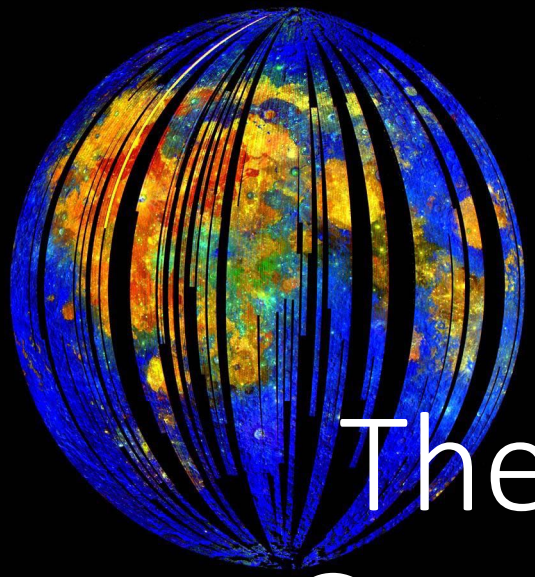
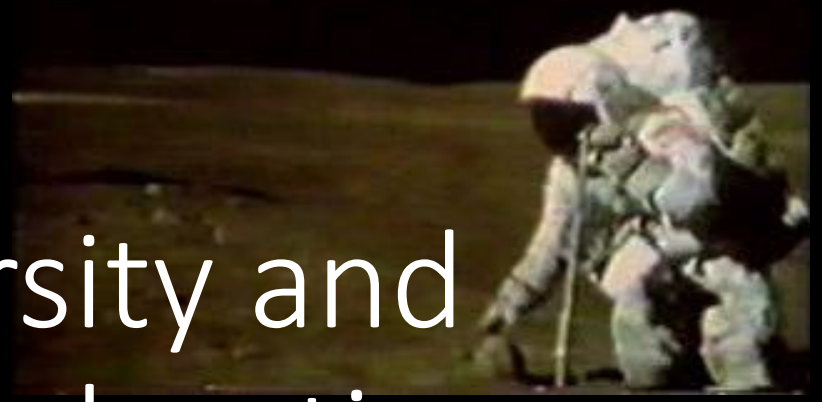
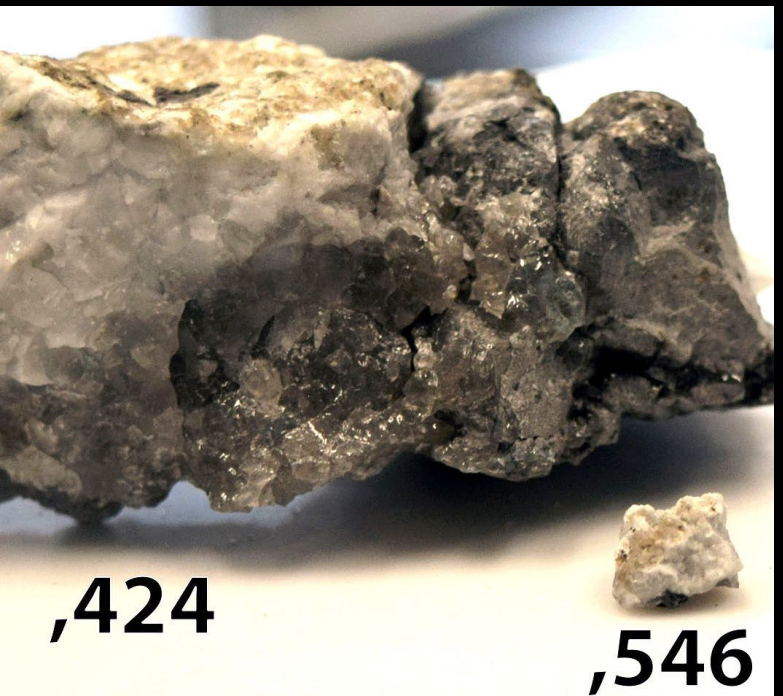
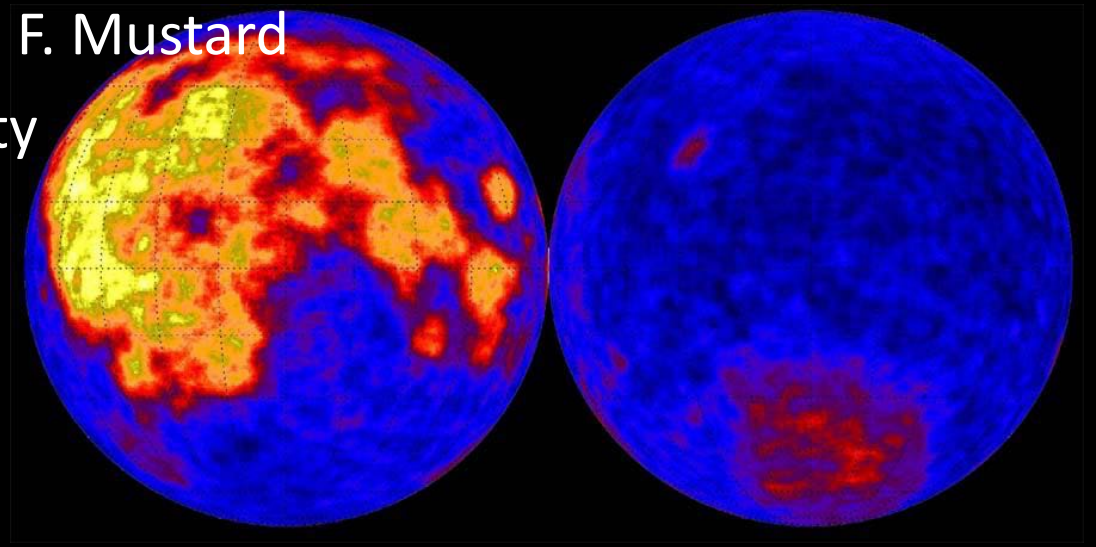




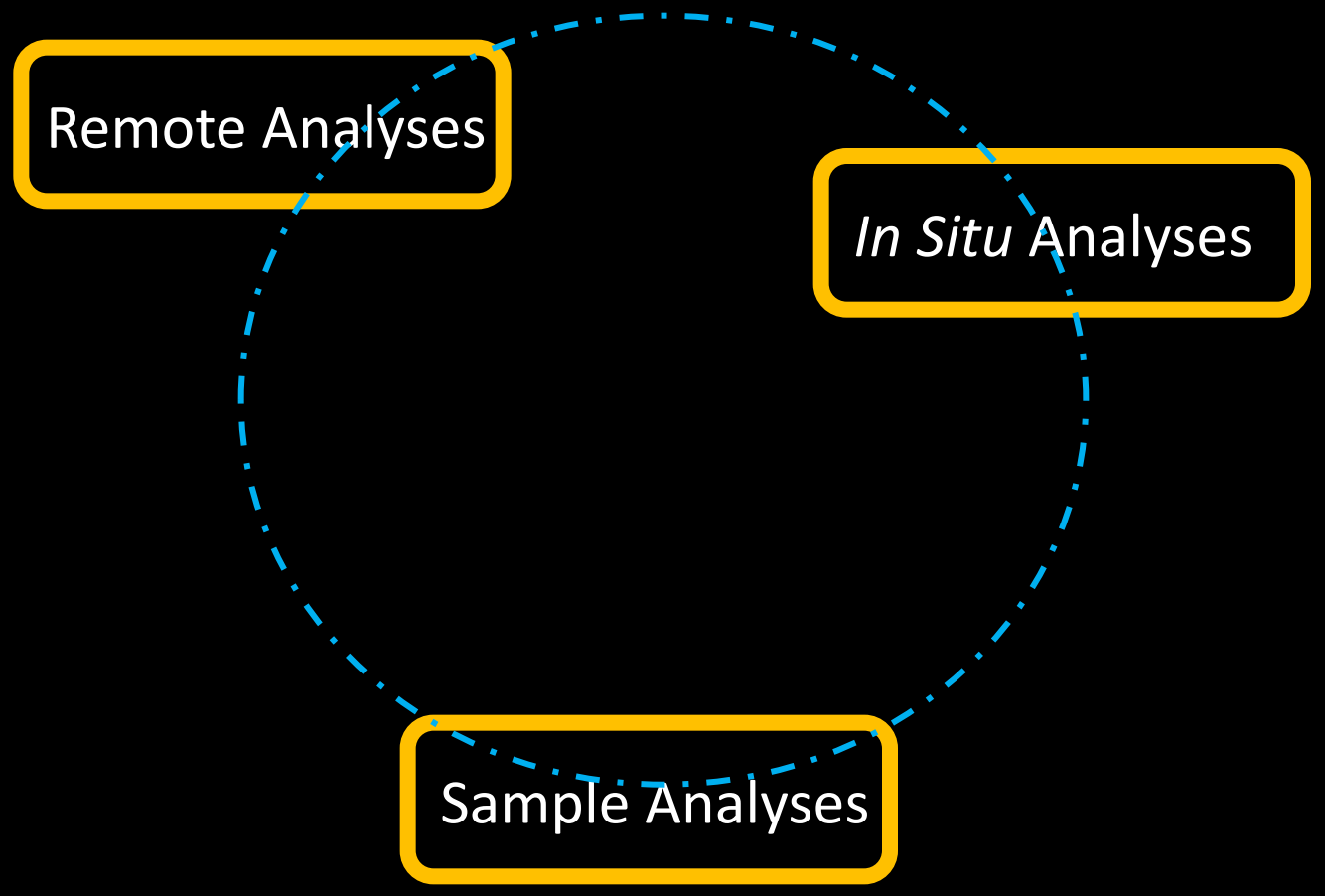
The Importance of Diversity and Ground Truth in Lunar Exploration



