CTX and HiRISE 3D mapping using cloud computing

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14 March 2017

Version: 31.03.2017

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The iMars project has received funding from the European Union's Seventh Framework programme for research, technological development and demonstration under grant agreement no. 607379

Overview

- Why process more DTMs of Mars?
- CASP-GO Auto-DTM processing chain
- DTM production on MSSL's Imaging Cluster
- Batch CTX DTM processing using Microsoft® Azure® cloud computing resources
- Global coverage of CTX DTM products
- Examples of processed CTX DTMs
- Examples of processed HiRISE DTMs

Why process more DTMs of Mars

- Digital Terrain Models (DTMs) tell us about how the Martian surface was formed
- Specifically, DTMs allow us to “read into the past” physical processes such as meteoritic impacts, volcanic lava flows, the action of water and dust and the motion of dunes.
- HRSC DTMs (from 50-150m/gridpoint) allow us to obtain a synoptic view of the surface
- CTX DTMs (≈18m/gridpoint) allow us to look at more of the details of the physical processes
- HiRISE DTMs (≈0.75m) and their time evolution) allow us to map the changes as they occur

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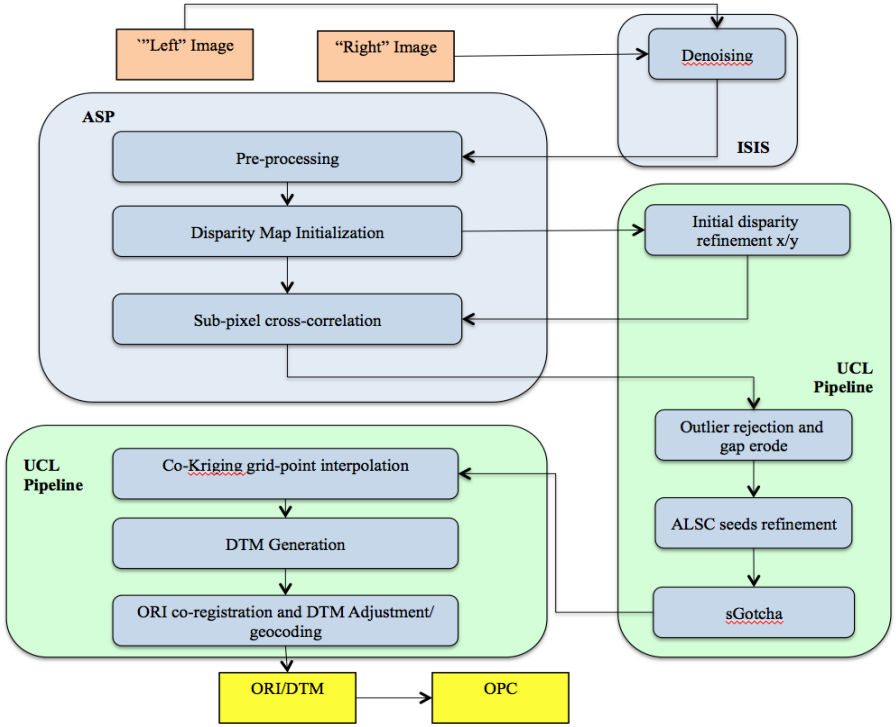
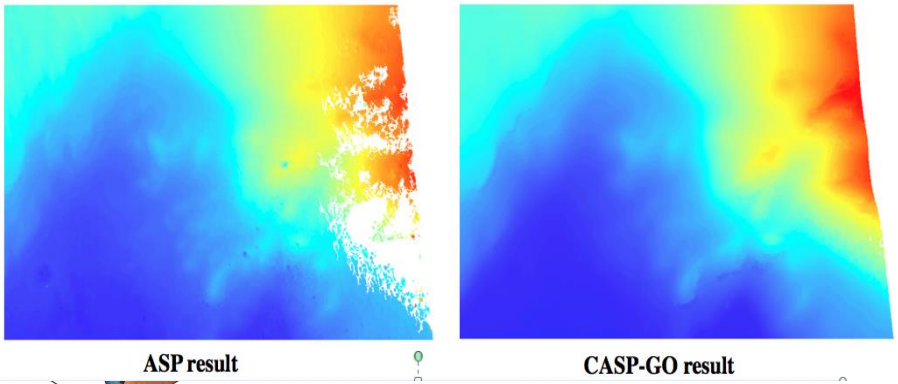
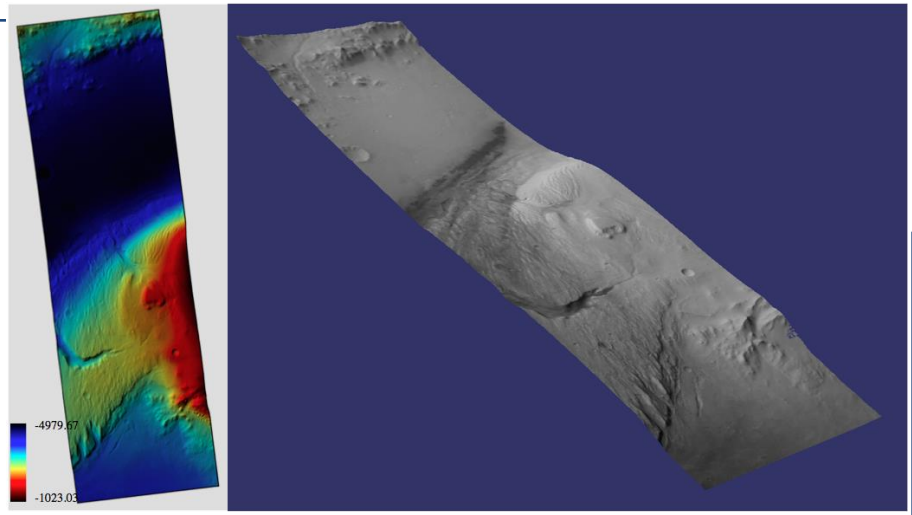
CASP-GO Auto-DTM processing chain







