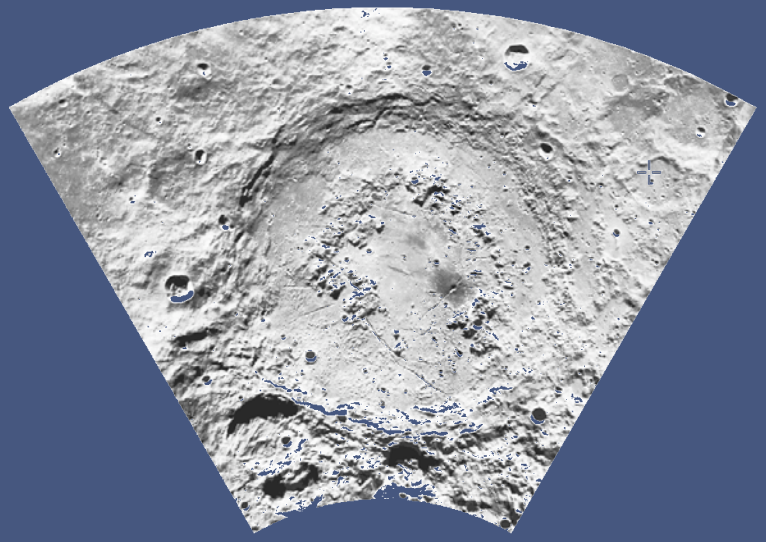
# Revisiting the geology of the Schrödinger basin



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***Canadian Lunar Research Network***

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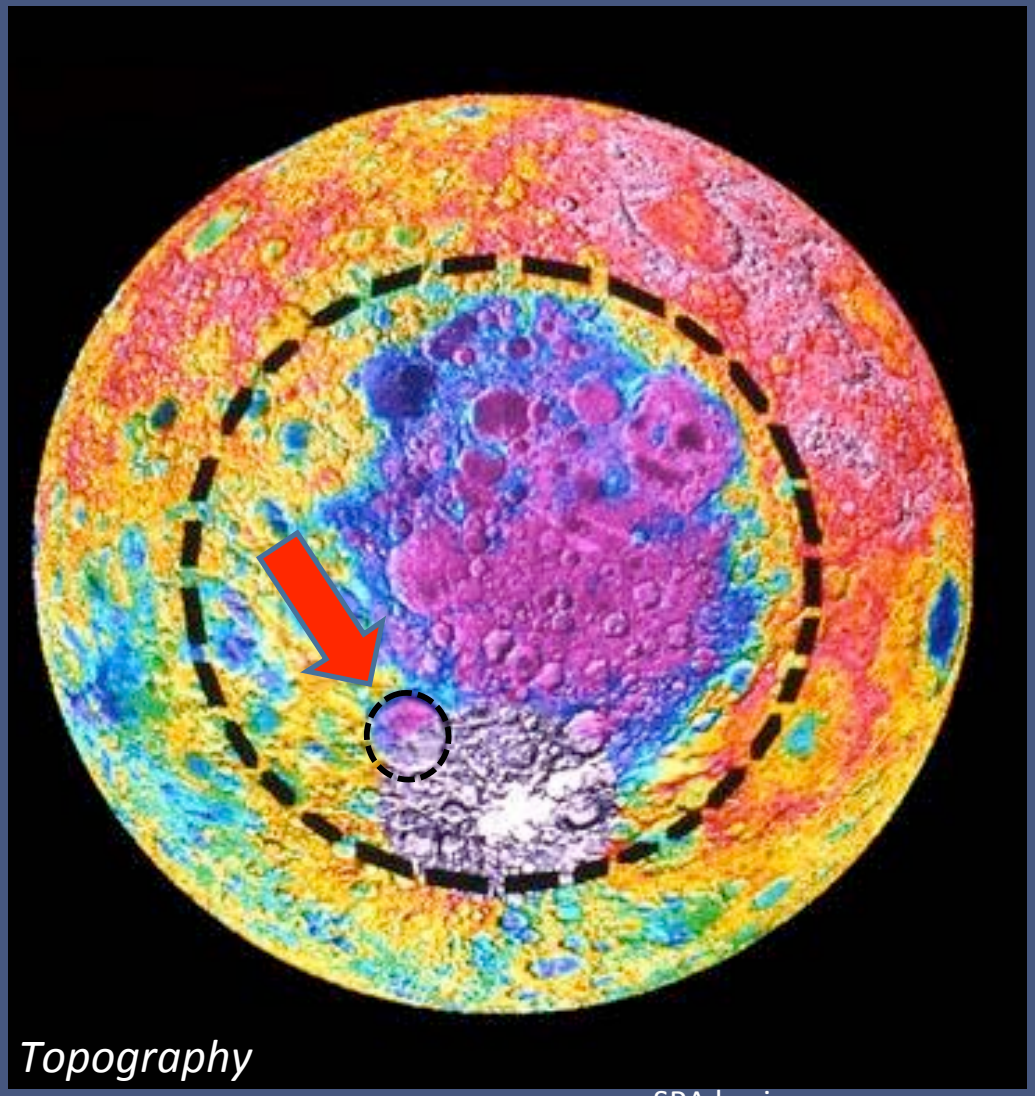
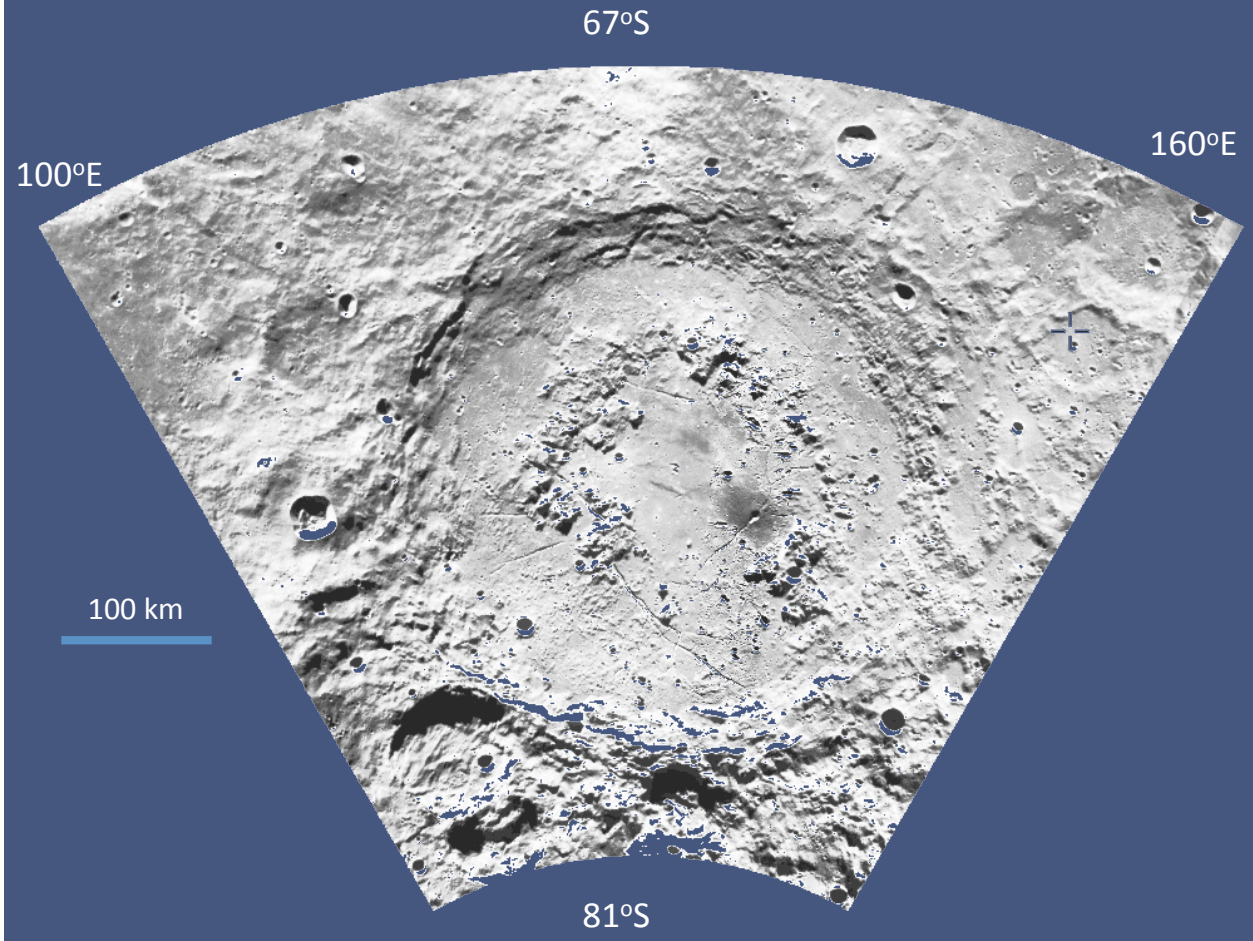
# South Pole Aitken Basin




- located within SPA basin
  - 2100 km in diameter; ~12 km deep
- Science interests
  - Late Heavy Bombardment Period
  - Giant basin cratering processes
  - Potential excavation of upper mantle materials
- Schrödinger - *Landing site target*
  - ***MoonRise*** *- sample return mission target location*

