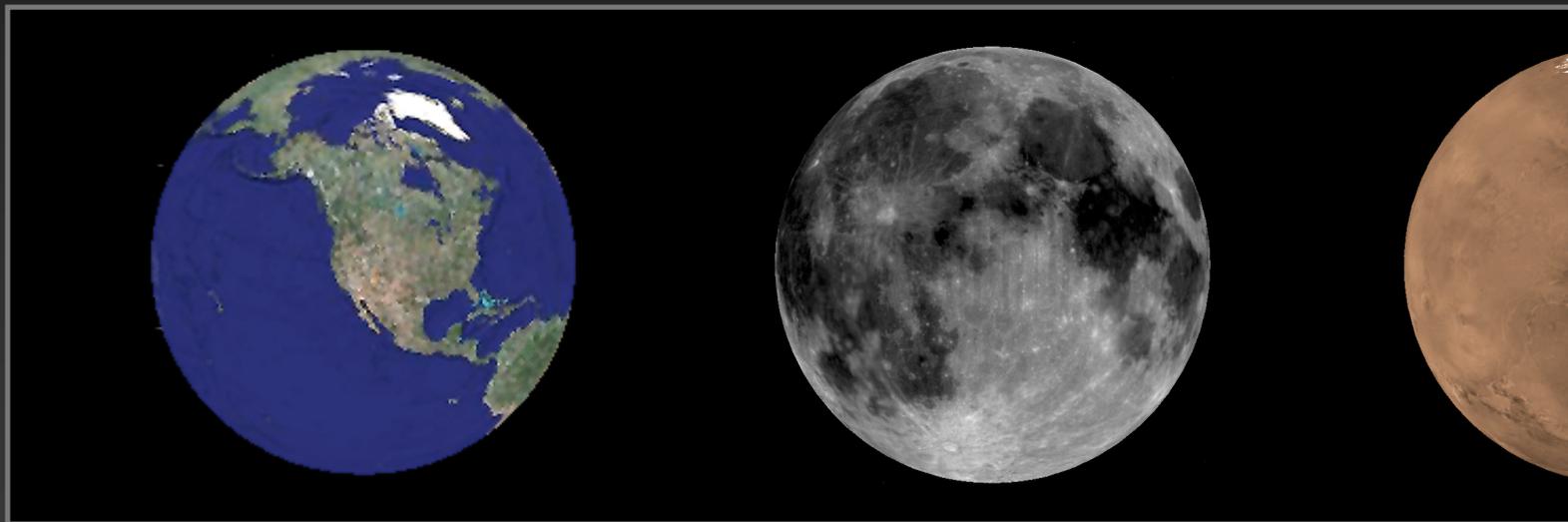


# Automated Stereo Processing Apollo Metric Camera Images



Michael Broxton

construction using NASA/JSC/ASU scans of

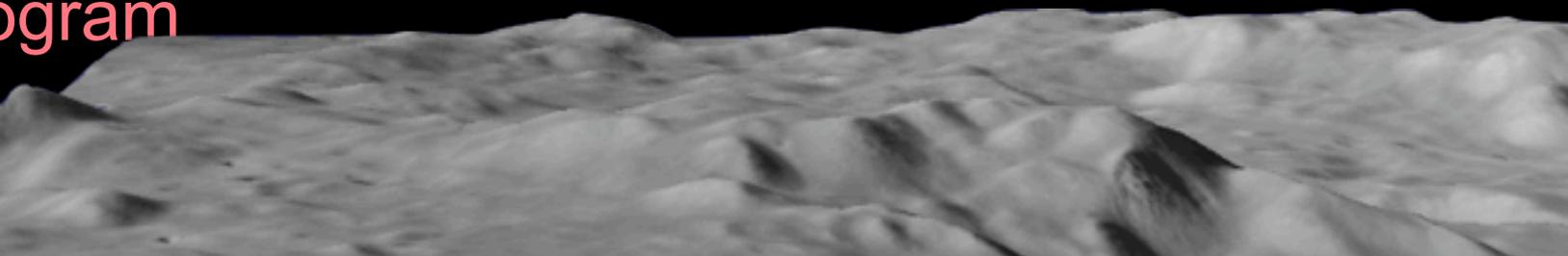
Apollo Metric Camera Frames

Proof of concept that a large, systematic construction of 3D terrain in the “Apollo Zone” is possible.