Co-registered Ames Stereo Pipeline with Gotcha refinement and Optimization (CASP-GO) has improved performance compared to the original open source NASA Ames Stereo Pipeline system:

(a) Co-registered geo-spatial coordinates wrt HRSC (and MOLA) data;

(b) Improved DTM completeness for unmatched areas;

(c) Reduced DTM artefacts;

(d) Improved DTM accuracy;

(e) Fully documented uncertainty value for every interpolated gridpoint

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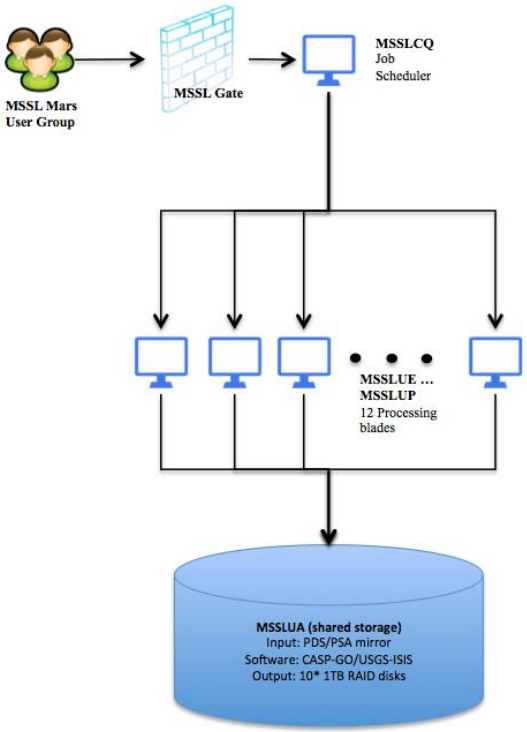
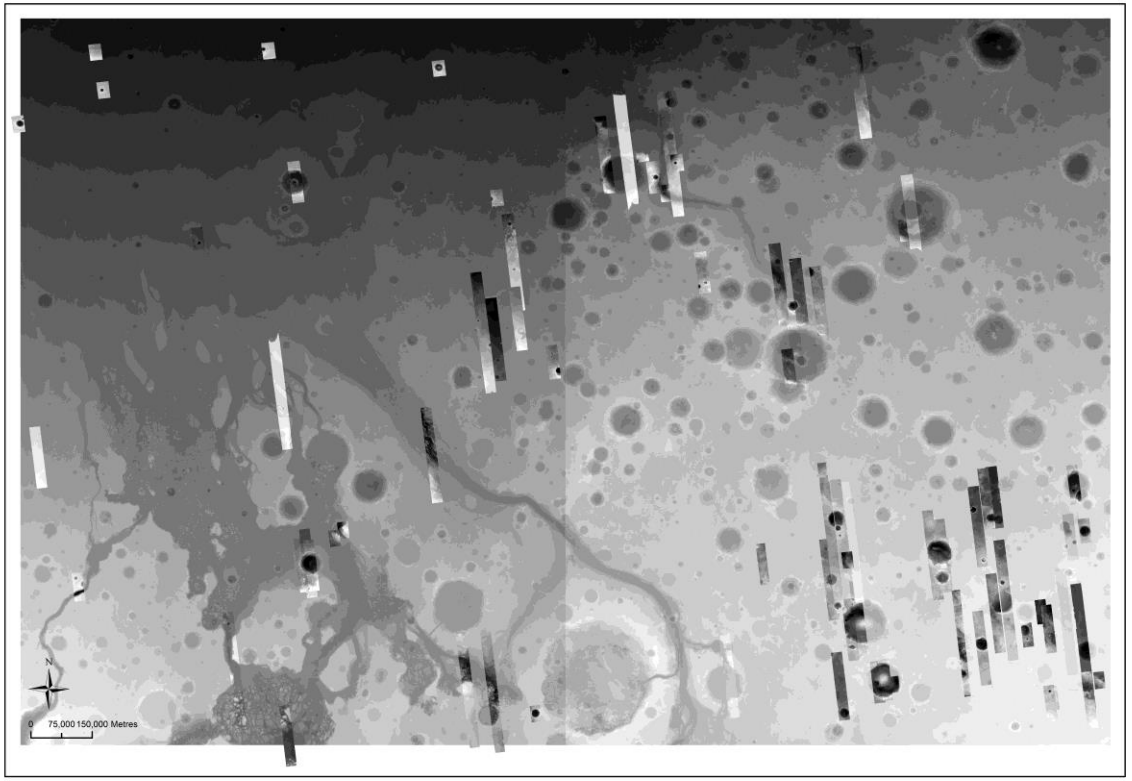
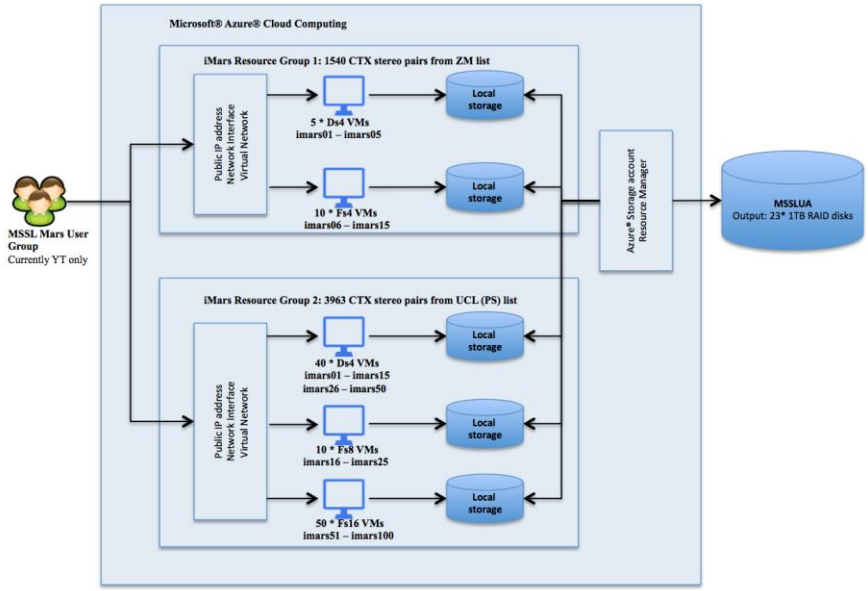
DTM production on MSSL's Imaging Cluster

