

GEOGRAPHIC INFORMATION SYSTEMS AT THE RONALD GREELEY CENTER FOR PLANETARY STUDIES. D. M. Nelson¹ and D. A. Williams¹, ¹School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287 (DavidMNelson@asu.edu).

Introduction: The NASA Regional Planetary Information Facilities (RPIFs) have historically provided images, literature, and education pertaining to past and existing planetary missions. The personnel at the Ronald Greeley Center for Planetary Studies (RGCPS), the RPIF of Arizona State University, are augmenting their facility with the addition of a Geographic Information Systems (GIS) computer laboratory. The current and future Data Managers of the Center 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 of all planetary data formats. The goal of this augmentation will be to encourage the scientific community to receive training and perform research using planetary data at the RGCPS.

The RGCPS: Regional Planetary Image (or Information) Facilities (RPIF) 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 established 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 in 1992 was moved to a 2740 ft² climate-controlled lab (Figure 1). 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 over-arching goal has been to promote and disseminate the results of NASA Planetary Science Division programs and missions, particularly those in which ASU has been involved (including the Mars Pathfinder, Mars Exploration Rovers, Galileo, and DAWN missions).

GIS at the RGCPS: With the advent of 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 clas-

ses continues undiminished. While planetary data have become widely distributed, there is still a strong need for experts to educate potential users regarding planetary image formats and the software needed to ingest and process the data.

All planetary image data are archived by NASA through the Planetary Data System (PDS) and freely available to the public. However, the data are not readily 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 balance photometry. Furthermore, software used for planetary mapping, such as ArcGIS™ [4], is very expensive and can be overwhelming to the new user—although there are cheaper 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).

Beginning in 2014, the personnel at the RGCPS have taken the initiative to transform the existing facility into a digital planetary GIS laboratory. Currently, we have five dedicated dual-screen GIS workstations, each of which have ArcGIS™ 10.2 [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]. Our goal over the next five years is to develop GIS projects for all terrestrial planets, outer planet satellites, and the larger small bodies. Already in development are GIS databases for Io and Vesta, as well as Titan, through a collaboration with the RPIF at Cornell University.

To facilitate training, the RGCPS Data Manager is developing seminar-style classes on planetary GIS. These will consist of 3 or more hour-long sessions, including such topics as: overview of the basic software components of ArcGIS™, understanding and integrating image datasets into ArcGIS™, creating and editing vector data files, and correctly projecting planetary datasets onto differently planetary bodies to enable surface measurements. More advanced seminars will include using ArcGIS™ as a planetary research tool, and the development of planetary mapping databases. Initially, these seminars will be made available to students and researchers at ASU, and will eventually be accessible to visiting planetary scientists in the American Southwest.

By reinventing the RGCPS as a digital planetary GIS laboratory, our goal is to facilitate planetary re-

search not only by providing image datasets, but also providing the instruction to understand and process 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/wordpress/index.php/rgcps/rgcps_rpif
- [3] 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>



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