Scientific Opportunities for Human Exploration of the Moon's Schrödinger basin

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9. Lunar and Planetary institute, Houston, TX, USA

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science and exploration

Ever since the world marveled at the first step, we've been diligently contemplating the second.

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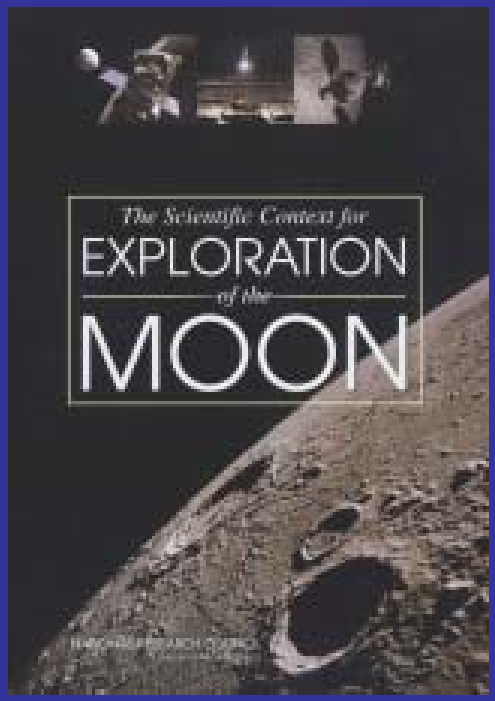
Lunar Exploration Summer Intern Program

10 week graduate student intern program at LPI

The team (from left to right)

- Kevin G. Thaisen
- Katie O'Sullivan
- Tomas Kohout
- Anna Losiak
- D. A. Kring (supervisor)
- Soshana Weider

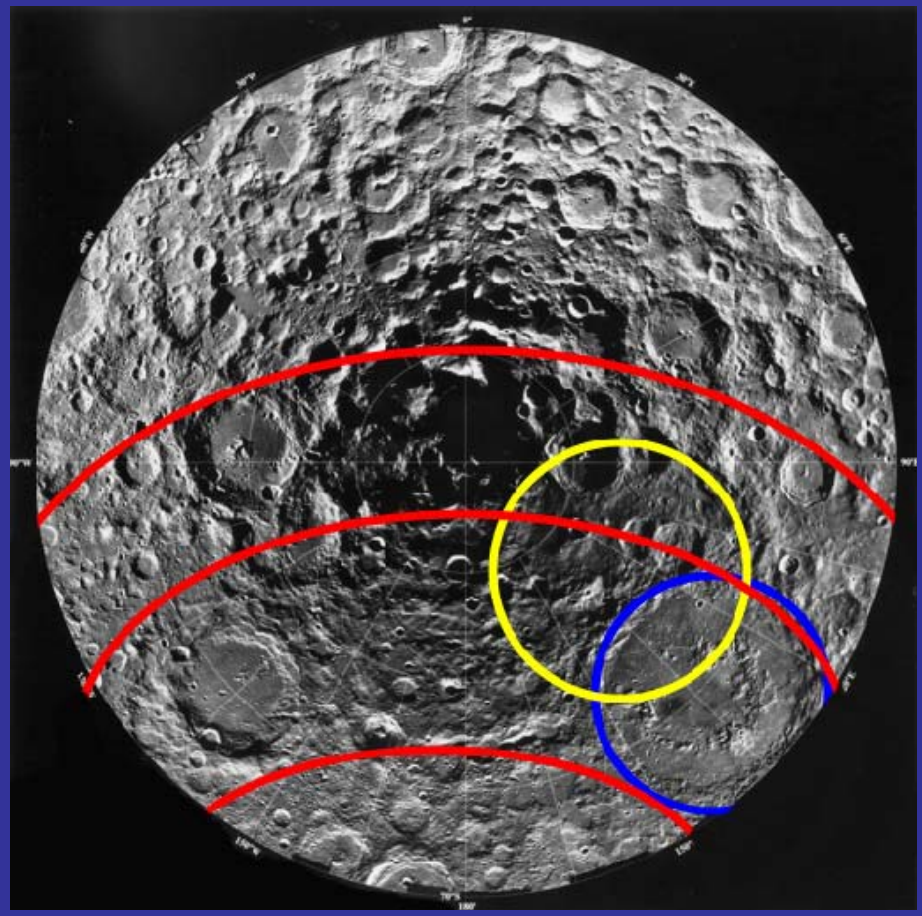
National Research Council The Scientific Context for Exploration of the Moon



