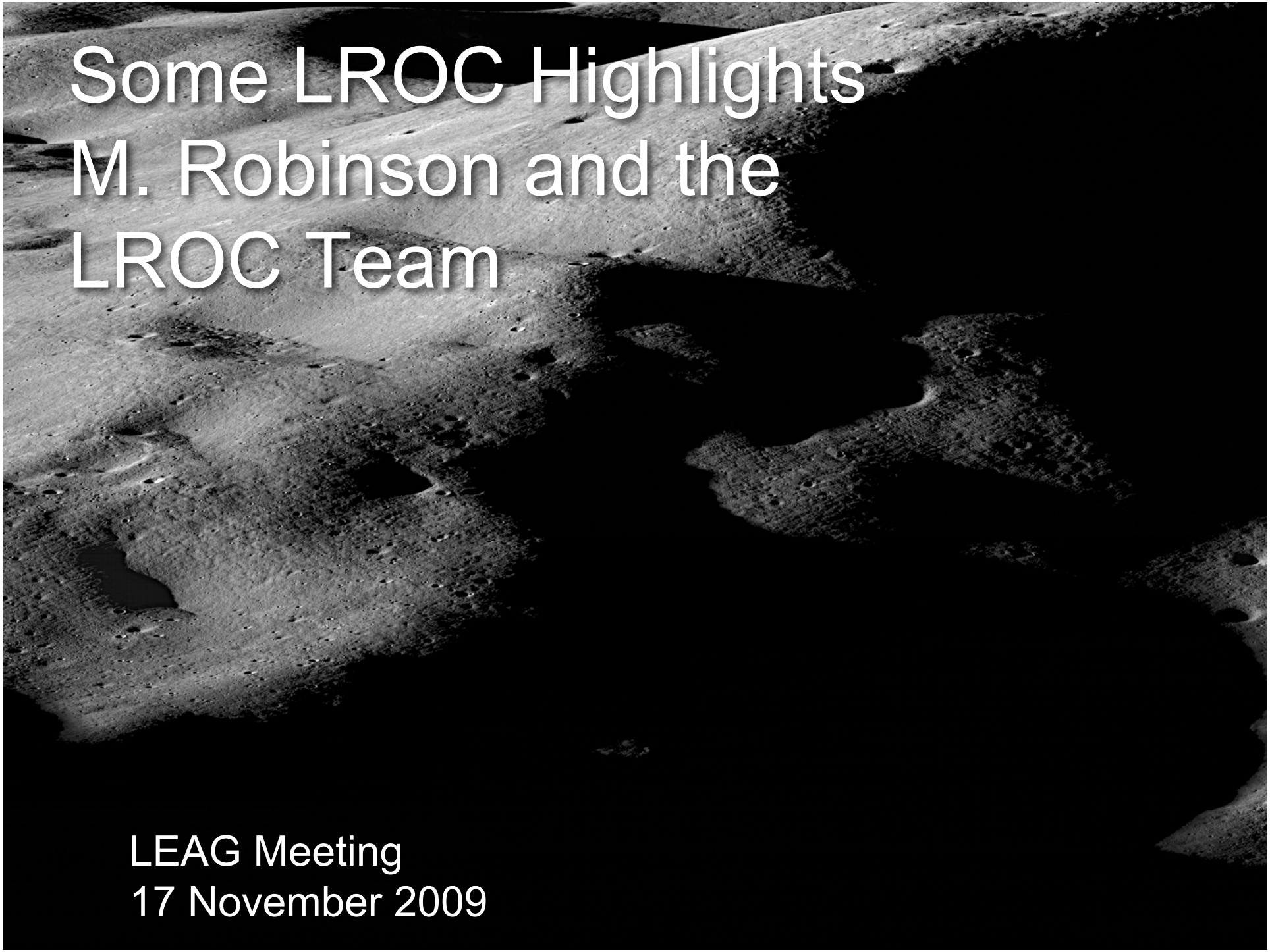


Some LROC Highlights

M. Robinson and the
LROC Team

LEAG Meeting
17 November 2009

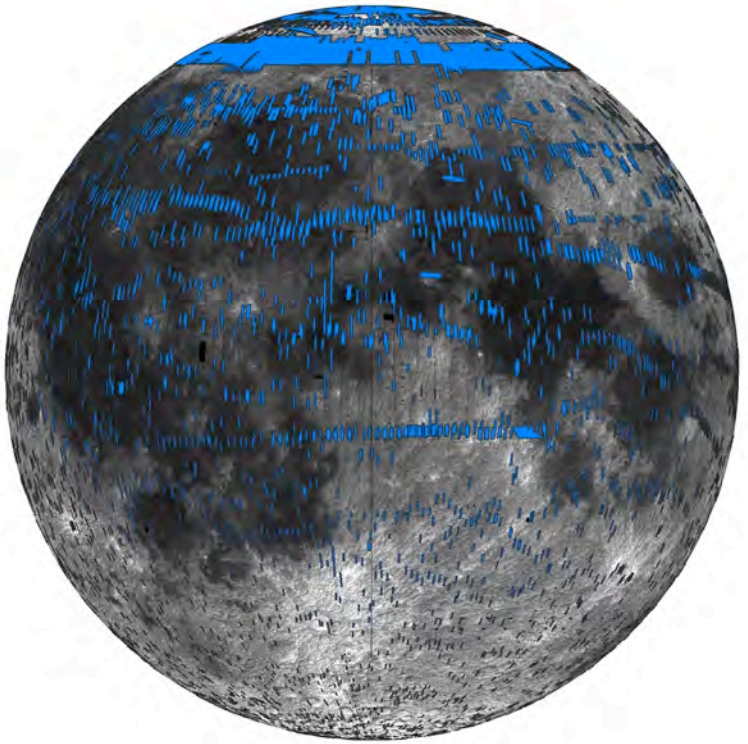
LRO ESMD Phase

- Commissioning phase: 3 months
  - Spacecraft and instrument check out
  - Low energy elliptical 30 x 216 km, periapse at south pole
- Nominal Mission: 12 months
  - Near-circular 50 x 50 km orbit
  - Decays to 35 x 65 km in one month
  - Re-initialize every month (11 m/sec delta V)
- ESMD Datasets
  - High-resolution 50 cm/pixel images of 1000s of targeted locations
  - Map poles at meter scales
  - Collect stereo NAC pairs for high value targets
  - Image entire Moon at 100-400 m in Visible and UV
  - Determine illumination conditions of the poles

We have come a long way!

Commissioning Phase NACs

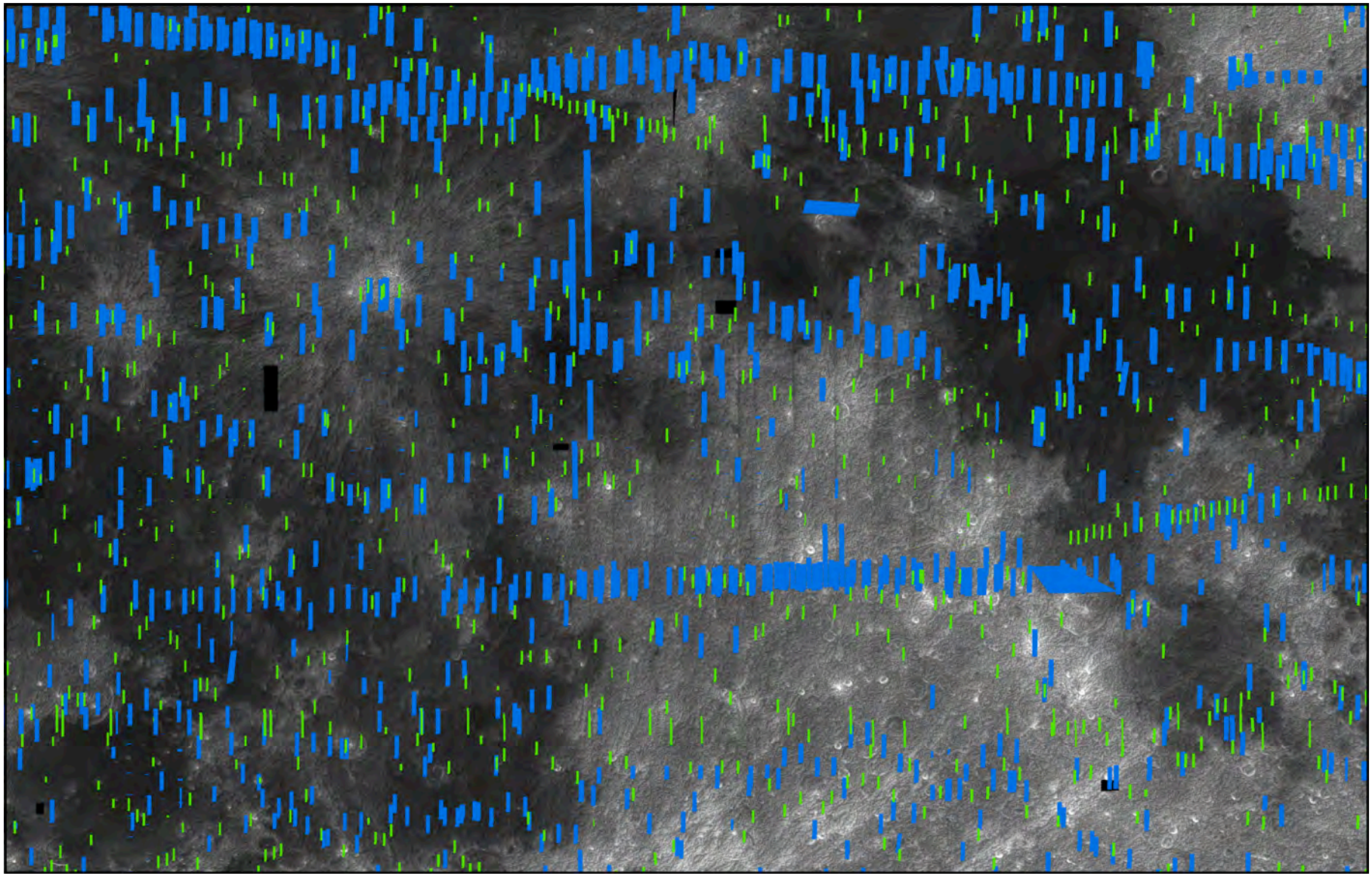
- Resolution 2 m/p at N. Pole and 0.6 m/p at S. Pole
- Covered 7.8% of lunar surface
- North Pole collar mosaic
- Apollo Pan coverage

