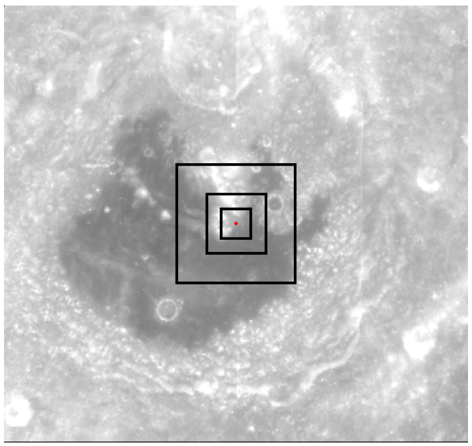
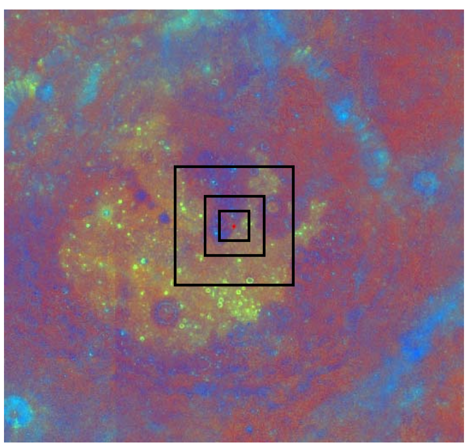
Constellation Program Office Tier 1 Regions of Interest
for
Lunar Reconnaissance Orbiter Camera (LROC) Imaging





Regions of Interest listed in alphabetical order (no priority implied)

East longitudes represented by 0° to 180°, West longitudes represented by 0° to -180°

North latitudes represented by 0° to 90°, South latitudes represented as 0° to -90°

Images come from LROC REACT targeting software (exceptions noted)

Top image, either from Lunar Orbiter global mosaics, or Clementine uvvis 750 nm mosaic

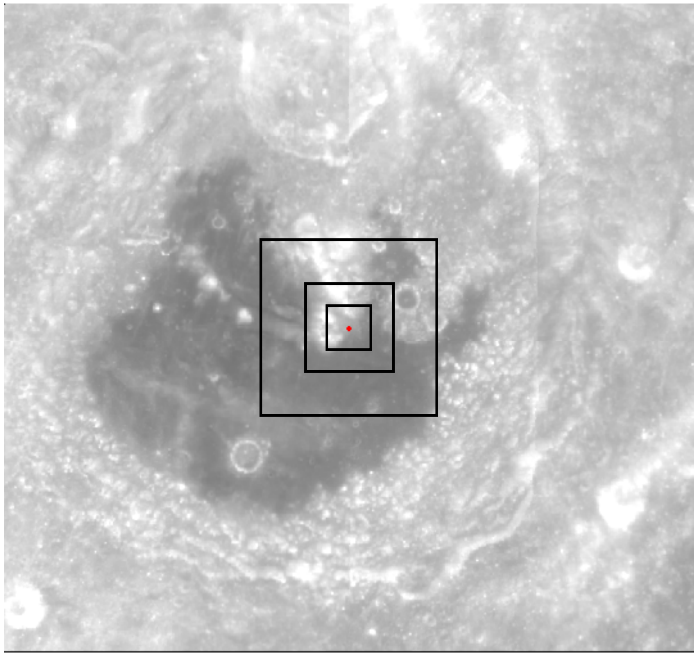
Bottom image, Clementine uvvis mineral ratio map
blue controlled by 415 nm/750 nm ratio
red controlled by 750 nm/415 nm ratio
green controlled by 750 nm/950 nm ratio

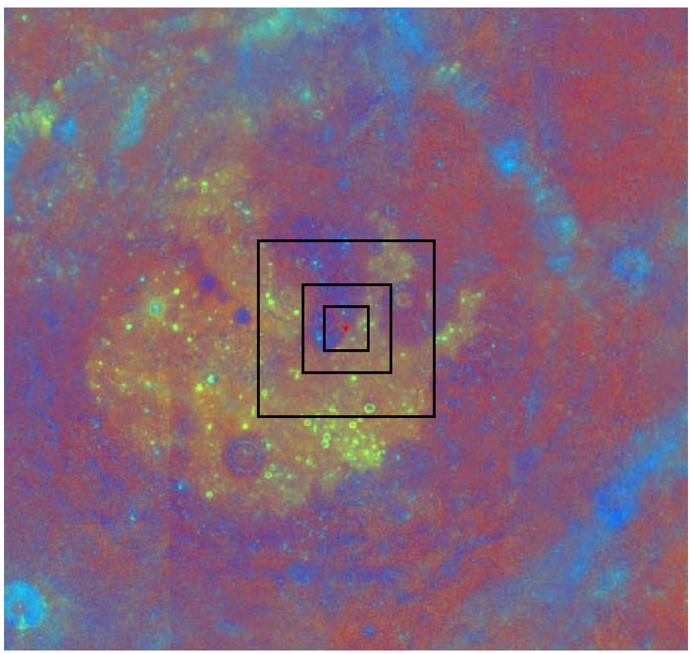
Boxes on images represent region of interest

Inner box, 10 x 10 km (LROC priority 1, nadir & stereo)

Middle box, 20 x 20 km (LROC priority 3, “best effort” nadir & stereo)

Outer box , 40 x 40 km (LROC priority 4, “best effort” nadir only)





Aitken Crater

Location (longitude, latitude): 173.48, -16.76

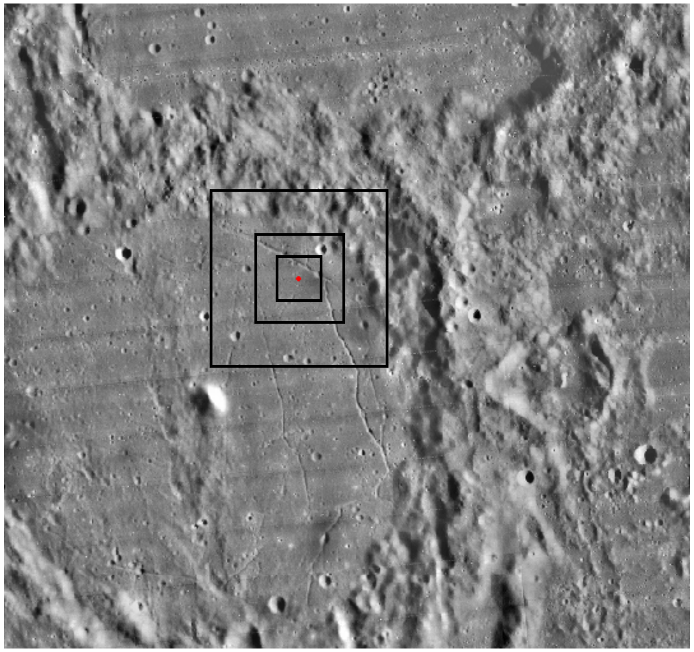
Scientific Rationale:
Farside mare
Crater central peak
Impact process
South Pole-Aitken (SPA) basin geology
Impact melt and breccias from SPA

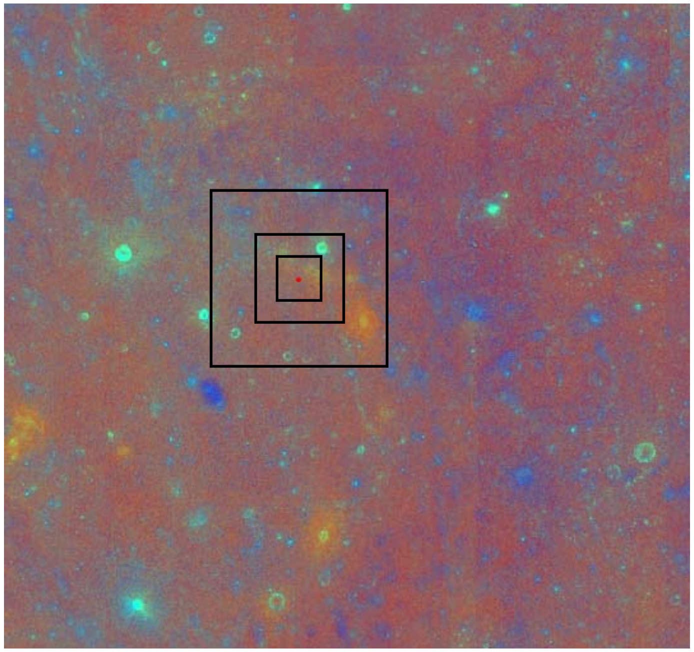
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain
Highlands terrain (e.g., central peak)
Far side location

NASA References:

Other References:





Alphonsus Crater

Location (longitude, latitude): -2.16, -12.56

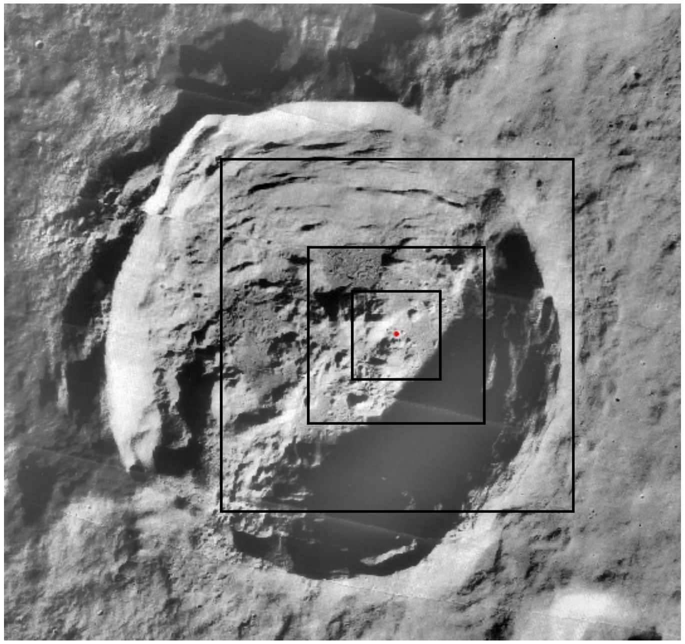
Scientific Rationale:
Pryoclastic vents and materials
Lunar transient events
Alphonsus crater rim massifs
Ranger 9 impact site