- The report describes scientific goals for Lunar exploration
- The purpose of our project was to evaluate the best landing sites to address the NRC’s science goals.

Schrödinger basin

- Main rim diameter 320 km
- Inner ring diameter 150 km
- Depth: 2 - 3 km
- Located near south pole on far side, inside rims of SPA basin
- Early Imbrian age (second youngest basin)
- Well exposed melt and impact breccia
- Deep faults on basin floor
- Antoniadi, Humbolt and Orientale secondary craters are present on the basin floor.
- Two distinct volcanic events
- Mare-type basalt (Late Imbrian or Erathosthenian in age)
- Explosive volcano (Erathosthenian or Copernican in age)



South Pole-Aitken
Amundsen-Ganwindt
Schrödinger

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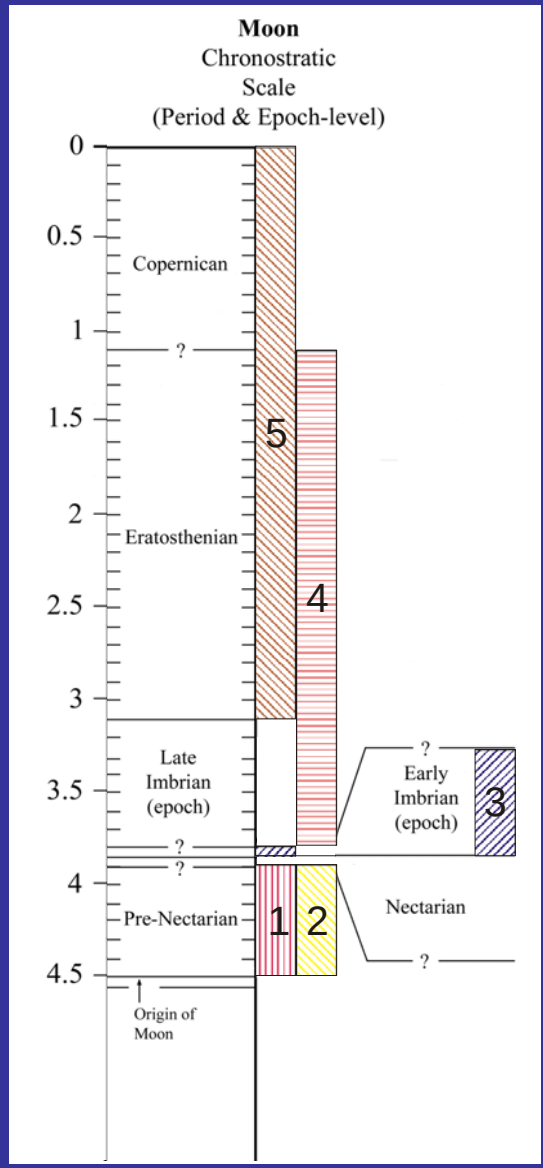
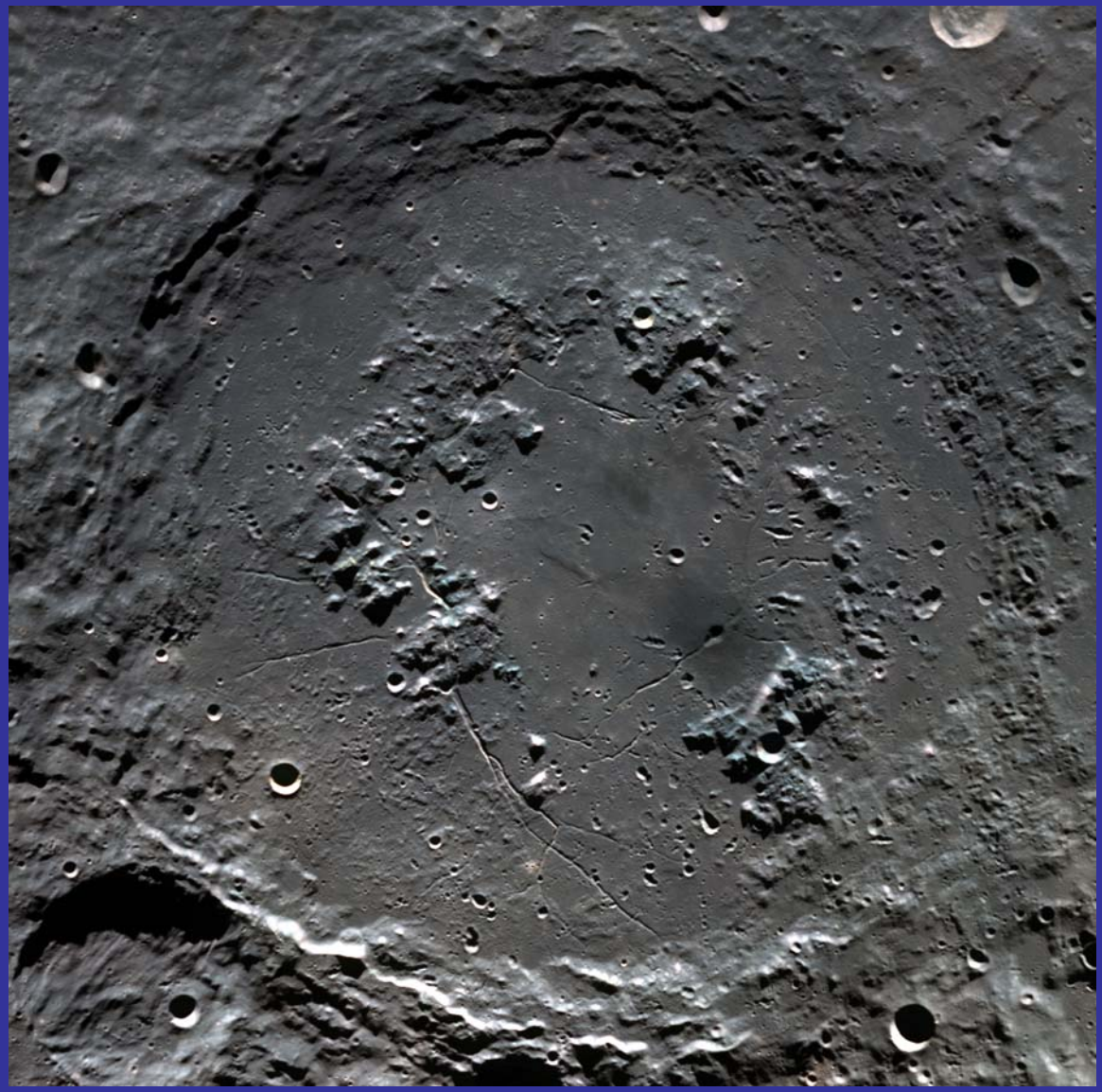


1.South Pole-Aitken
2. Amundsen-Ganwindt
3. Schrödinger
4. Mare-type basalt
5. Explosive volcano