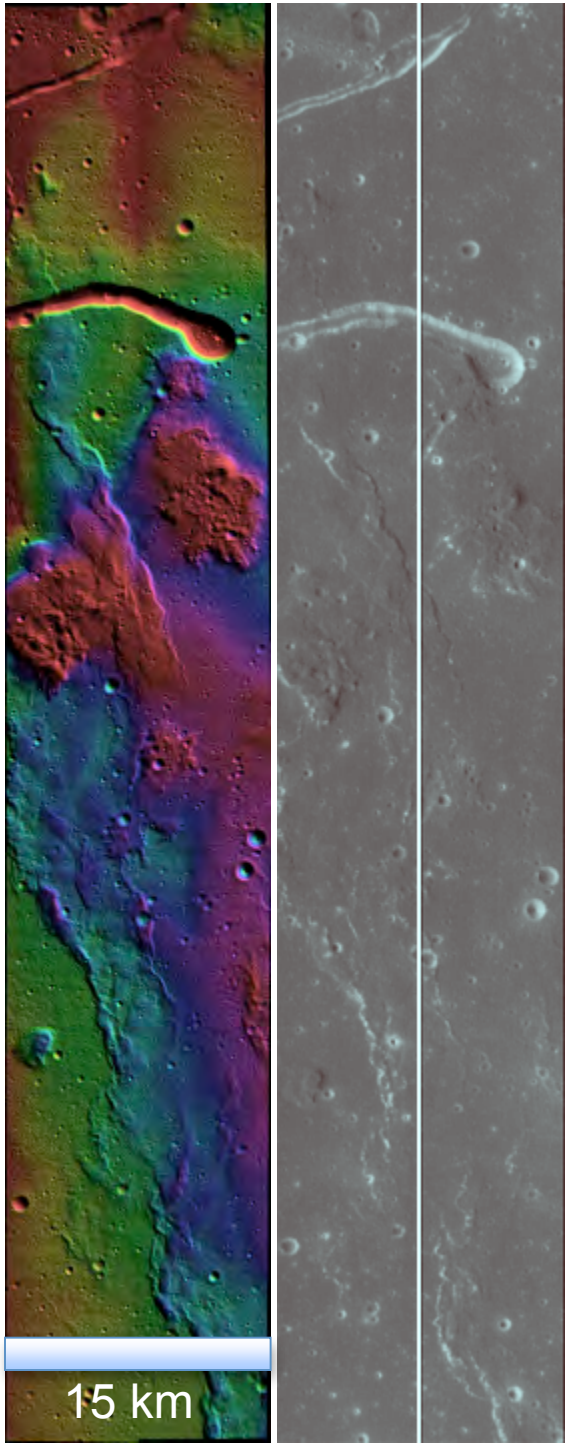


Commissioning: 16,292 NACs of the illuminated Moon, 990 orbits
Mapping: 20,000 NACs of the illuminated Moon, 780 orbits

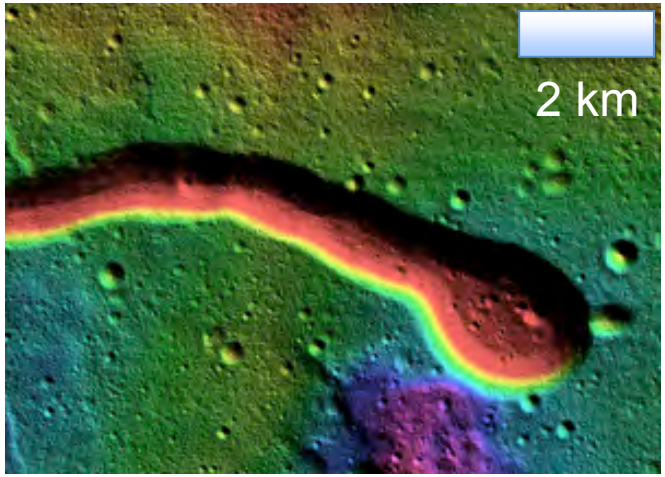
Nearside: 45W to 45E, 30N to 30S

NACs: Commissioning (blue) and Nominal (green)