Carried out at Ames Research Center using the NASA Ames Stereo Pipeline and USGS ISIS software packages

Work is funded by NASA’s Lunar Mapping and Modeling Program (LMMP) & NASA’s LASER program

Geo



m: Given multiple images from different viewing angles, compute a large number of stereo pairs of reasonable quality **intervention**.

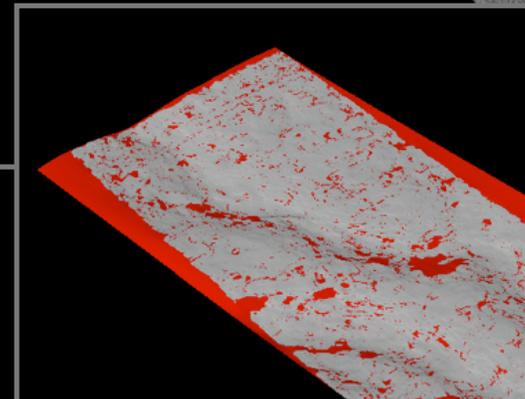
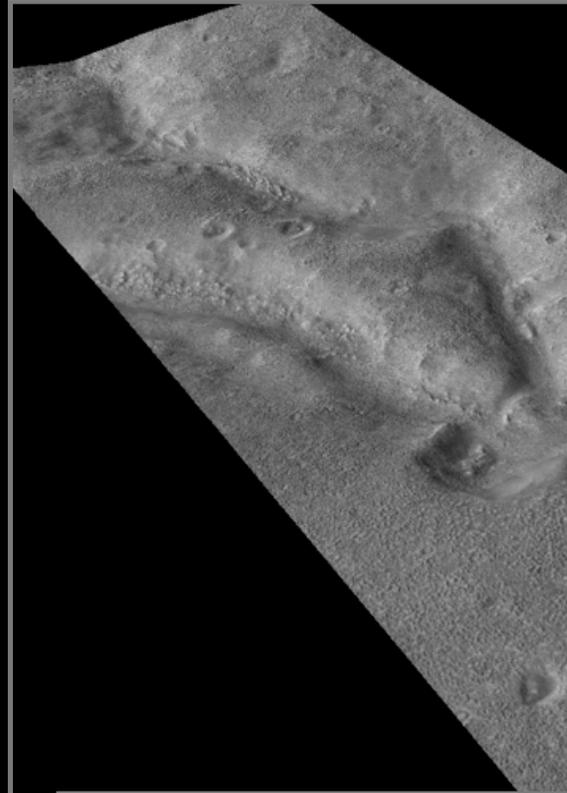
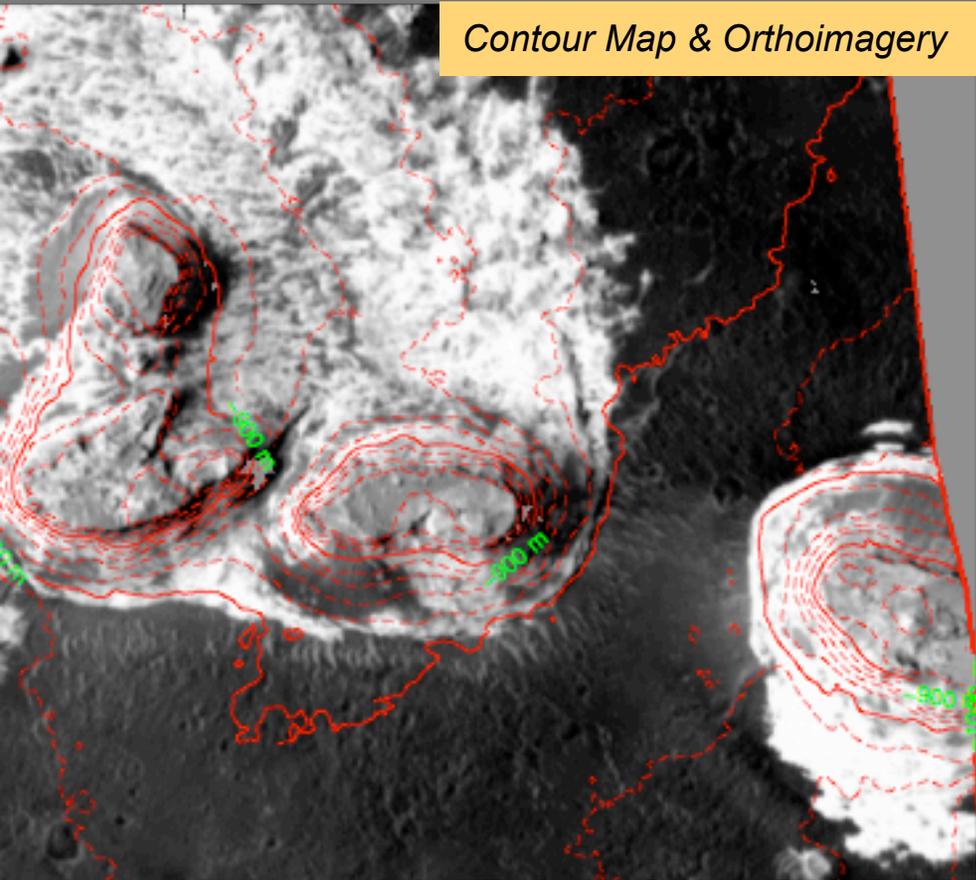
international partners (ESA and JAXA) have/are also developed automated DEM generation pipelines.