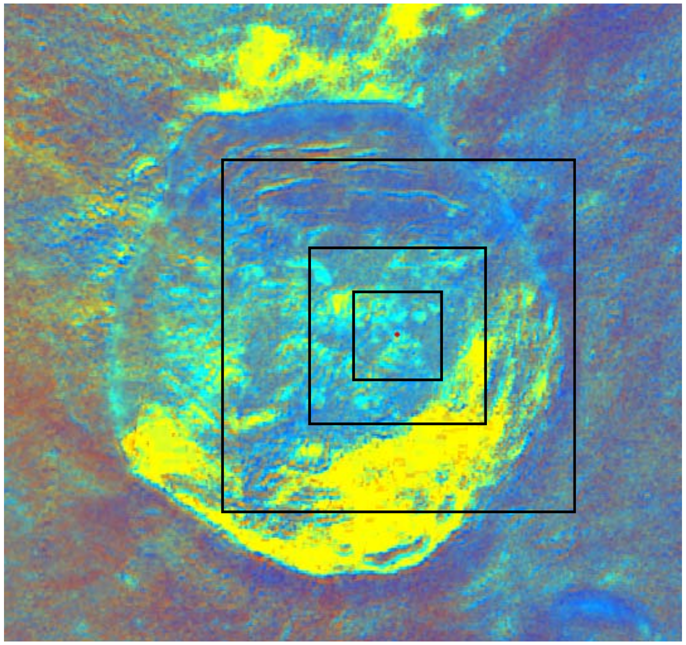
Resource Potential:
Highlands regolith
Pyroclastic materials

Operational Perspective:
Highlands terrain
Pyroclastic covered surface
Surface fracture

NASA References:
Optimizing Science and Exploration Working Group (OSEWG) Sortie Surface Scenario Workshop (2008), report in preparation
Geoscience and a Lunar Base (1990)

Other References:





Anaxagoras Crater

Location (longitude, latitude): -9.30, 73.48

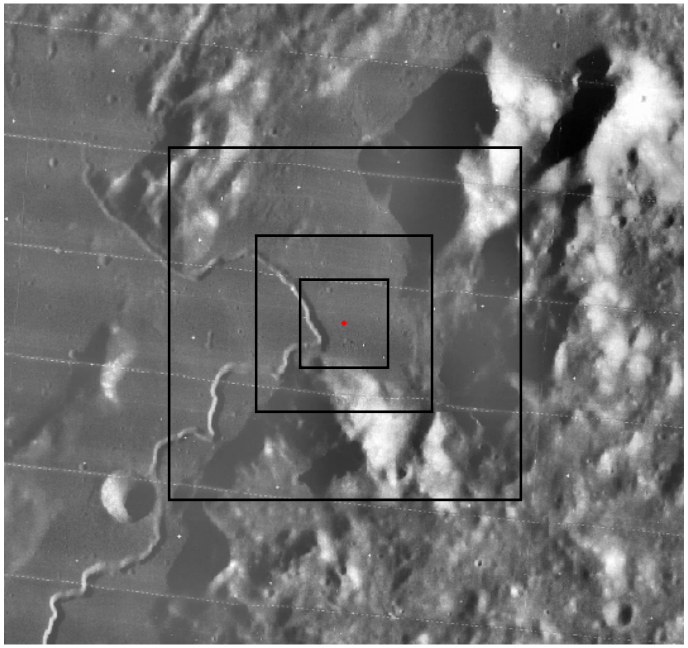
Scientific Rationale:
Crater central peak (e.g., pure anorthosite)
Impact process

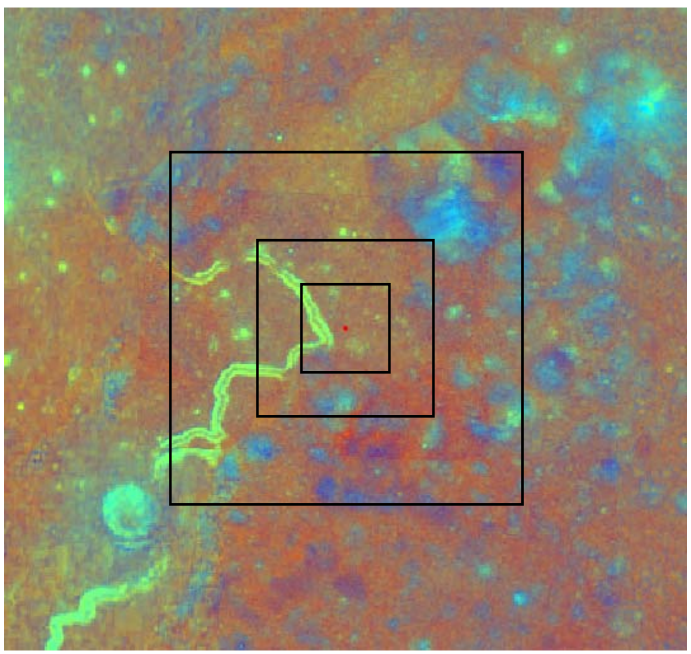
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain (e.g., central peak)
Near side location

NASA References:

Other References:





Apollo 15

Location (longitude, latitude): 3.66, 26.08

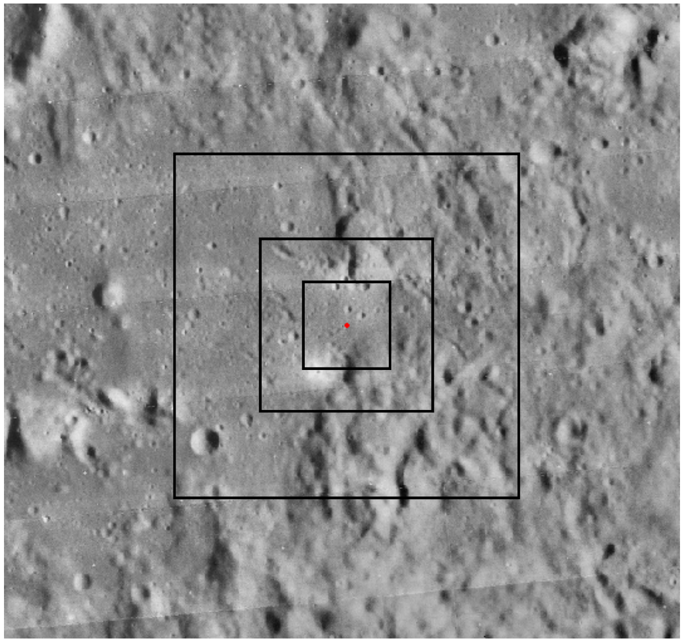
Scientific Rationale:
Surface space weathering (e.g., lunar LDEF)
Follow up exploration of a complex Apollo site (e.g., Hadley rille, Apennine bench)

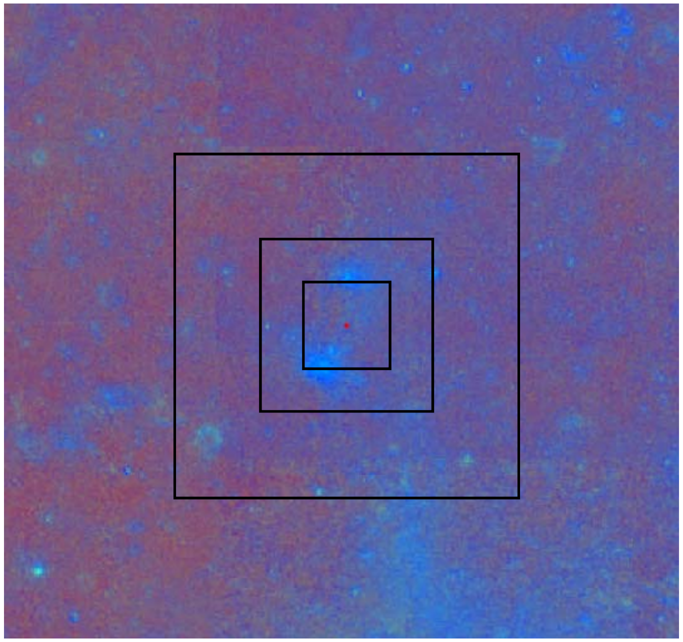
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain
Highlands terrain
Near side location
Apollo 15 experience

NASA References:
Apollo 15 Preliminary Science Report (1972)

Other References:





Apollo 16

Location (longitude, latitude): 15.47, -9.00

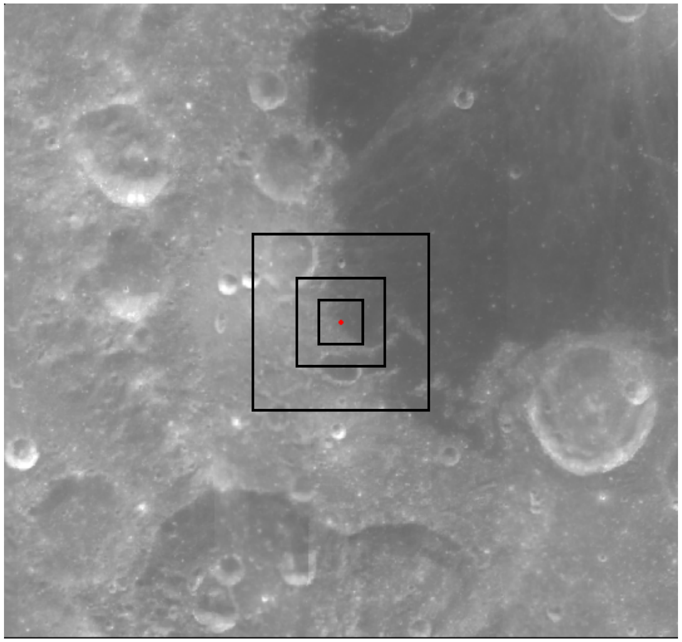
Scientific Rationale:
Surface space weathering (e.g., lunar LDEF)
Follow up exploration of an Apollo highland site (e.g., Nectaris and Imbrium basin ejecta)