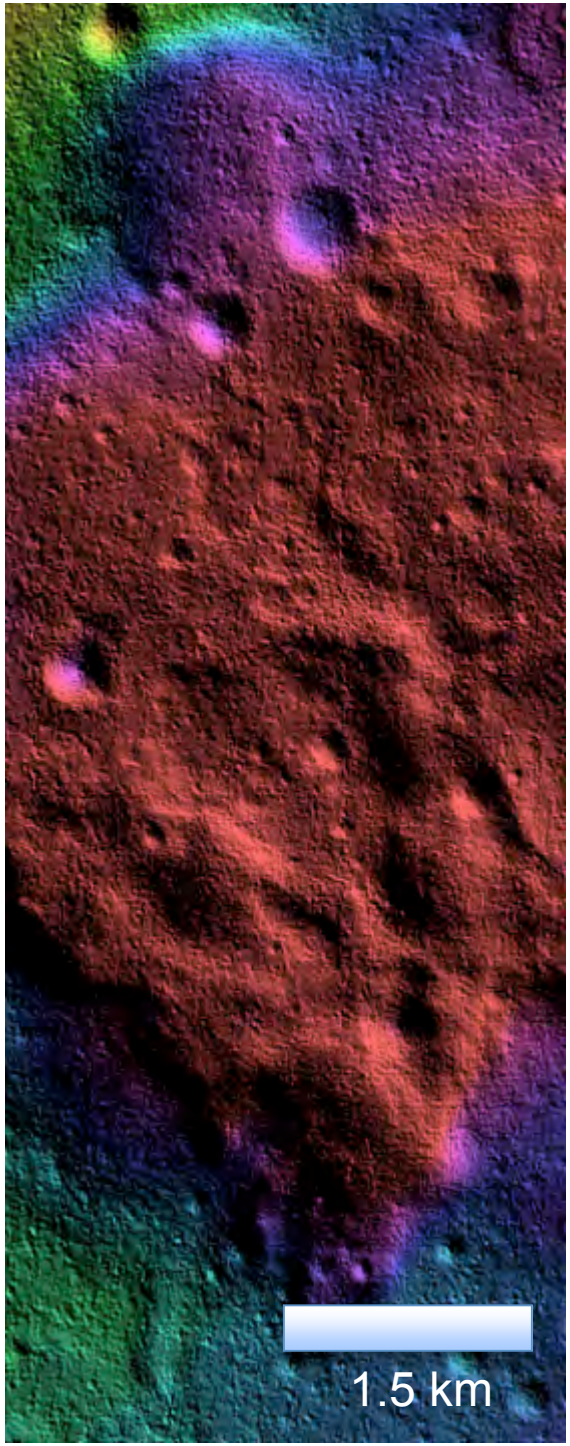


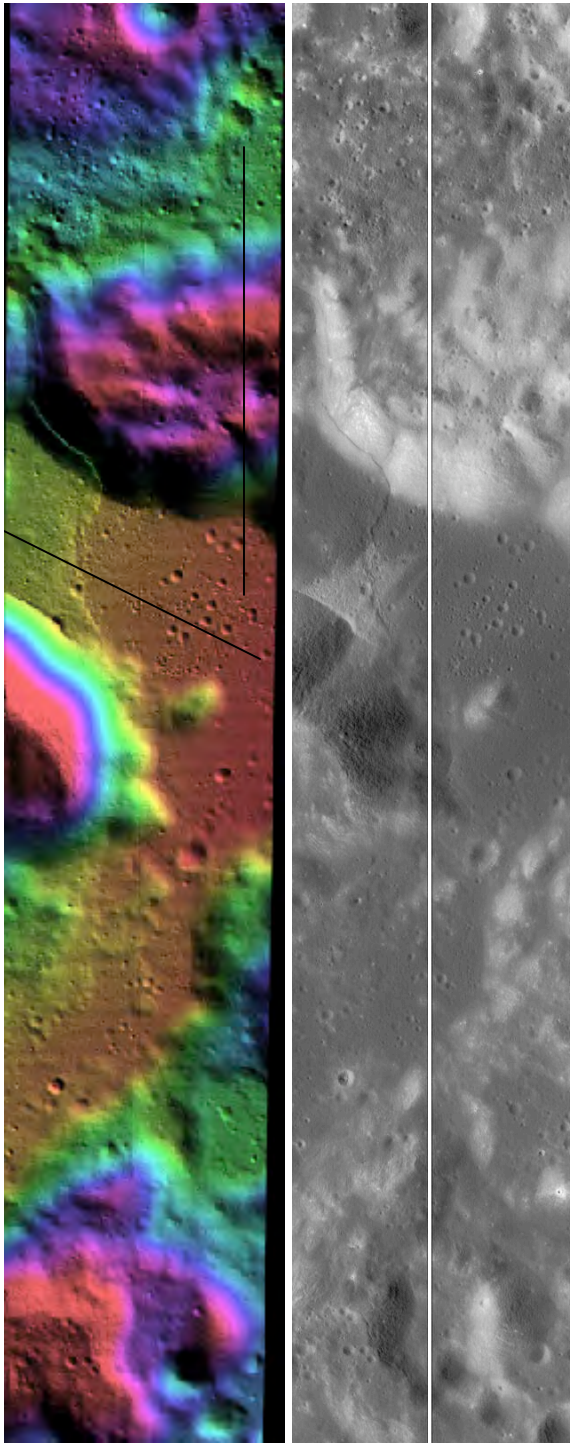


Marius Hills
Preliminary DEM

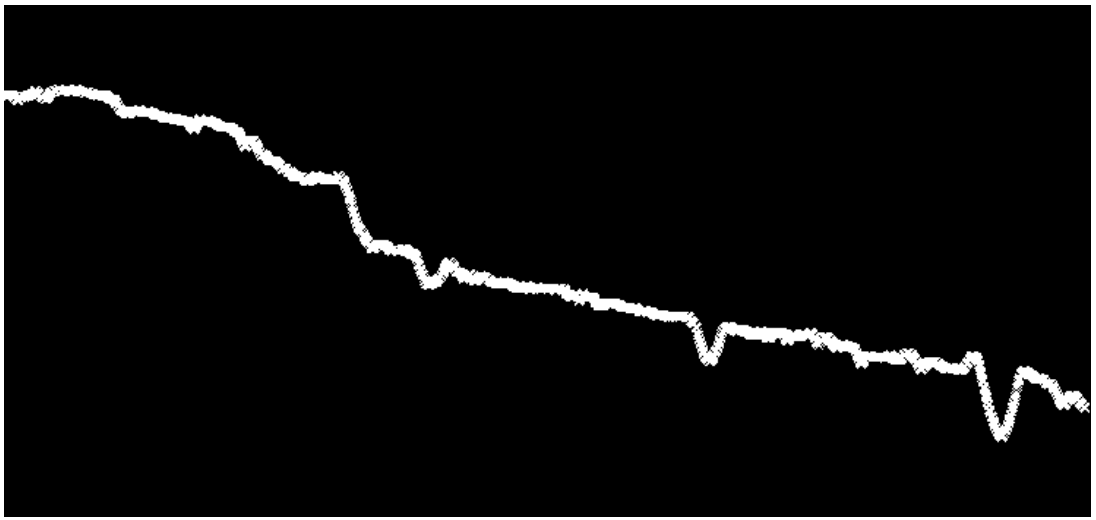


Region of proposed basaltic and silicic volcanic centers

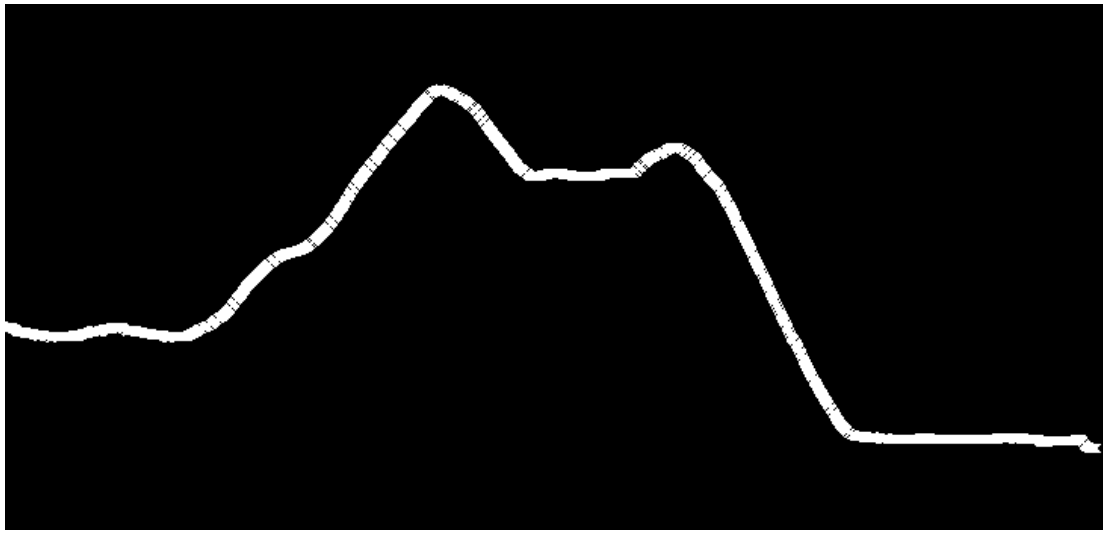




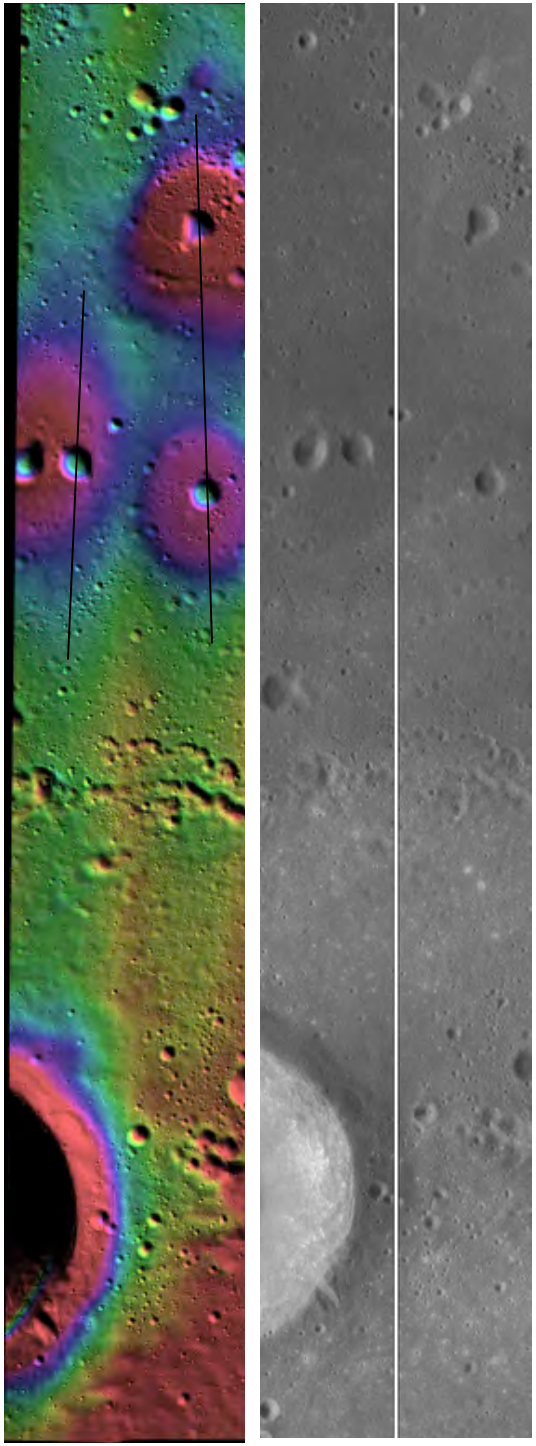
Taurus-Littrow Region