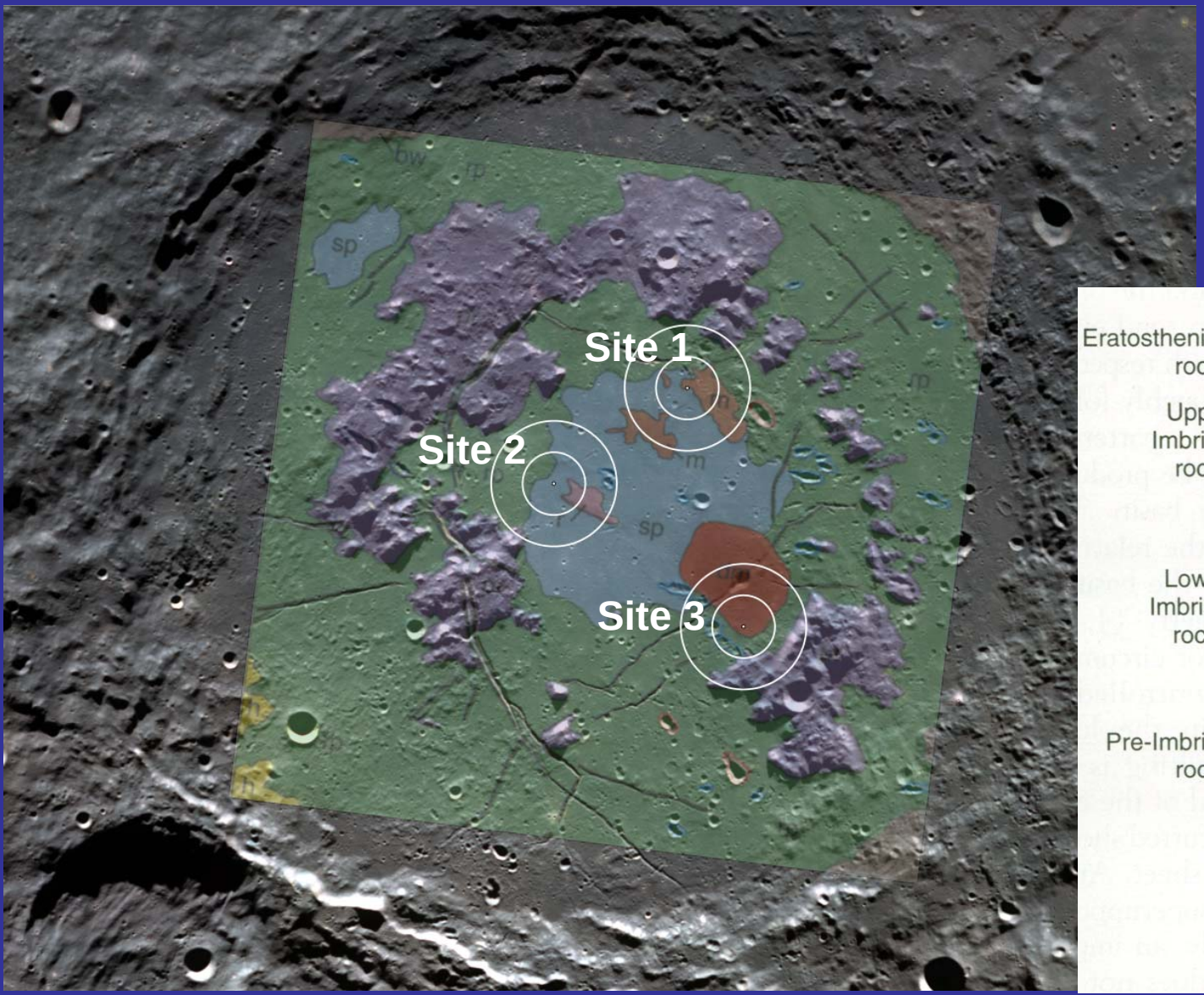
Schrödinger basin



Main scientific objectives within Schrödinger basin

- Date Schrödinger impact event
- Sample basaltic and deep seated explosive volcanic units
- Analyze potential volatile products of crustal and mantle degassing along deep fractures
- Study ghost craters flooded by a melt sheet
- Study secondary craters on the basin floor
- Date the material from Schrödinger’s inner ring (possible uplift of the SPA material?)