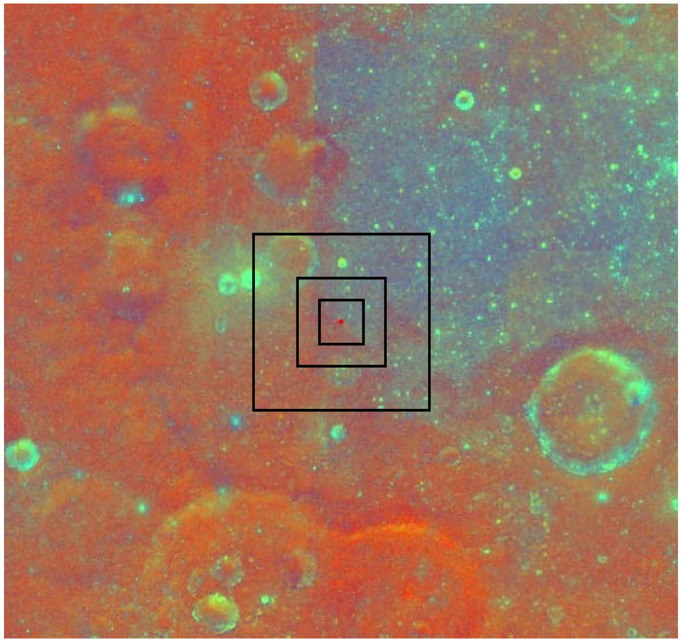
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Near side location
Apollo 16 experience

NASA References:
Apollo 16 Preliminary Science Report (1972)

Other References:





Apollo Basin

Location (longitude, latitude): -153.72, -37.05

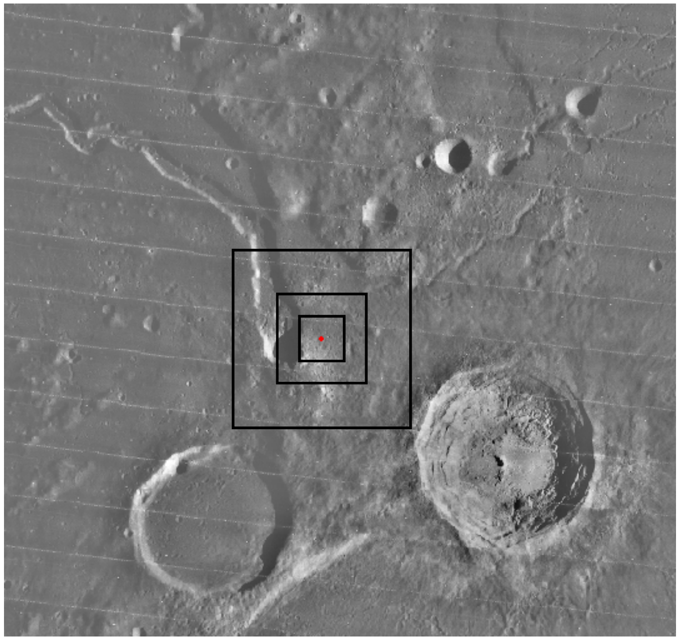
Scientific Rationale:
Farside mare
Feldspathic highlands; basin inner ring (e.g. anorthosite)
Basin geology; impact melts and breccias

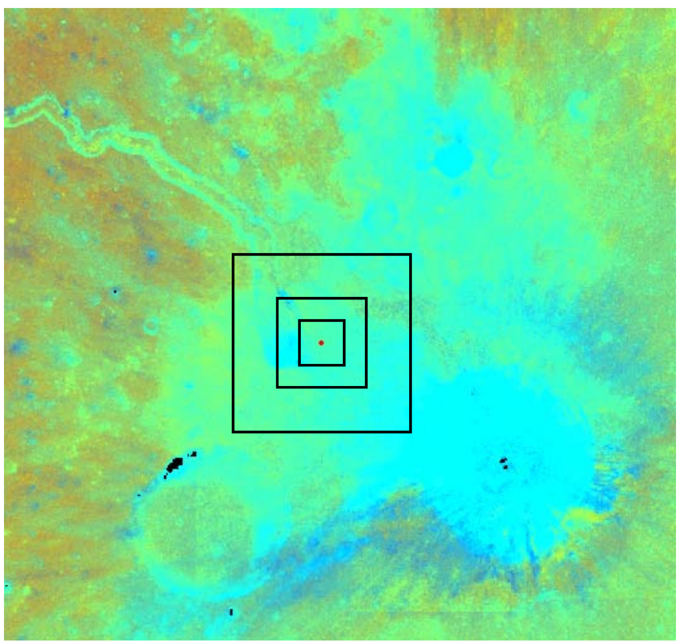
Resource Potential:
Mare regolith
Highands regolith

Operational Perspective:
Mare terrain
Highlands terrain
Far side location

NASA References:

Other References:





Aristarchus 1

Location (longitude, latitude): -48.95, 24.56

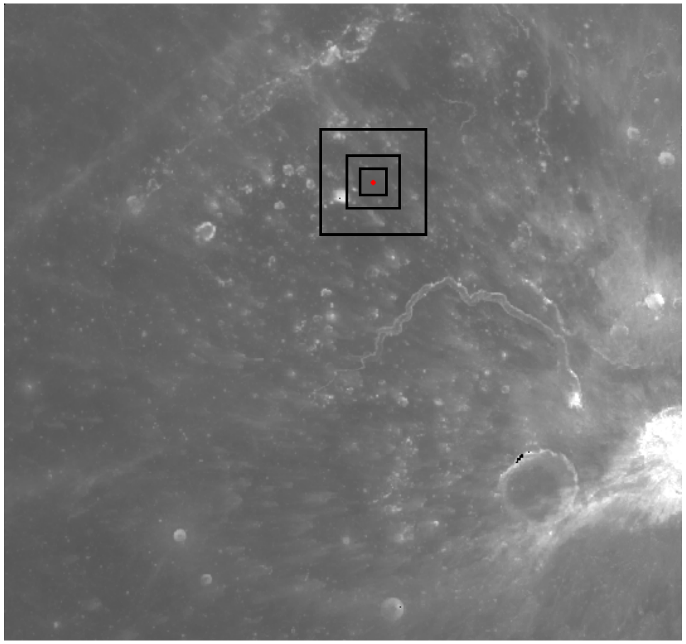
Scientific Rationale:
Geologically complex location
Vallis Schröteri (e.g., ‘Cobra Head’)
Pyroclastic materials and lava flows
Aristarchus crater ejecta

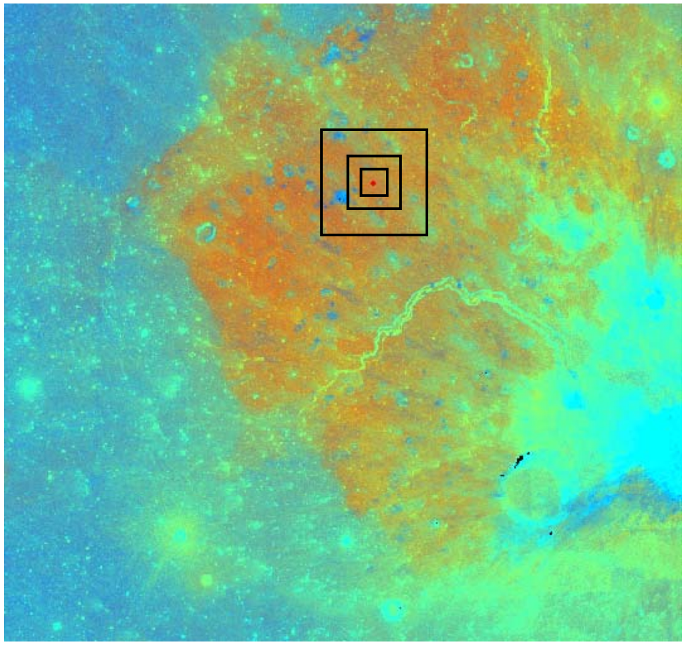
Resource Potential:
Pyroclastic materials

Operational Perspective:
Highlands terrain
Pyroclastic covered surface
Near side location

NASA References:
Exploration Systems Architecture Study (2005)
A Site Selection Strategy for a Lunar Outpost (1990)
Geoscience and a Lunar Base (1990)

Other References:





Aristarchus 2

Location (longitude, latitude): -52.40, 27.70

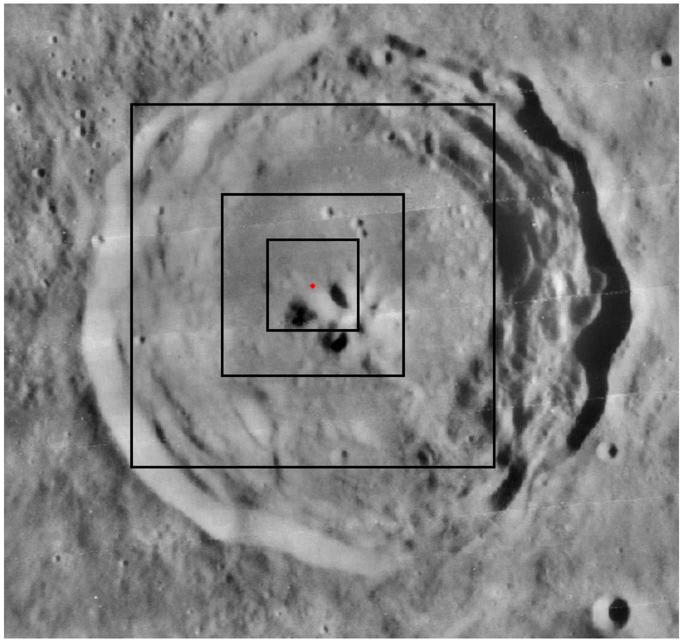
Scientific Rationale:
Pyroclastic materials
Nearby volcanic features

