Equatorial Progress

All equatorial regions have run through our automated code. During this process, the code has been completely re-written, twice. Therefore, we are only showing a part of this region that has been run through with our latest code, and show another part on our large poster. The region shown here spans 4 of our 480 regions.

South Polar Progress

Large Image: This shows 4 of the 64 equatorial regions, spanning 281.25° - 303.75°E; ~52° - 75°S approximately 0.82% the surface area of Mars.

Table: This shows the average scores of the six equatorial regions with the four means that the scores are controlled separately, our group solution for the two means. This table is created to be used in the next release.

Mosaic Order

Mosaic order is initially set in the image selection step. Our code assigns a score from 0 to 1 based on how far the parameters are from what we set as the ideal: Best pixel scale, 0° emission angle, 70° incidence angle, and L &= 90° (northern spring).

The scores are then summed for each image and initial order is set by the score order.

Equatorial Progress

Good Control Point Coverage

Our iterative automated process emphasizes the need for good spatial coverage of control points across all images. This is accomplished by progressively finer automated seeding of points, but on progressively fewer images, as needed, down to a minimum at which time it is faster to add a few remaining points manually (if needed, if possible).

Near ~65°S is the worst current coverage with some of the largest seasonal differences at CTX scale (e.g., dust devil tracks) with few persistent features. Our code does have trouble in these areas such that manual effort is needed more here than elsewhere. However, the automated steps significantly reduce the needed manual effort, even in these areas.

Low Residuals

JIGSAW solves the control network’s points for the best solution, modifying spacecraft and camera data. Residuals from that solution are always present. Our code applies a “skinner” that removes the largest residual points, tries to re-match them with different parameters, and re-runs JIGSAW. It repeats, again, skimming the largest residuals (or removing those points if they were already tried the last iteration). The threshold at which our code stops and considers the network finalized is when the 99.99% percentile of the residuals of the control points is <1 pixel.

Equatorial Progress

Workflow

This flow chart illustrates a summary of our Python workflow, interfacing with ISIS3 tools.

Updated SPICE Data

Upon completion of a “group” solution, updated SPICE data can be output using ISIS3’s SPICE writer and CKWRITER. We will provide updated SPICE data for all images covering all areas in published regions.

Future Mars Work

We plan to fully control all available, usable CTX data. Such a task is large, even with our mostly automated process, such that we are pursuing potential funding this must be the sources. This work complements the Caltech group’s seamless global mosaics and does not compete.

Future Work on Other Bodies

Our workflow was developed specifically for CTX data, which are taken under almost ideal conditions: Similar times of day, a fairly stable image, similar pixel scales, similar emission angle, and same wavelength. Modifying our code to operate with data that do not meet those constraints is also an area we are pursuing, with promising initial, very preliminary results for MESSENGER data of Mercury and Cassini data of Saturn’s moon.

References & Acknowledgments


This work was funded by internal grant awards to the authors by Southwest Research Institute. Acknowledgments: We acknowledge the instrument built by Malin Space Science Systems, NASA-JPL for managing the Context Camera Investigation on board the Mars Reconnaissance Orbiter, and ISGS for providing the data available, and USGS for creating and maintaining SPICE. We also thank K. Edmundson, L. Weller, and T. Hare for ISIS3 assistance.