Carlé M. Pieters and John F. Mustard
Brown University



Exploration of the Solar System



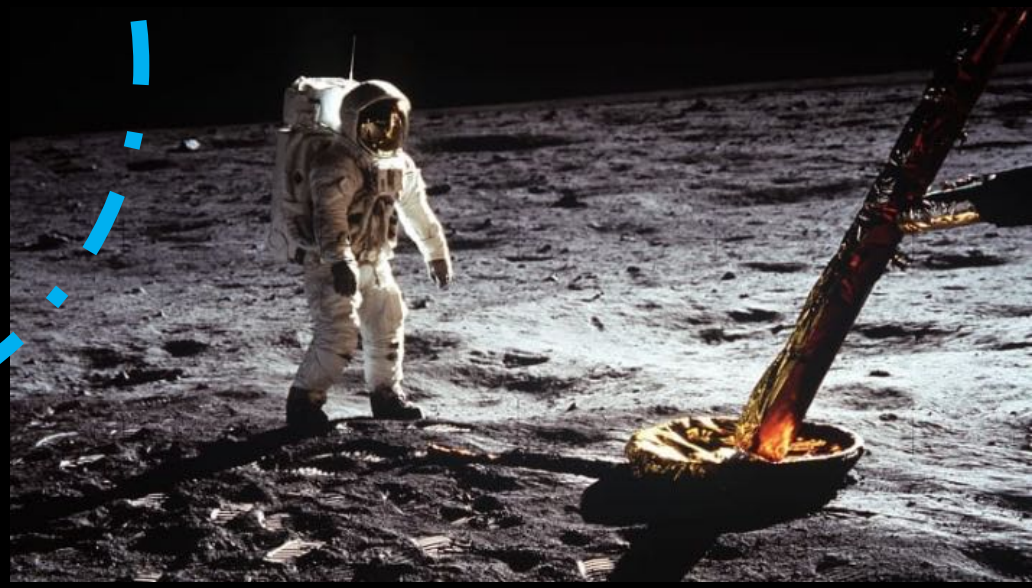
Exploration of the Moon

50 years ago

Remote Analyses

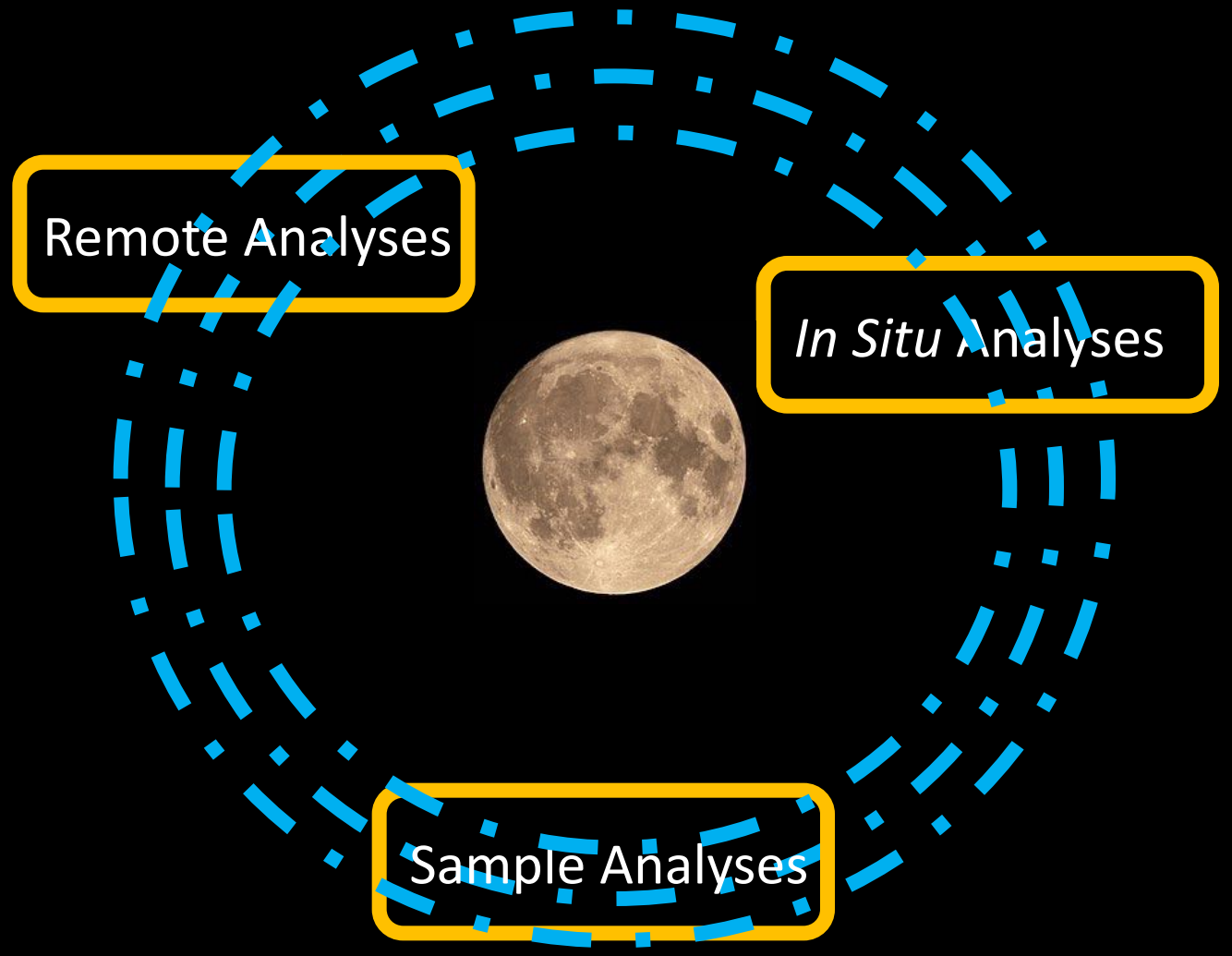
In Situ Analyses

Sample Analyses



Exploration of the Moon

Vast Unknown



Present

Vast Unknown

Exploration of the Moon

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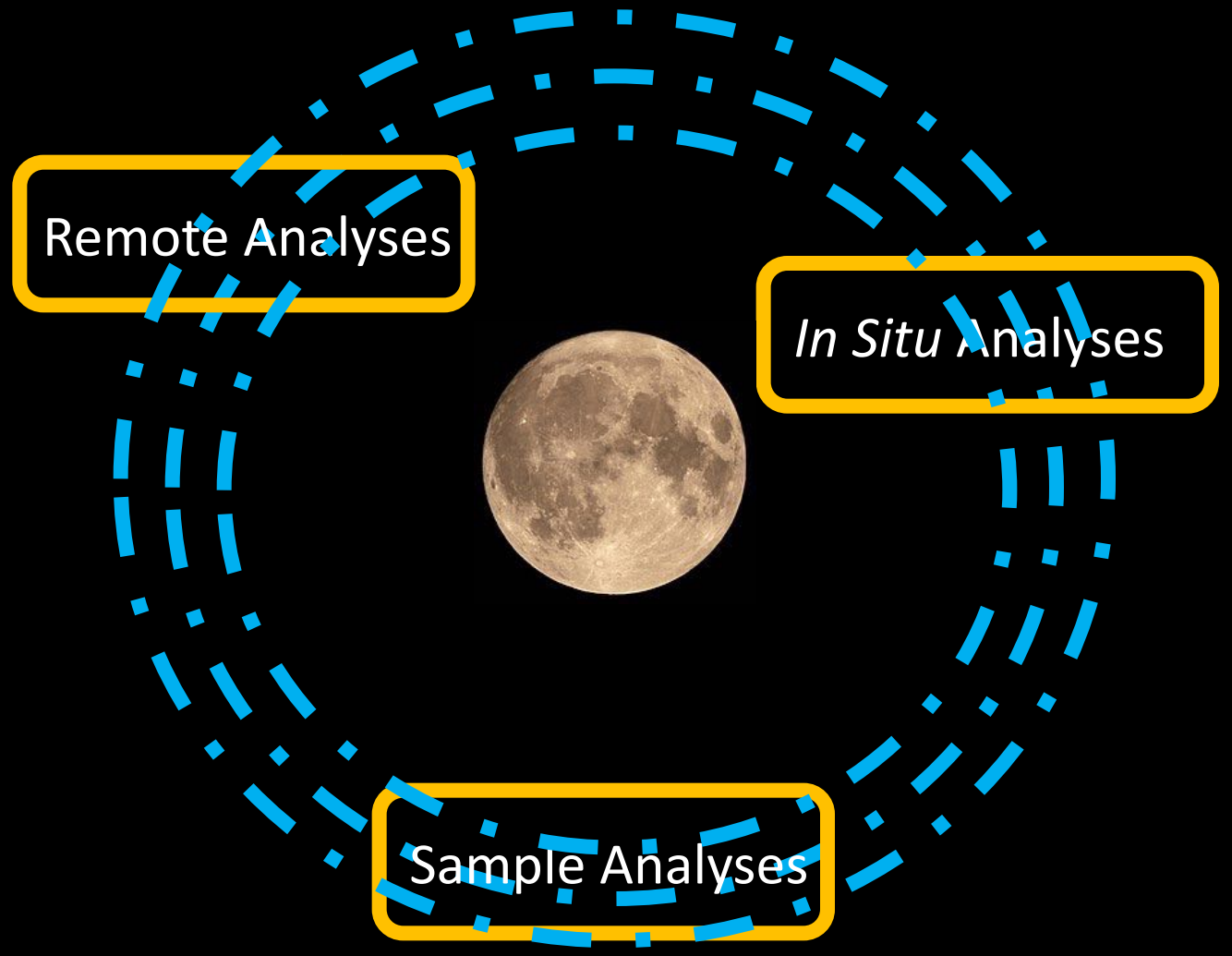

