

**GIS FACILITY AND SERVICES AT THE RONALD GREELEY CENTER FOR PLANETARY STUDIES.**

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**Introduction:** The NASA Regional Planetary Information Facilities (RPIFs) have historically provided images, literature, and education materials pertaining to past and active planetary missions. At the Ronald Greeley Center for Planetary Studies (RGCPs), the RPIF of Arizona State University, we are in the process of rendering our archive digitally so that our data will be available on computers and the Internet. In order to make the digital planetary image data usable for research, we have established a Geographic Information Systems (GIS) computer laboratory in our facility. The current and future Data Managers of the RGCPs will be responsible for maintaining the GIS lab, instructing researchers on the use of GIS and image processing software, and act as the resident expert on how to use planetary data sets. Our goal of establishing a GIS lab is to encourage the scientific community to receive training and perform research using planetary data at the RGCPs.

**The RGCPs RPIF at ASU:** Regional Planetary Image Facilities were originally established in the 1970s to serve two primary functions: 1) to archive photographs and literature from active and completed planetary missions, and 2) to provide researchers and the public access to the archive for scientific research, future mission planning, and education/public outreach [1]. There are currently 9 US and 7 international RPIFs that continue to provide these services at the local and regional level.

The RGCPs, originally the Space Photography Laboratory, was founded by Professor Ronald Greeley at Arizona State University (ASU) in 1977 as a branch of the U.S. Geological Survey RPIF [2]. By 1982, the facility at ASU became a full, independent RPIF, and after the death of Dr. Greeley in 2011, the facility was renamed the “Ronald Greeley Center for Planetary Studies”. Since its inception, the RGCPs has been utilized to aid and support planetary geology research for faculty, staff, and students at ASU, as well as visiting scientists.

**The RGCPs GIS Lab:** With the advent of high resolution scanning devices and the Internet, the images and literature originally exclusive to the RPIFs have become increasingly available electronically for download. As a result, fewer people utilize the RGCPs for research—although support for education, public outreach, and student access for classes continues. Even so, there is still a strong need for experts to instruct researchers in the use of planetary image data,

including the various image formats, and the software needed to ingest and process the data.

All planetary image datasets are archived by NASA through the Planetary Data System (PDS) and are freely available to the public. However, the data are not immediately readable by commonly accessible image viewing software, such as Adobe Photoshop™. In addition, most image data require a comprehensive database of camera-pointing information (e.g., SPICE kernels [3]) to process the images, to correct for geometric distortion, and to balance photometry. Furthermore, the software used for planetary mapping, such as ArcGIS™ [4], is very expensive and can be overwhelming to the new user. Although there are cheaper software alternatives that can be used, such as QGIS (a still-developing open-source, multi-platform GIS) [5], and Adobe Illustrator™ (a non-GIS graphic design software).

In 2014, we added our planetary GIS laboratory to the RGCPs facility (Figure 1). The lab consists of five dedicated dual-screen GIS workstations, each of which has ArcGIS™ 10.3 [4] and JMars [6] installed. In addition, the computers have access to a Linux server for image processing with ISIS 3 (Integrated System for Imagers and Spectrometers) [7] and VICAR (Video Image Communication And Retrieval) [8]. Our goal is to continue developing GIS projects for all terrestrial planets, outer planet satellites, and the larger small bodies.

To facilitate training, the RGCPs Data Manager has produced seminar-style classes for planetary GIS. These consist of two sessions that include an overview of the basic software components of ArcGIS™, understanding and integrating of image datasets into ArcGIS™, creating and editing vector data files, and correctly projecting disparate datasets to different planetary bodies in order to make surface measurements. More advanced seminars include using the software to perform crater counting, to map out the orientation of structural features, and to create publishable geologic maps. Initially, these seminars have been presented to students and researchers at ASU, but will eventually be available to visiting planetary scientists in the American Southwest.

By reinventing the RGCPs as a digital planetary GIS laboratory, our goal is to facilitate planetary research not only by providing image datasets, but also providing the instruction for understanding and processing of data from a variety of disparate planetary

missions. In this way, we will bring the photograph-based image archives into the digital age.

**References:**

[1] <http://www.lpi.usra.edu/library/RPIF/>

[2] [http://rpif.asu.edu/index.php/about\\_rgcp/](http://rpif.asu.edu/index.php/about_rgcp/)

[3] [ftp://naif.jpl.nasa.gov/pub/naif/toolkit\\_docs/C/info/intrdctn.html](ftp://naif.jpl.nasa.gov/pub/naif/toolkit_docs/C/info/intrdctn.html)

[4] <http://www.esri.com>

[5] <http://www.qgis.org/en/site/>

[6] <http://jmars.asu.edu>

[7] <http://isis.astrogeology.usgs.gov>

[8] <http://www-mipl.jpl.nasa.gov/external/vicar.html>



**Figure 1.** The Ronald Greeley Center for Planetary Studies, at Arizona State University, site of the planetary GIS laboratory.