ENHANCEMENTS TO GRIDVIEW: SOFTWARE FOR TOPOGRAPHY ANALYSIS. J. H. Roark\textsuperscript{1}, A. B. Seifter\textsuperscript{2} and H. V. Frey\textsuperscript{3}, \textsuperscript{1}Science Systems and Applications, Inc. Code 698, NASA GSFC, Greenbelt, MD 20771, jim.roark@gsfc.nasa.gov, \textsuperscript{2}Centennial H. S., Ellicott City, MD 21042, \textsuperscript{3}Planetary Geodynamics Branch, Code 698, NASA GSFC, Greenbelt, MD 20771, Herbert.V.Frey@nasa.gov.

Introduction: Gridview is a software application designed to aid researchers in their efforts to analyze, measure and visualize gridded data products such as planetary topography. While it was specifically designed to be used with Mars Orbiter Laser Altimeter (MOLA) data, it also functions well as a tool for analyzing other gridded data sets. It has been used by researchers and students to study Mars topography, magnetic anomalies and Gamma Ray Spectrometer grids as well as the topography of other planetary objects. It has become a basic tool in the study of visible and buried basins on Mars [1], investigations of the dichotomy boundary [2], measurement of slope [3], and measurement of volcano and crater geometry [4].

Recent enhancements to Gridview include:
(1) Improved image handling, including overlay and merging capabilities
(2) Addition of a crustal layer profile thickness visualization tool
(3) Addition of a color table appropriate for Gamma Ray Spectrometer data

Figure 1. An example of new image handling capabilities showing a Mars Viking merged color image of Olympus Mons draped over MOLA topography produced with the Gridview "Fly Through" tool.

Image Handling: Users have the ability to load gridded data of various formats into Gridview. Some common formats include the Experiment Gridded Data Records (EGDRs) “img” format that NASA’s Planetary Data System (PDS) [5] uses to distribute the MOLA topographic data, the IDL specific “sav” format, and the Generic Mapping Tools (GMT) NetCDF format. A new feature is that users can now load and view JPEG images such as the planetary images that can be created and downloaded from the USGS Map-a-Planet web site [6]. To geographically register correctly the image must be in a simple cylindrical projection. Users will be prompted to input the image’s latitude and longitude limits. Mouse over data value tracking will be preserved if another grid was previously loaded. Grayscale JPEG images can be contrast stretched for enhanced presentation.

Many of the standard tools such as “zoom in” and location tracking function normally while viewing images, while others such as “profile” and “fly through” will prompt the user for a topography data set to use as the base for the requested operation.

Figure 2. An example of the “Image Overlay” tool output showing a Mars Viking image merged with MOLA topography.

Also available, is a new tool called “Image Overlay”. This is an often requested tool that allows users to visually merge an image with some other data such as topography. In the merged image the data will be represented by a controllable color stretch while the initial image will provide the lightness and darkness values for the resulting image. This is an effective way to present topography and image data together. It allows the
subtle albedo features in the photographic image to show while also showing an additional data set such as topography. If the image and the data overlay do not geographically register accurately the tool allows the user to shift the overlay in any direction using the arrow keys of the computer keyboard. The resulting merged image can be saved as a standard JPEG file for further use in Gridview or other applications.

**Figure 3.** An example of the output from the new “Profile Layer” tool showing a cross section of the crustal thickness of the Hellas basin and surrounding high-lands of Mars.

**Profile Layer:** A new profile tool called “Profile Layer” is also available in the latest version of Gridview. It works similar to the existing profile tool however it prompts the user for a crustal thickness grid that the program uses to calculate the depth to the base of the crust along the selected profile. The resulting display shows a cross section view of the crustal layer defined by the data (Figure 3).

**Color Tables:** Gridview has access to all of the standard color tables of IDL as well as several tools for user controlled and maximum stretching. In some cases it is preferable to apply a hard coded color stretch as opposed to a dynamically controlled computation. Applying a constant stretch allows easier image to image comparison. Gridview now contains hard coded color table stretches for various magnetic data sets as well as Gamma Ray Spectrometer data (figure 4).

**Figure 4.** An image showing GRS data with Gridview’s GRS color table stretch centered on Latitude 0 and Longitude 0 of Mars.

**Availability:** GRIDVIEW is being developed by the Planetary Geodynamics Branch at NASA’s Goddard Space Flight Center and can be downloaded at [http://geodynamics.gsfc.nasa.gov/gridview/](http://geodynamics.gsfc.nasa.gov/gridview/). The software can run on any system supported by the IDL virtual machine application supplied by RSI [7], including Windows, Linux, Mac OS X and the UNIX operating systems.