EPSC Abstracts
Vol. 8, EPSC2013-666, 2013
European Planetary Science Congress 2013

The UCL NASA 3D-RPIF Imaging Centre – a status report.

J.-P. Muller (1,2), P. Grindrod (2,3)
(1) Imaging Group, Mullard Space Science Laboratory, Dept. of Space & Climate Physics, University College London, RH5 6NT, UK (j.muller@ucl.ac.uk); (2) Centre for Planetary Sciences, University College London, Gower Street, London, WC1E 6BT; (3) Dept. of Earth Sciences, University College London, Gower Street, London, WC1E 6BT (p.grindrod@ucl.ac.uk)

Abstract

The NASA RPIF (Regional Planetary Imaging Facility) network of 9 US and 8 international centres were originally set-up in 1977 to "*maintain photographic and digital data as well as mission documentation and cartographic data. Each facility's general holding contains images and maps of planets and their satellites taken by solar system exploration spacecraft. These planetary image facilities are open to the public. The facilities are primarily reference centers for browsing, studying, and selecting lunar and planetary photographic and cartographic materials. Experienced staff can assist scientists, educators, students, media, and the public in ordering materials for their own use.*" In parallel, the NASA Planetary Data System (PDS) and ESA Planetary Science Archive (PSA) were set-up to distribute digital data initially on media such as CD-ROM and DVD but now entirely online. The UK NASA RPIF was the first RPIF to be established outside of the US, in 1980. In [1], the 3D-RPIF is described. Some example products derived using this equipment are illustrated here. In parallel, at MSSL a large linux cluster and associated RAID_based system has been created to act as a mirror PDS Imaging node so that huge numbers of rover imagery (from MER & MSL to begin with) and very high resolution (large size) data is available to users of the RPIF and a variety of EU-FP7 projects based at UCL.

1. Introduction

The 3D-RPIF was designed to provide access to specialist (and expensive) hardware and software for planetary geoscientists in the UK and on continental Europe [1]. An example showing the stereo workstation and the double-headed 30-inch Mac screens is shown in Figure 1. However, such manually intensive systems are limited in their throughput, especially if we are ever to be able to view Mars over the almost 50 years. Therefore a fully automated system is being developed to process all the images of Mars to begin with into an uniform geospatial set of co-ordinates.

Figure 1. 3D-RPIF stereo workstation hardware and double-headed 30-inch Mac displays to view full HiRise or HRSC images.

2. Methods

Manual measurements of perceived height from following a floating mark was the traditional method for many years to derive 3D from stereo images. Nowadays, the setup process for NASA MRO HiRISE and CTX stereo imagery is still very manually intensive but the heights are automatically obtained using image matching techniques. It typically takes around 3 days to generate a single HiRISE DTM and around one day for several CTX stereo-pairs. Although NASA release HiRISE DTMs created at the University of Arizona PDS node and at USGS, the production timescale is slow given the human resources available. Therefore, it was envisaged that other centers, such as the 3D-RPIF, could generate their own DTMs without fear of repeating other measurements. A different approach

is now being taken to exploit massive processing architectures (224 cores on 14 blades with 96GB/blade) and a large RAID system (currently 240Tb) to generate multi-threaded software to process the entire archive of Mars orbital images and Mars rover imagery. The system architecture is shown in Figure 2 below. This system has been commissioned and used in anger by the ESA GlobAlbedo project (http://GlobAlbedo.org) to generate a 150Tb set of BRDF/albedo surface products over 14 years of the Earth's land surface.

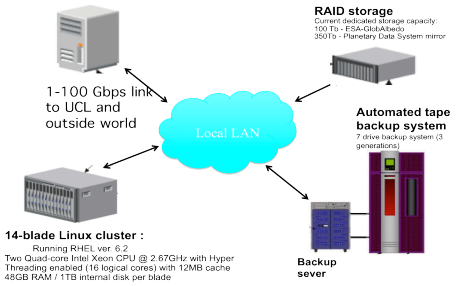

Figure 2. 3D-RPIF next generation hardware system components to automate the DTMs.

3. Sample 3D results

The existing 3D-RPIF hardware was employed by P. Grindrod to generate a set of 26 HiRISE and CTX DTMs which have been employed in a variety of peer review papers. These are shown in Figure 3.

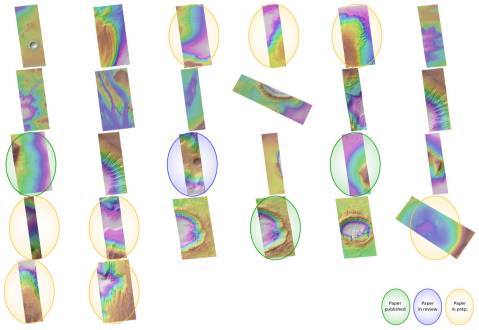

Figure 3. 26 HiRISE & 20 CTX DTMs created by Dr P. Grindrod using the exiting RPIF-3D system involving 7 collaborative teams in UK, IRL, FR.

4. Conclusions and Future Work

The existing stereo workstation 3D-RPIF has been employed to generate a substantial set of HiRise and CTX DTMs and orthorectified images. A large-scale linux cluster with substantial disk-space has been acquired to generate a geocoded set of all martian imagery acquired by NASA spacecraft since the early 1970s.

Acknowledgements

PMG is funded by the UK Space Agency (Aurora Fellowship grants ST/J002127/1; ST/J005215/1). JPM's work is partially supported by the EU-FP7 PRoViSG and PRoViDE project (European Commission Framework 7, grant agreement n° 312377) and STFC Consolidated grant ST/K000977/1.

References

[1] Muller, J.-P., Grindrod, P. (2010) UK NASA 3D-RPIF: A European facility for extracting, analysing and visualising DTMs from HiRISE and CTX. in EPSC 2010, Rome, Italy.