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Stereo Pipeline is built on the open source **NASA Vision** **ISIS** image processing toolkits.

Correlation is carried out using an **area-based correlation** an affine-adaptive correlation window the ability to learn the statistics of image noise sub-pixel accuracy

*Contour Map & Orthoimagery*

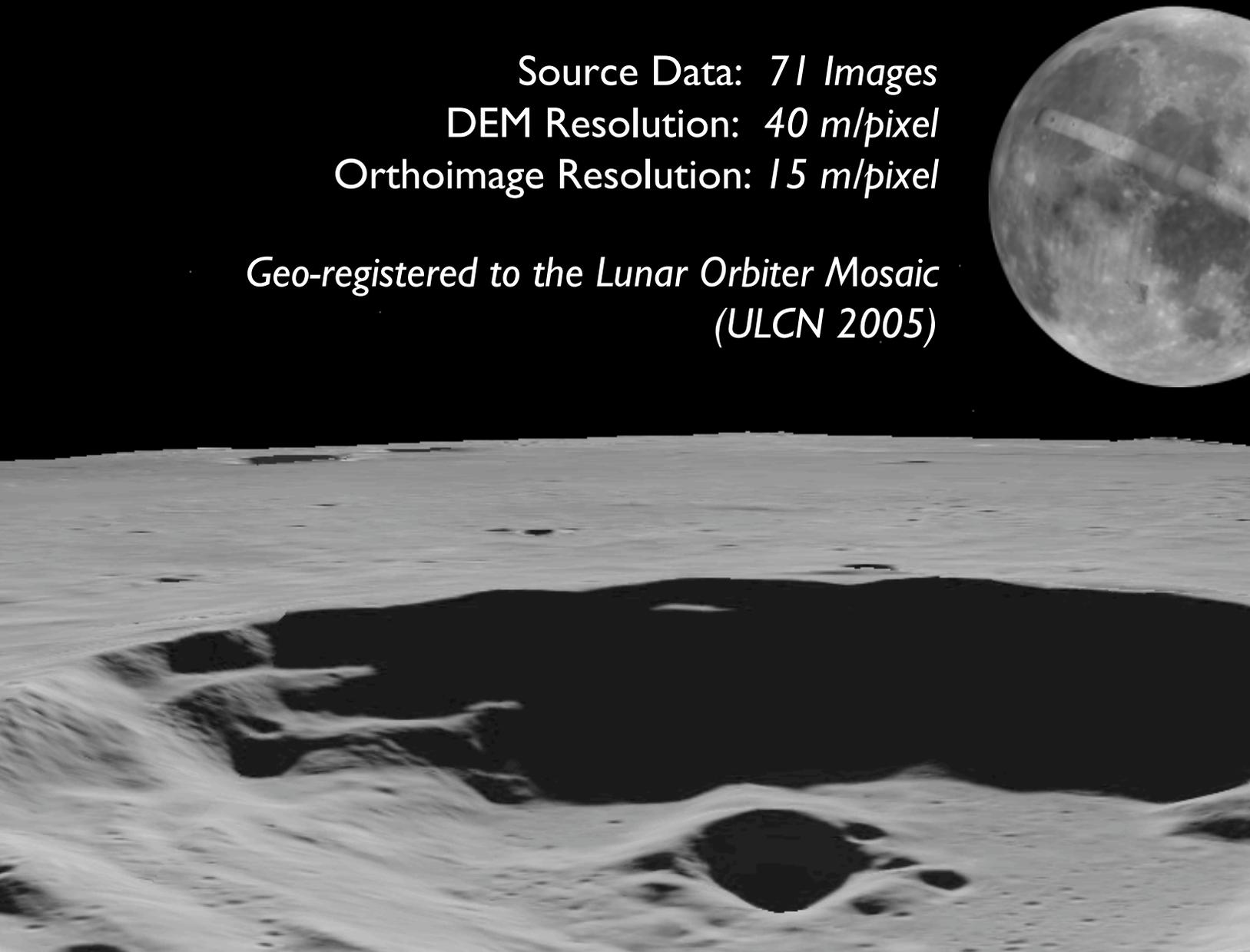


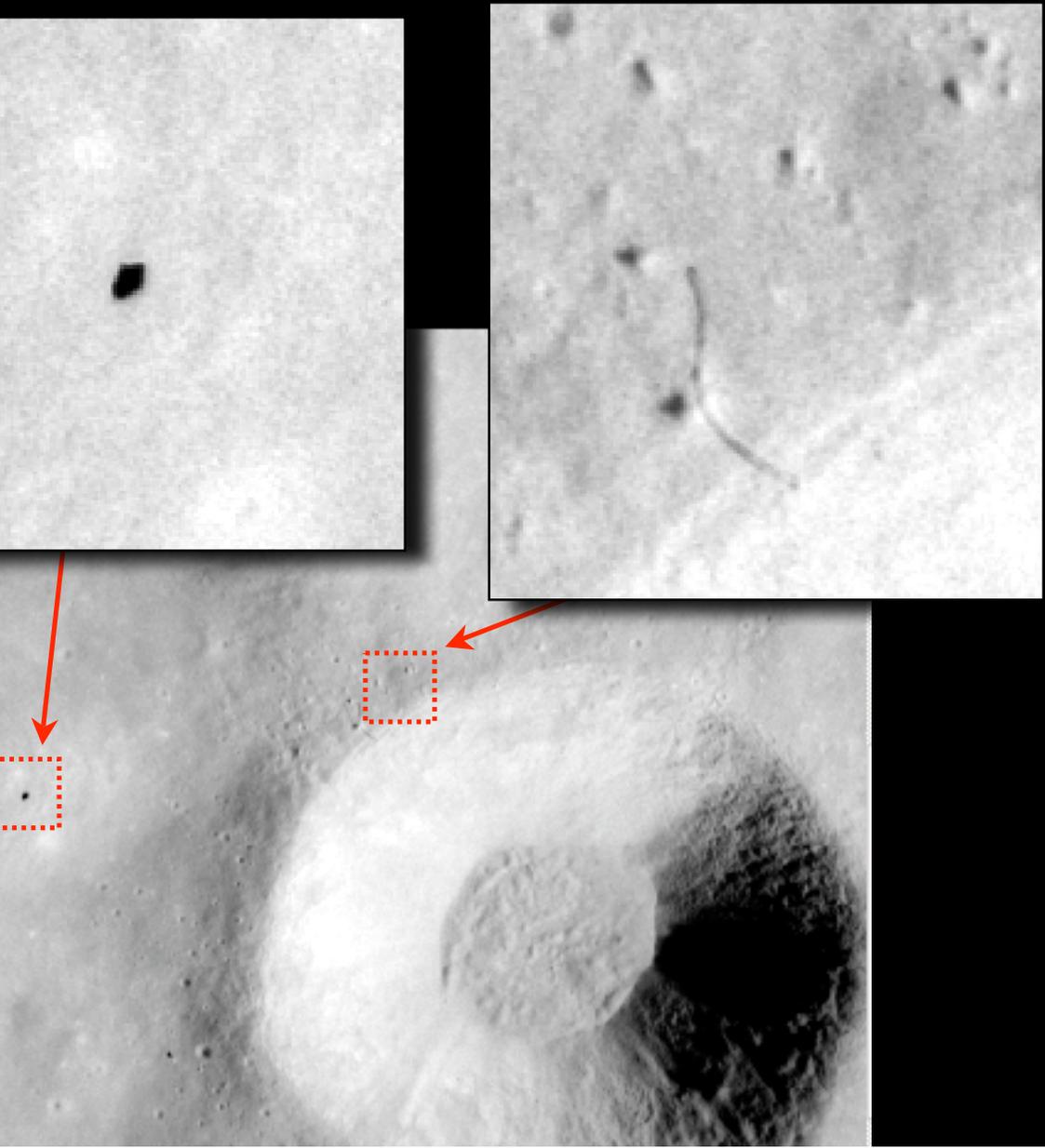
*VRML Model*



Source Data: *71 Images*  
DEM Resolution: *40 m/pixel*  
Orthoimage Resolution: *15 m/pixel*

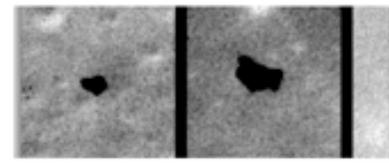
*Geo-registered to the Lunar Orbiter Mosaic  
(ULCN 2005)*



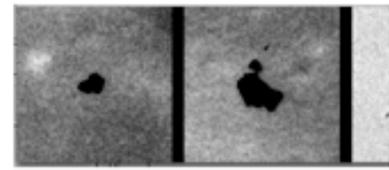