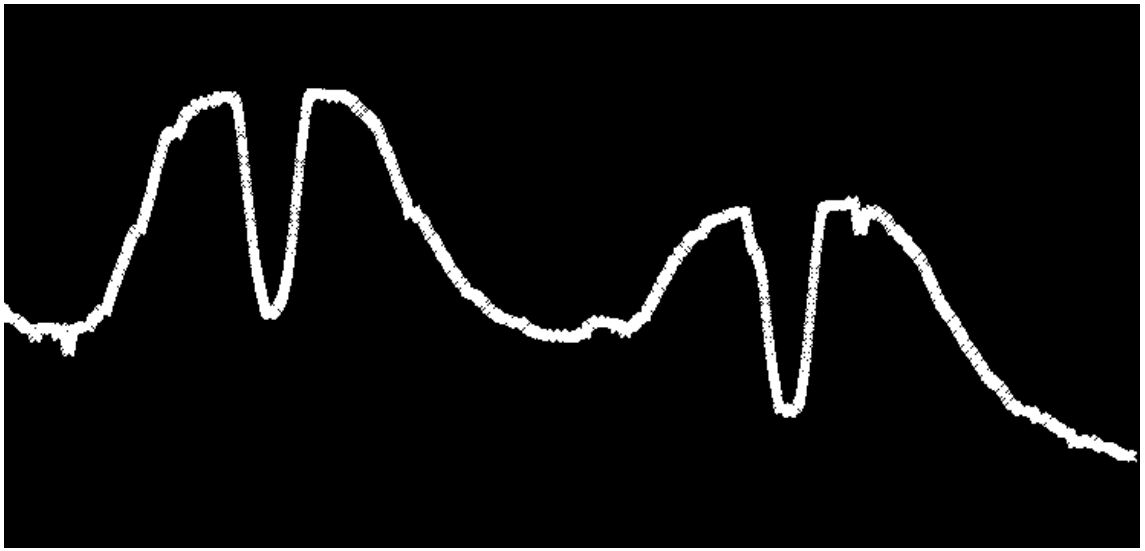
Lee-Lincoln Scarp

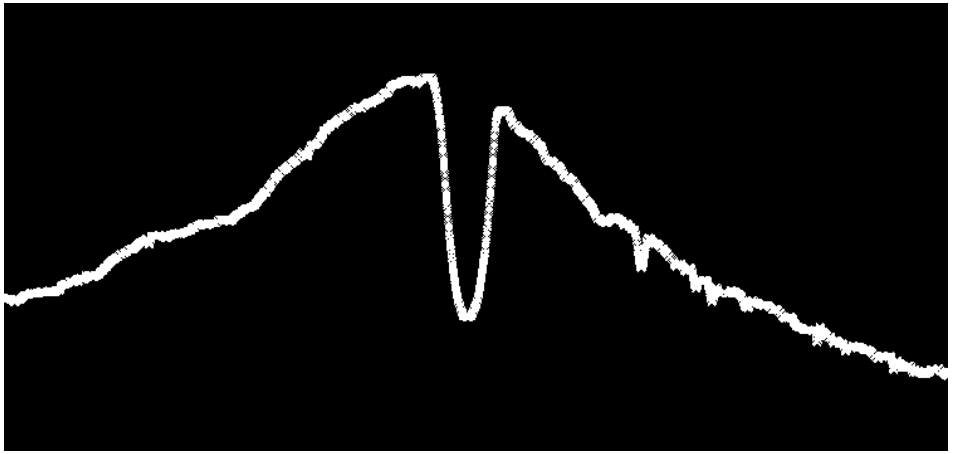


North Massif

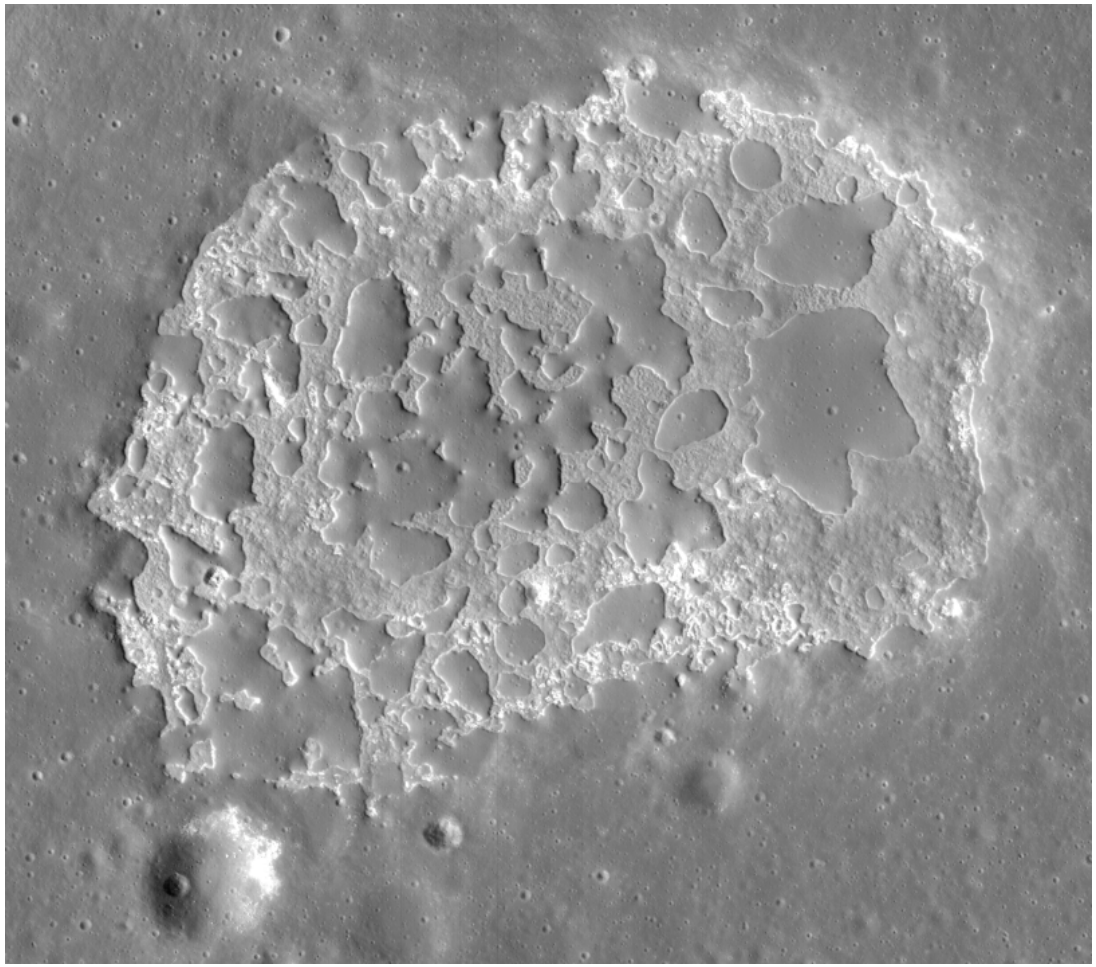


Hortensius Domes





Ina D Feature



3-km across the straight part of the “D”

NAC: M104483493 L & R

1.4 m/px Comm Phase

55° incidence angle

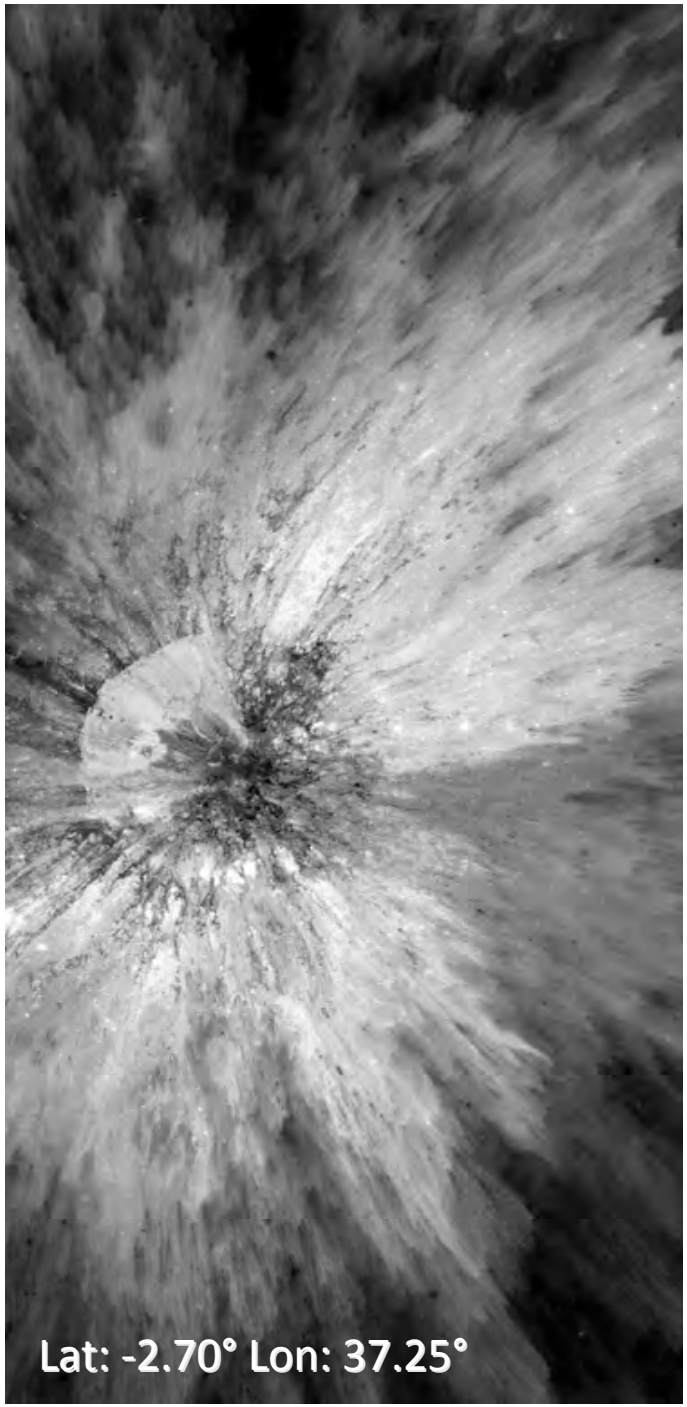
Four main “Terrains”