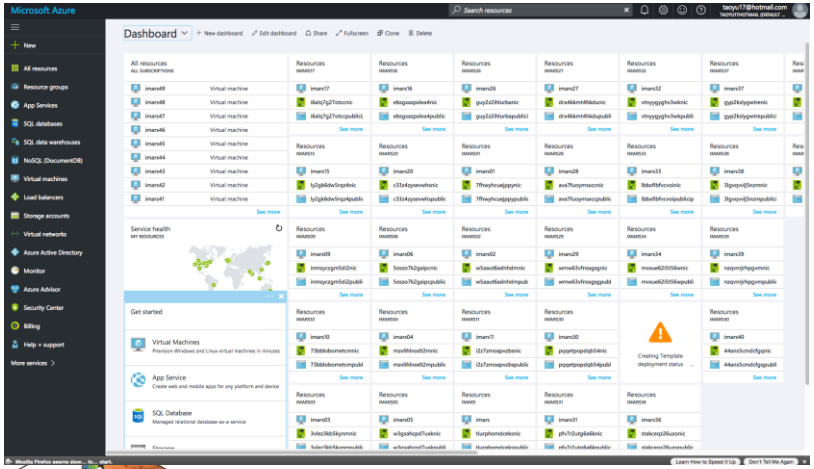


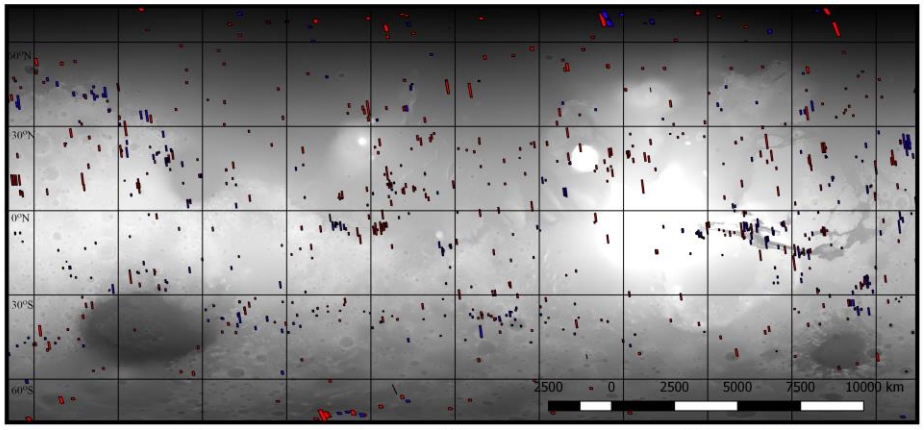


- Initial experiments based on the CTX & HiRISE stereo pairs for the 3 Mars rover sites.
- CASP-GO development based on QA from the 3 rover site data and then ported onto the MSSL's imaging processing blades for batch processing of MC11 CTX DTMs.
- A total of 117 CTX stereo pairs were processed for MC11 E (78) &W (39) on MSSL's imaging cluster.

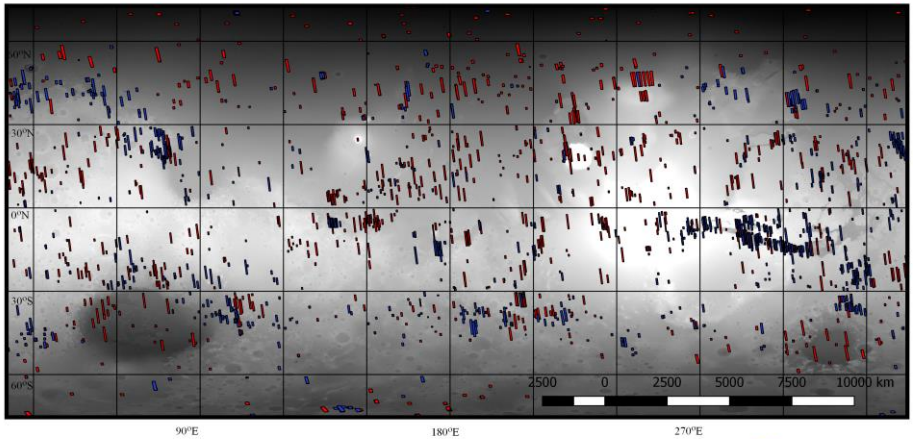
Batch CTX DTM processing using Microsoft® Azure® cloud computing resources







Coverage of processed CTX stereo pairs (total 1540 from NASA list)



Coverage of (in-processing) CTX stereo pairs (total 3963 from UCL-P. Sidiropoulos list)