Potential landing sites



Explanation

Eratosthenian rocks	dm	Dark mantle material
Upper Imbrian rocks	m	Mare material
	r	Ridged material
Lower Imbrian rocks	sp	Smooth plains material
	rp	Rough plains material
	h	Hummocky material
	bw	Basin wall material
Pre-Imbrian rocks	pr	Peak ring material

Antoniadi secondary craters

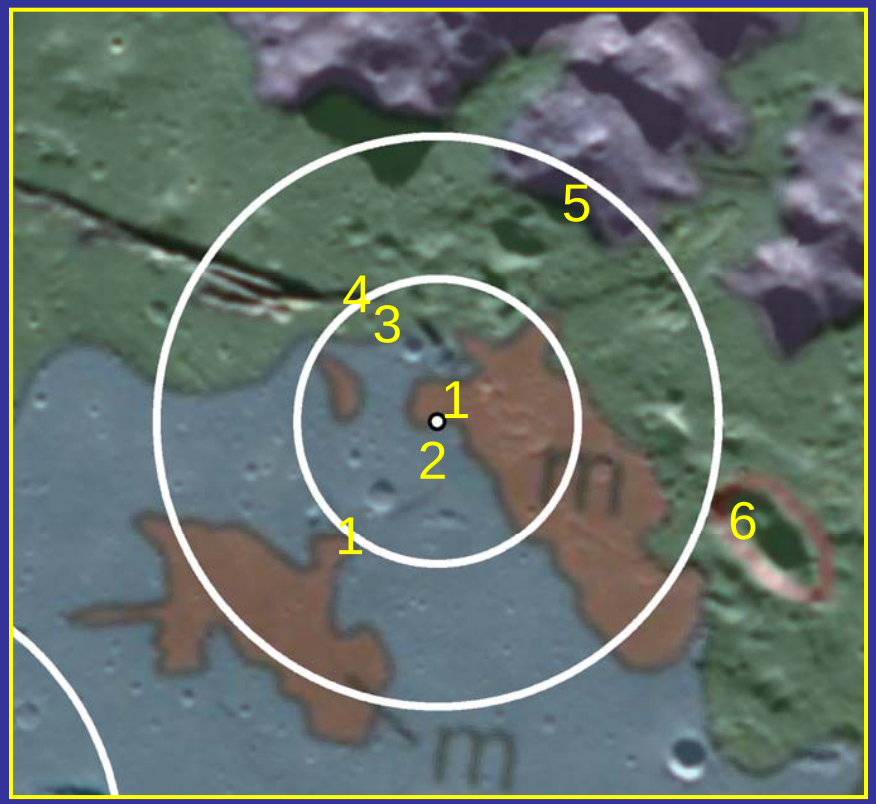
Humboldt secondary craters

Orientale secondary craters

