use of trade, product, or firm names is for descriptive purposes only and does not constitute endorsement by the U.S. Government.]

**References:** [1] Hare T., Tanaka K., Skinner J., GIS 101 for Planetary Research, ISPRS WG IV/9: Extraterrestrial Mapping Workshop, Advances in Planetary Technology, LPI, Houston, 2003. [2] Hare T. and Tanaka K. (2003) LPS XXXIV, Abstract #1974. [3] <http://www.opengis.org> [4] <http://www.maptools.org> [5] <http://deegree.sourceforge.net> [6] <http://geoserver.sourceforge.net>

**Additional Information:** The PIGWAD website can be found at the following address: <http://webgis.wr.usgs.gov>. To learn more about using planetary datasets in various GIS

applications please visit our Planetary GIS Discussion site:

[http://webgis.wr.usgs.gov/pgis\\_discussion/](http://webgis.wr.usgs.gov/pgis_discussion/)

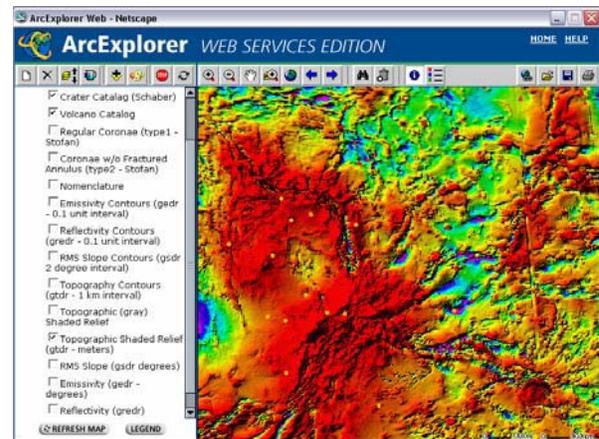


Figure 1. The beginner ArcExplorer Web interface showing the Venus general image service displaying a topographic color shaded relief and the crater and volcano catalogs.

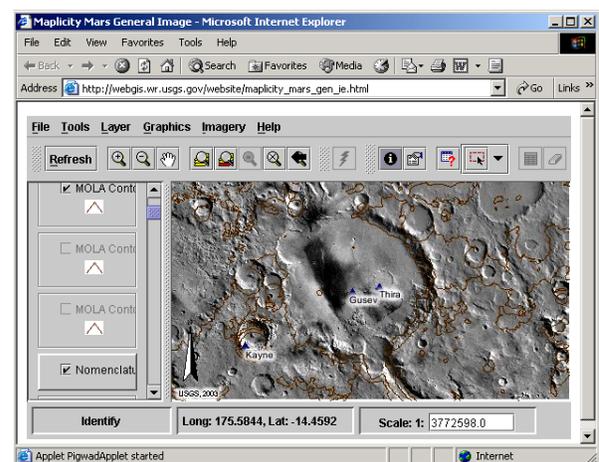


Figure 2. The advanced Maplicity interface showing the Mars general image service displaying the MDIM 2.1, MOLA contours and nomenclature and zoomed into the MER A landing site, Gusev Crater.



[www.thepigsite.com](http://www.thepigsite.com)