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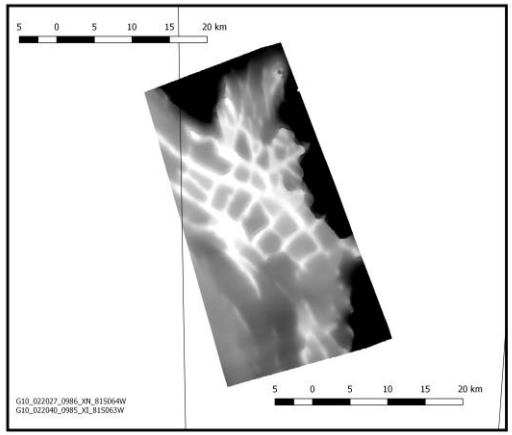
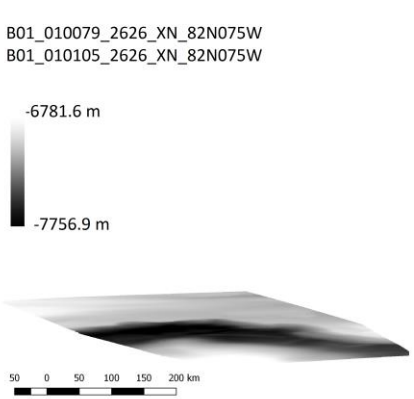
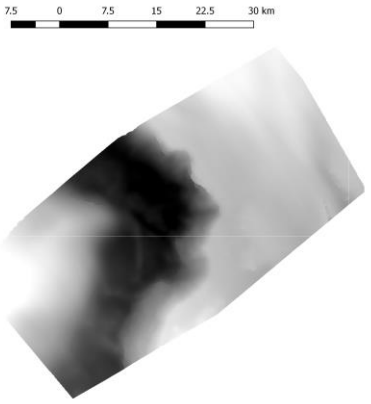
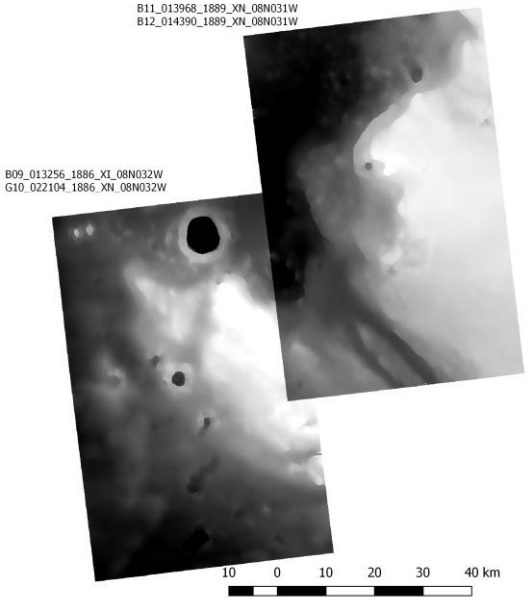
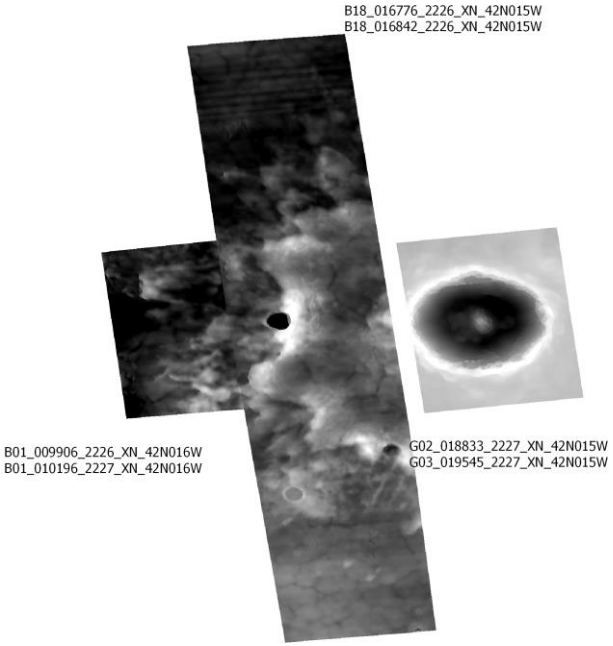
Examples of CASP-GO processed CTX DTMs

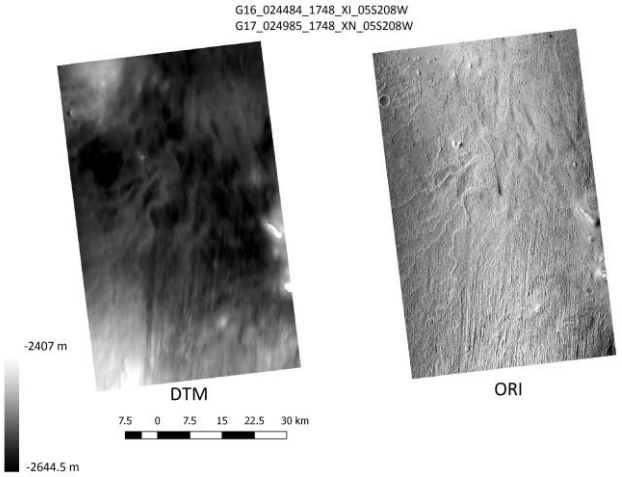












QGIS display

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Examples of CASP-GO processed HiRISE DTMs