Present

Vast Unknown

Exploration of the Moon

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Exploration of the Moon

The Eighth Continent

Vast Unknown

Vast Unknown

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Exploration of the Moon

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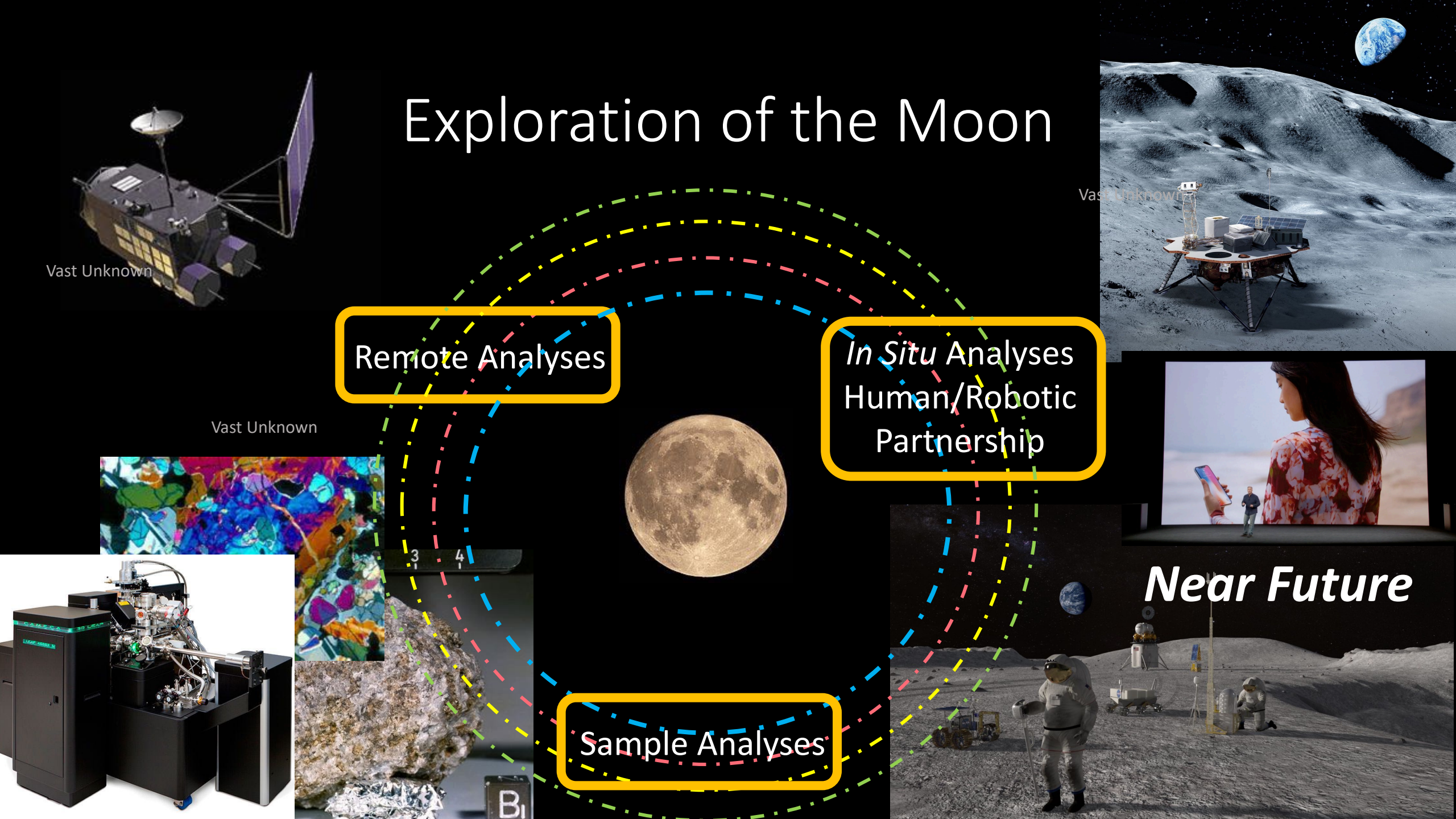
Near Future

Vast Unknown

Vast Unknown

Exploration of the Moon



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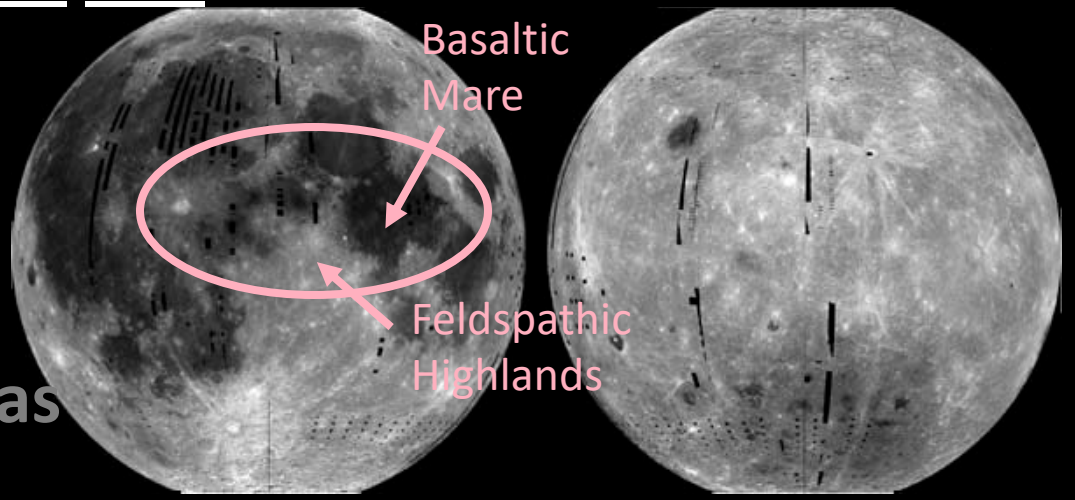

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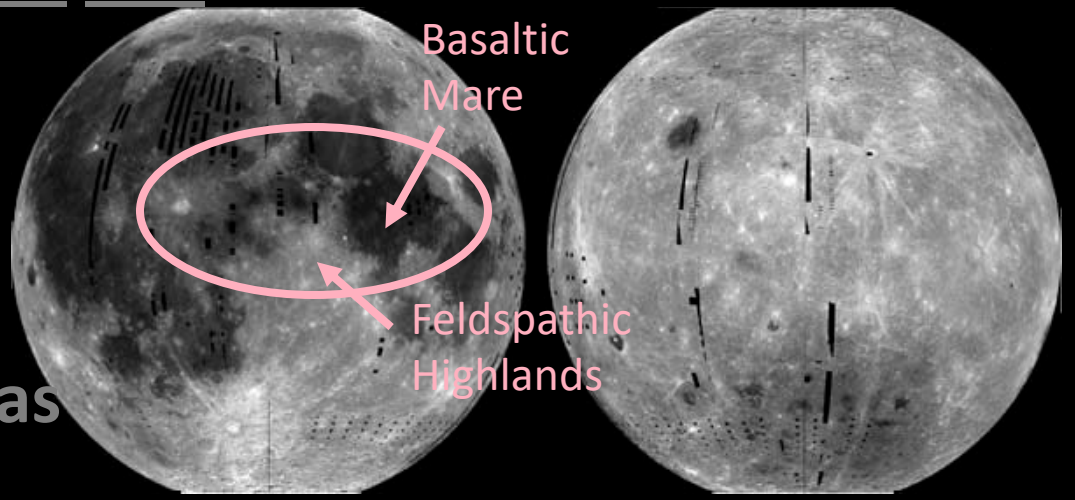