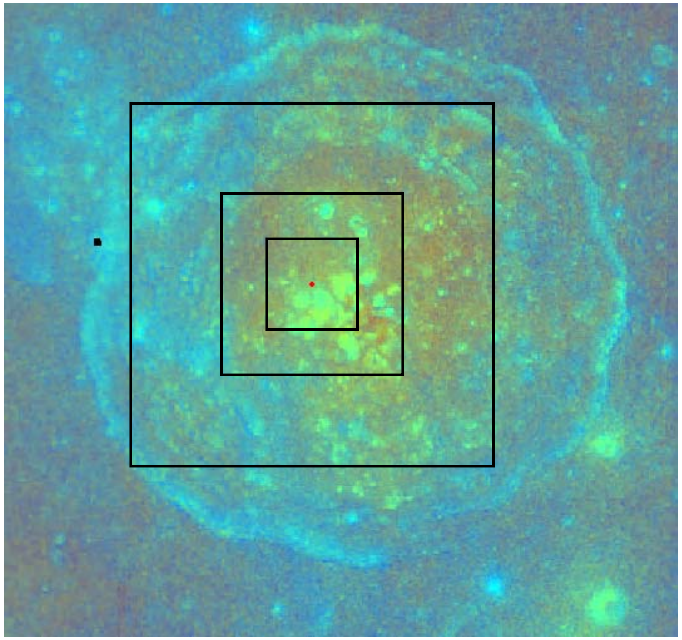
Resource Potential:
Pyroclastic materials

Operational Perspective:
Pyroclastic covered surface
Near side location

NASA References:
Exploration Systems Architecture Study (2005)
A Site Selection Strategy for a Lunar Outpost (1990)
Geoscience and a Lunar Base (1990)

Other References:





Bullialdus Crater

Location (longitude, latitude): -22.50, -20.70

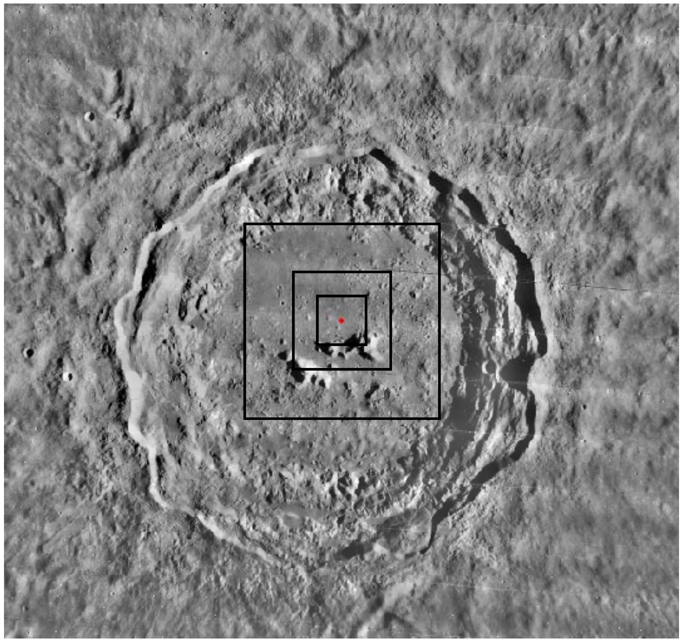
Scientific Rationale:
Complex crater with very interesting central peak (e.g., highlands gabbro)
Impact process

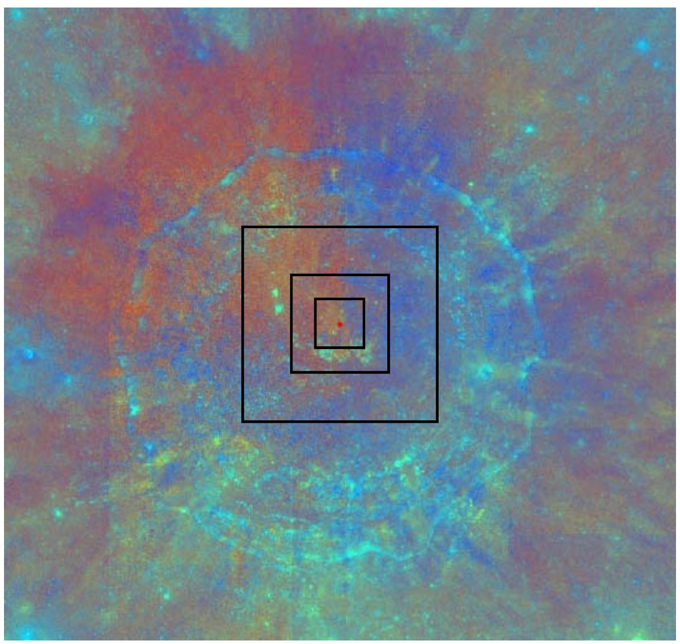
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Near side location

NASA References:

Other References:





Copernicus Crater

Location (longitude, latitude): -20.01, 9.85

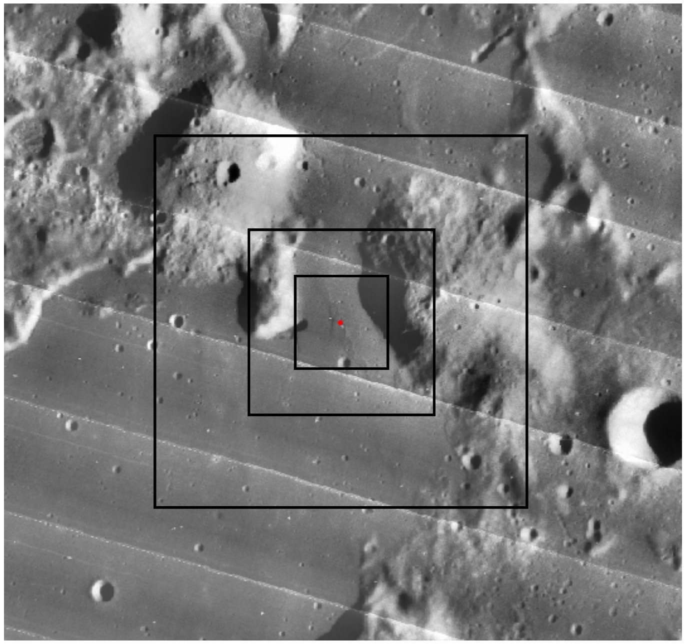
Scientific Rationale:
Major stratigraphic horizon
Crater floor materials, central peak
Impact process

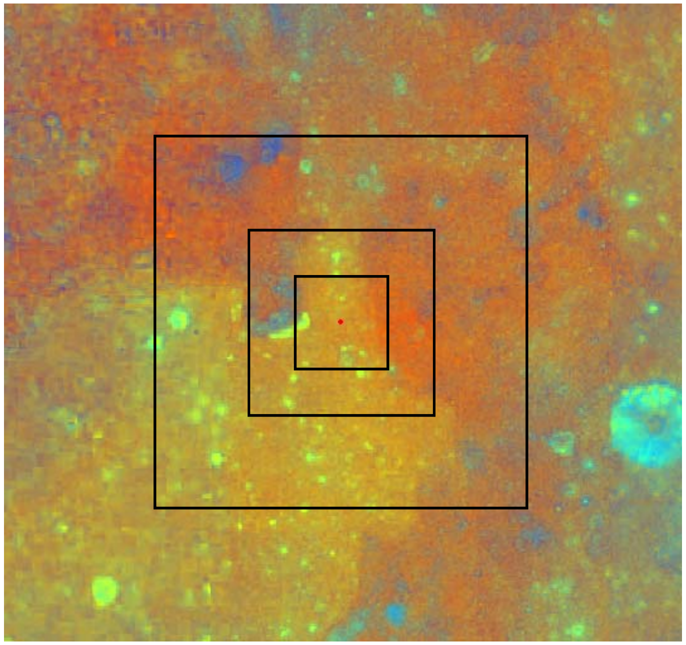
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:





Gruithuisen Domes

Location (longitude, latitude): -40.14, 36.03

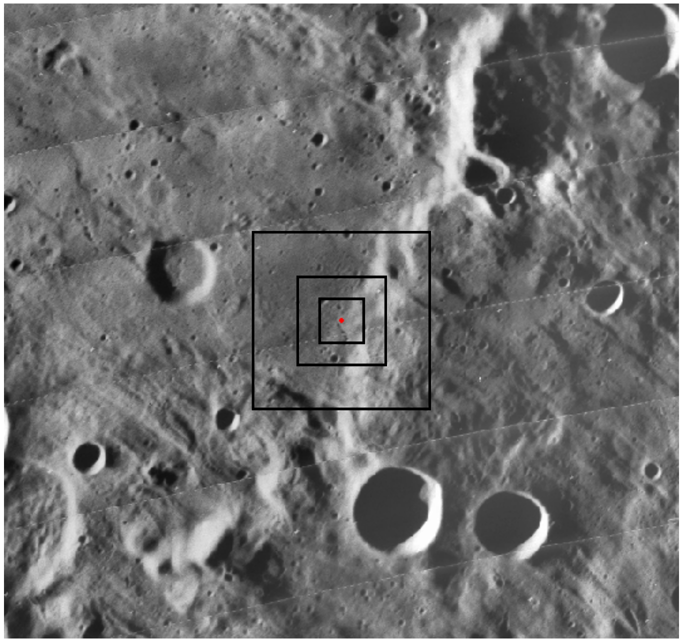
Scientific Rationale:
Volcanic domes (felsic ?)

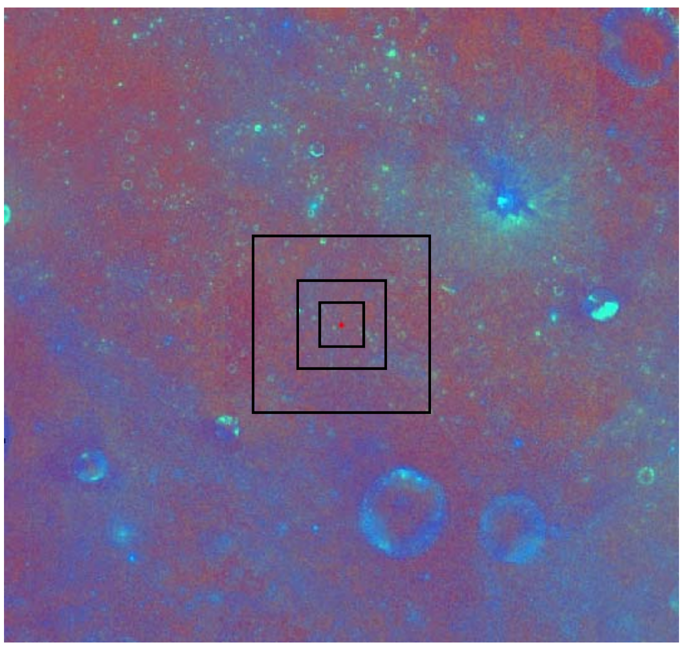
Resource Potential:
Mare regolith (KREEP-rich?)