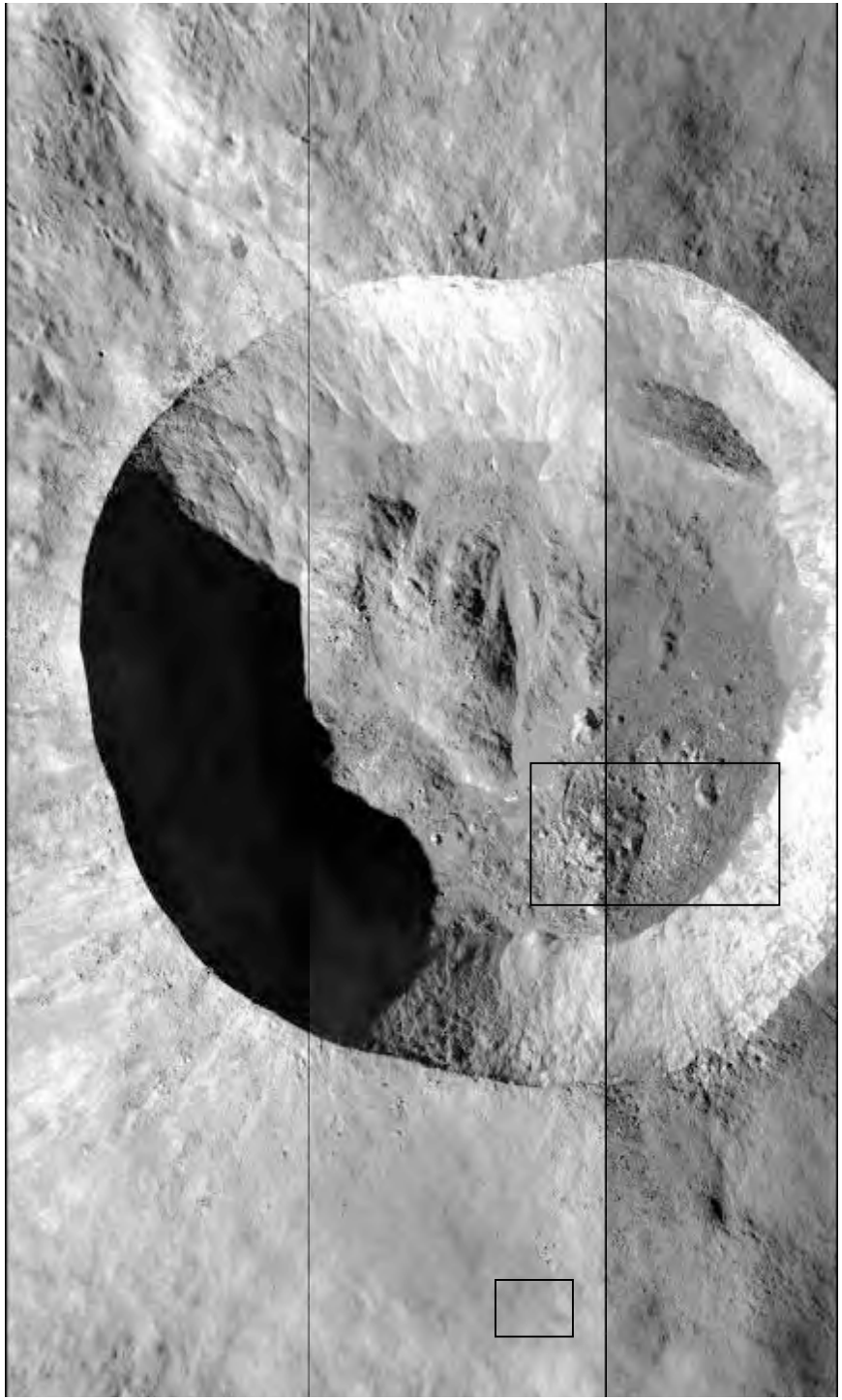
1) Surrounding mare
2) Isolated PRFs
3) Rough low material
4) High reflectance material

Fresh Craters

- Many details observed on fresh craters illustrate the processes and complexities of impact cratering
  - Melt ponds
  - Melt flows
  - Distribution of boulders
  - Ejecta patterns
- We can see evidence that boulders landed after main ejecta emplacement, indicating a relatively late, low-velocity excavation phase
  - and that they must have been traveling at a low enough velocity that they did not form a crater and remained intact.

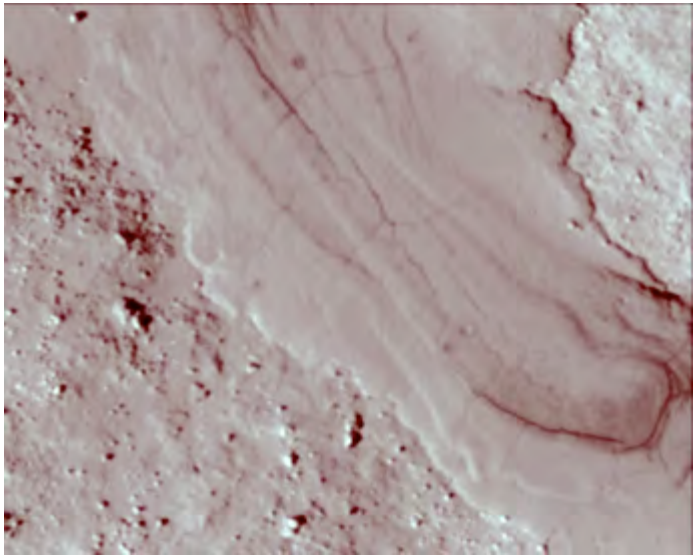
700 m diameter crater





Fresh Crater Impact-melt Features: Giordano Bruno Crater (22 km diam)

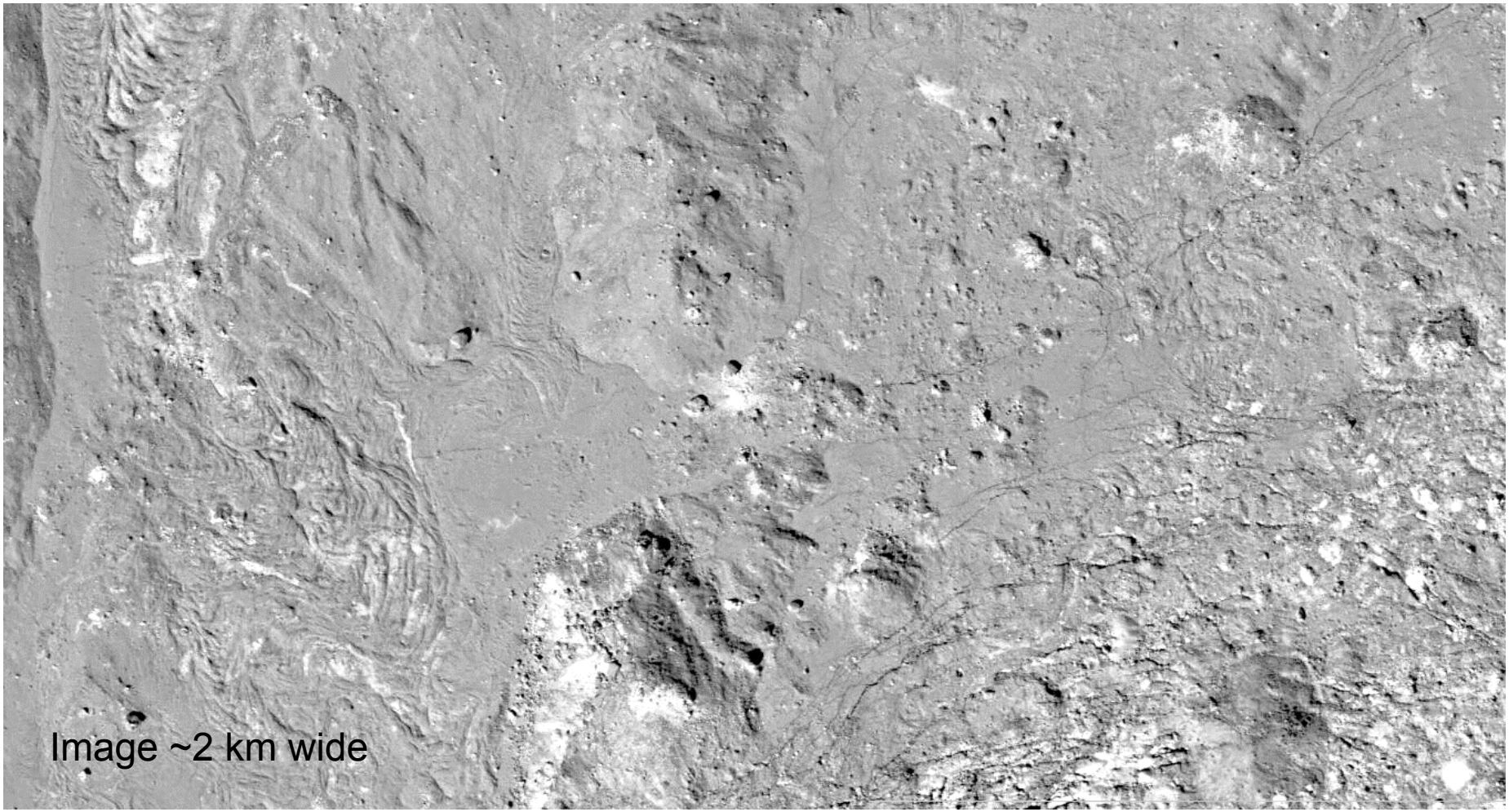
NAC Image: M103831840R



NAC Image: M103831840L

Impact Melts

Impact melt textures are commonly well preserved in Copernican craters..
Giordano Bruno crater (22 km diameter)



