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HRSCview: a web-based data exploration system for the Mars Express HRSC instrument

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The High Resolution Stereo Camera (HRSC) on the ESA Mars Express spacecraft has been orbiting Mars since January 2004. By spring 2007 it had returned around 2 terabytes of image data, covering around 35% of the Martian surface in stereo and colour at a resolu-tion of 10-20 m/pixel. HRSCview provides a rapid means to explore these images up to their full resolu-tion with the data-subsetting, sub-sampling, stretching and compositing being carried out on-the-fly by the image server. It is a joint website of the Free University of Berlin and the German Aerospace Center (DLR).

The system operates by on-the-fly processing of the six HRSC level-4 image products: the map-projected ortho-rectified nadir pan-chromatic and four colour channels, and the stereo-derived DTM (digital terrain model). The user generates a request via the web-page for an image with several parameters: the centre of the view in surface coordinates, the image resolution in metres/pixel, the image dimensions, and one of several colour modes. If there is HRSC coverage at the given location, the necessary segments are extracted from the full orbit images, resampled to the required resolution, and composited according to the user's choice. In all modes the nadir channel, which has the highest resolu-tion, is included in the composite so that the maximum detail is always retained. The images are stretched ac-cording to the current view: this applies to the eleva-tion colour scale, as well as the nadir brightness and the colour channels. There are modes for raw colour, stretched colour, enhanced colour (exaggerated colour differences), and a synthetic 'Mars-like' colour stretch. A colour ratio mode is given as an alternative way to examine colour differences (R=IR/R, G=R/G and B=G/B). The final image is packaged as a JPEG file and returned to the user over the web. Each request requires approximately 1 second to process.

A link is provided from each view to a data product page, where header items describing the full map-projected science data product are displayed, and a direct link to the archived data products on the ESA Planetary Science Archive (PSA) is provided. At pre-sent the majority of the elevation composites are de-rived from the HRSC Preliminary 200m DTMs gener-ated at the German Aerospace Center (DLR), which will not be available as separately downloadable data products. These DTMs are being progressively super-seded by systematically generated higher resolution archival DTMs, also from DLR, which will become available for download through the PSA, and be simi-larly accessible via HRSCview. At the time of writing this abstract (May 2007), four such high resolution DTMs are available for download via the HRSCview data product pages (for images from orbits 0572, 0905, 1004, and 2039).