- The occasion of the Apollo scan stereo correlation
- Some of these move **across**

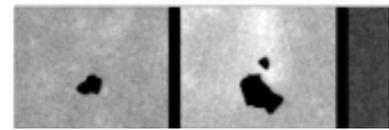
AS15-M-0135



AS15-M-0329



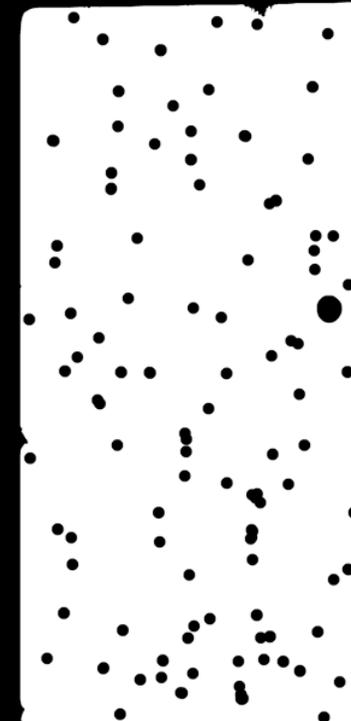
AS15-M-0370



we attempted to mitigate this effect using two techniques:

**Image-to-Image Comparison:** using the **dense pixel-wise correlation** we get from stereo correlation, we are able to *warp* two images to match each other pixel-for-pixel almost exactly. The **difference of the images** is the dust (see below)!

Difference Image (crop) for  
AS15-M-1134 (warped) &  
AS15-M-1135



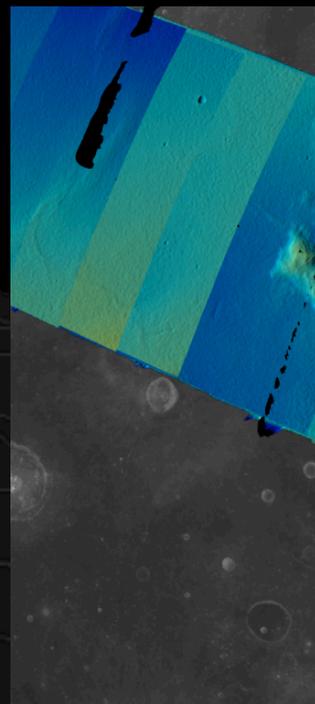
# ing Apollo SPICE Kernels

position and pose in “historical” SPICE  
provided by ASU provide a good initial solution,  
require refinement.

erate new Apollo Metric Camera tie-points into  
05 - or - tie these points to the preliminary  
ontrol network in late 2009.

## ating Bundle Adjustment

te tie-point matching using the **SIFT** and **SURF**  
s.



## Release:

are currently working with ASU and the USGS to assess the  
construction.

ch, the raw DEM data is not available for download at this  
time. We will make it available soon.

## Acknowledgements:

Arizona State University (Mark Robinson, Sam Lawrence, Ernest Bowler,  
John, & Melissa Bunte)

Landscape Mapping & Modeling Program (LMMP) (Ray French & Mark

CEP D (B A L)

# Questions?

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