Impact Melt (GB)

WAC Global Observations: Stereo

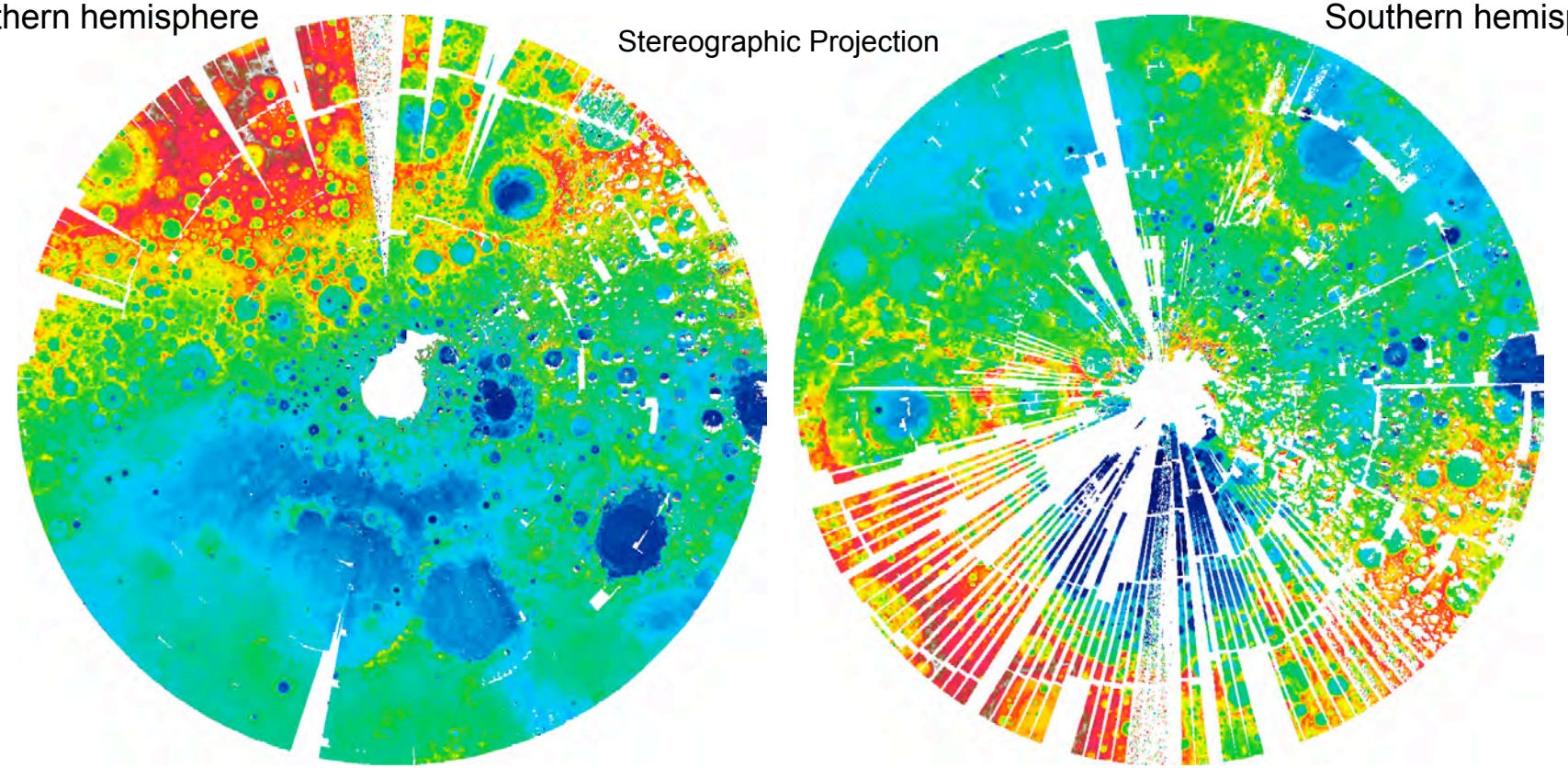
Status w.r.t. global Lunar topography model @ ~200-250 m grid spacing

WAC DTM processing by DLR/TUB
(1 km lateral grid Aug 17, DOY 229)