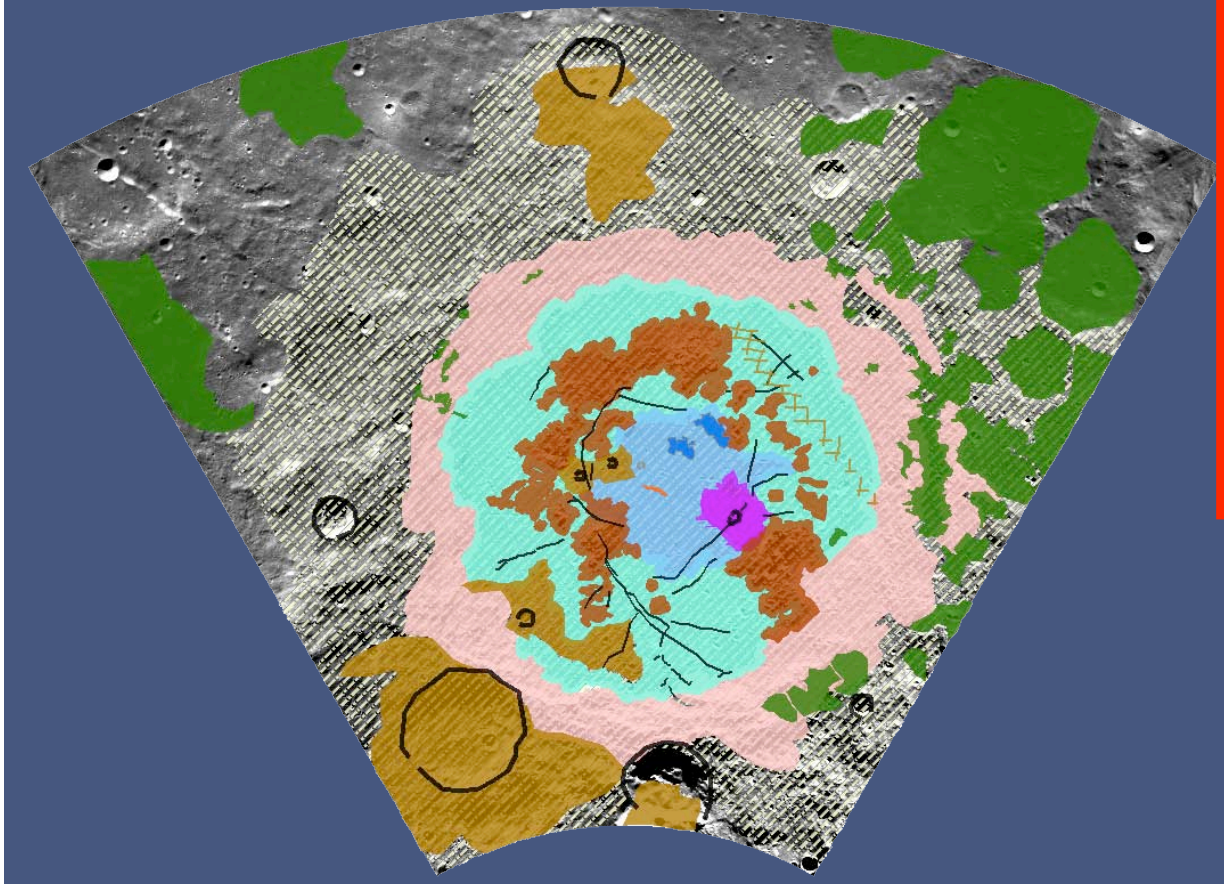
# Background




Clementine Basemap (750 nm)

- Peak ring crater
- Relatively fresh
- 312 km diameter
- 2-3 km deep basin floor

# Geologic Map

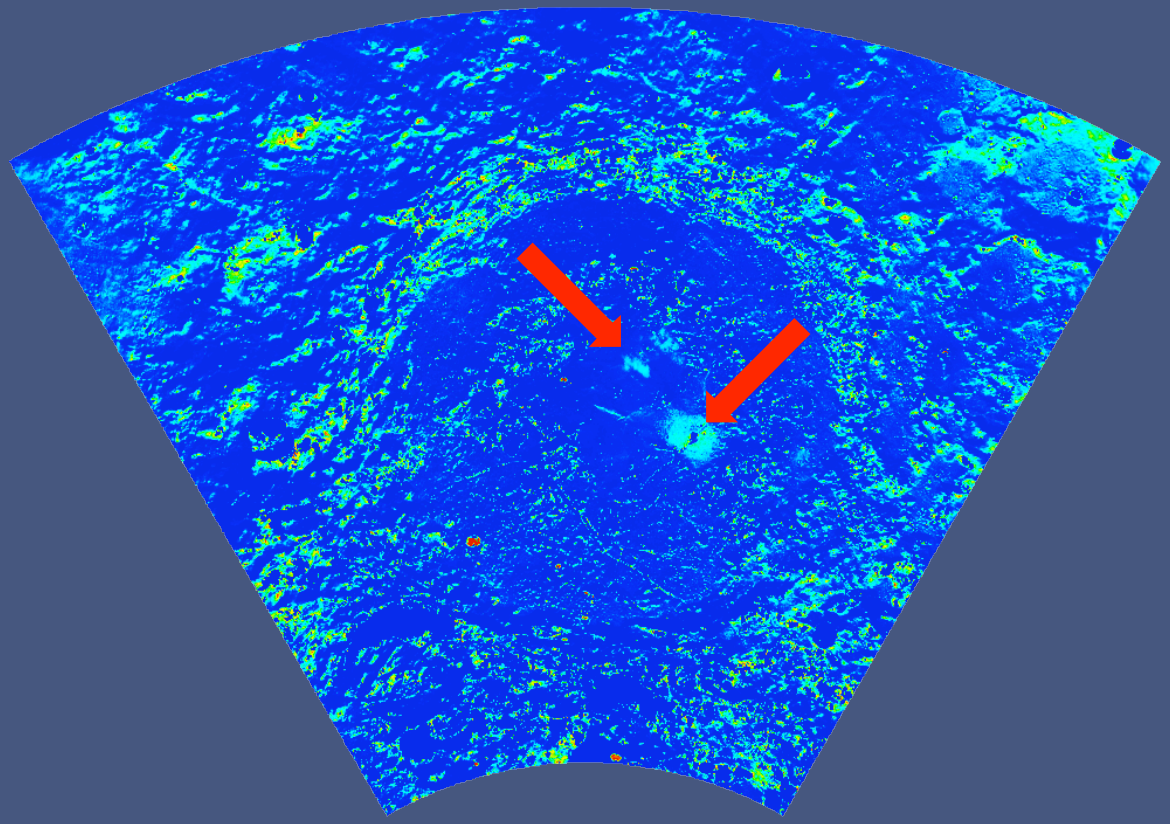


[Shoemaker et al. (1994); Mest and VanArsdall (2008); and Shankar et al. (2009, present)]

- Basin Wall
- Peak Ring
- Proposed Schrödinger Ejecta
- Interior Rough Melts
- Interior Smooth Melts
- Proposed Exterior Melt Ponds
- Mare Patch
- Pyroclast Deposit
- Tectonic Ridge
- Post-Schrödinger impact materials
- Rilles, crater outlines
- Ghost Crater
- Crater Ray

- compositional information
- SPA topography

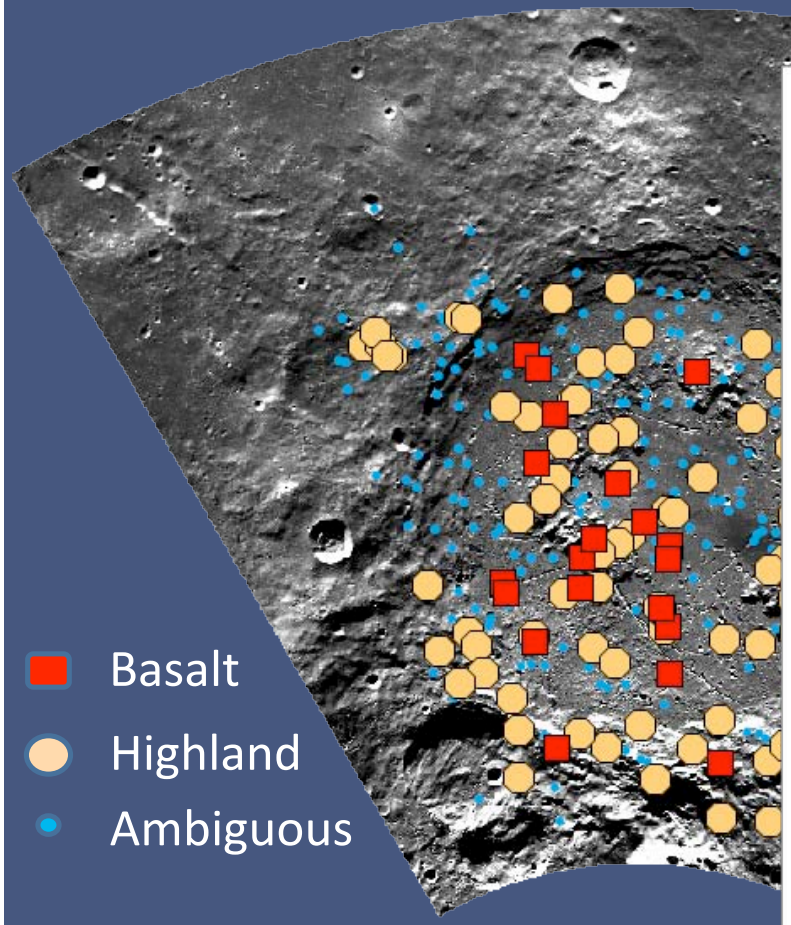
# Composition: FeO Weight % Distribution



[Lucey et al., (2000)]

- values comparable to FeO wt % within SPA basin.
  - impact materials
- high FeO areas
  - mare patches
  - pyroclast deposits
- high phase angles, yet can identify trends

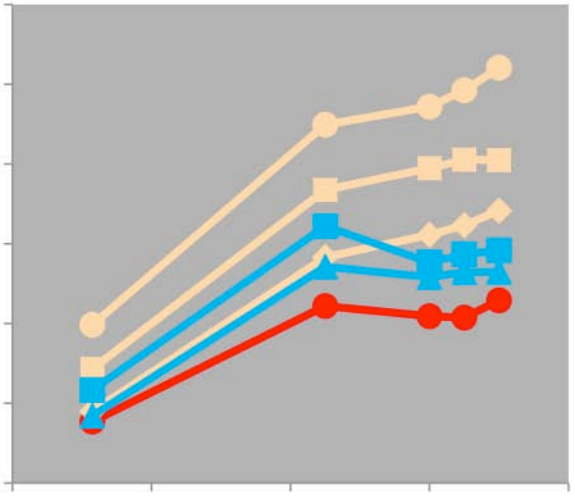
# Composition: Spectral Profiles



Basalt

Highland

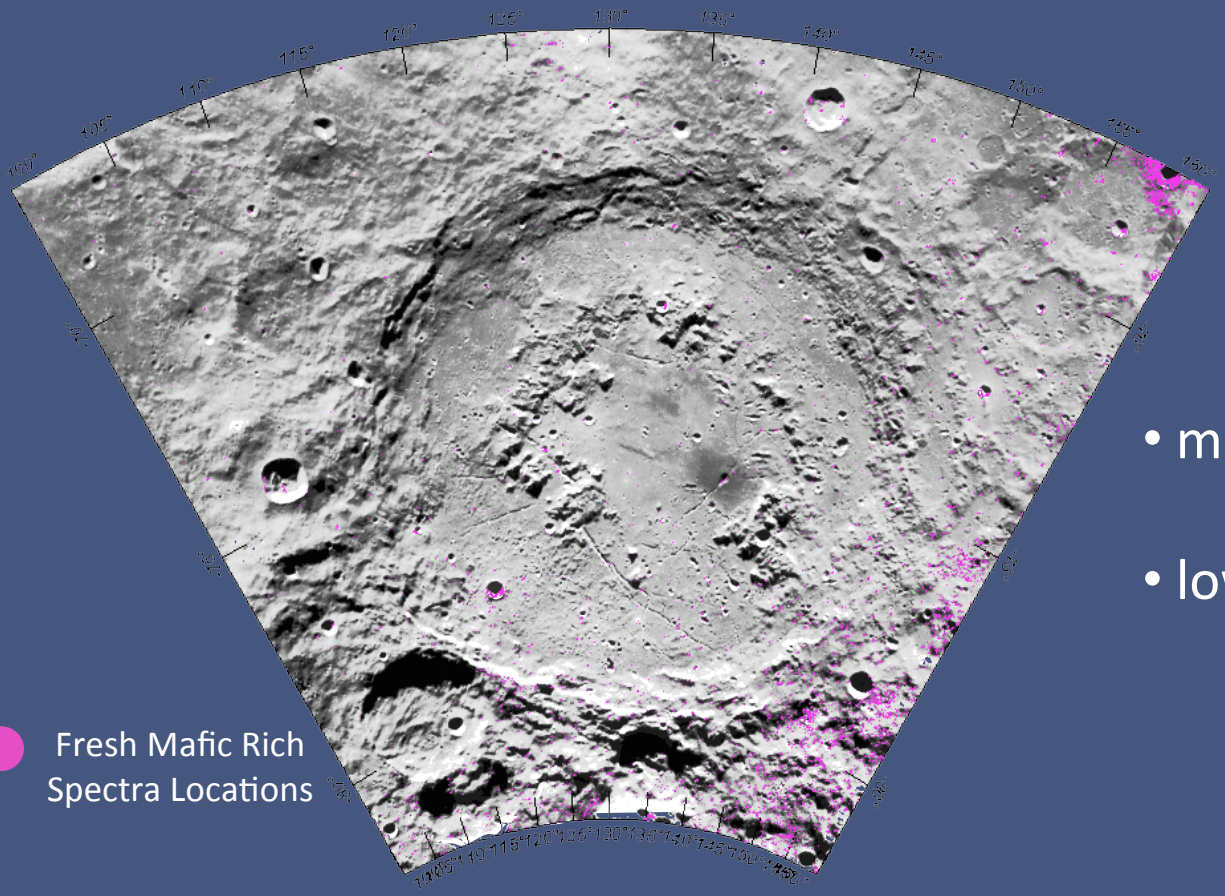
Ambiguous



- heterogeneous distr

- ambiguous spectra s
spectral mixing

# Composition: Fresh Mafic Signatures

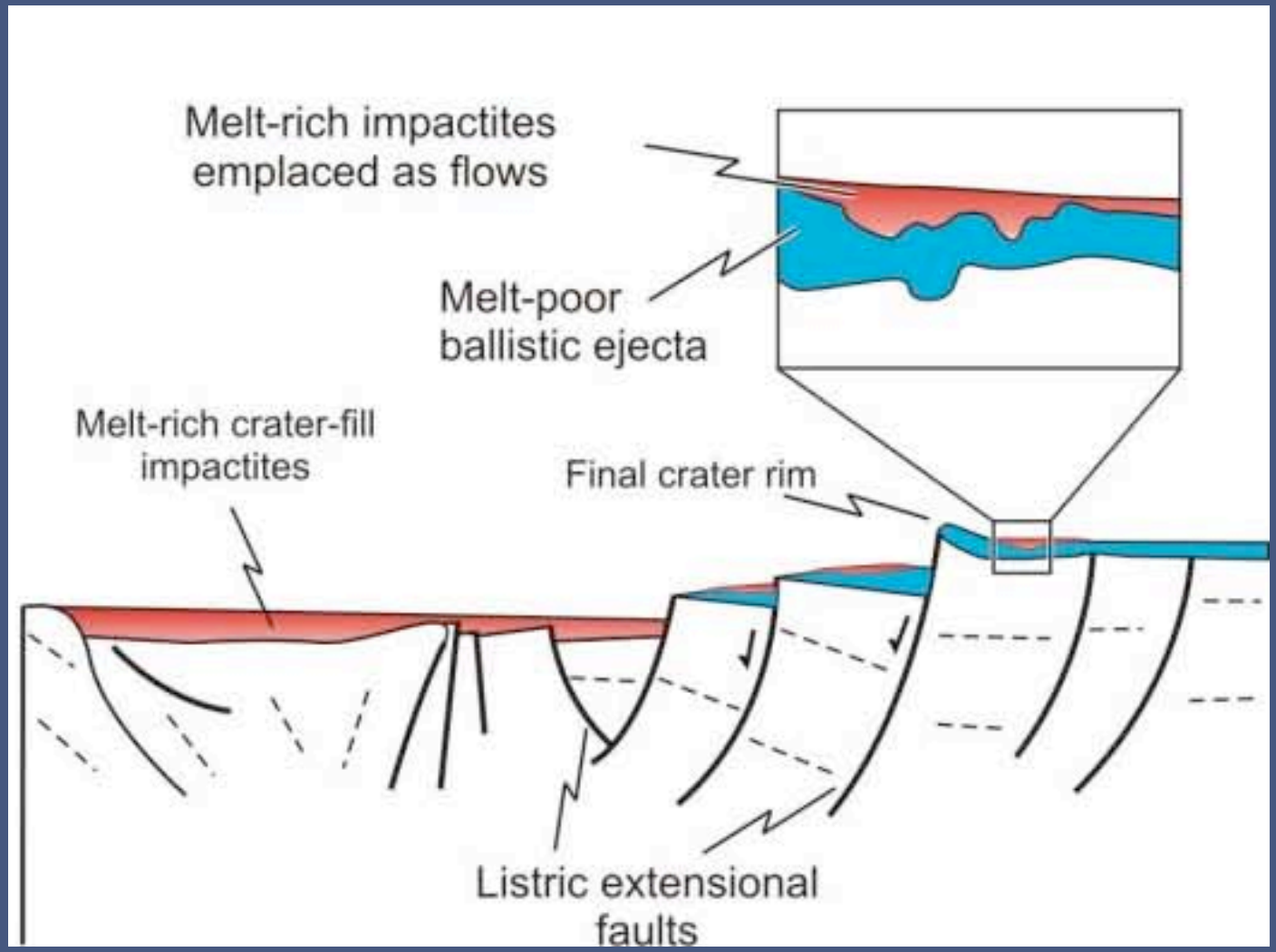


Fresh Mafic Rich Spectra Locations

[Antonenko and Osinski, (2010)]

- melt areas
- low fresh mafic distributions

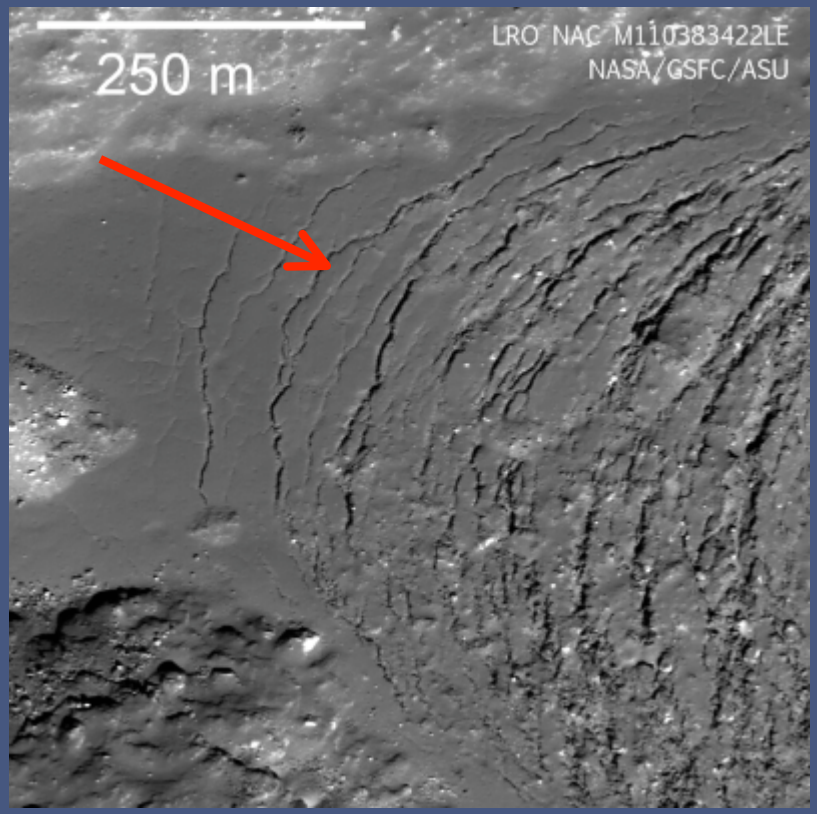
# Distribution of Impact Melt




End of Modification Stage

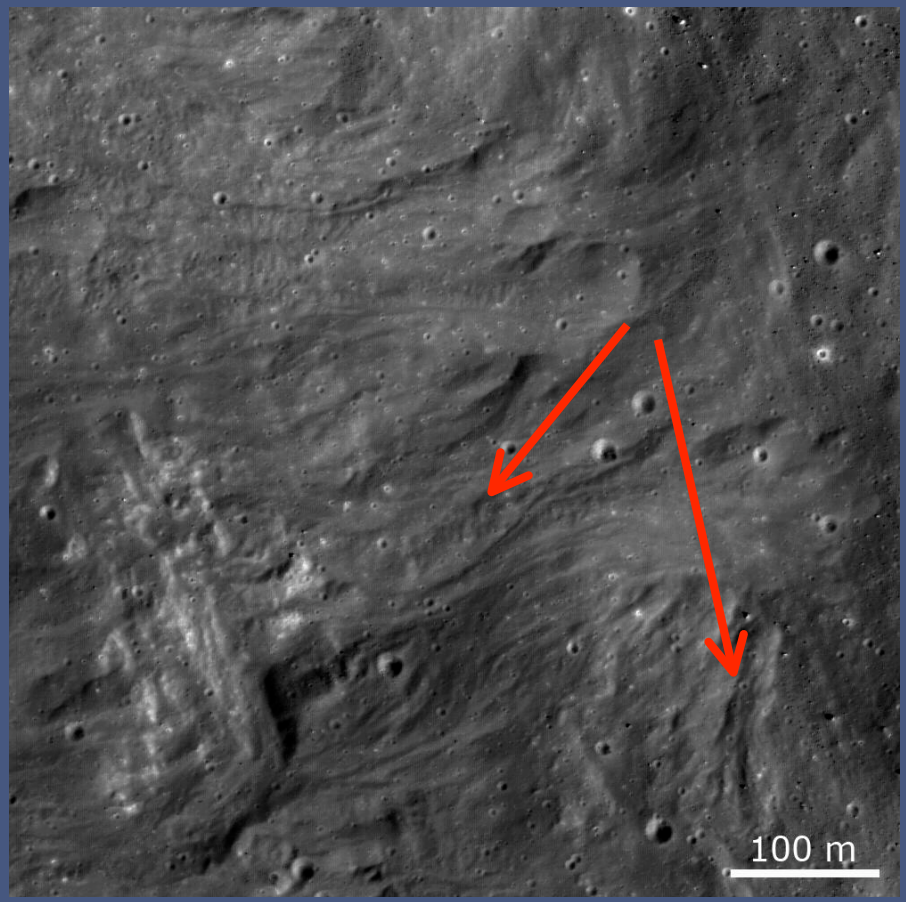
Osinski et al., 2004

# Impact Melt Flows – As Seen by LROC




Moore F crater

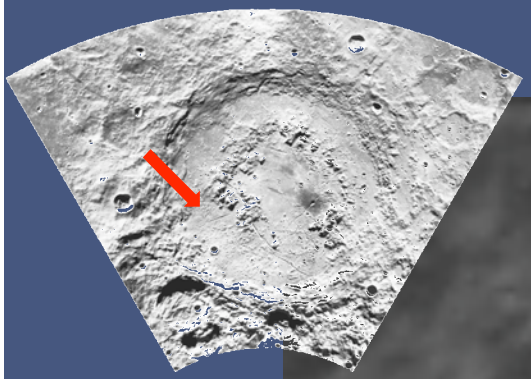
- preserved chill crusts
- smooth surfaces

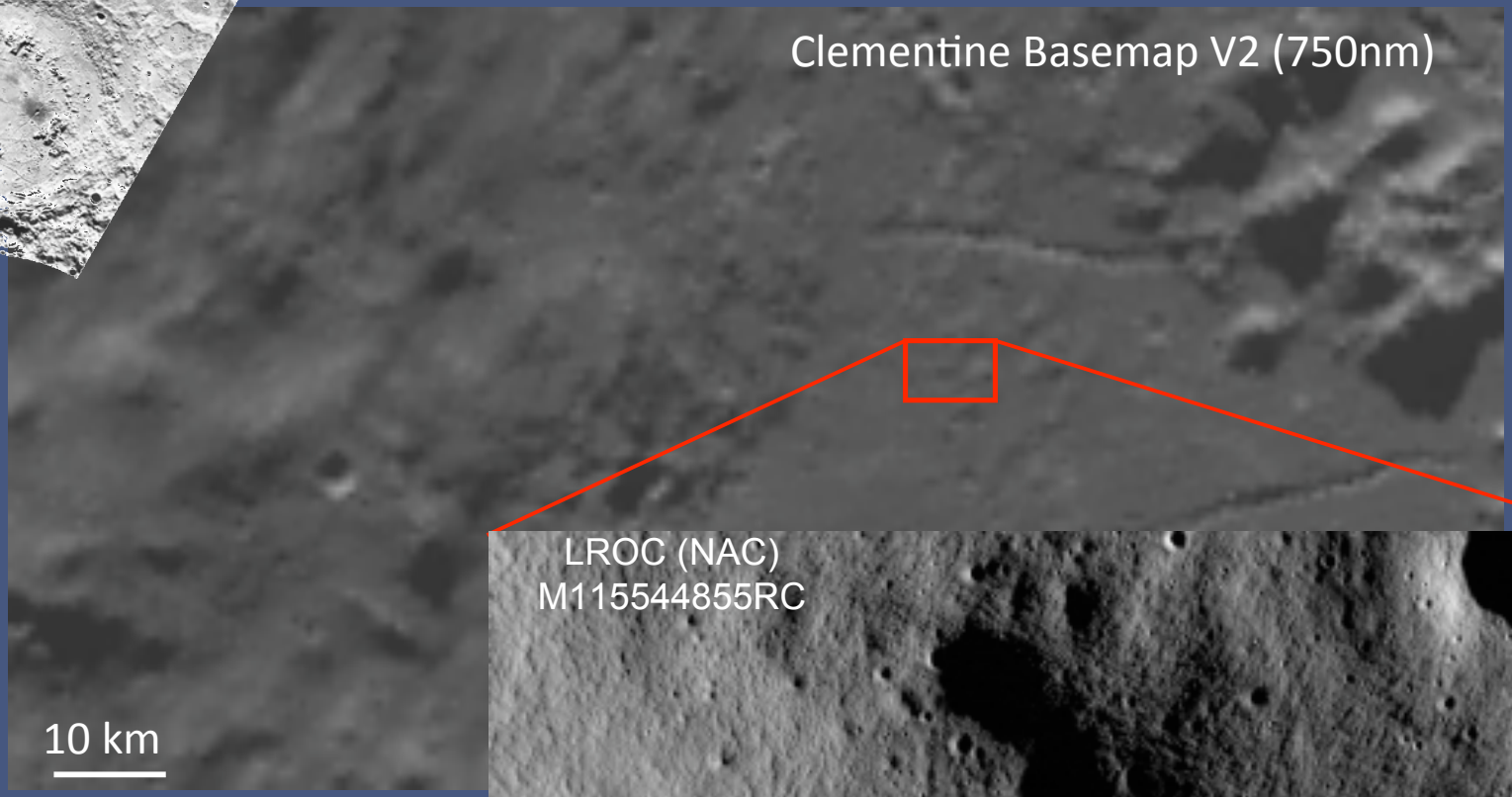



Giordano Bruno crater

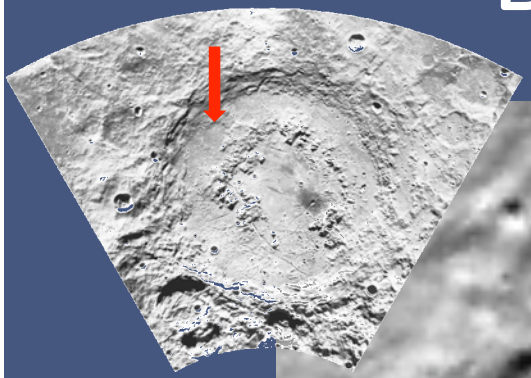
- ropey flow textures

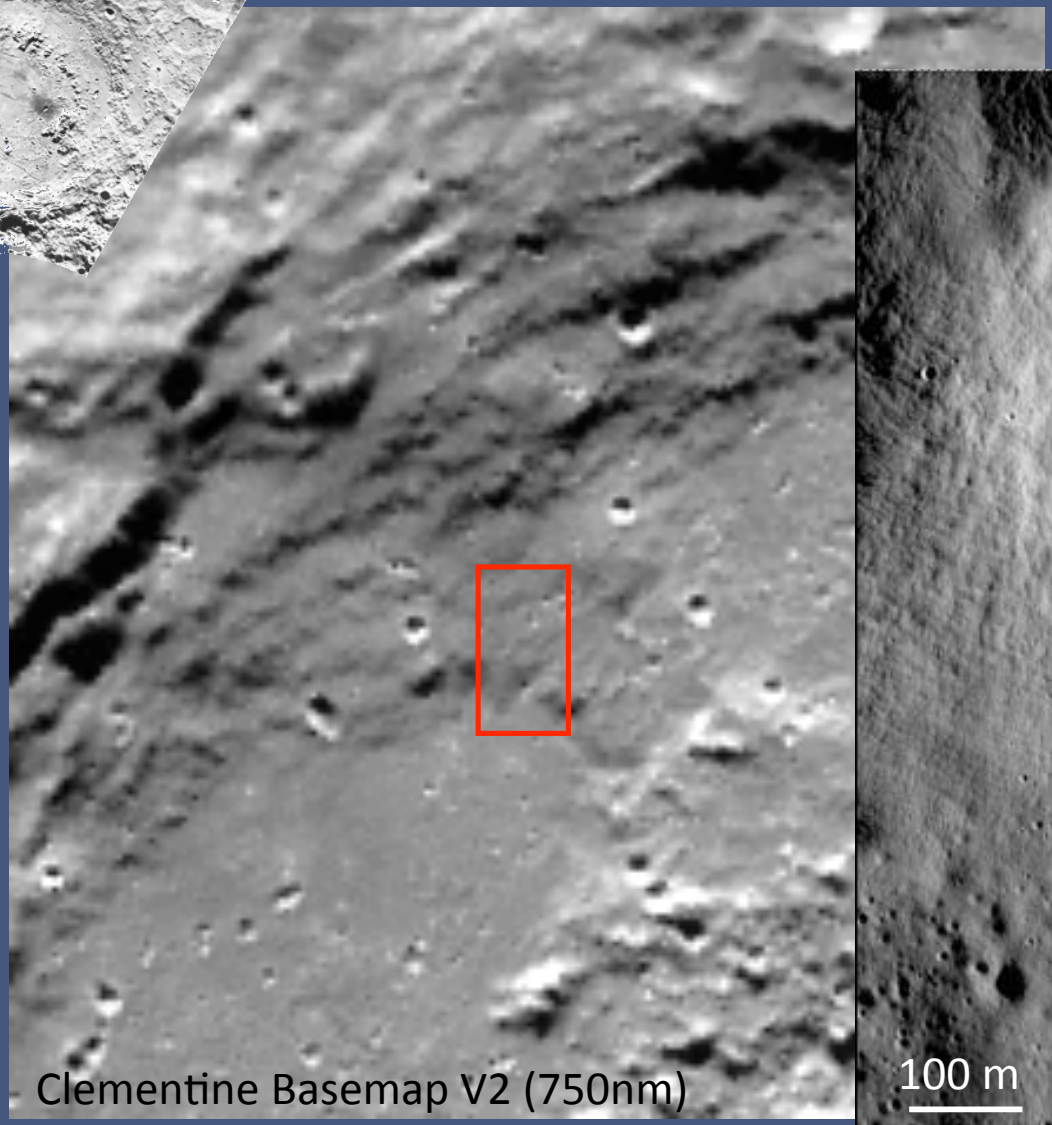
# Schrödinger Inner Melts (Rough)





# Basin Wall - Terrace



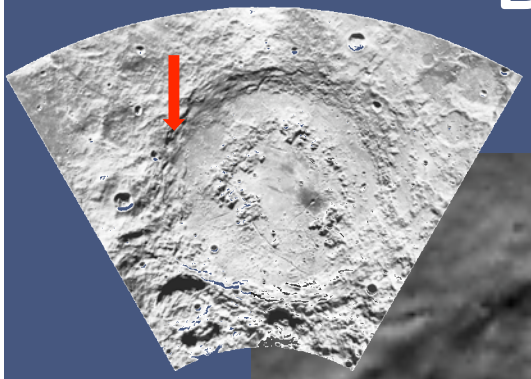


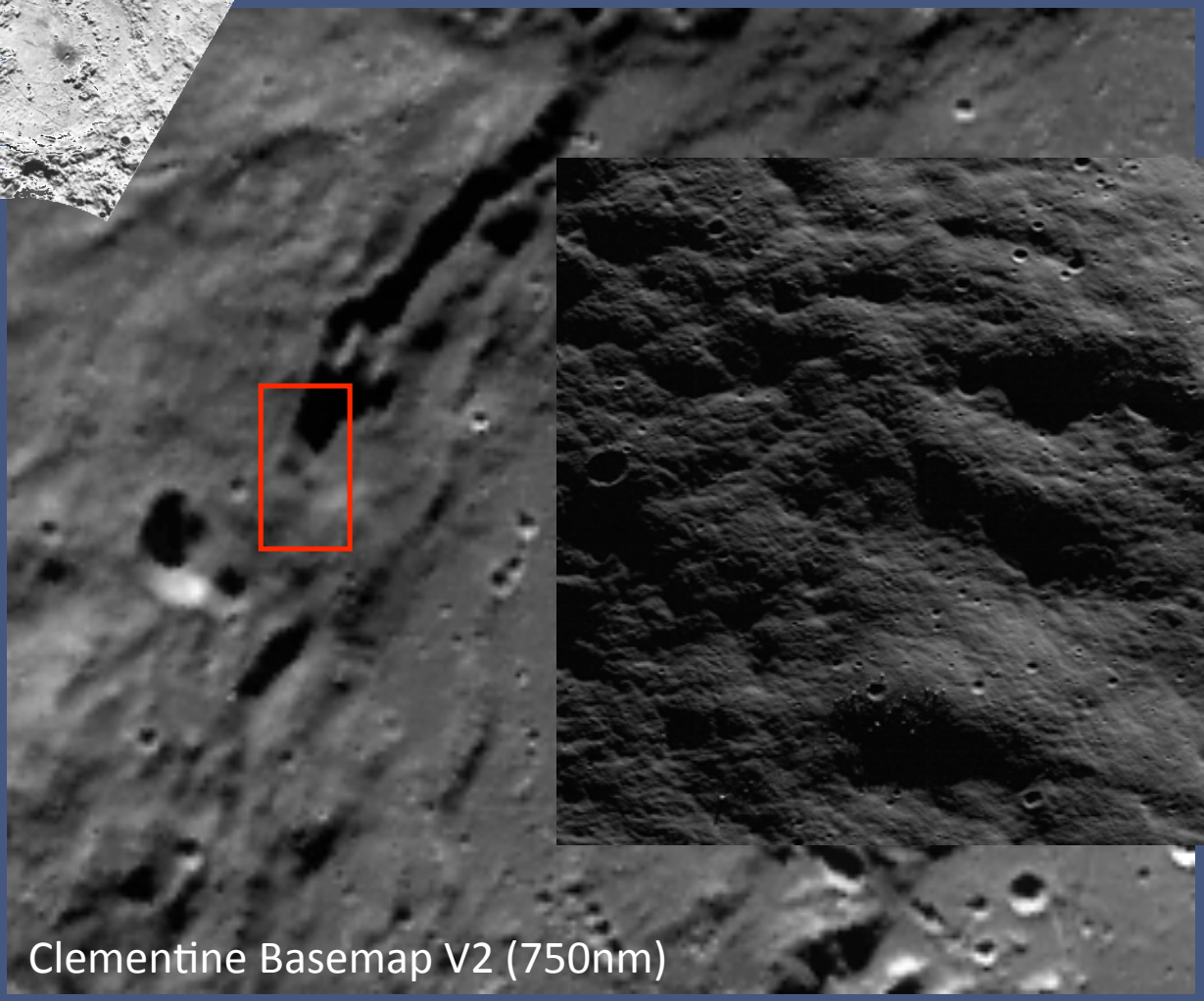
Clementine Basemap V2 (750nm)

LROC (NAC)
M115510858L
C

100 m

# Basin Wall - Terrace



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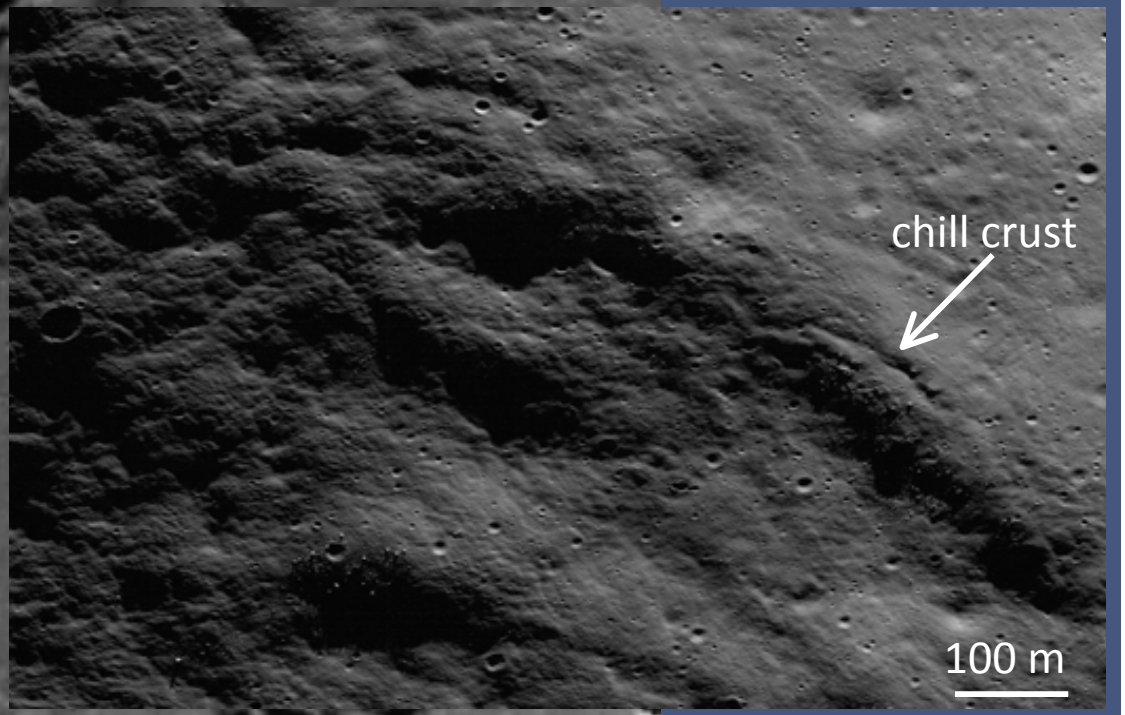
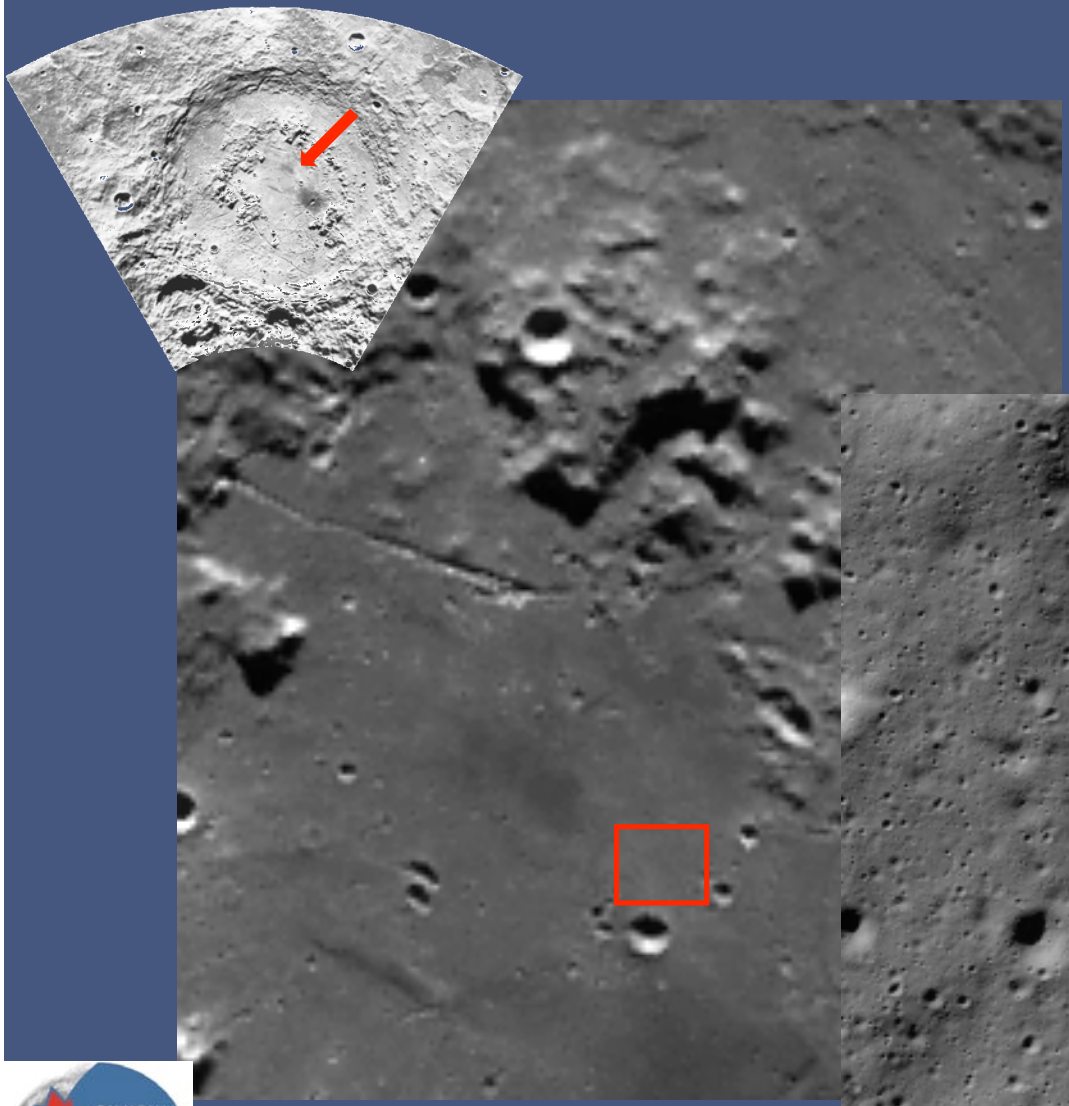


# Schrödinger Inner Melts - Smooth



LROC (NAC)
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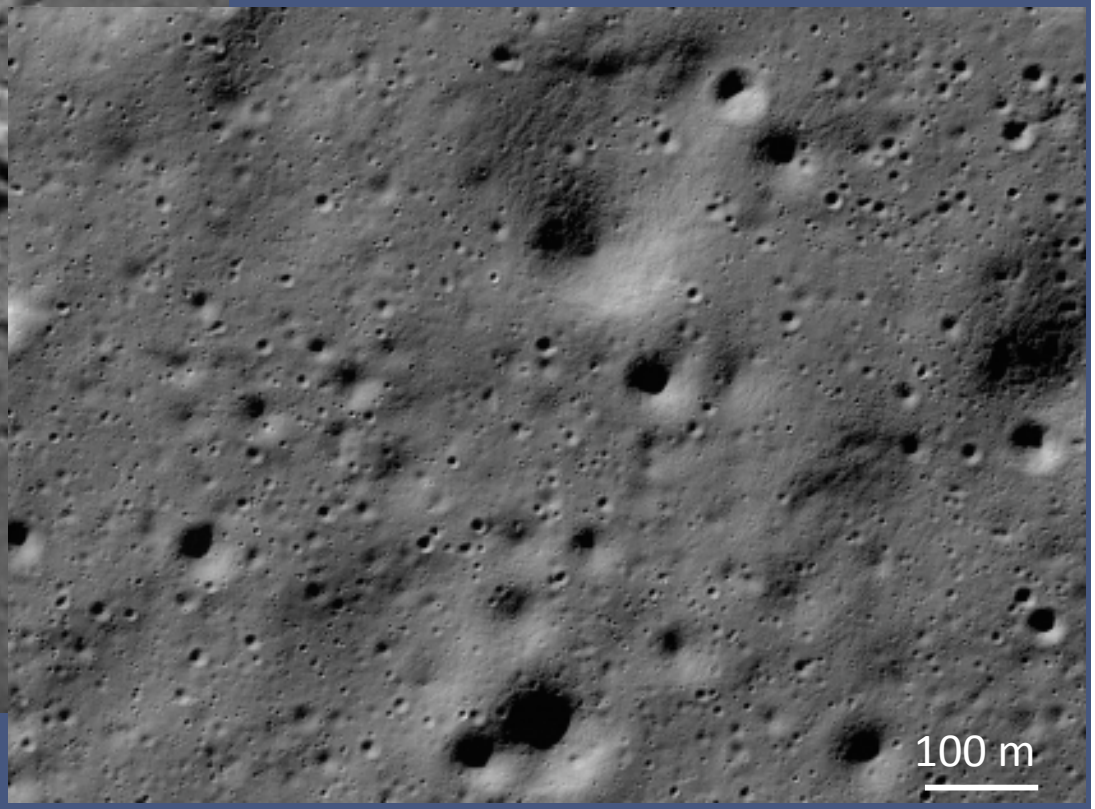
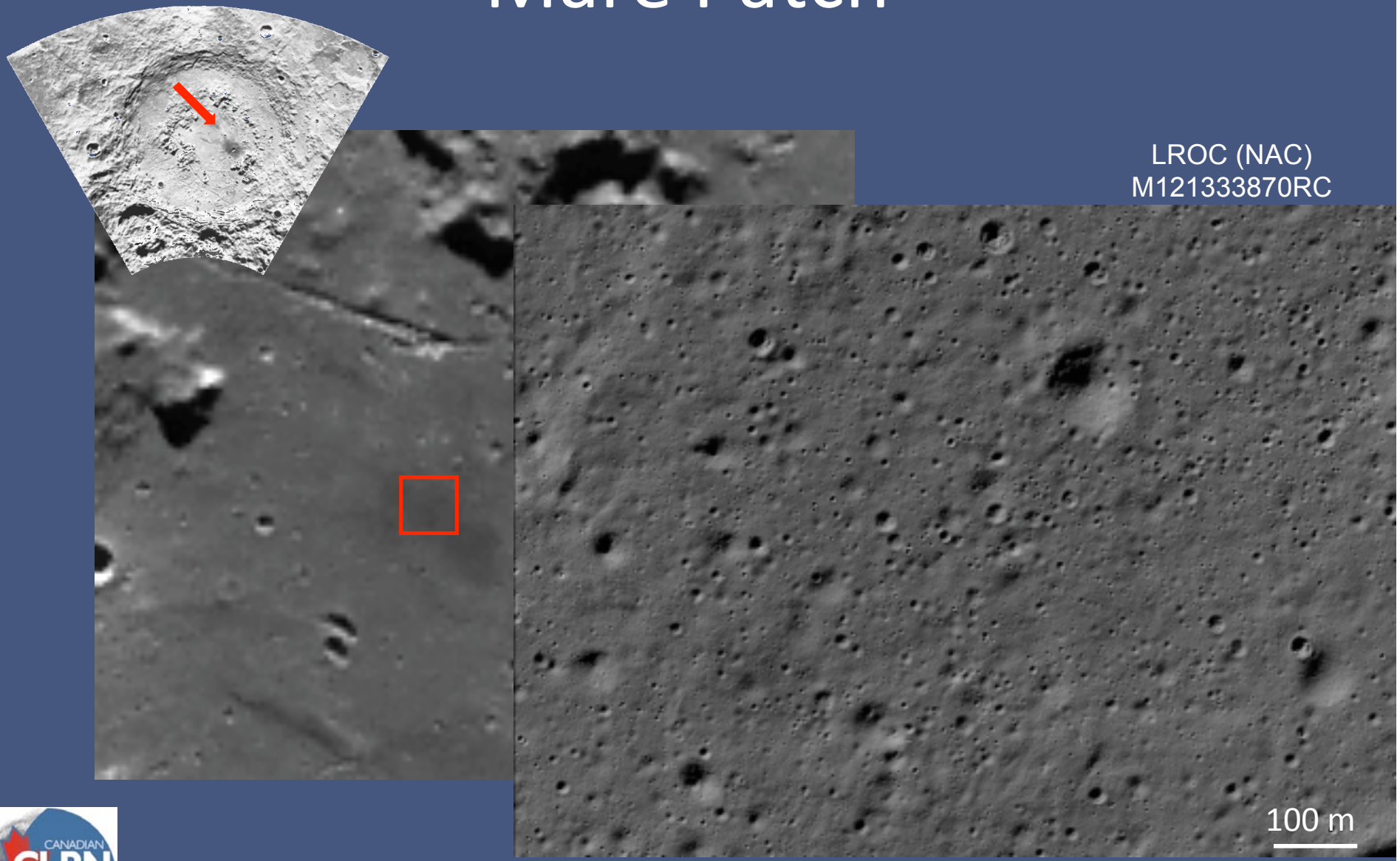
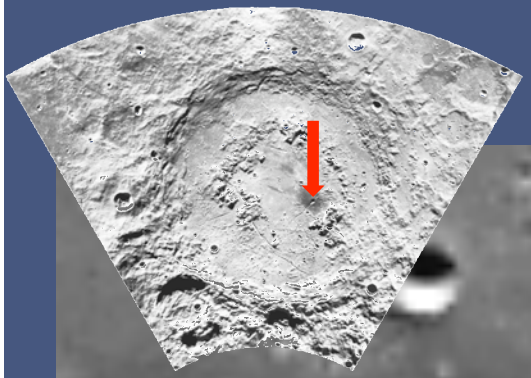
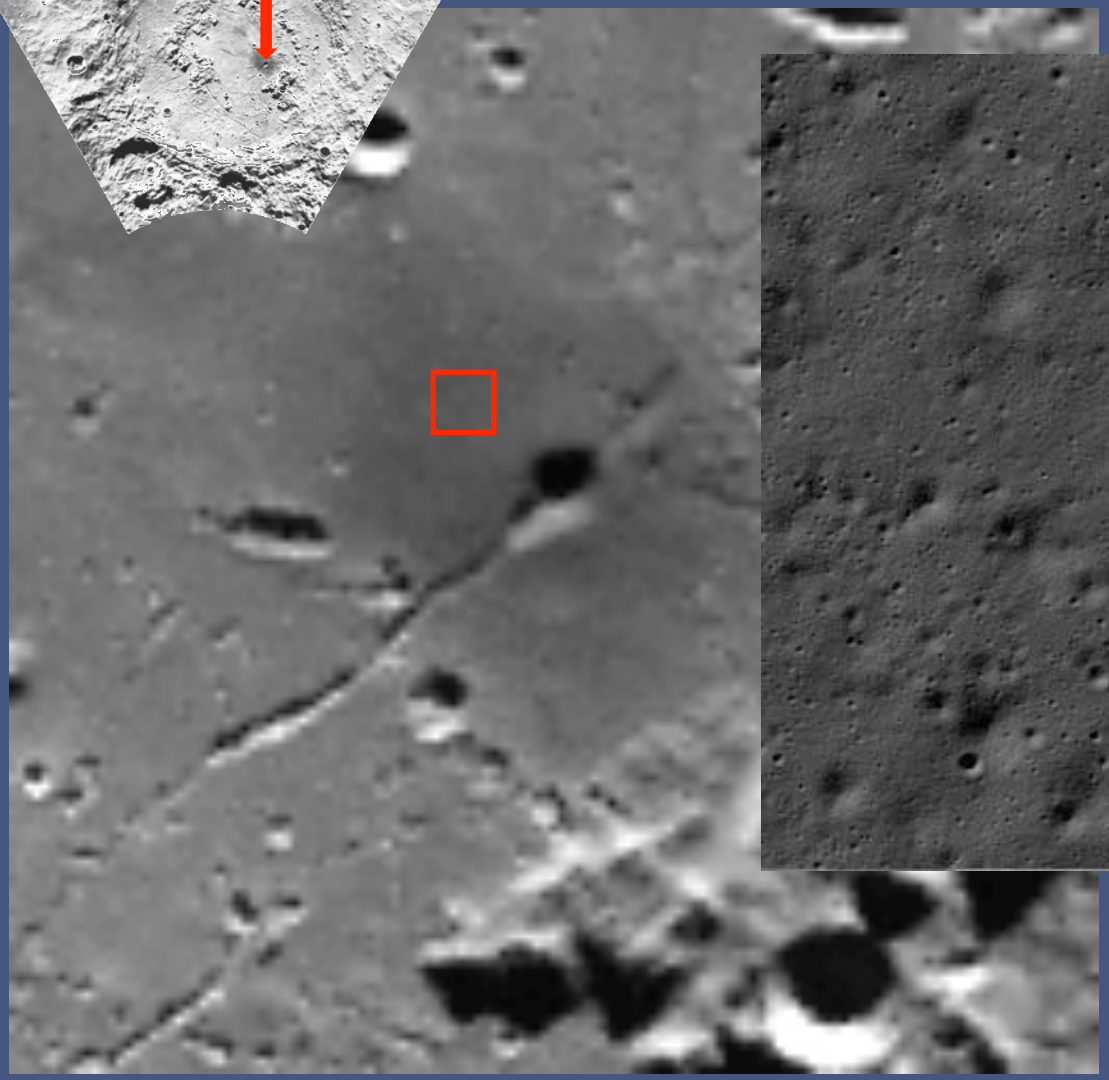


# Mare Patch



# Pyroclast Deposits





LROC (NAC)
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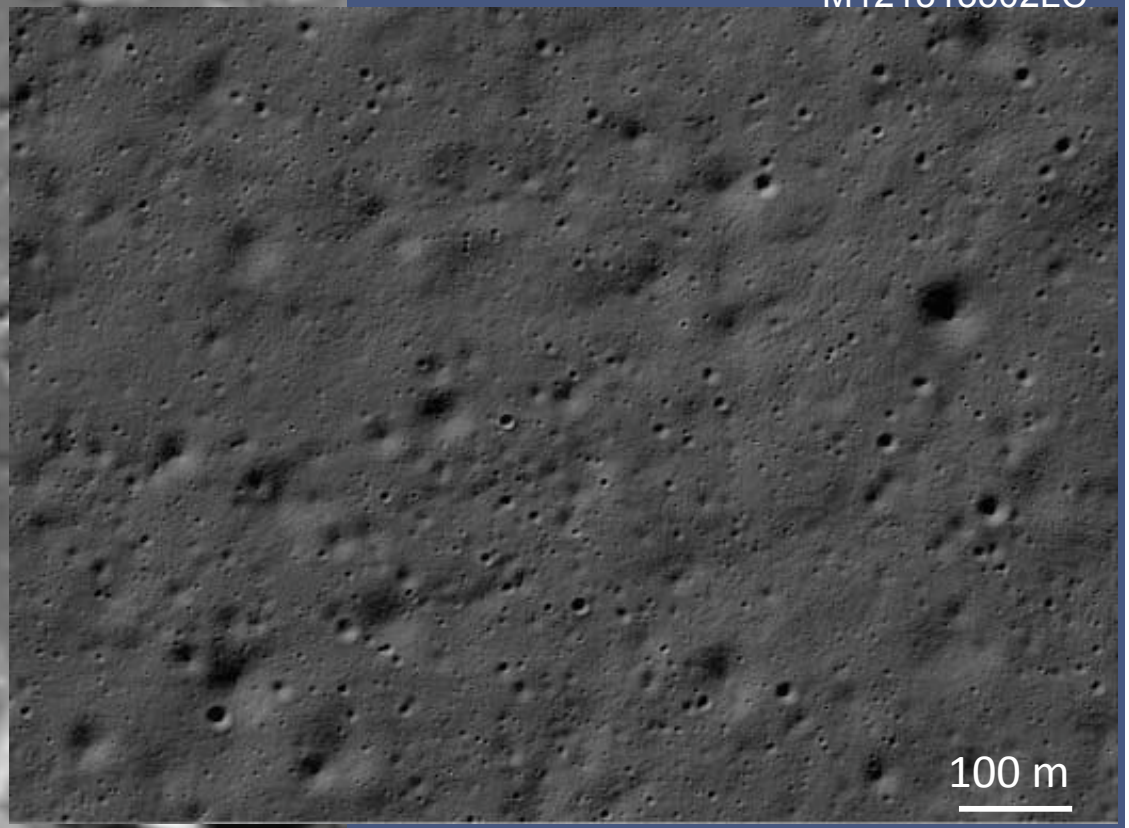
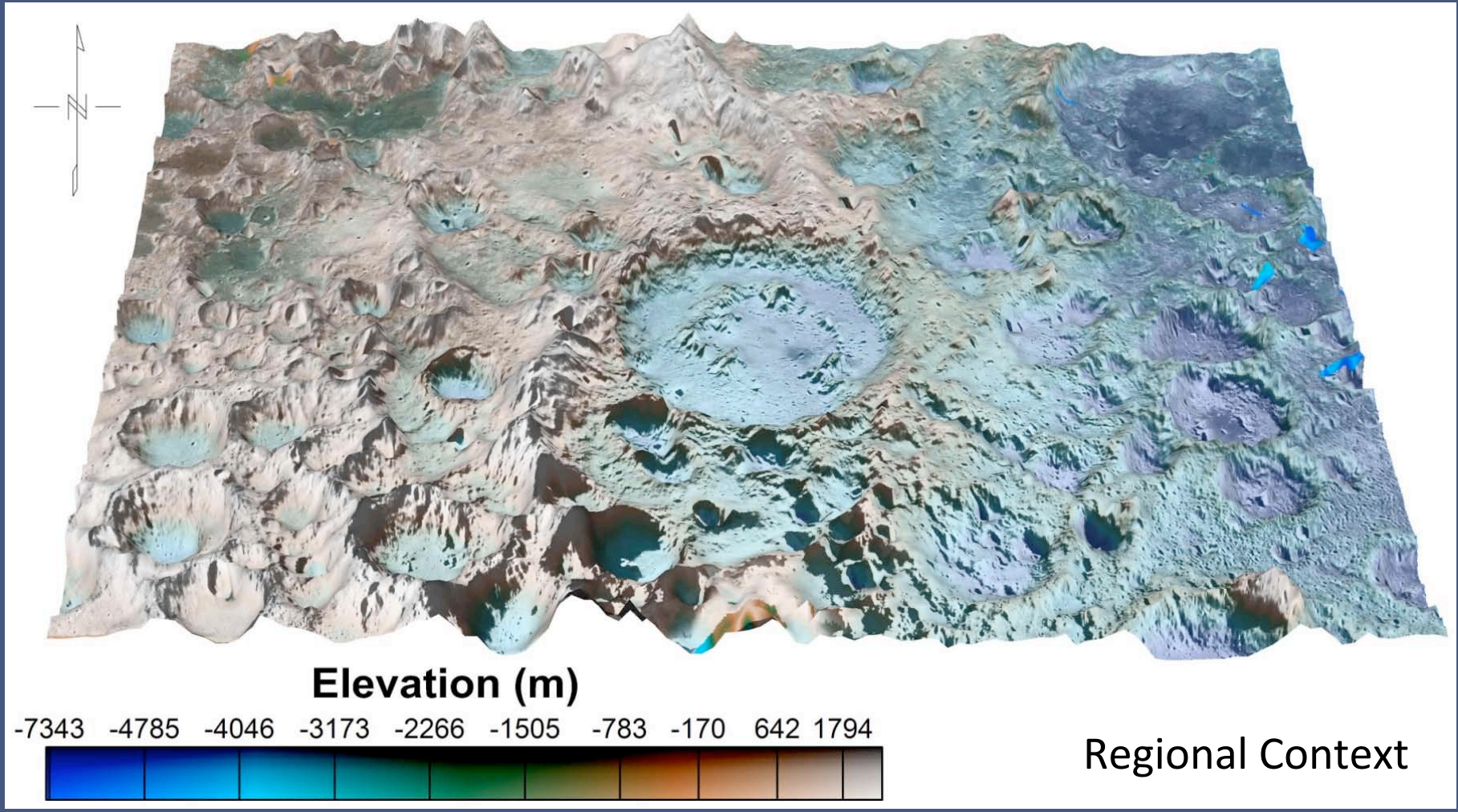


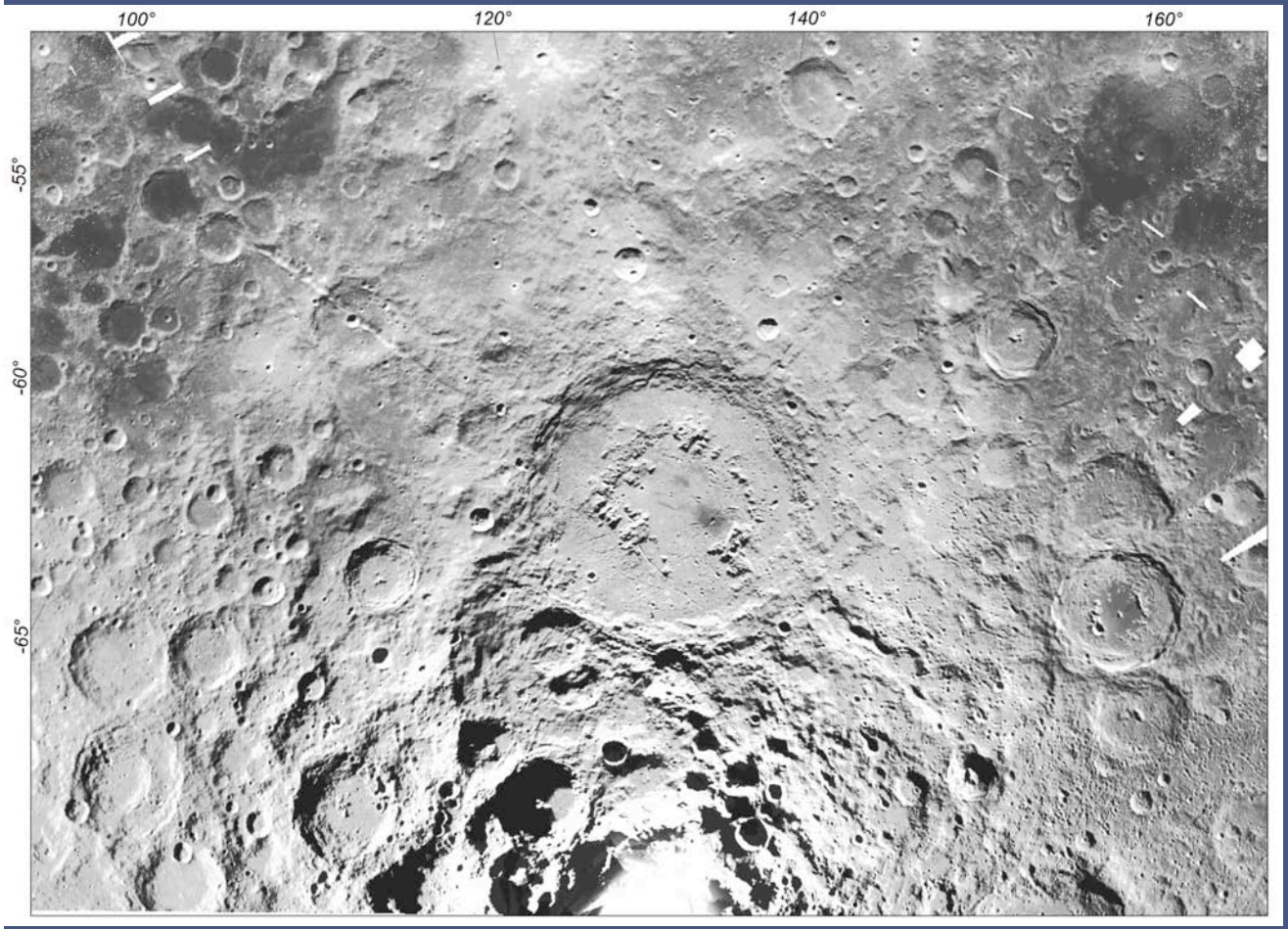
# Where can we look for melts?




Regional Context

*Topography Dependence*
*LRO - LOLA DEM*

# Where can we look for melts?



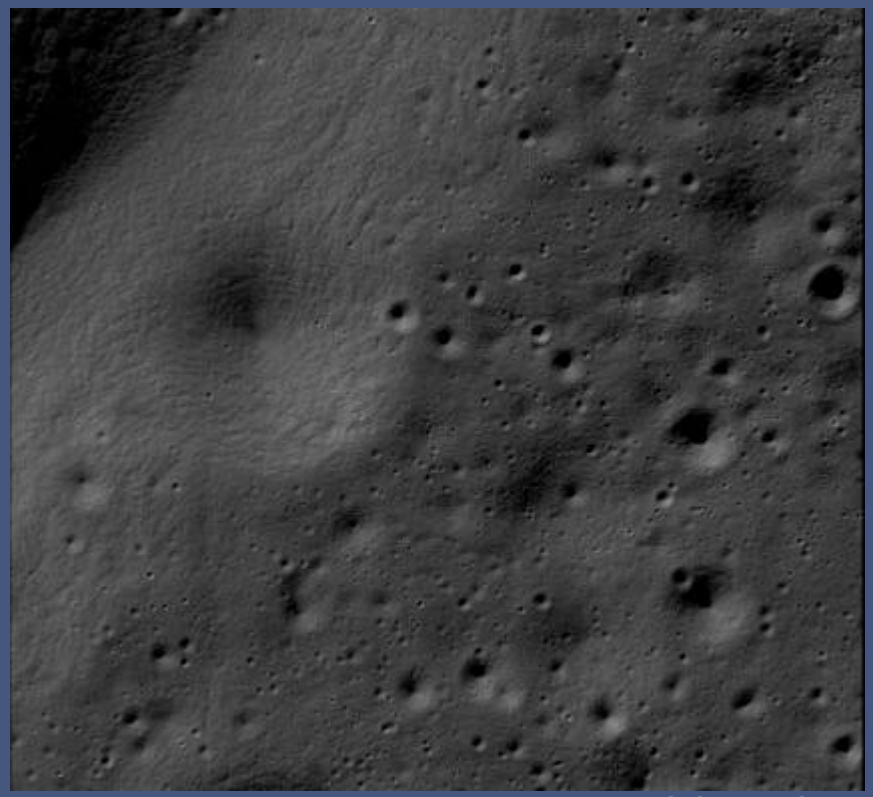

Regional Context

- sampling at internal and external locations
- melts from SPA, Schrödinger, and other nearby craters

CANADIAN CLRN LUNAR RESEARCH NETWORK

# Future Work

- Identify external melt deposits
- Measure melt and ejecta distributions
  - 1,2 crater radii
- Compare results to model predictions
- Fusing data from other instruments
  - LRO (mini-RF)
  - Kaguya (MI)
  - Chandrayaan-1 ($M^3$)



LROC (NAC)
M105953715LC

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