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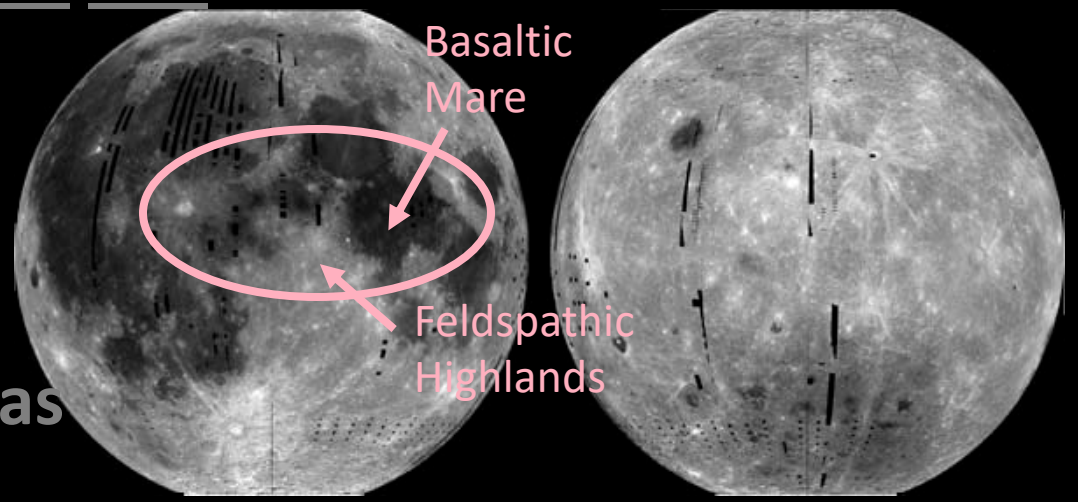

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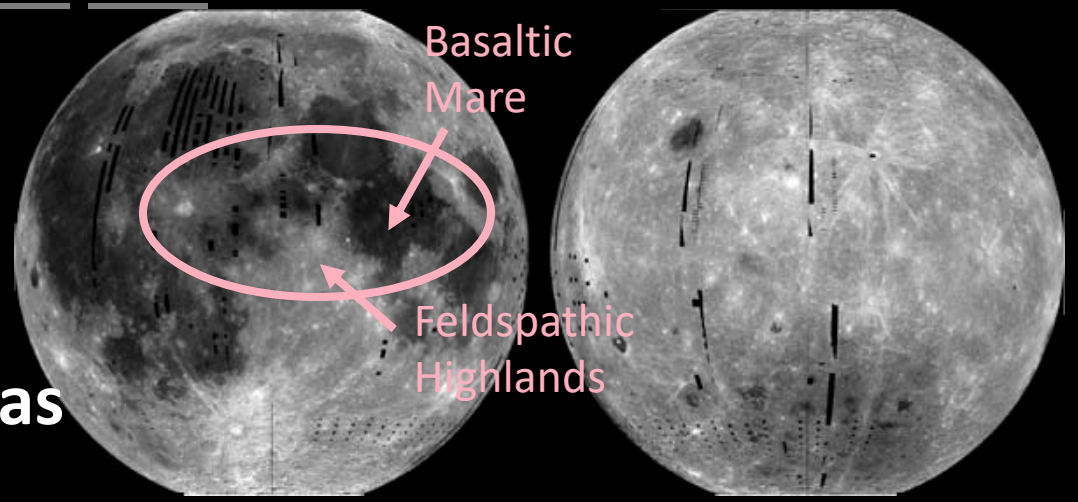

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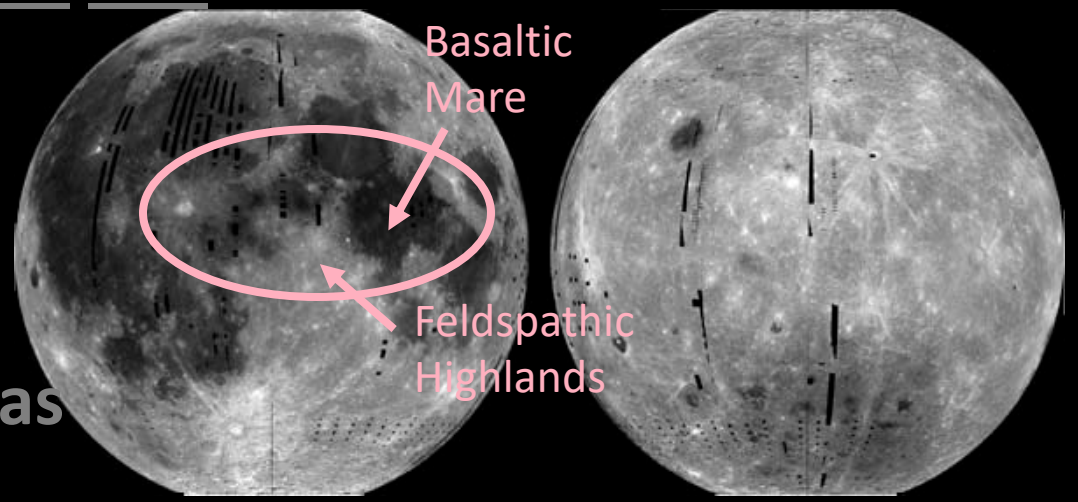

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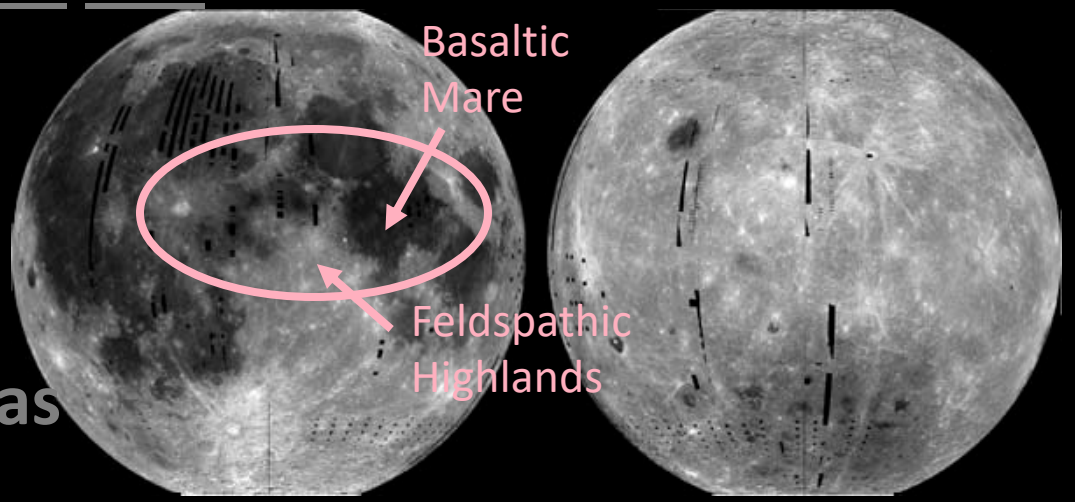

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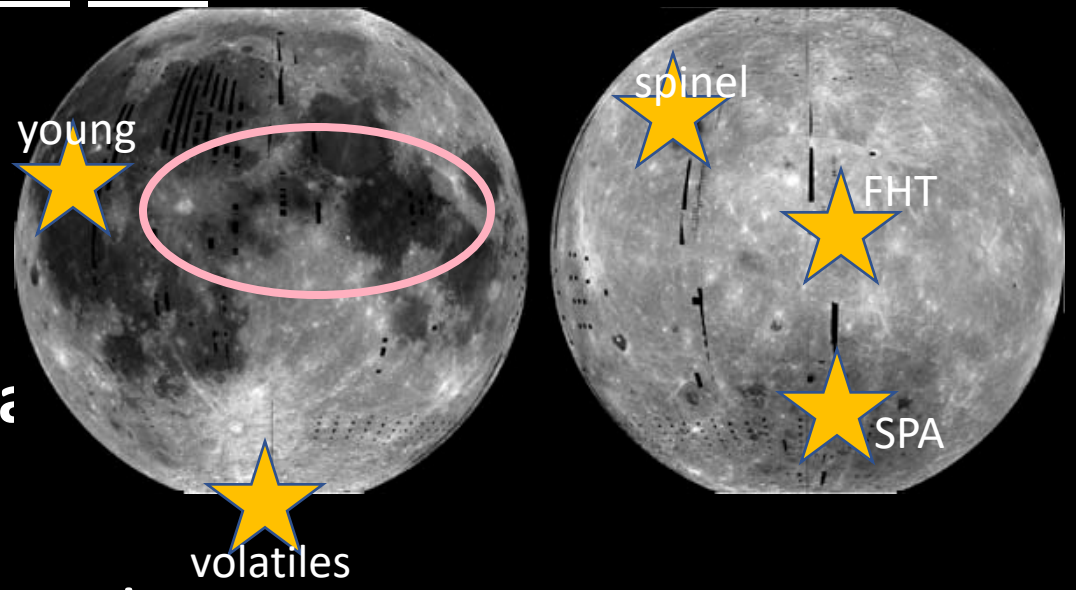
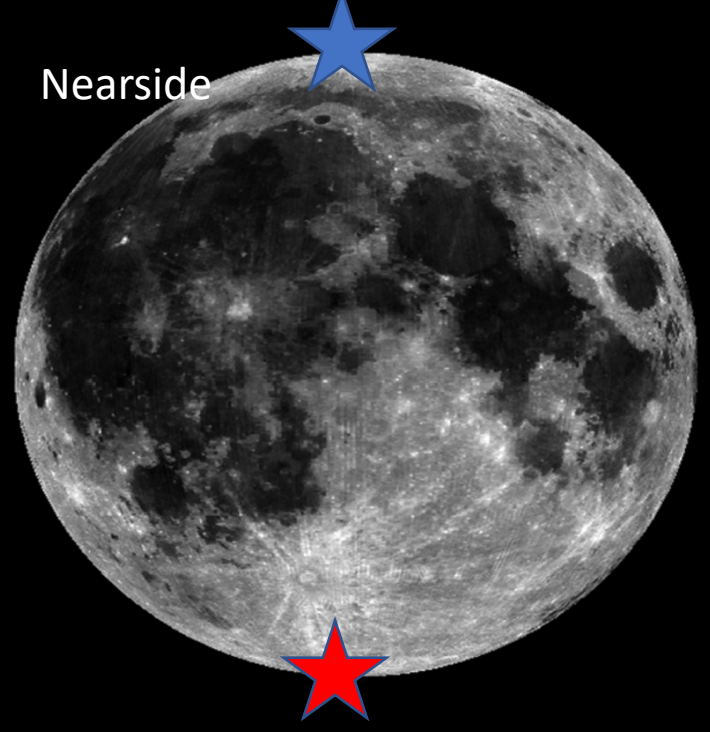
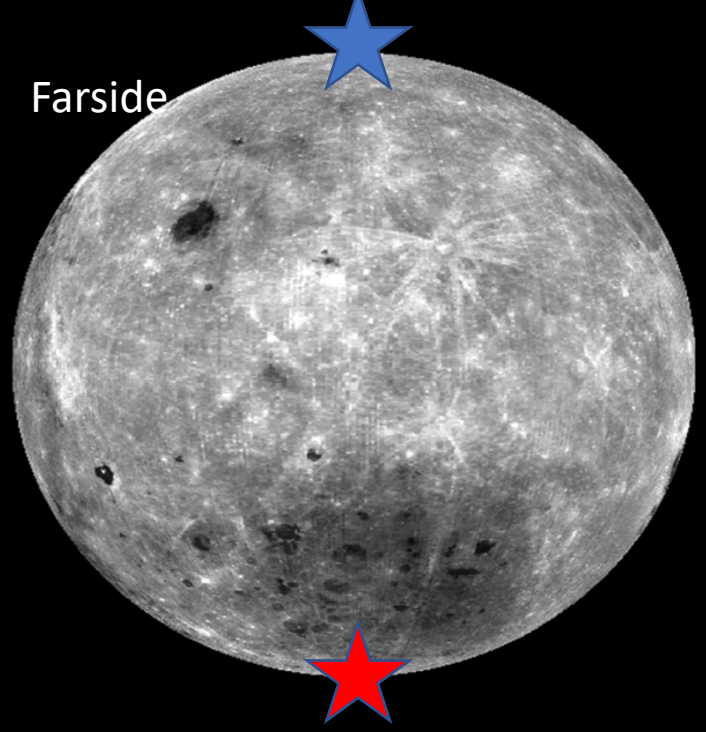


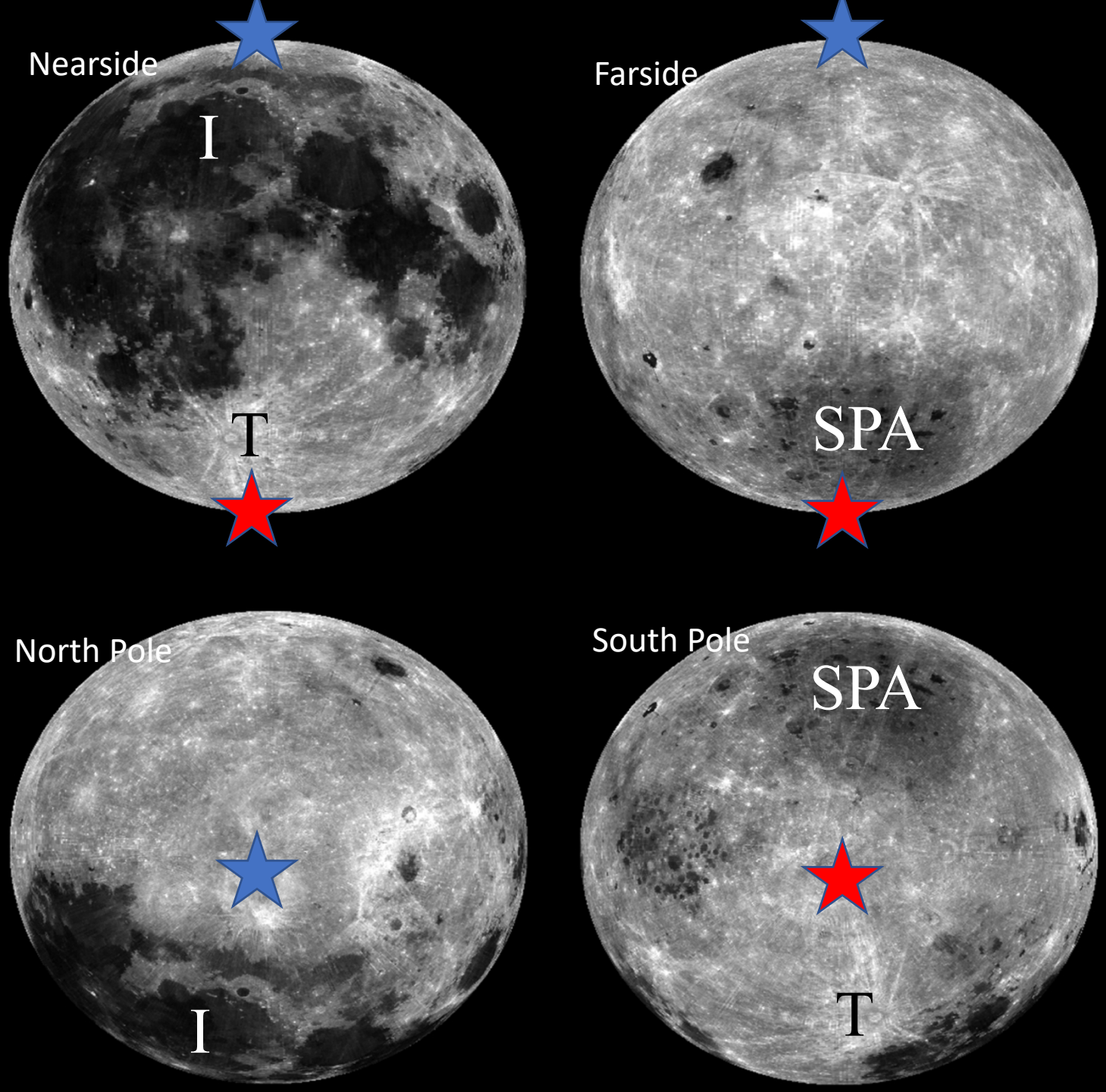




Albedo of the Moon

LOLA Albedo: Lucey et al., 2014, JGR

[no shadows]



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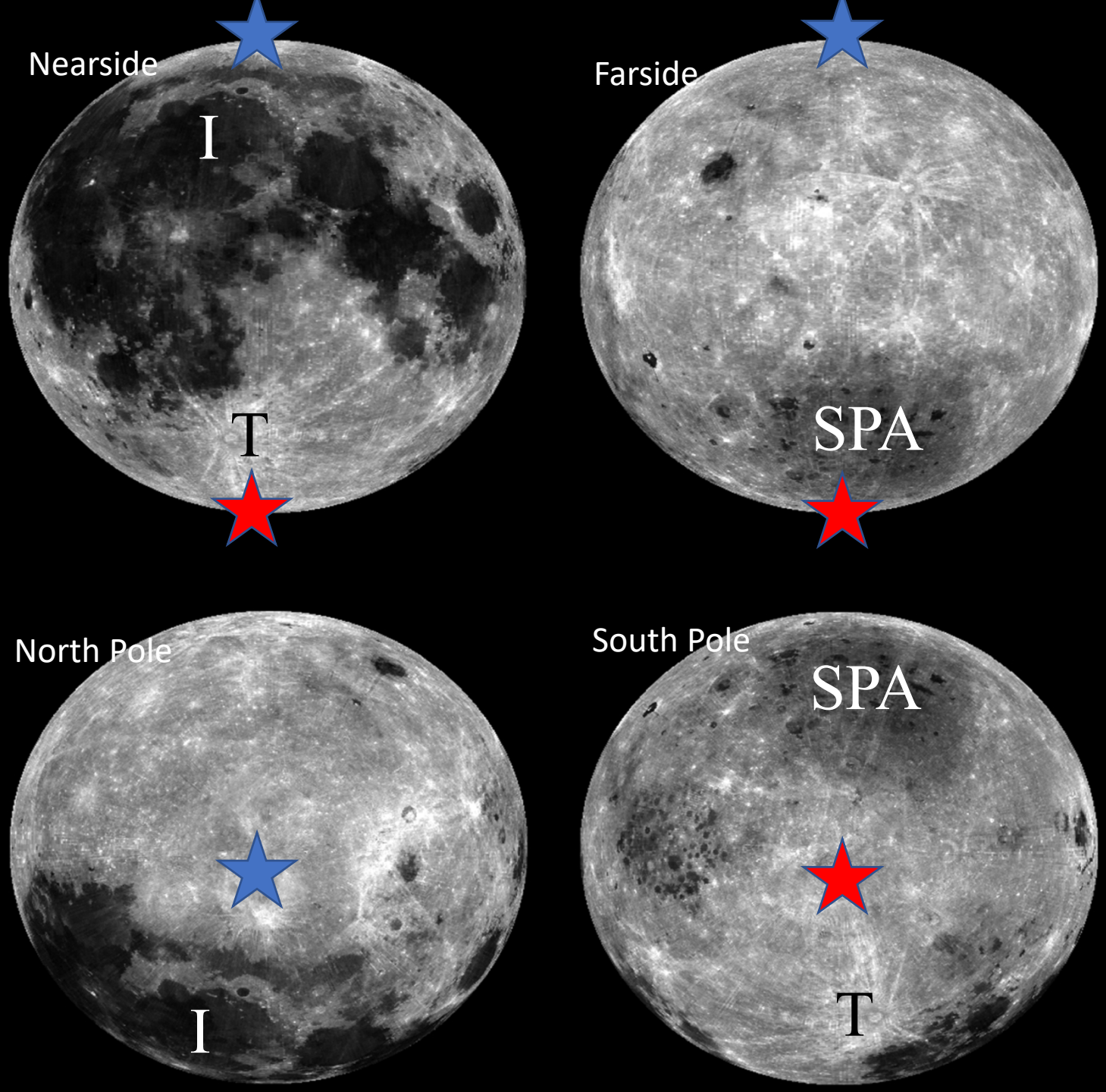

Albedo of the Moon

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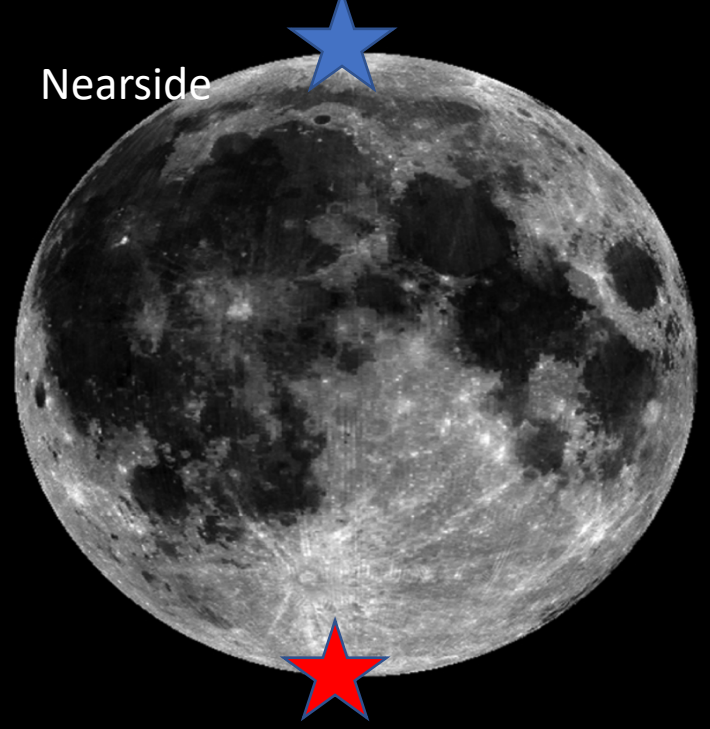
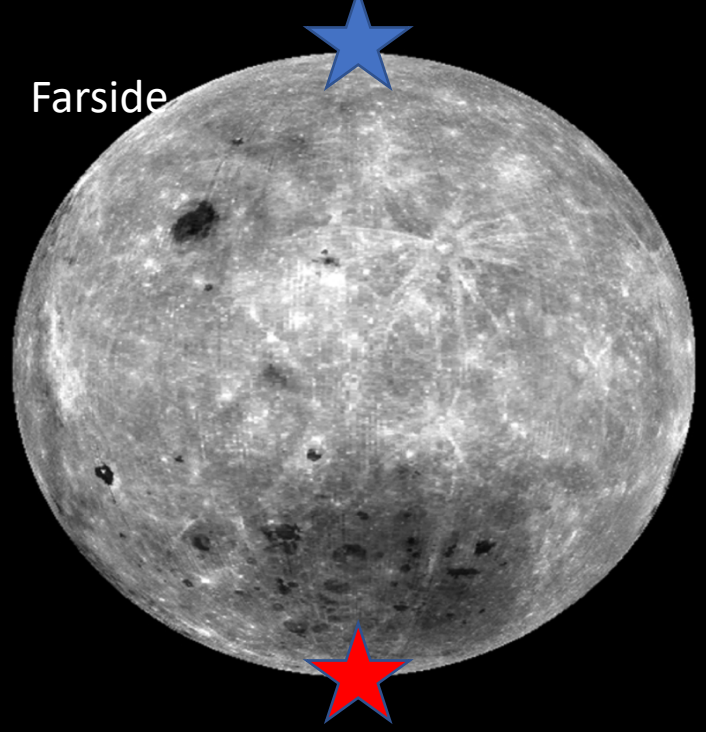
- Both the North and South Pole are in **Feldspathic Highland terrain**, 100s km from mare or mafic terrain.





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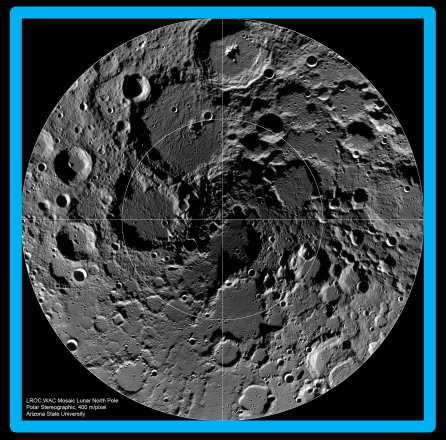
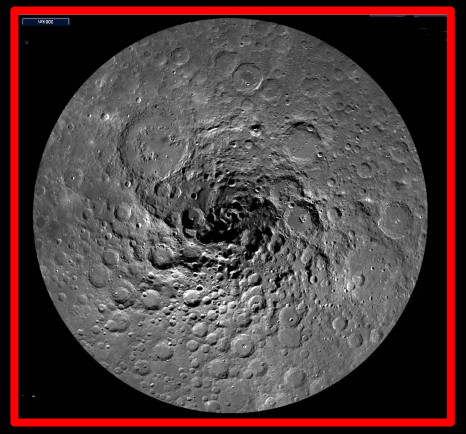
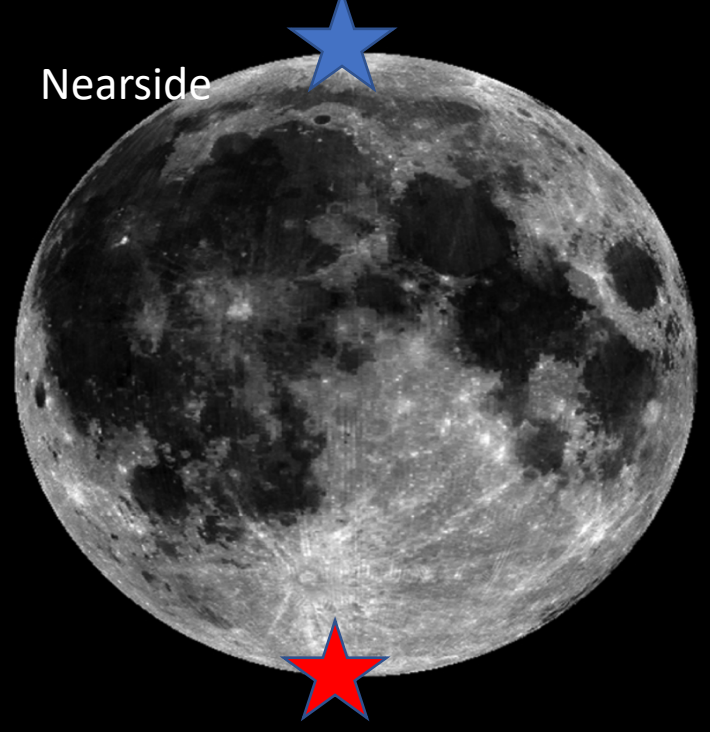
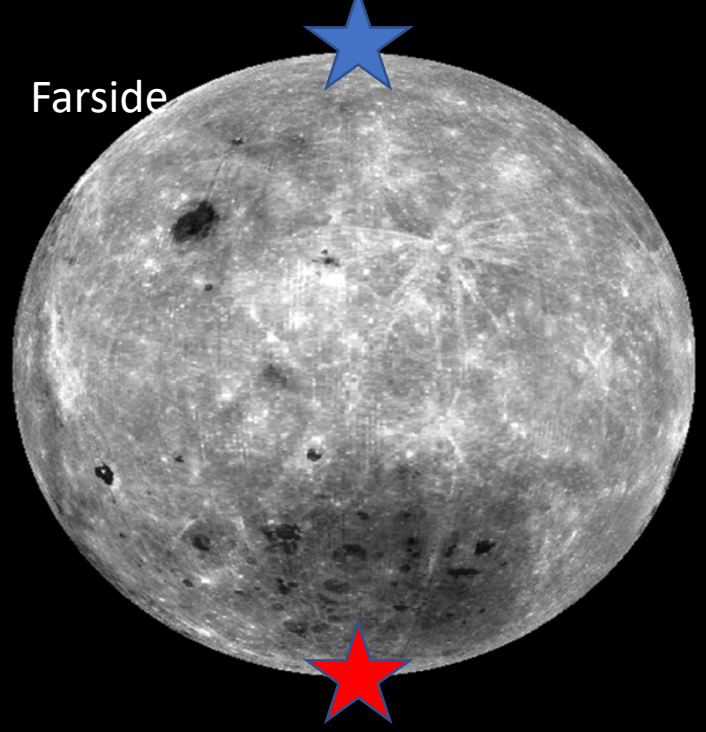




- Both the North and South Pole contain abundant **PSRs**, likely traps for **ancient SS volatiles** of great scientific interest.
- Previous and current activity is at the **South Pole**.





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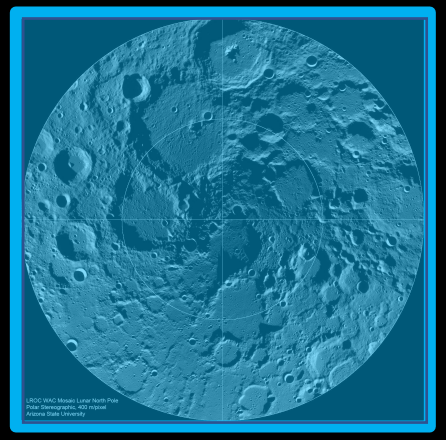
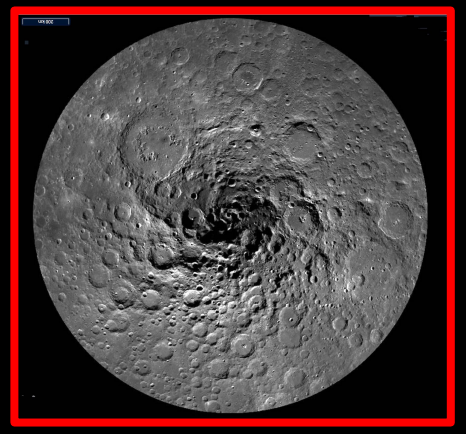
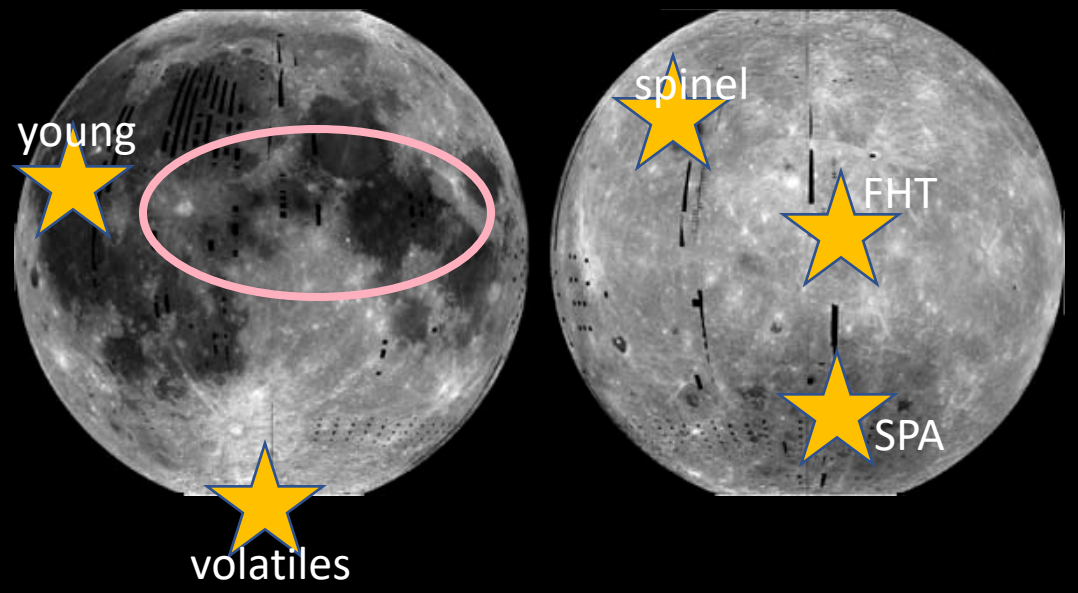




Until the scientific value of ancient materials at the lunar poles are known, it would be prudent to **protect the North Pole** and allow it to **remain** ***pristine*** for science and exploration in the future.

Diversity of Samples Reveal Unknown Unknowns

- Volatiles sequestered at the Poles



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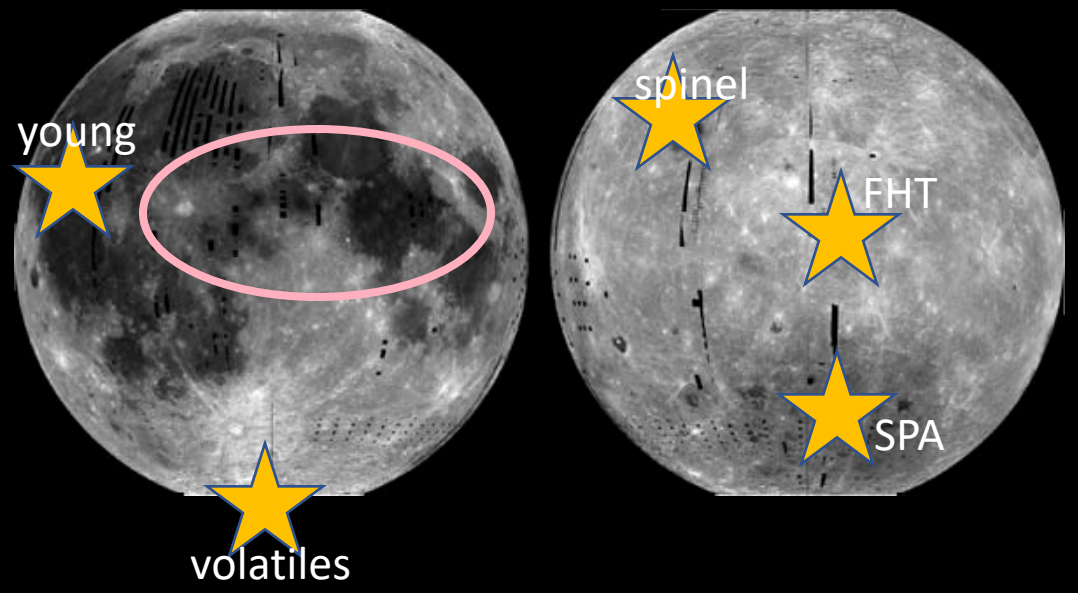

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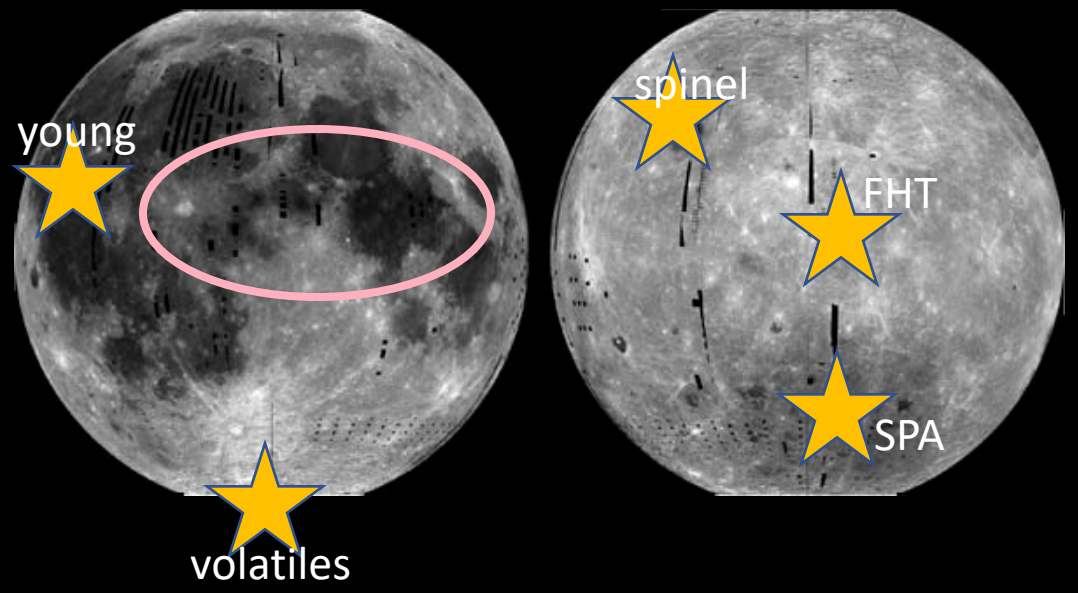

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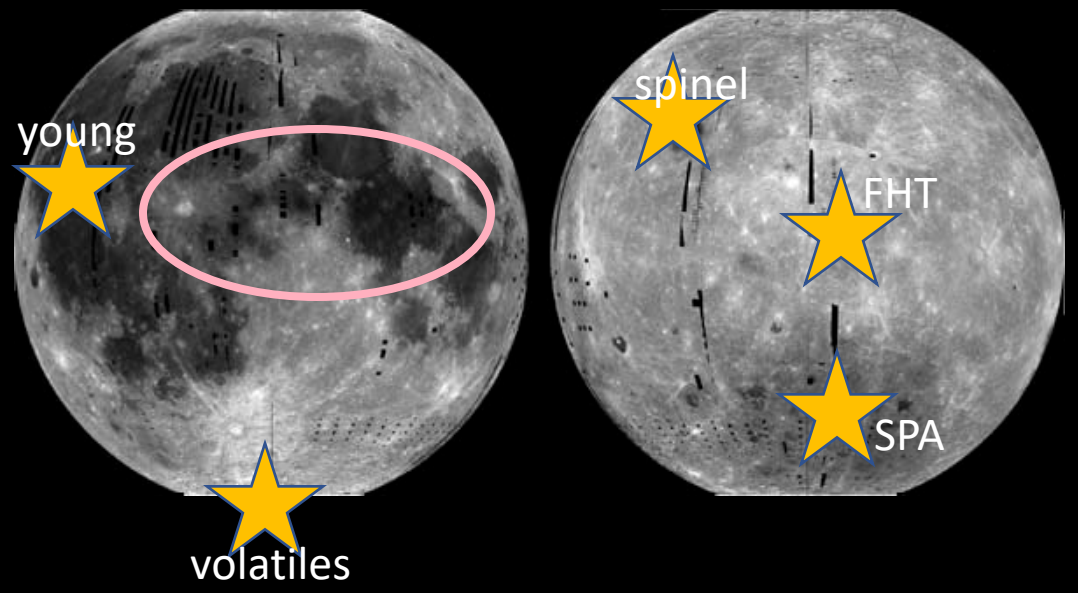

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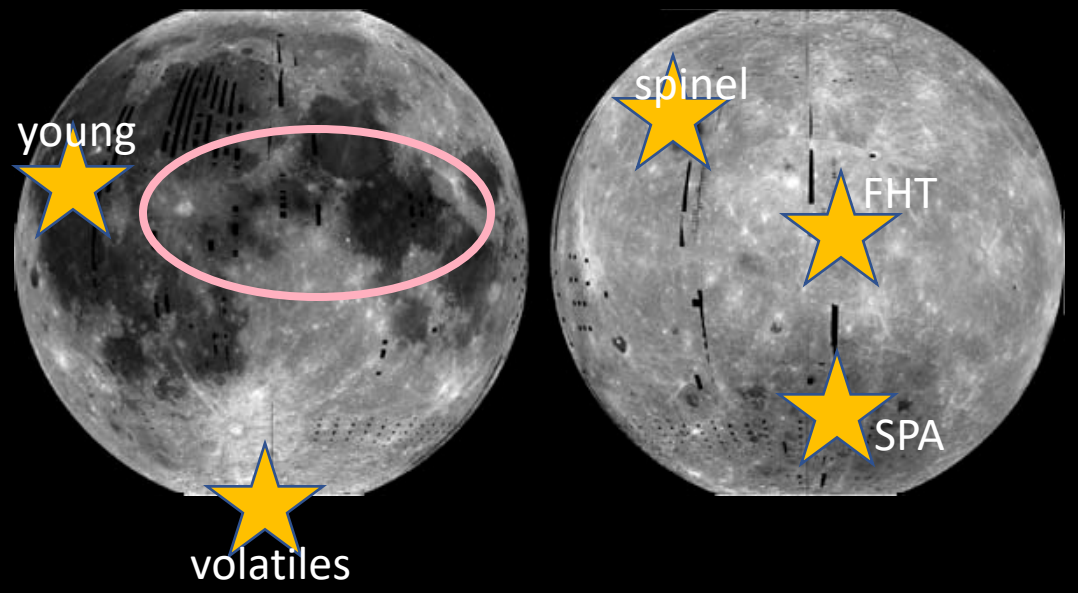
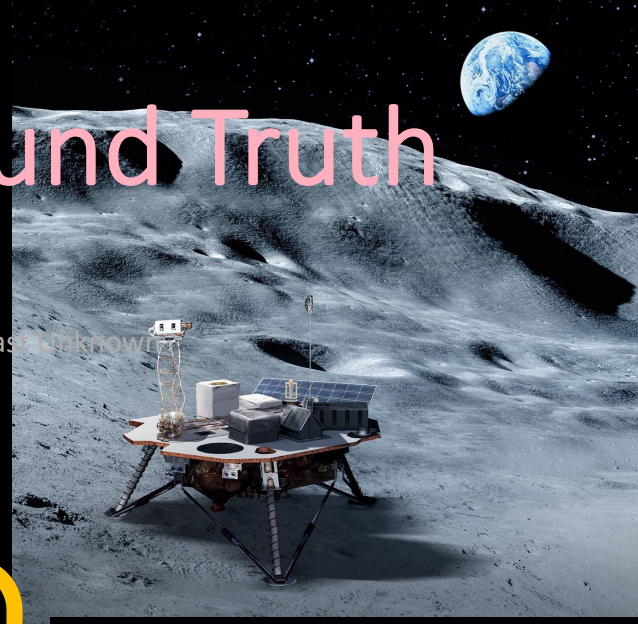
- The vast Feldspathic Highland Terrain on the farside



The Importance of Diversity and Ground Truth as We Explore the Moon

Vast Unknown

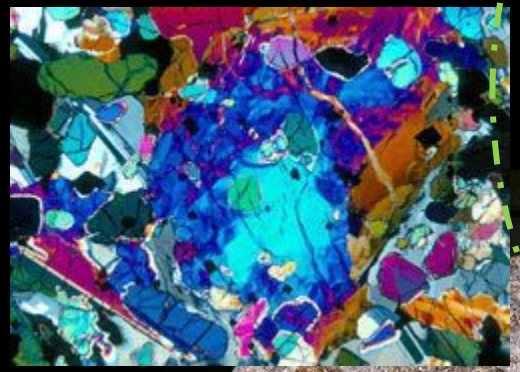


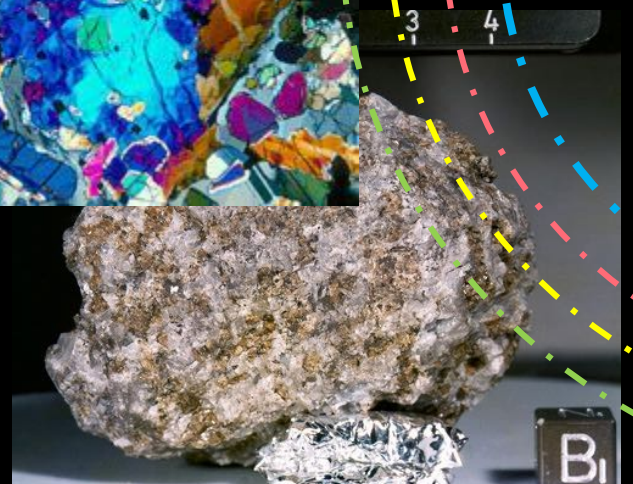
Vast Unknown

Remote Analyses

In Situ Analyses
Human/Robotic
Partnership

Vast Unknown





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