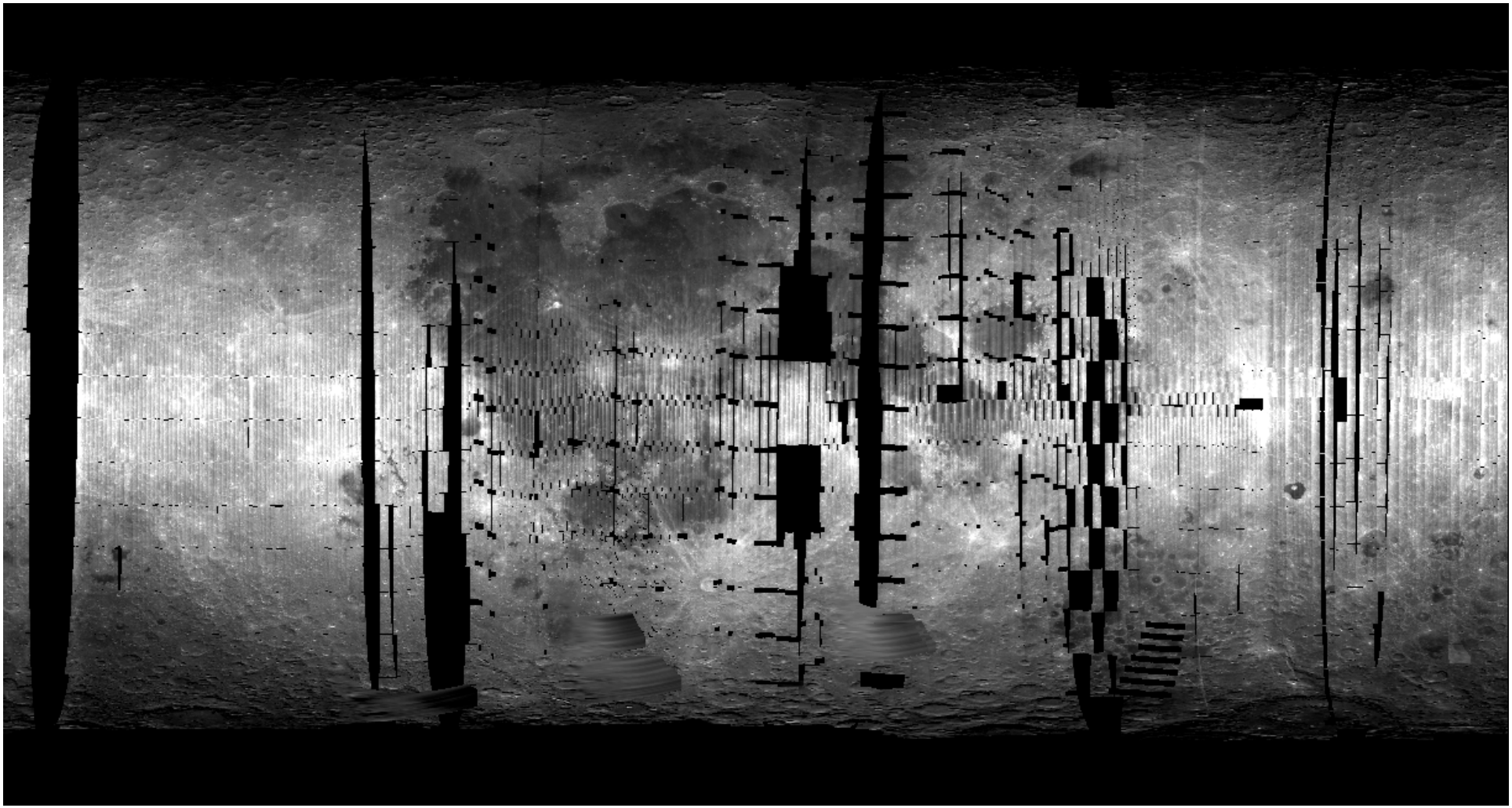
Northern hemisphere

Stereographic Projection

Southern hemisphere

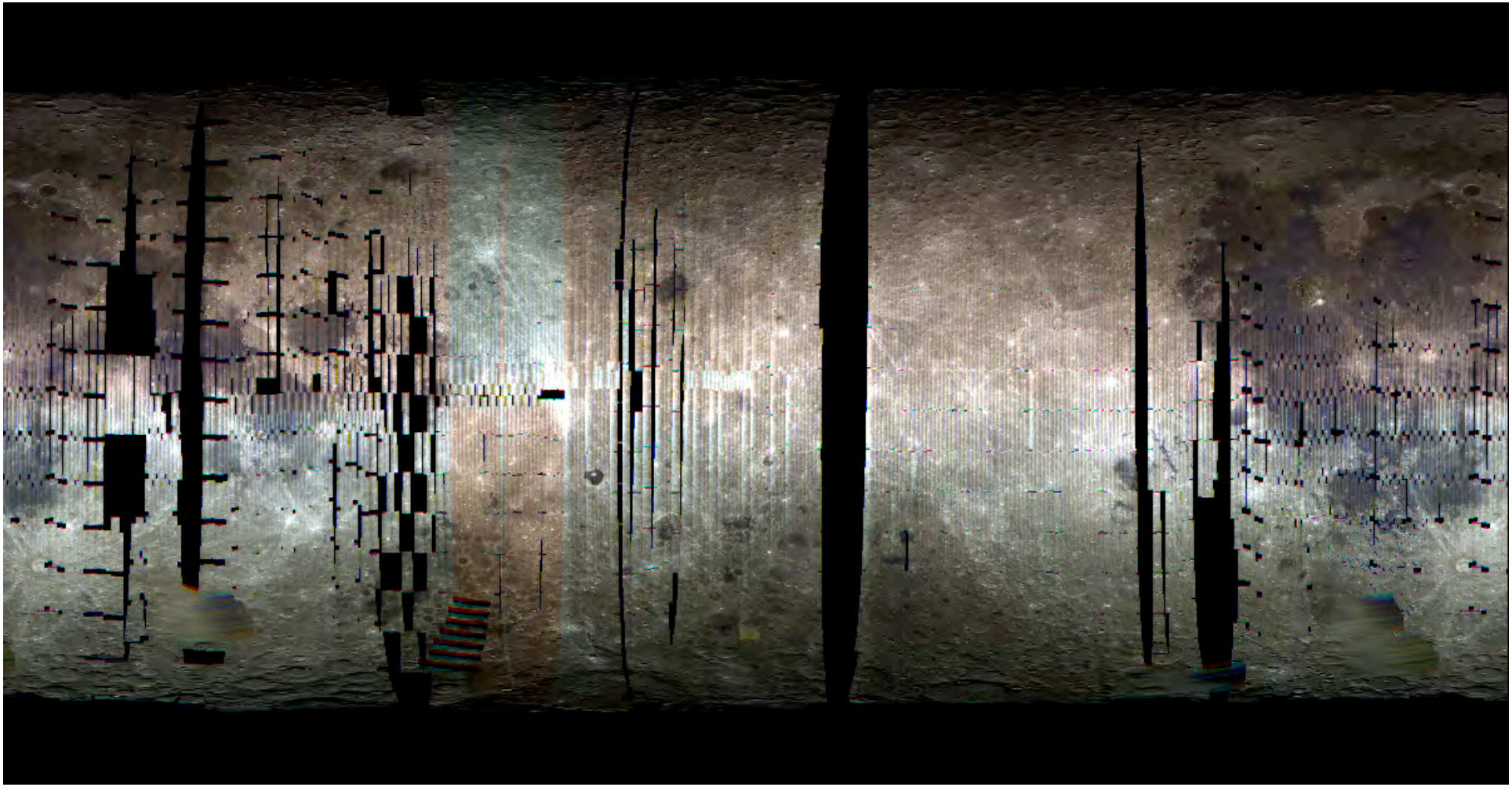


current mean overall point spacing: 1 km (will finally be ~200-250 m!)

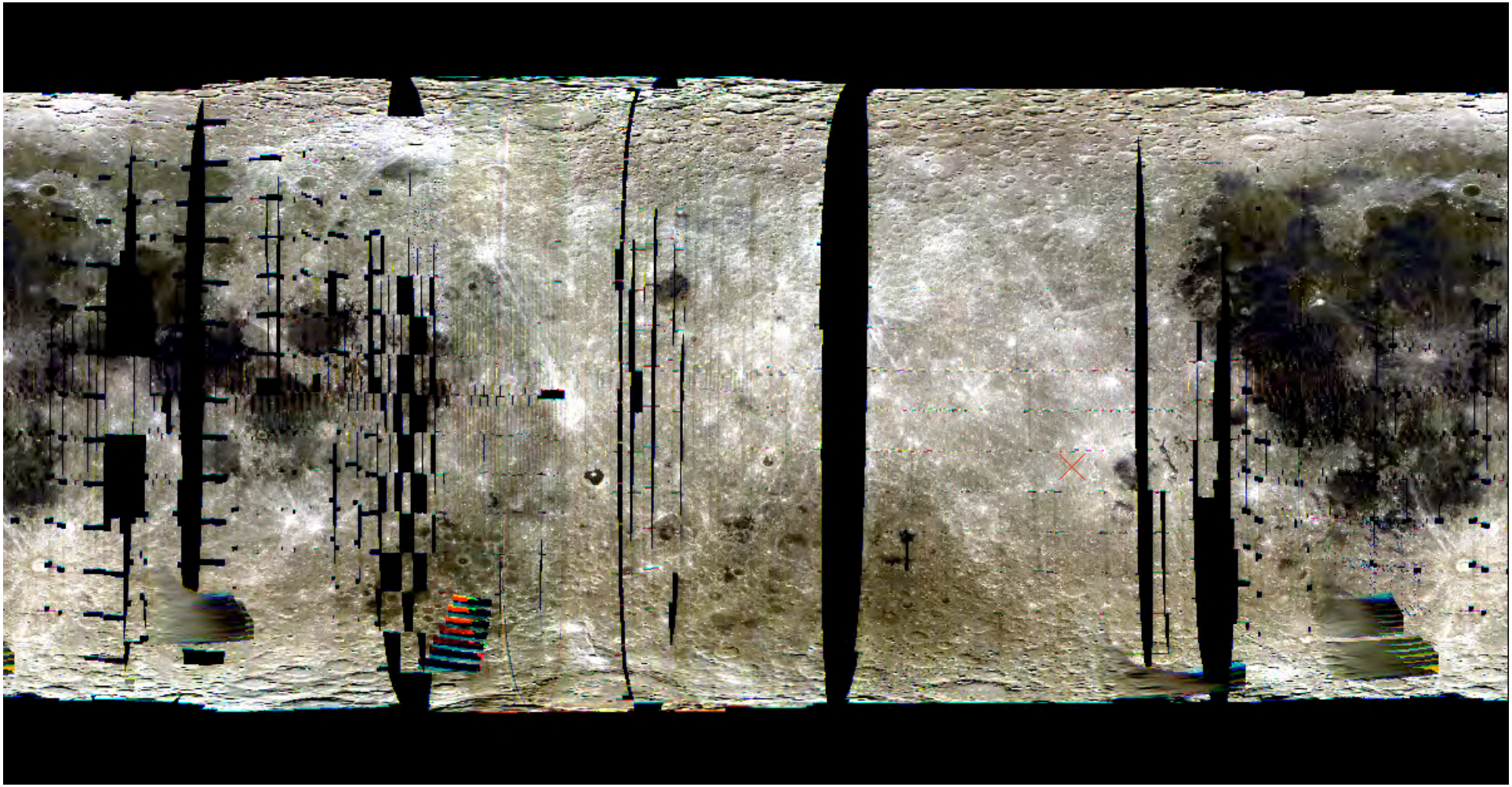


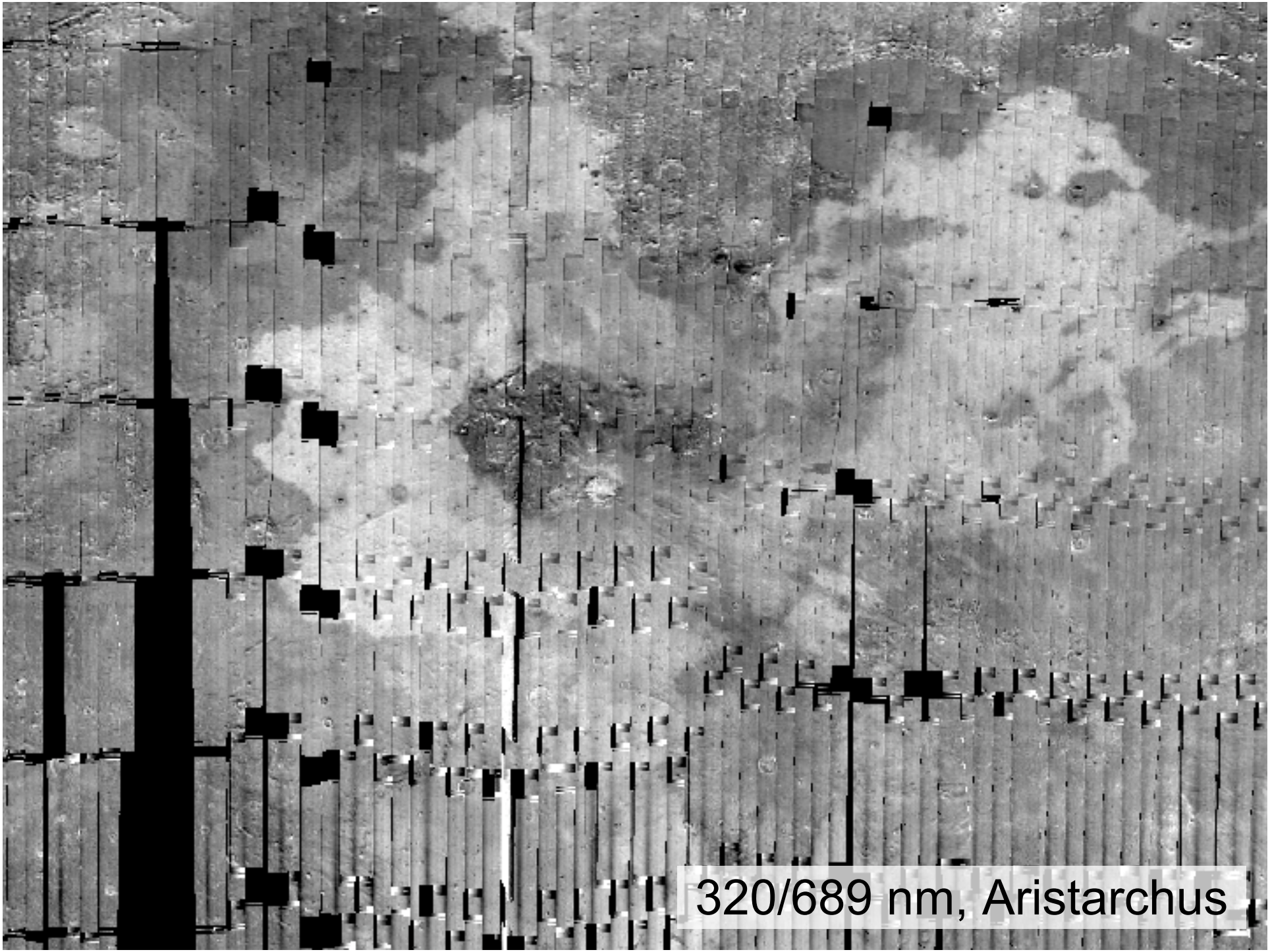
DOY 264-294, 689 nm
Calibrated, No photometric correction

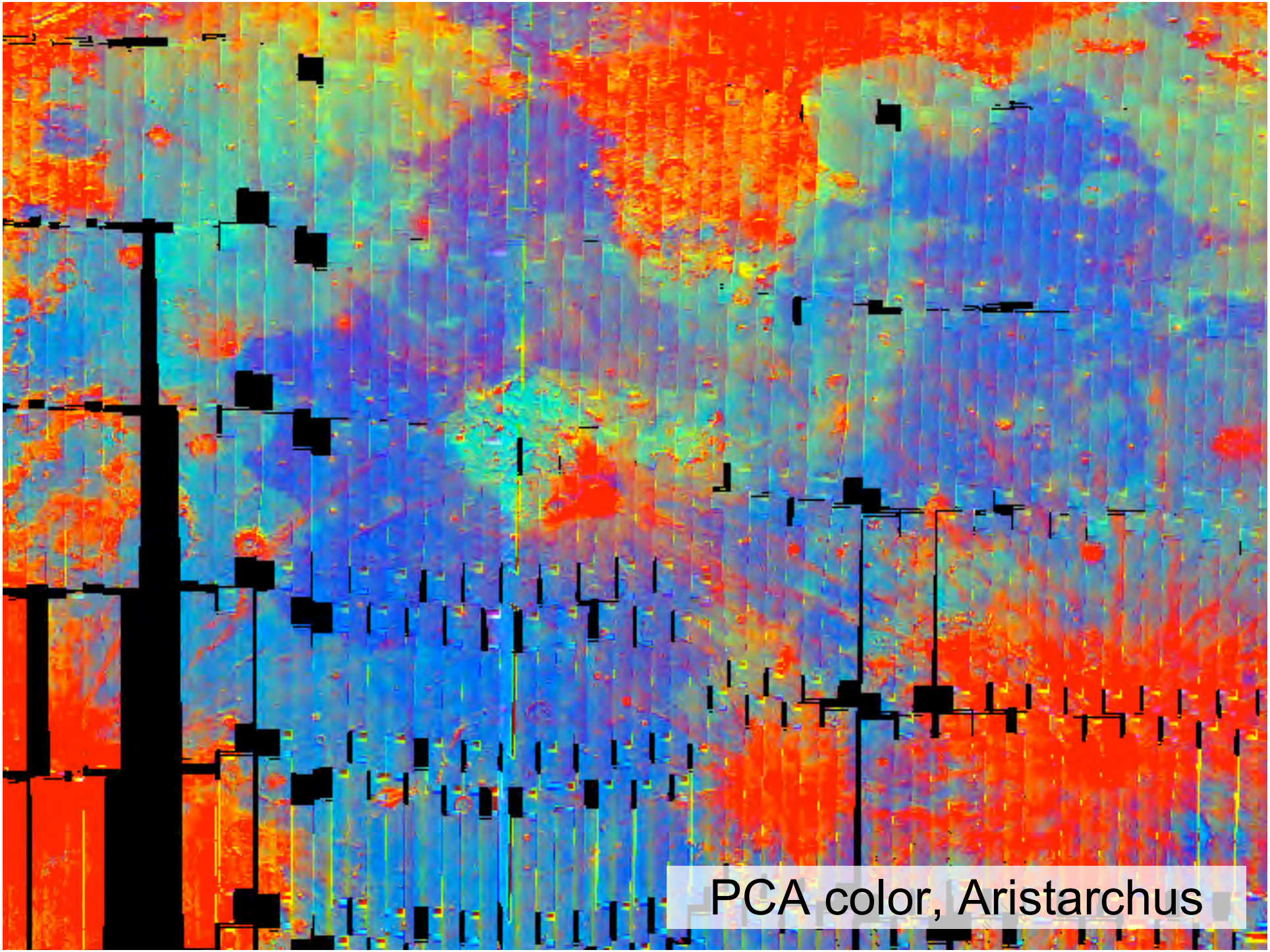
Before correction



After preliminary photometric correction

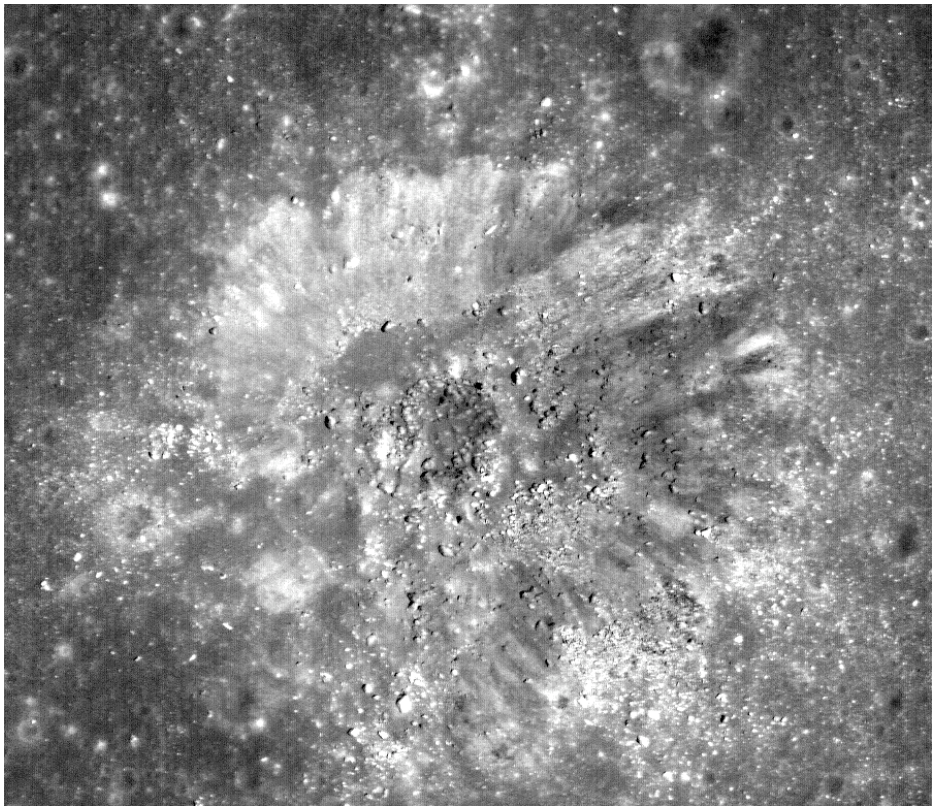



320/689 nm, Aristarchus


PCA color, Aristarchus

SMD Mission

- More stereo pairs (perhaps 500 per year) to follow up on ESMD phase discoveries
- Global NAC 2-m coverage ~6 years
- Acquire WAC data over broad range of incidence and emission for robust solution



Incidence = 2°, resolution = 54 cm/p, width = 486 meters