Operational Perspective:
Mare terrain
Highlands terrain
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:





Hertzsprung

Location (longitude, latitude): -125.56, 0.09

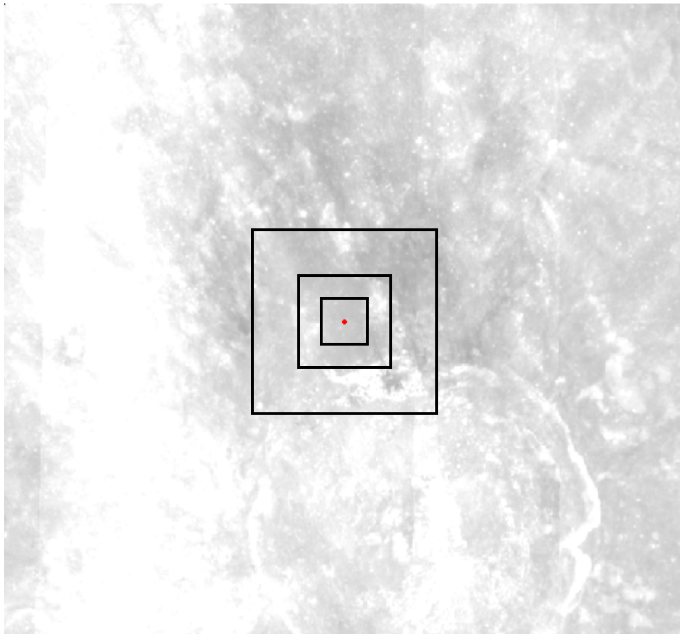
Scientific Rationale:
Inner ring (e.g., anorthosite)
Basin age
Intermediate-sized basin, mapped as Nectarian age
Basin geology

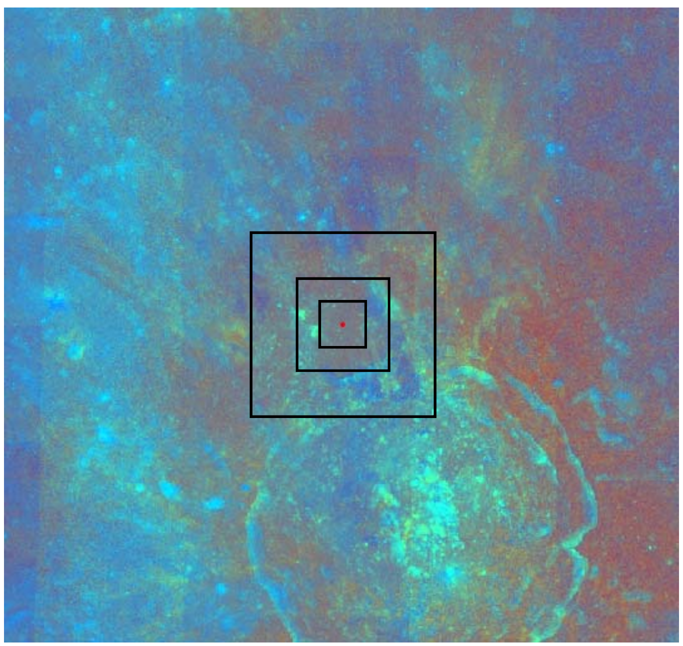
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain (e.g., basin ring)
Far side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:
Stockstill and Spudis, 29th LPSC, Abstract #1236, (1998)





King Crater

Location (longitude, latitude): 119.91, 6.39

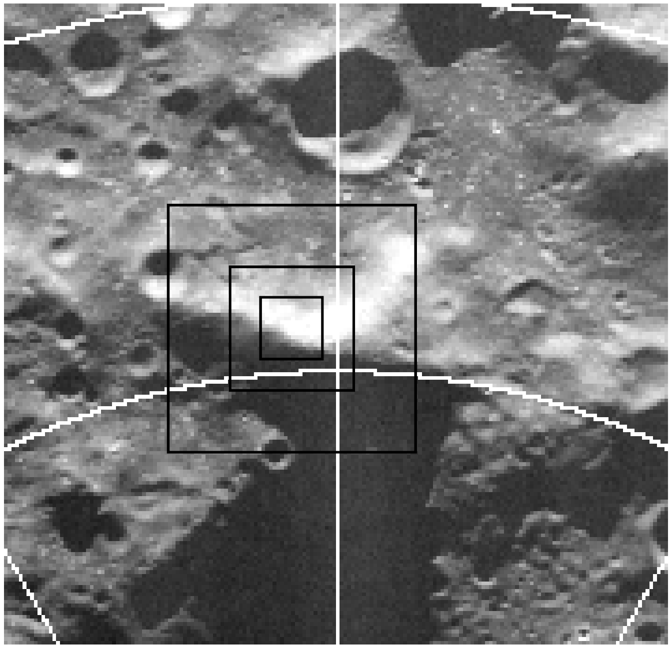
Scientific Rationale:
Impact melt (e.g., age dating)

Resource Potential:
Highlands regolith

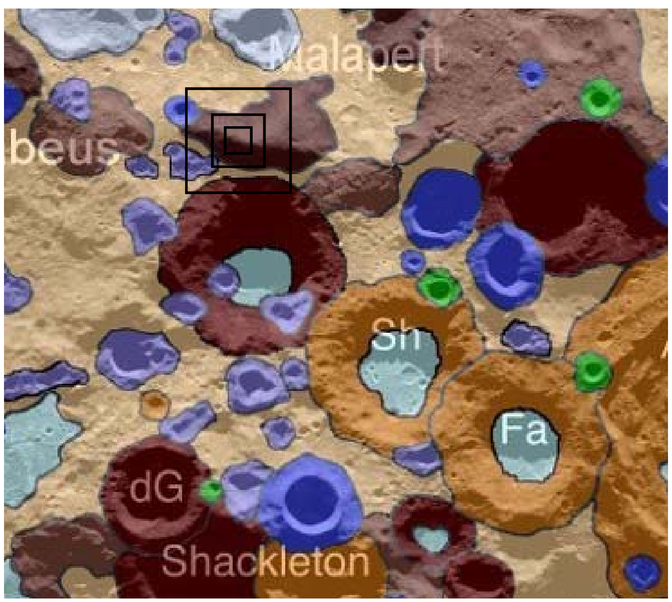
Operational Perspective:
Highlands terrain
Impact melt sheet
Far side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:
O'Keefe and Ahrens, GSA Special Paper 293, 103-109 (1994)



Radar image from Margot et al., Science 284, 1658-1660 (1999)



Geologic map from Spudis et al., (2008)

Malapert Massif

Location (longitude, latitude): -2.93, -85.99 (best estimate, see image to left)

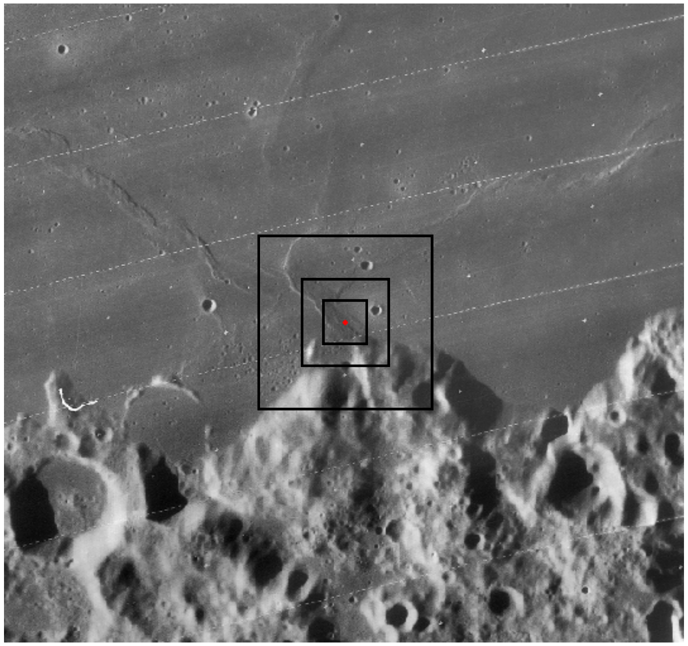
Scientific Rationale:
South Pole-Aitken (SPA) basin rim?
Basin geology
Observatories

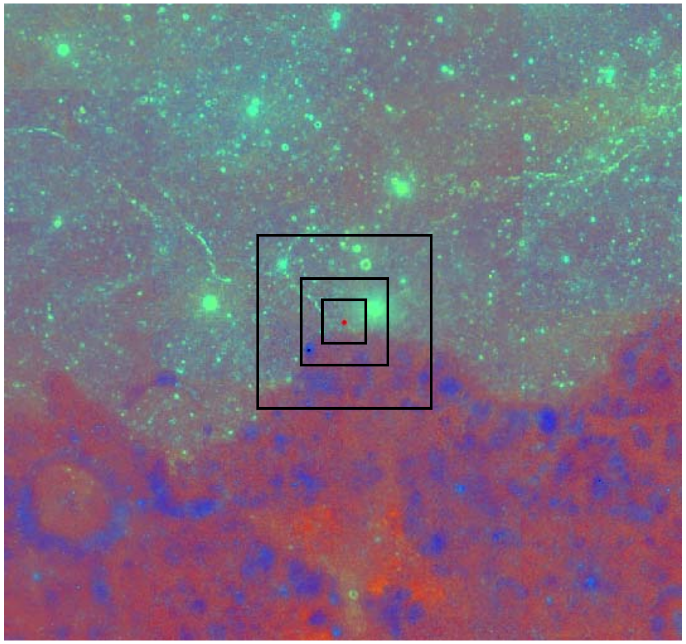
Resource Potential:
Near-continuous sunlight (continuous?)
Direct-to-Earth communication

Operational Perspective:
Highlands terrain (e.g., massif)
Polar location

NASA References:

Other References:
Spudis et al., GRL, 35, L14201, doi:10.1029/2008GL034468





Mare Crisium

Location (longitude, latitude): 58.84, 10.68

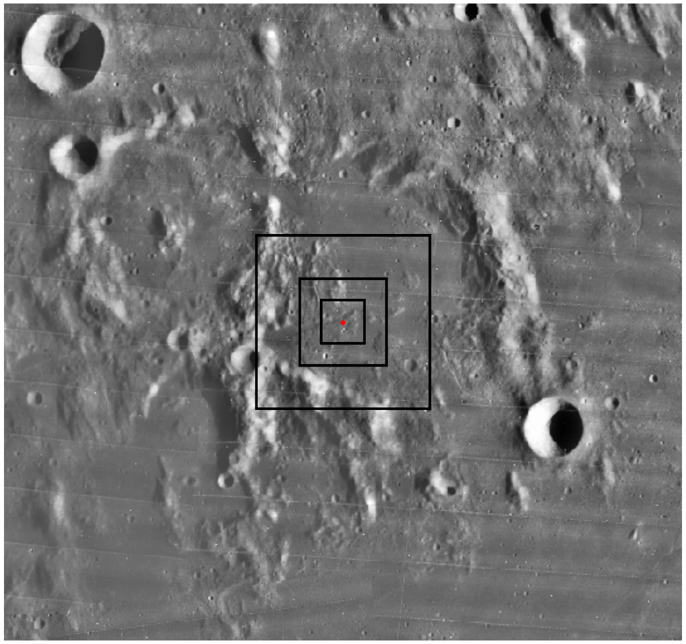
Scientific Rationale:
Mare age and composition (cf. Luna 24 samples)
Basin geology (e.g., rim)

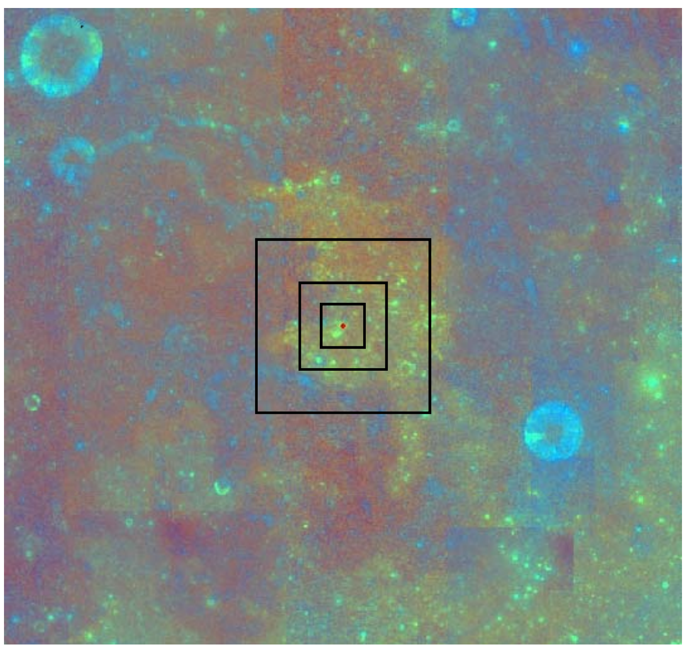
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain
Highlands terrain
Near side location

NASA References:

Other References:





Murchison Crater

Location (longitude, latitude): -0.42, 4.74

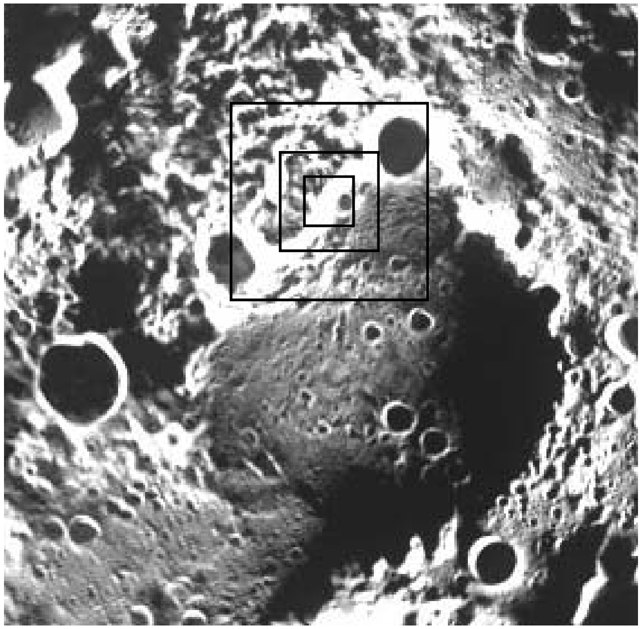
Scientific Rationale:
Ejected Imbrium basin melt pond

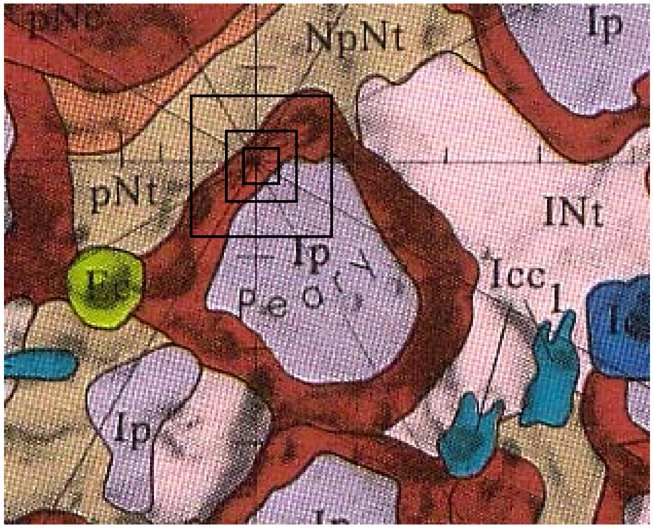
Resource Potential:
Highlands regolith

Operational Perspective:
Highland terrain
Basin impact melt
Near side location

NASA References:

Other References:





(Clementine uvvis color ratio image not available)

North Pole

Location (longitude, latitude): 76.19, 89.60 (best estimate, see image to left)

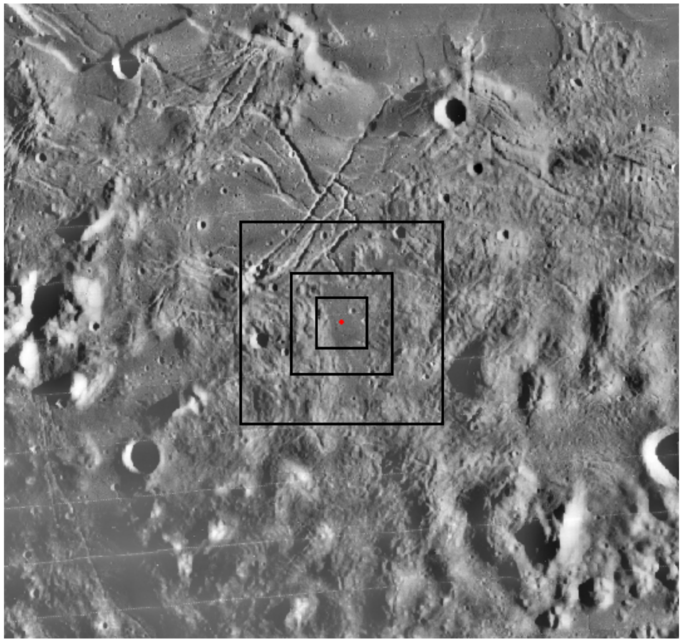
Scientific Rationale:
Polar volatiles
Impact process (e.g., heavily cratered highlands)
Distal Imbrium ejecta

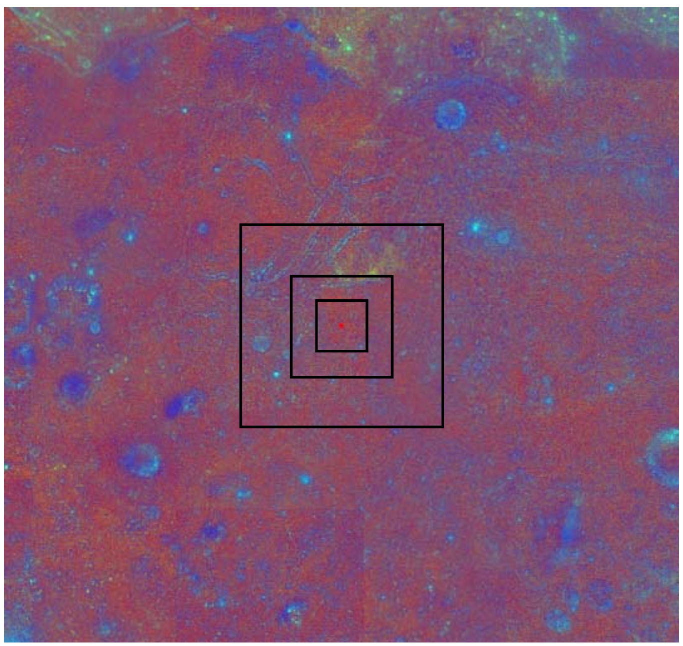
Resource Potential:
Highlands regolith
Enhanced hydrogen in nearby permanently shadowed polar craters (water ice?)
Sunlight

Operational Perspective:
Highlands terrain
Polar location
Nearby areas of permanent shadow
Points of near-continuous sunlight

NASA References:
Exploration Systems Architecture Study (2005)
Geoscience and a Lunar Base (1990)

Other References:





Orientale 1

Location (longitude, latitude): -95.38, -26.20

Scientific Rationale:
Orientale basin melt sheet (Maunder formation)
Nearby fractured surface