Normal faults bounding rilles

White circles outline 10 and 20 km EVA radius. Geology by Shoemaker et al., 2004

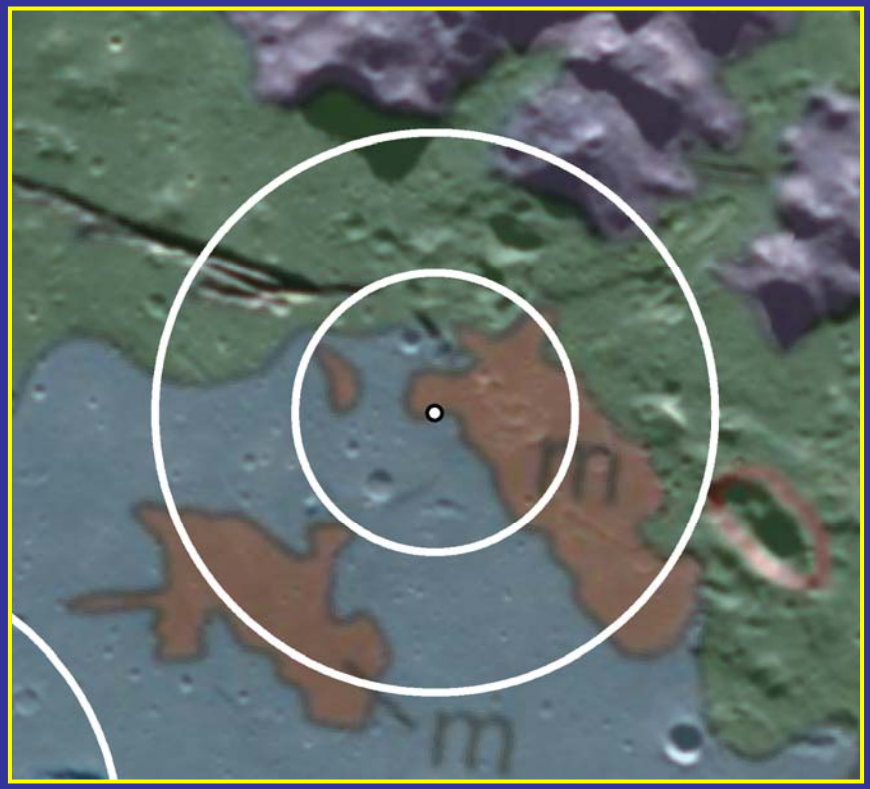
Site 1



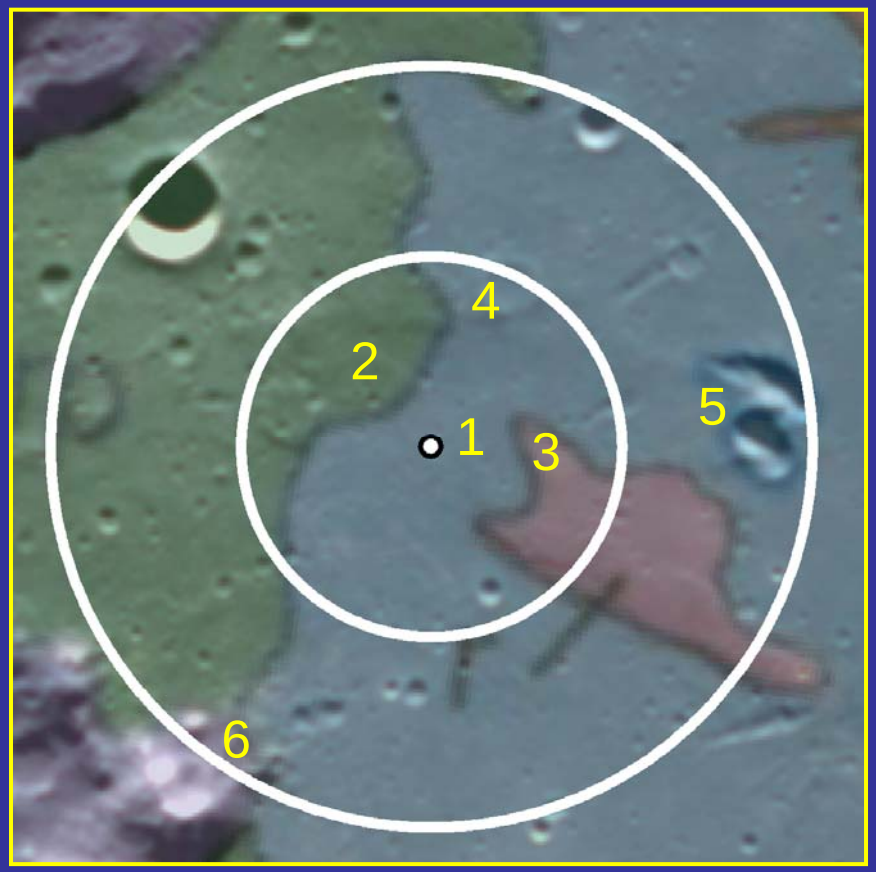
Potential travers stations

1. Basaltic volcanic units
2. Smooth plains material (central impact melt sheet)
3. Rough plains material (impact melt breccia)
4. Deep fracture
5. Inner ring material
6. Orientale secondary crater

Site 1



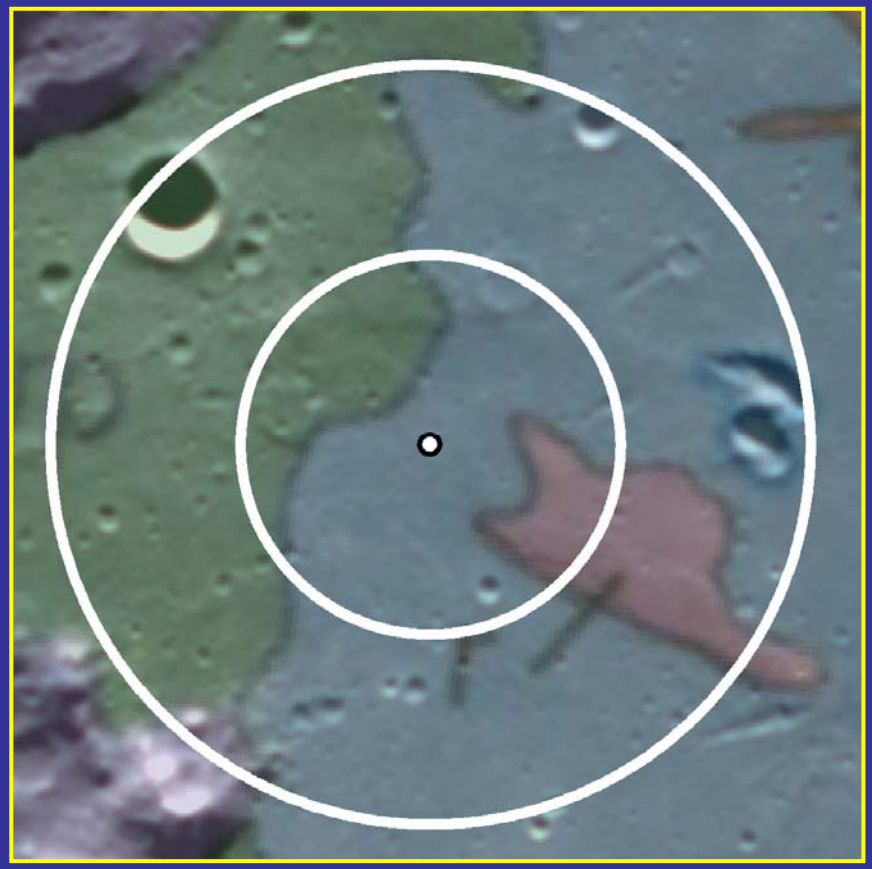
Site 2



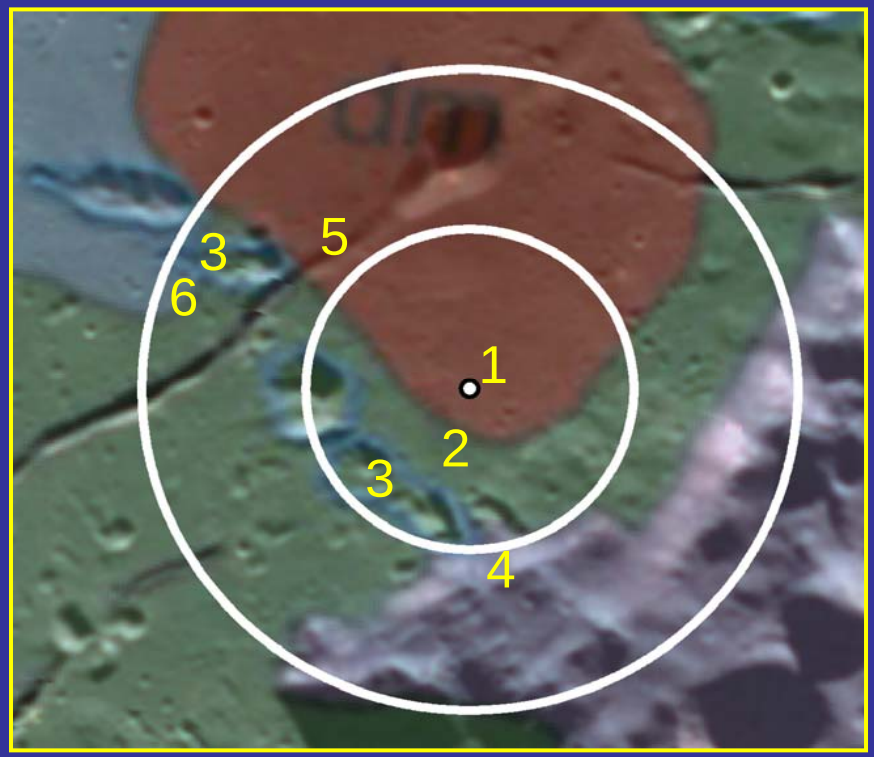
Potential travers stations

1. Smooth plains material (central impact melt sheet)
2. Rough plains material (impact melt breccia)
3. Ridged material
4. Ghost craters
5. Antoniadi secondary crater
6. Inner ring material

Site 2



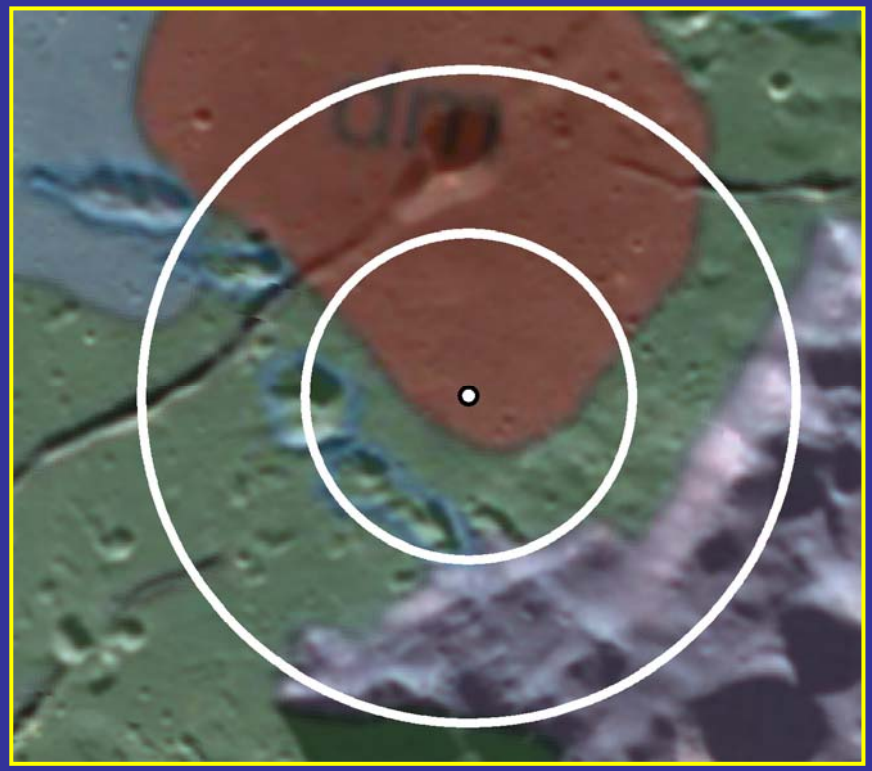
Site 3



Potential travers stations

1. Explosive volcanic unit
2. Rough plains material (impact melt breccia)
3. Antoniadi secondary crater
4. Inner ring material
5. Deep fracture
6. Smooth plains material (central impact melt sheet)

Site 3



Conclusions

- Number of high priority scientific goals can be answered within Schrödinger basin

- However, there is a need for new observations in order to proceed with more detailed EVA plan
  - High resolution imaging (e.g., LROC-NAC)
  - Compositional information on various units
  - Subsurface sounding and geophysical modeling
  - Precise elevation model for slope calculation

Acknowledgements

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- We would like to thank LPI staff for their help and support

Acknowledgements