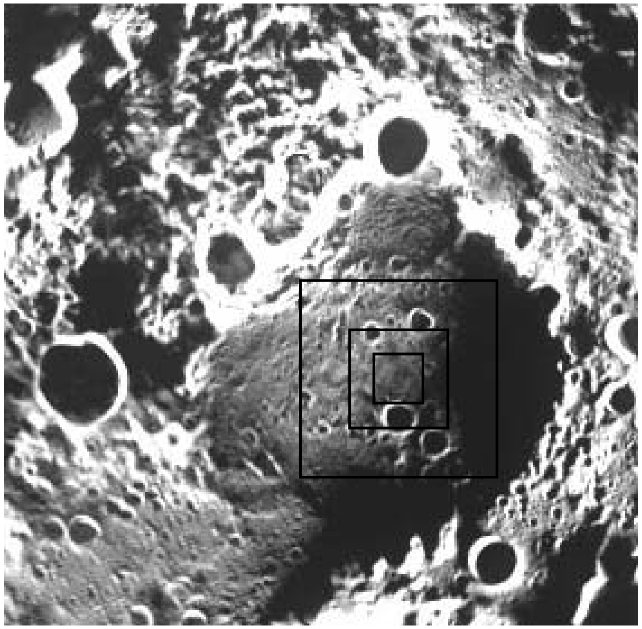
Resource Potential:
Highlands regolith

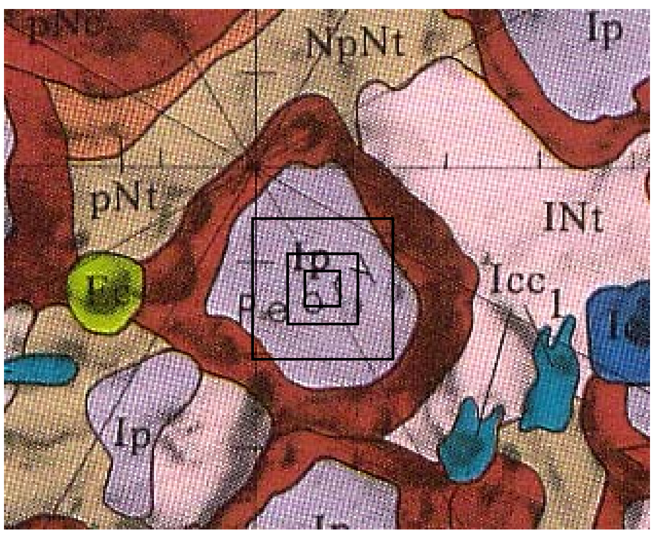
Operational Perspective:
Highlands terrain
Limb location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:

Peary Crater





(Clementine uvvis color ratio image not available)

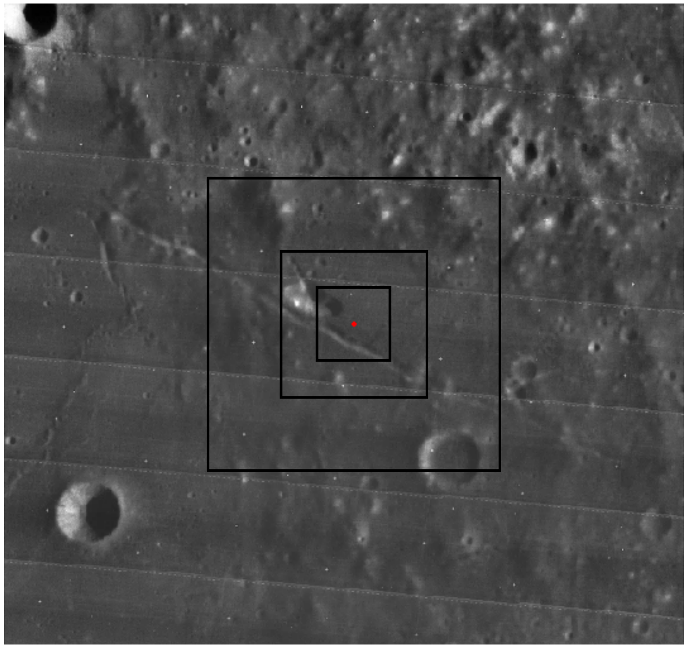
Location (longitude, latitude): 30.00, 88.50

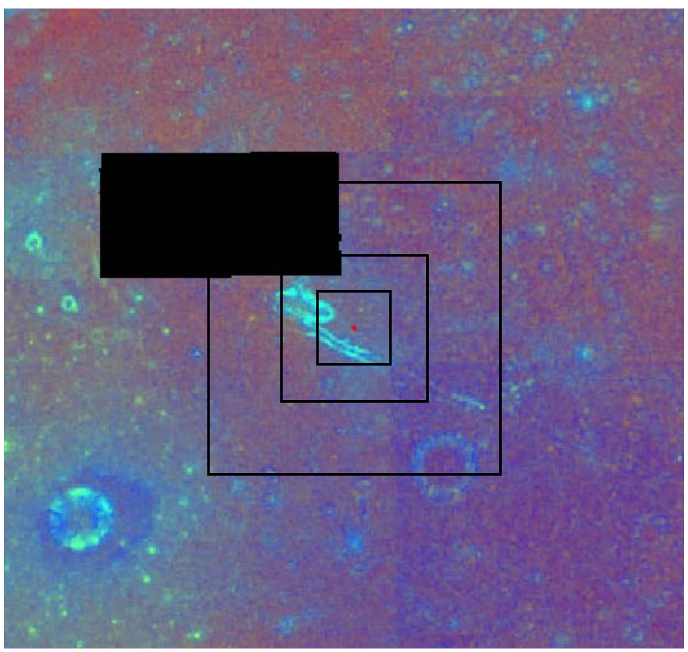
Scientific Rationale:
Polar volatiles
Impact process

Resource Potential:
Highlands regolith
Enhanced hydrogen in permanently shadowed polar craters (water ice?)

Operational Perspective:
Highlands terrain
Polar location
Areas of permanent shadow

NASA References:
Exploration Systems Architecture Study (2005)
Geoscience and a Lunar Base (1990)





Rima Bode

Location (longitude, latitude): -3.80, 12.90

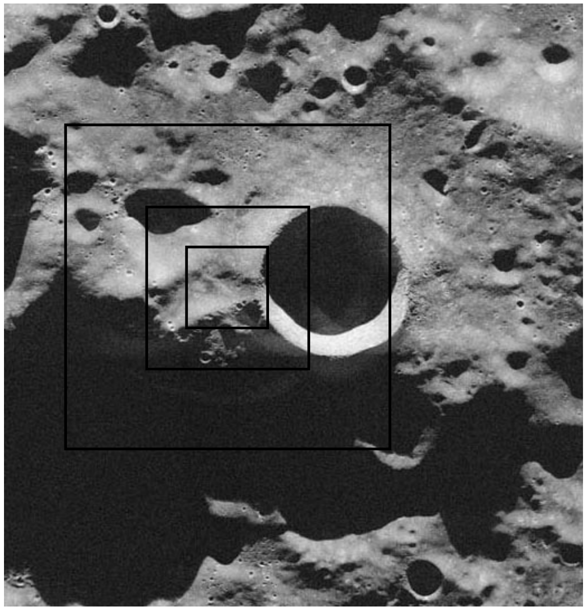
Scientific Rationale:
High-Ti pryroclastic material
Mantle xenoliths

Resource Potential:
High-Ti pyroclastic material

Operational Perspective:
Pyroclastic covered surface
Highlands terrain
Near side location

NASA References:
Exploration Systems Architecture Study (2005)
Geoscience and a Lunar Base (1990)

Other References:



Radar image from Margot et al., Science 284, 1658-1660 (1999)

Geologic map from Spudis et al., (2008)

South Pole

Location (longitude, latitude): -130, -89.3 (best estimate, see image to left)

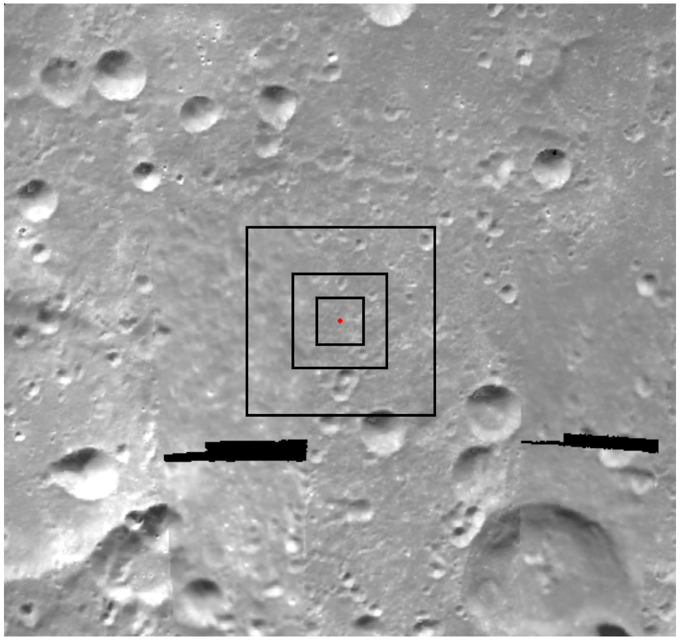
Scientific Rationale:
South Pole-Aiken (SPA) basin geology
Polar volatiles
Impact process (e.g., Shackleton and other craters)

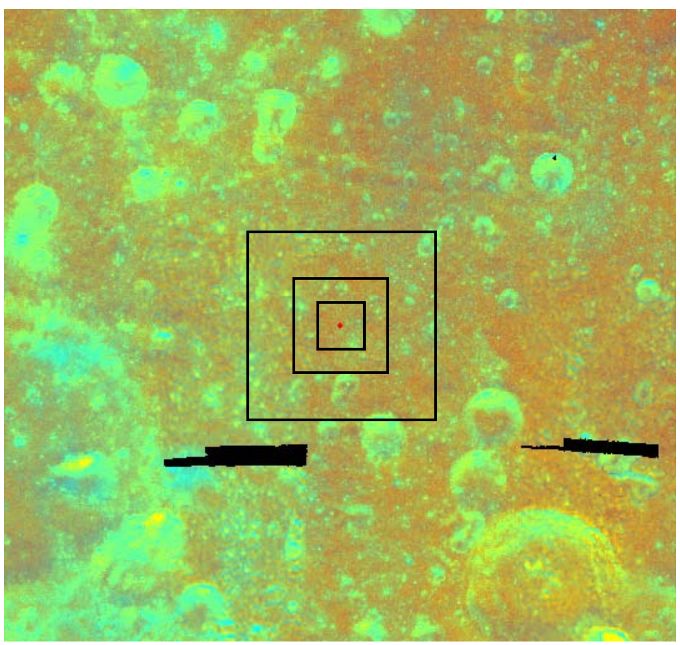
Resource Potential:
Highlands regolith
Enhanced hydrogen in permanently shadowed polar craters (water ice?)
Sunlight

Operational Perspective:
Highlands terrain
Polar location
Areas of permanent shadow
Points of near-continuous sunlight

NASA References:
Exploration Systems Architecture Study (2005)
Geoscience and a Lunar Base (1990)

Other References:
Spudis et al., GRL, 35, L14201, doi:10.1029/2008GL034468.
Bussey et al., GRL, 26, no.9, 1187-1190 (1999)





South Pole-Aitken Basin Interior

Location (longitude, latitude): -159.94, -60.00

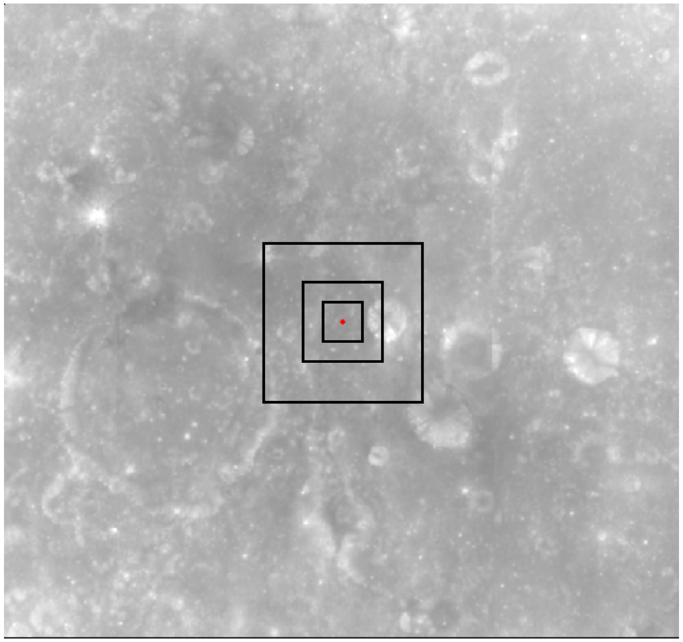
Scientific Rationale:
South Pole-Aitken (SPA) basin floor materials
Basin impact melt and breccias

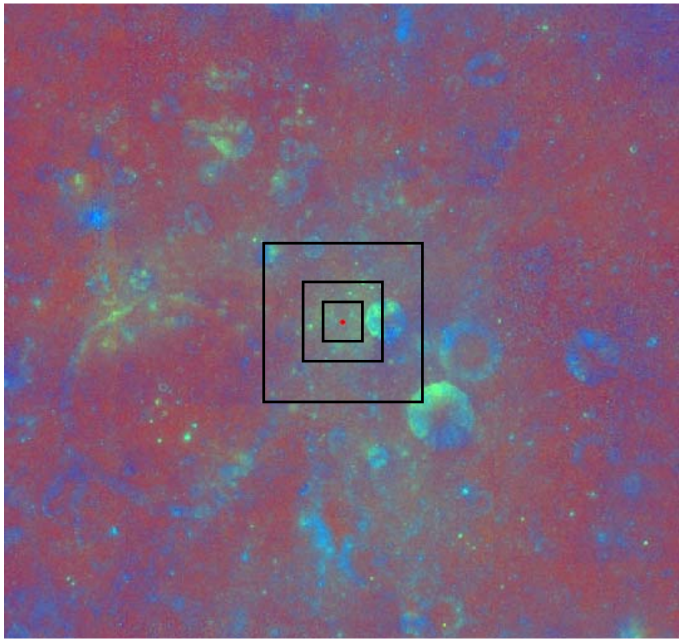
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Far side location

NASA References:
Exploration Systems Architecture Study (2005)

Other References:
Petro and Pieters, 2004





Stratton

Location (longitude, latitude): 166.88, -2.08

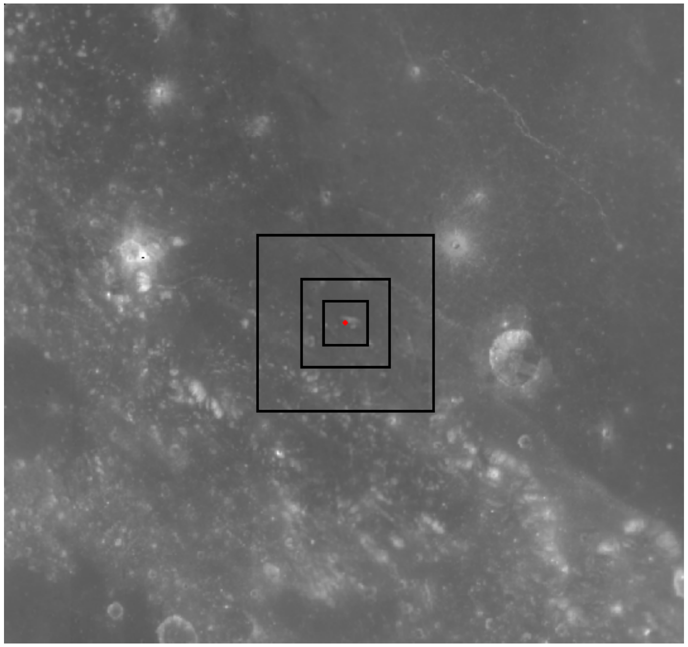
Scientific Rationale:
Far side highlands high-Fe anomaly (mafic highlands or ancient maria?)

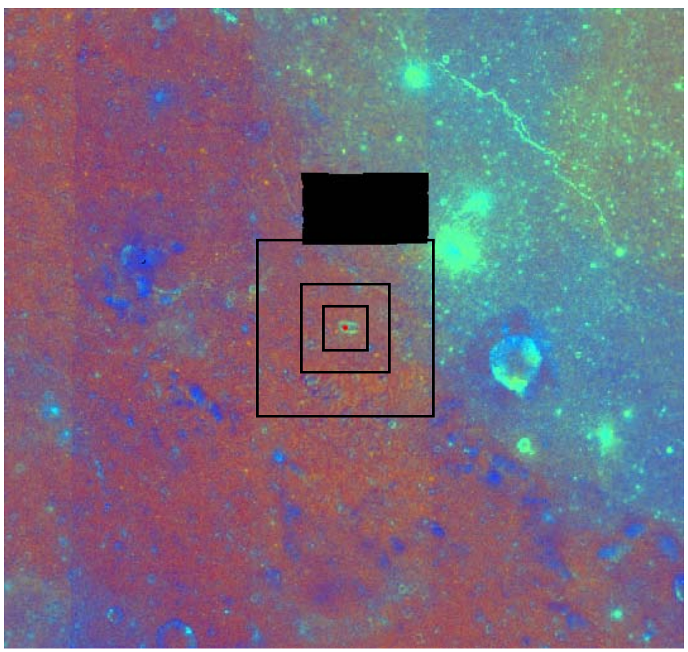
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Far side location

NASA References:

Other References:





Sulpicius Gallus

Location (longitude, latitude): 10.37, 19.87

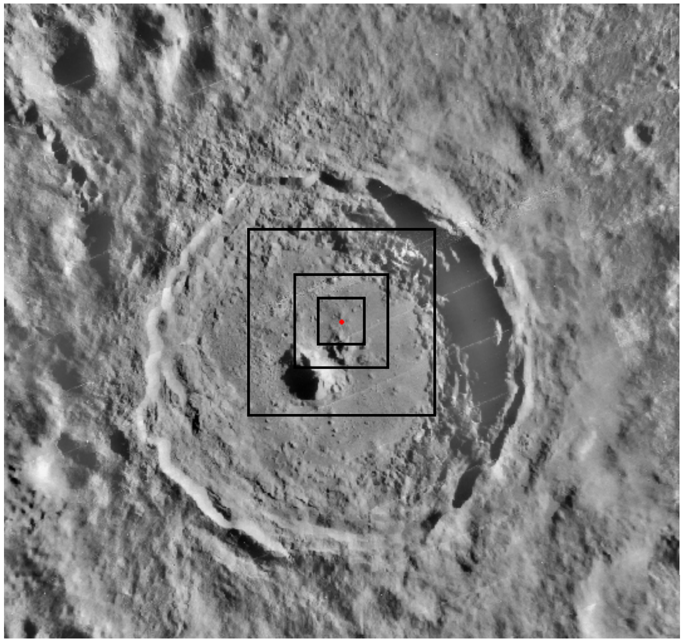
Scientific Rationale:
Dark mantling material, pyroclastics
Mantle xenoliths

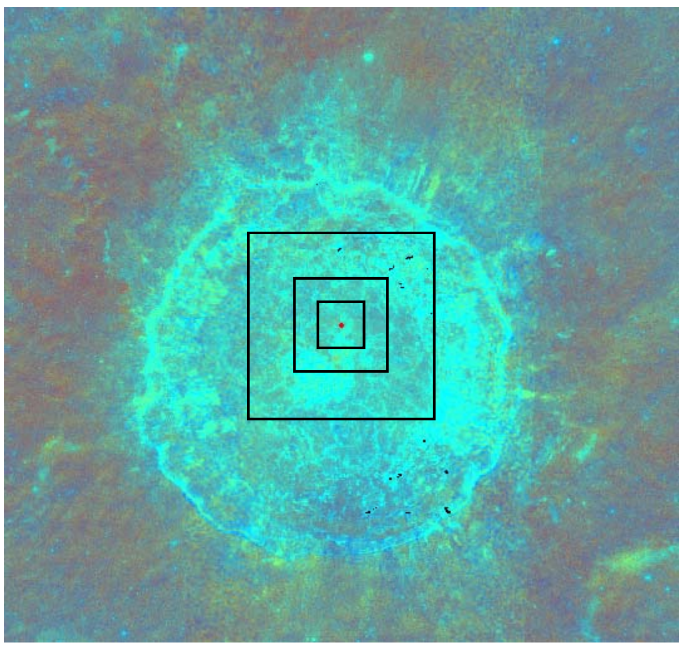
Resource Potential:
Pyroclastic deposits

Operational Perspective:
Smooth pyroclastic covered surface
Mare terrain
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:
Lucchitta and Schmitt, 5th Lunar Conference (1974)





Tycho Crater

Location (longitude, latitude): -11.20, -42.99

Scientific Rationale:
Young crater (e.g., Copernican)
Central peak
Impact process

Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Crater floor
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References: