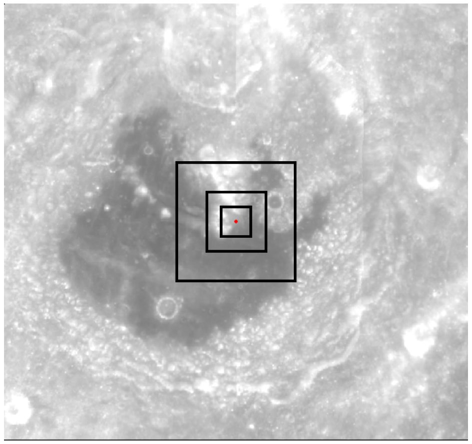
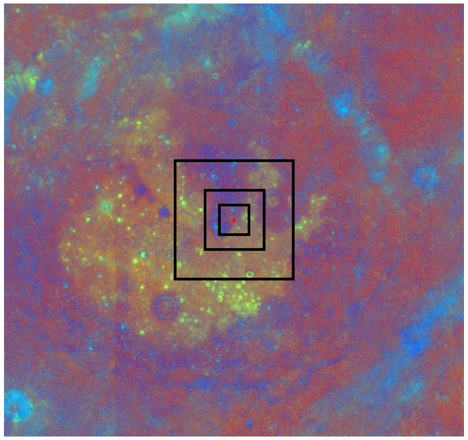
Constellation Program Office Tier 2 Regions of Interest
for
Lunar Reconnaissance Orbiter Camera (LROC) Imaging





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

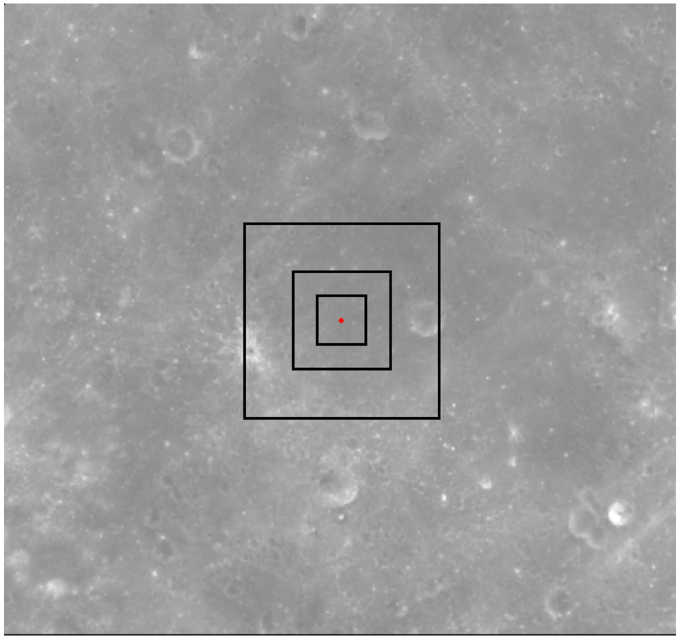
Bottom image, Clementine uvvis mineral ratio map
blue controlled by 415 nm/750 nm ratio
red controlled by 750 nm/415 nm ratio
green controlled by 750 nm/950 nm ratio

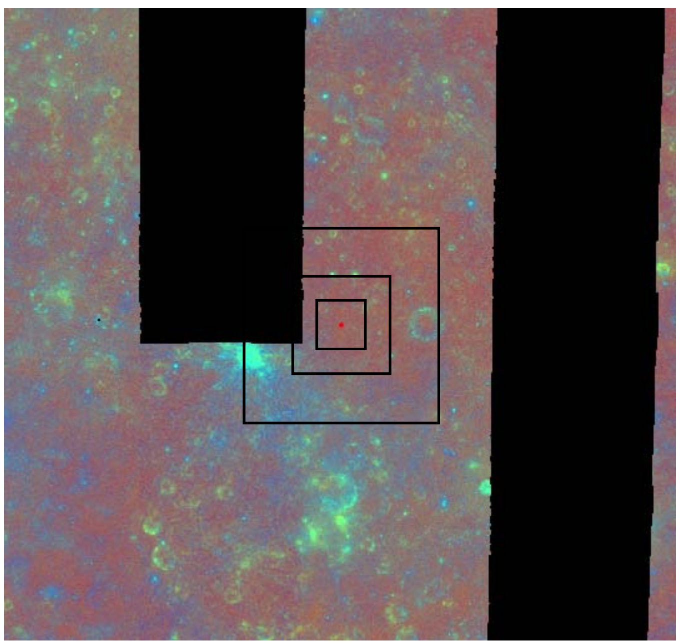
Boxes on images represent region of interest

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)





Balmer Basin

Location (longitude, latitude): 69.82, -18.69

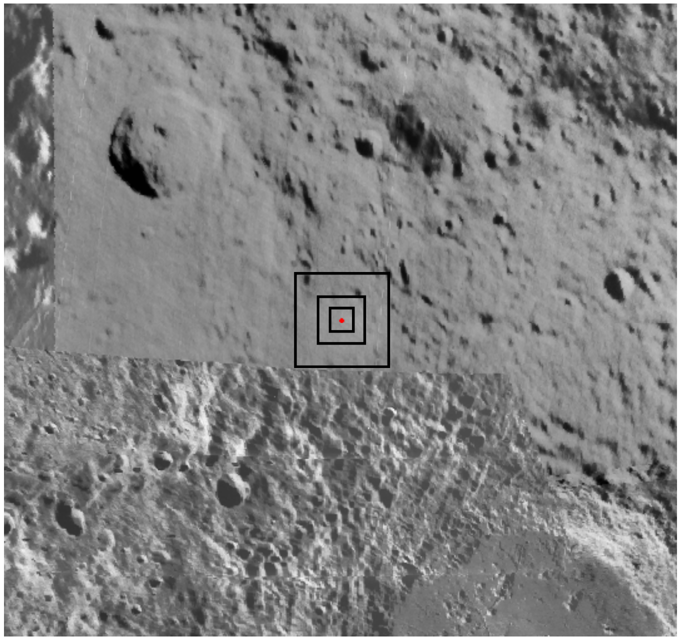
Scientific Rationale:
Ancient mare (e.g., ‘cryptomare’)/basin

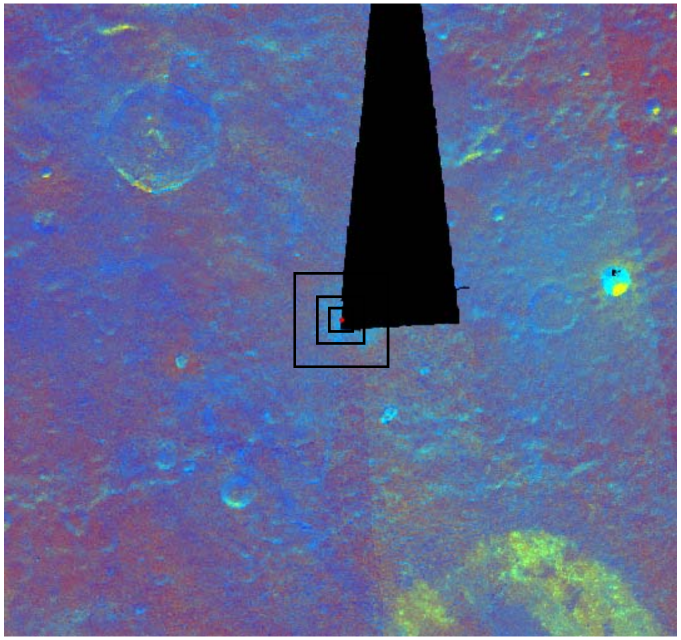
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Near side location

NASA References:

Other References:





Compton/Belkovich Th Anomaly

Location (longitude, latitude): 99.45, 61.11

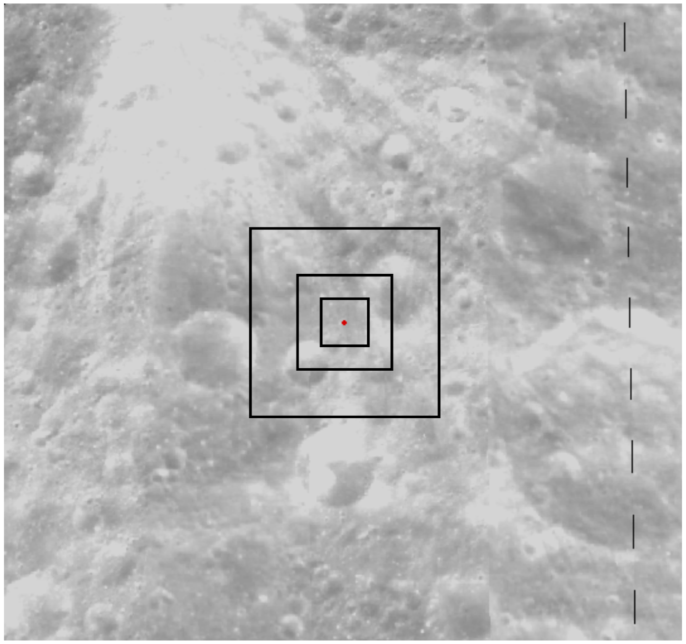
Scientific Rationale:
Far side KREEP Th (~10 ppm) anomaly

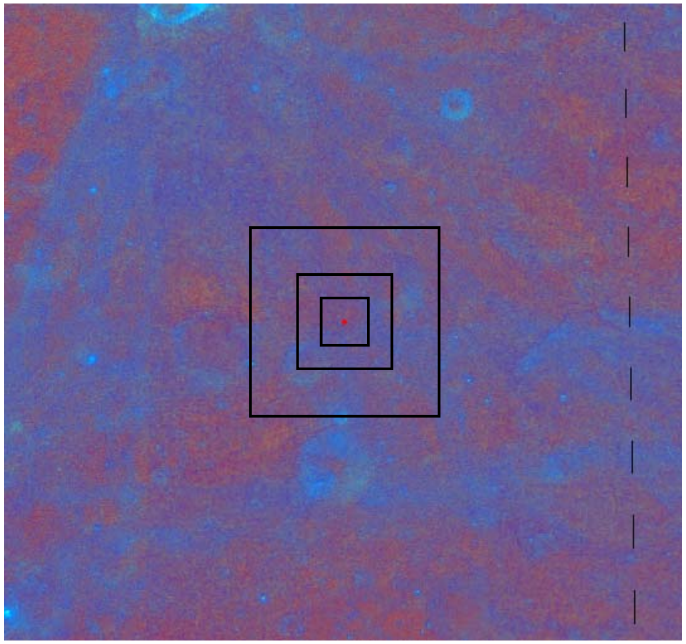
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Far side location

NASA References:

Other References:
Lawrence et al., GRL, Vol. 26, No. 17, 2681-2684 (1999)





Dante Crater

Location (longitude, latitude): 177.70, 26.14

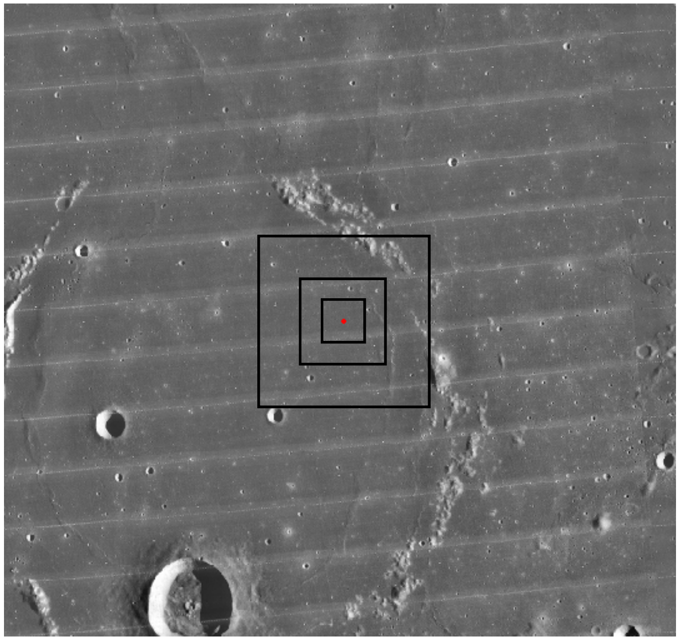
Scientific Rationale:
Ancient, primordial crust
Northern end of Freundlich-Sharanov impact basin

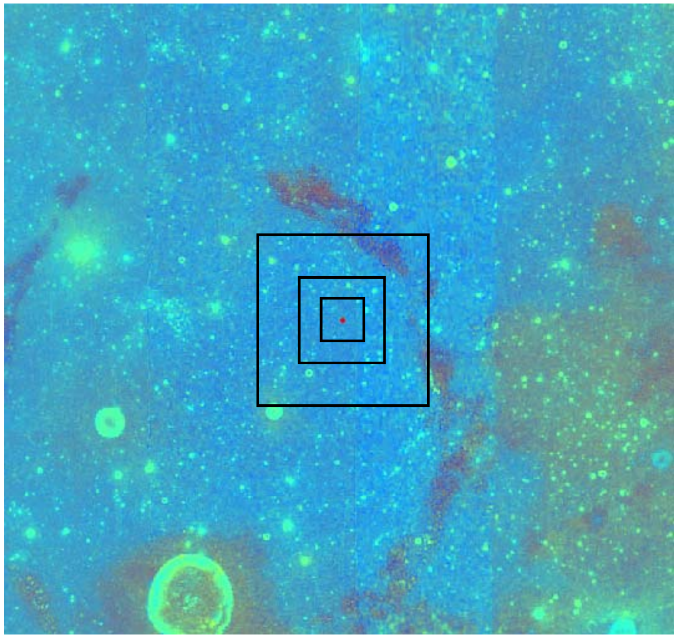
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Far side location

NASA References:
Exploration Systems Architecture Study (2005)

Other References:





Flamsteed Crater

Location (longitude, latitude): -43.22, -2.45

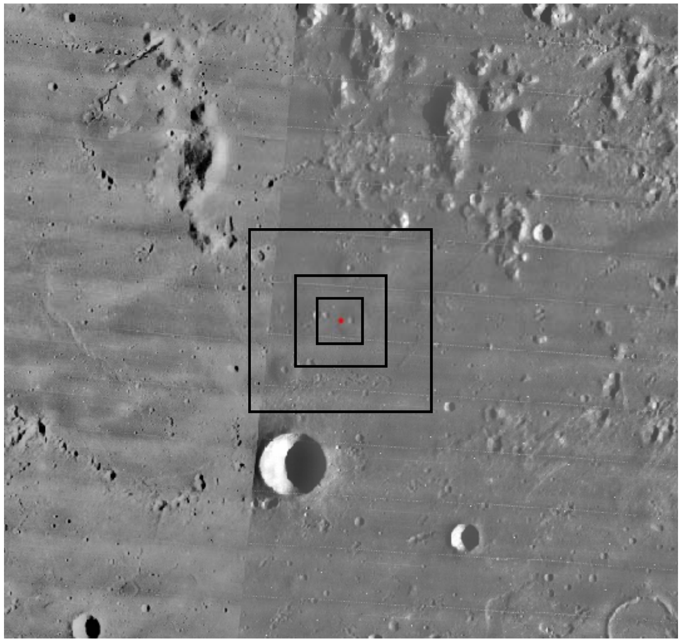
Scientific Rationale:
Surveyor 1 site
Young basaltic lavas (Eratosthenian–Copernican?)
Thin regolith
Nearby Flamsteed P crater ring

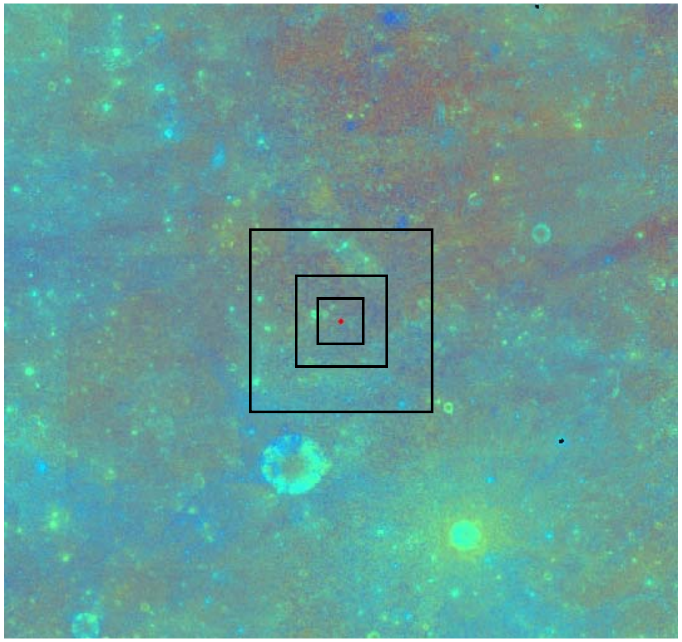
Resource Potential:
High-Ti basalts

Operational Perspective:
Mare terrain
Near side location

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

Other References:





Hortensius Domes

Location (longitude, latitude): -27.67, 7.48

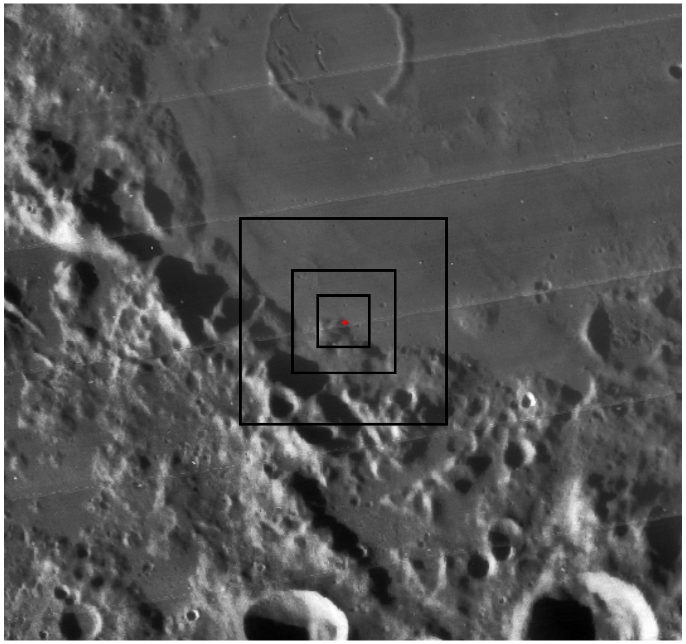
Scientific Rationale:
Low basaltic shields

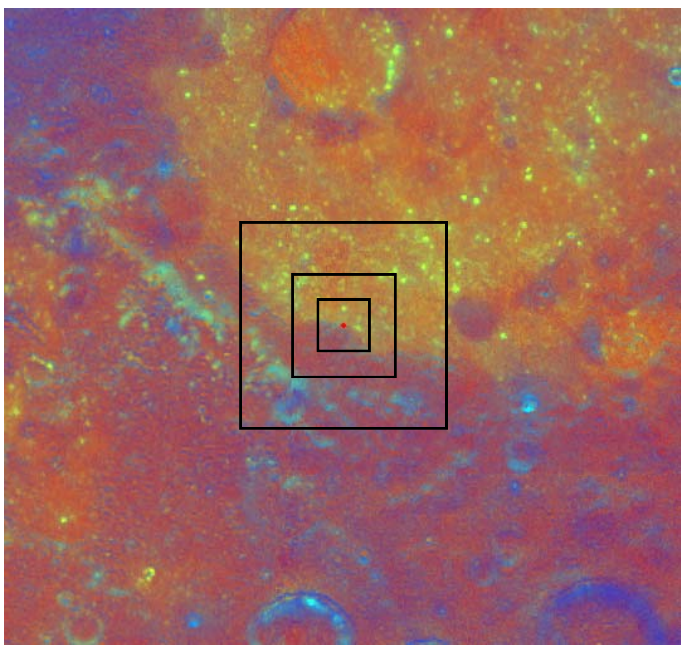
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain, low shields
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:





Humboldtianum Basin

Location (longitude, latitude): 77.14, 54.54

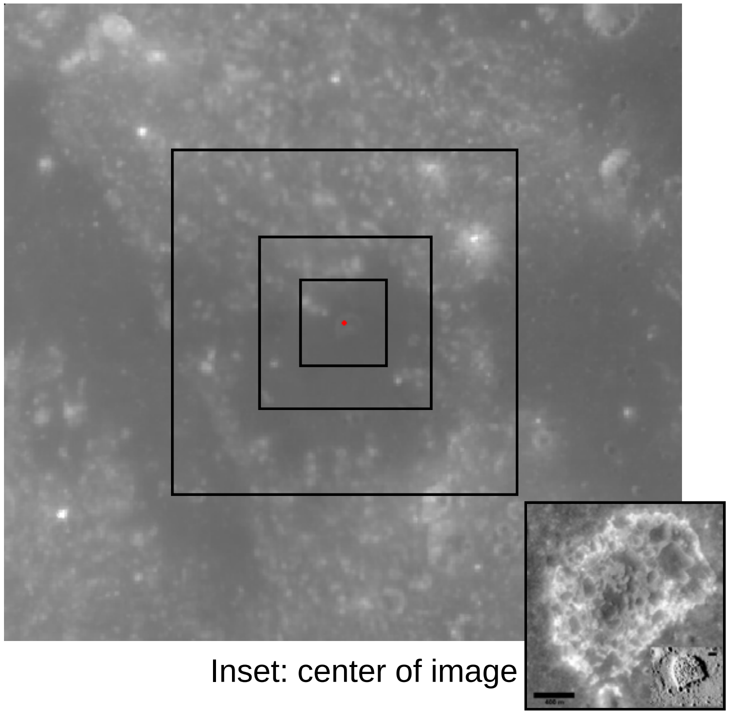
Scientific Rationale:
Basin geology
Basin melt sheet
Mare age and composition

Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain
Highlands massifs terrain
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:



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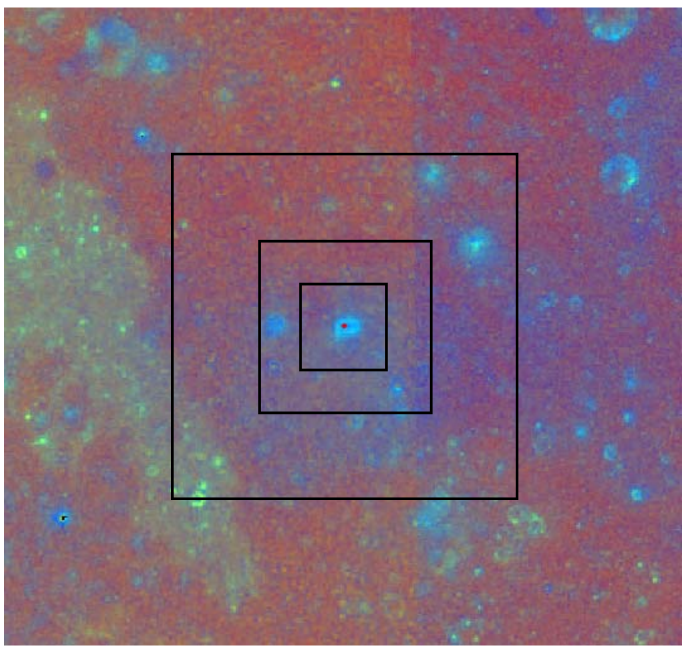


Ina (‘D-caldera’)

Location (longitude, latitude): 5.29, 18.65

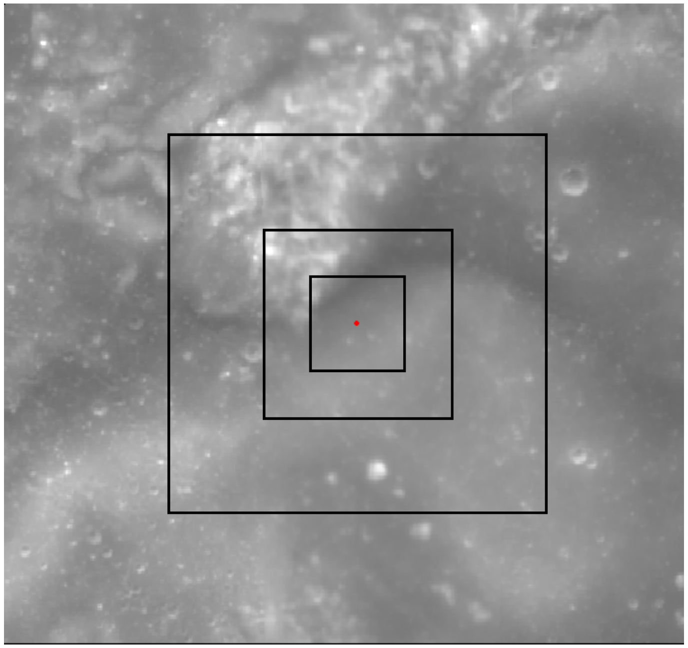
Scientific Rationale:
Young, D-shaped collapse feature
Possible vent for endogenous volatiles or volcanism

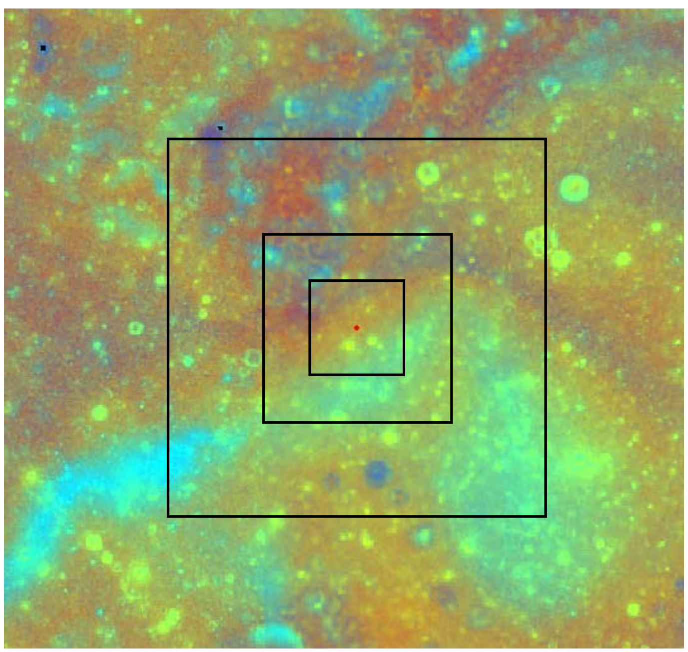
Resource Potential:
Mare regolith
Endogenous volatiles?

Operational Perspective:
Mare terrain
Nearby highlands terrain
Near side location

NASA References:
Geoscience and a Lunar Base, 1990

Other References:
Schultz, Staid and Pieters, Nature, 444, 184 (2006)
(inset in upper image)





Ingenii

Location (longitude, latitude): 164.42, -35.48

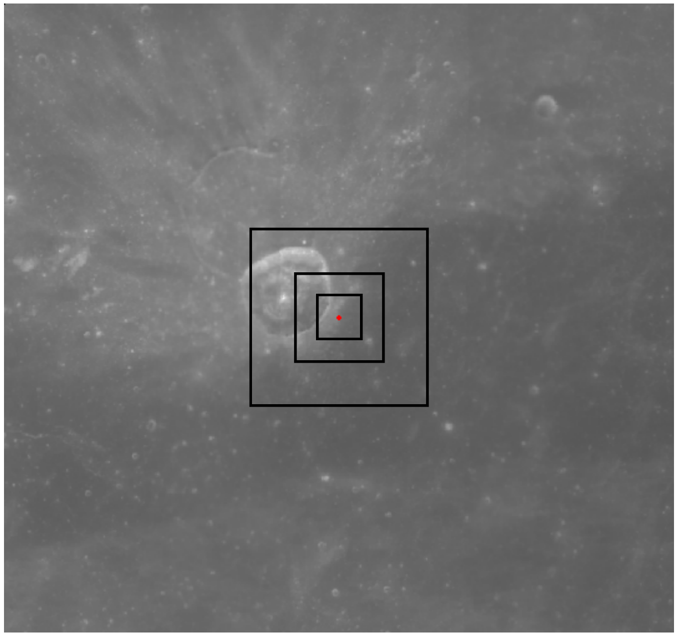
Scientific Rationale:
Far side mare
Magnetic anomaly (e.g., bright swirl)
Thomson M crater rim
Impact process

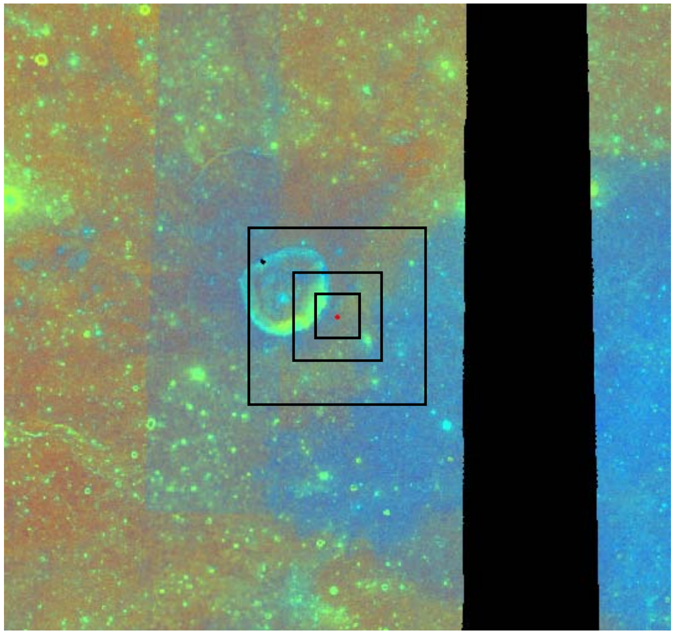
Resource Potential:
Mare regolith

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

NASA References:
Geoscience and a Lunar Base (1990)
A Site Selection Strategy for a Lunar Outpost (1990)

Other References:





Lichtenberg Crater

Location (longitude, latitude): -67.23, 31.65

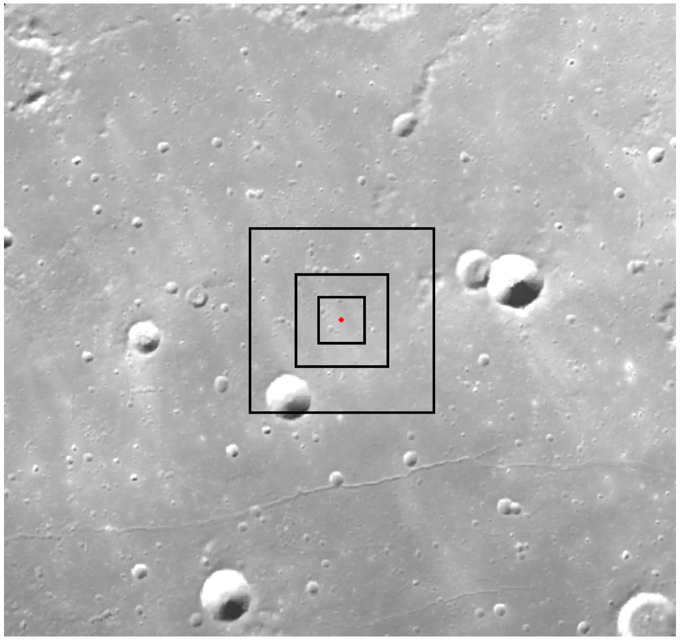
Scientific Rationale:
Fresh, rayed crater
Young (e.g., Copernican?), thin lavas

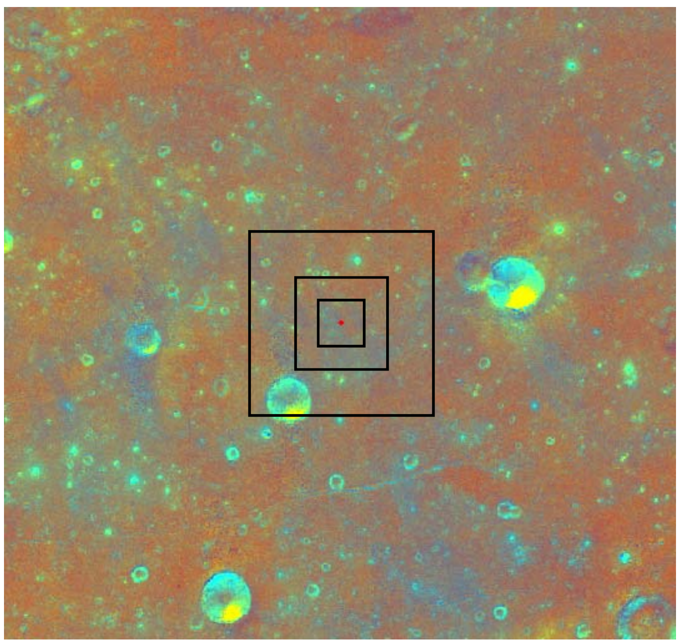
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain
Crater ejecta
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:
Schultz and Spudis, Nature 302, 233-236 (1983)





Mare Frigoris

Location (longitude, latitude): 26.10, 59.80

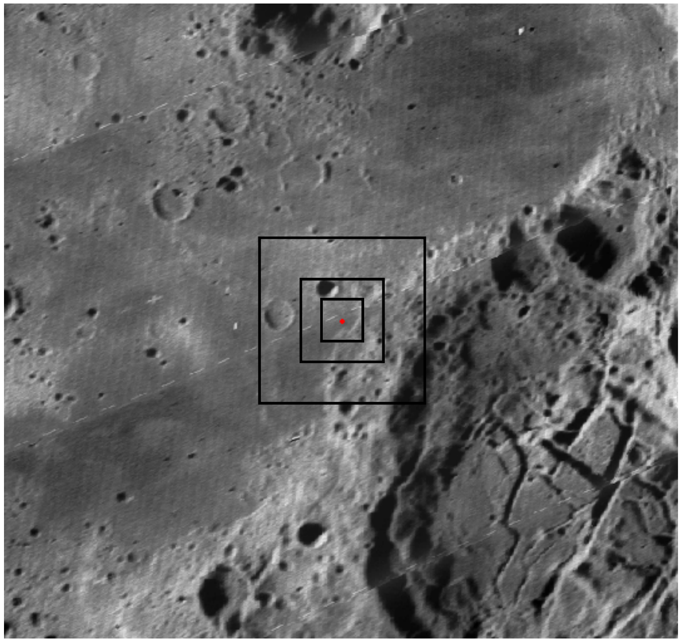
Scientific Rationale:
Mare age and composition (low-Fe, low-Ti)
Light plains

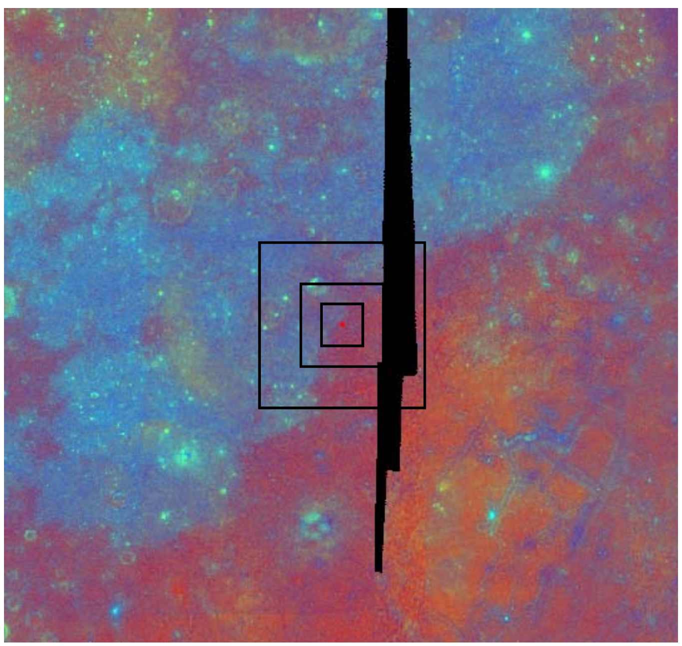
Resource Potential:
Mare regolith
Low-Ti basalts

Operational Perspective:
Mare terrain
Near side location

NASA References:

Other References:





Mare Moscoviense

Location (longitude, latitude): 150.47, 26.19

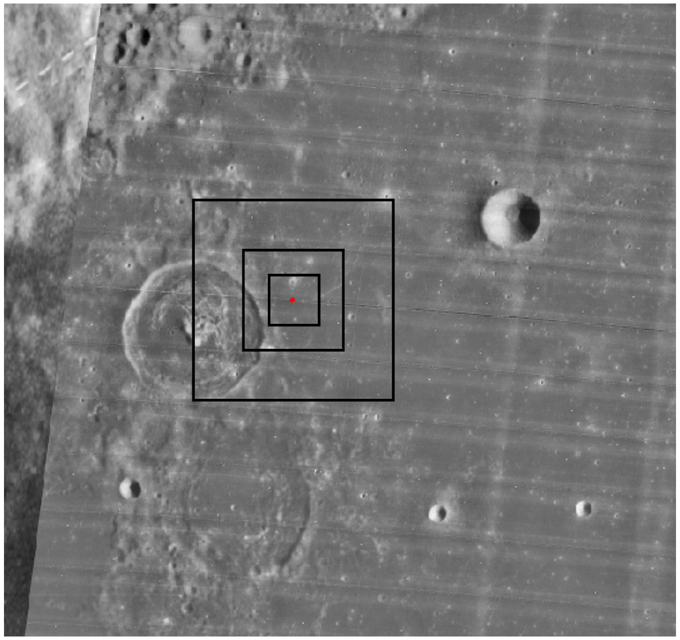
Scientific Rationale:
Mare age and composition (e.g., far side mare)
Basin geology (e.g., inner ring)

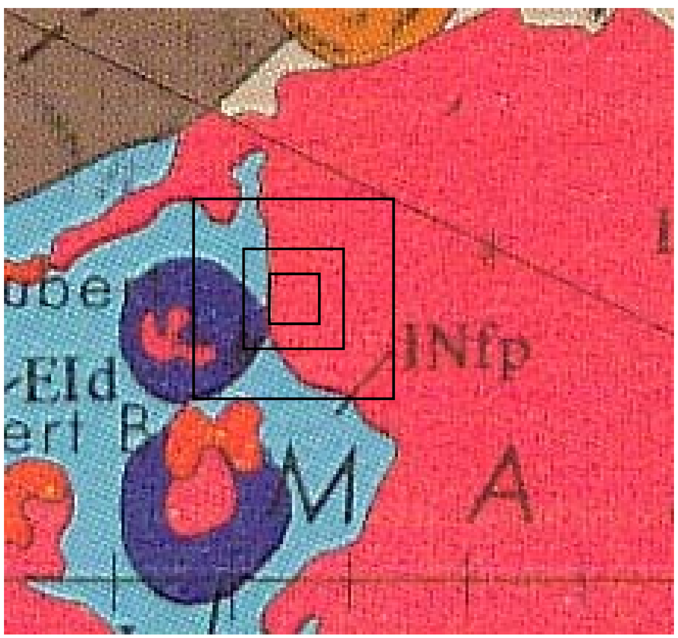
Resource Potential:
High-Ti mare regolith

Operational Perspective:
Mare terrain
Highlands terrain
Far side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:





(Clementine uvvis color ratio image not available)

Mare Smythii

Location (longitude, latitude): 85.33, 2.15

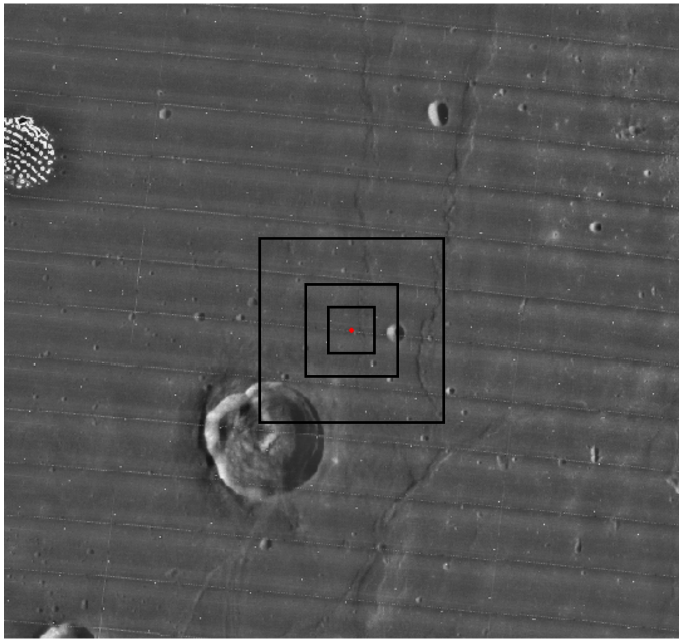
Scientific Rationale:
Young basaltic lavas
Nearby floor-fractured crater

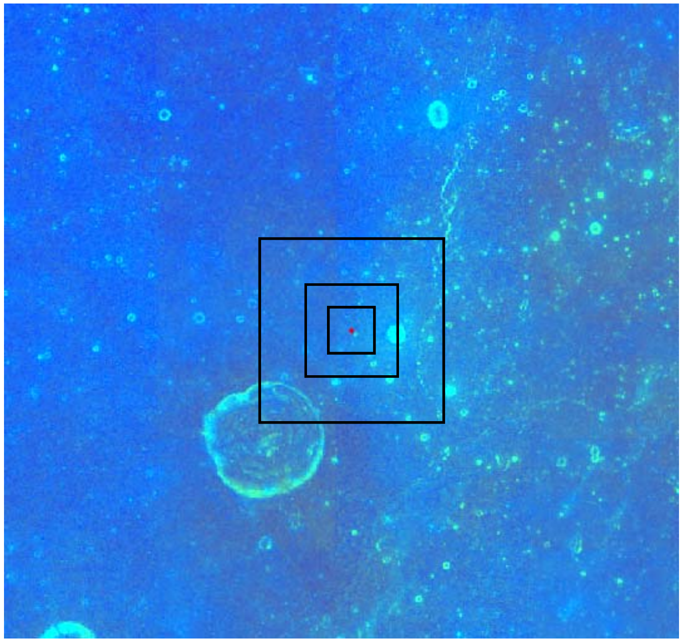
Resource Potential:
High-Fe mare regoilth

Operational Perspective:
Mare terrain
Limb location

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

Other References:





Mare Tranquillitatis

Location (longitude, latitude): 22.06, 6.93

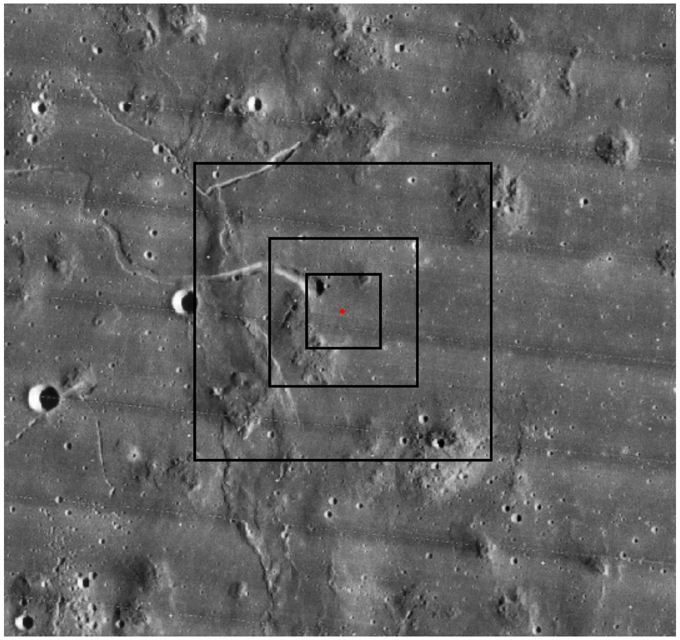
Scientific Rationale:
High-Ti basaltic lavas
Volcanic processes
Wrinkle ridges, low basaltic shields

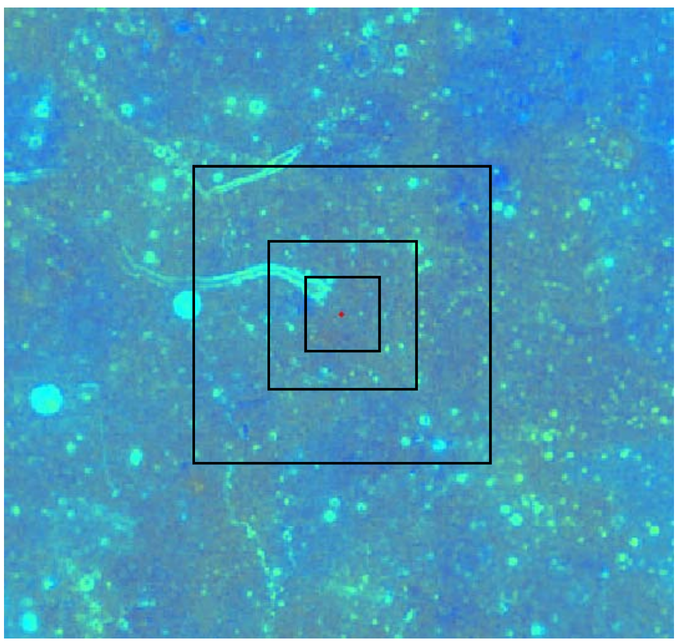
Resource Potential:
High-Ti mare regolith

Operational Perspective:
Mare terrain
Near side location

NASA References:
Exploration Systems Architecture Study (2005)

Other References:





Marius Hills

Location (longitude, latitude): -55.80, 13.58

Scientific Rationale:
Volcanic field
Lava flows, domes, rilles
Pyroclastic materials ?

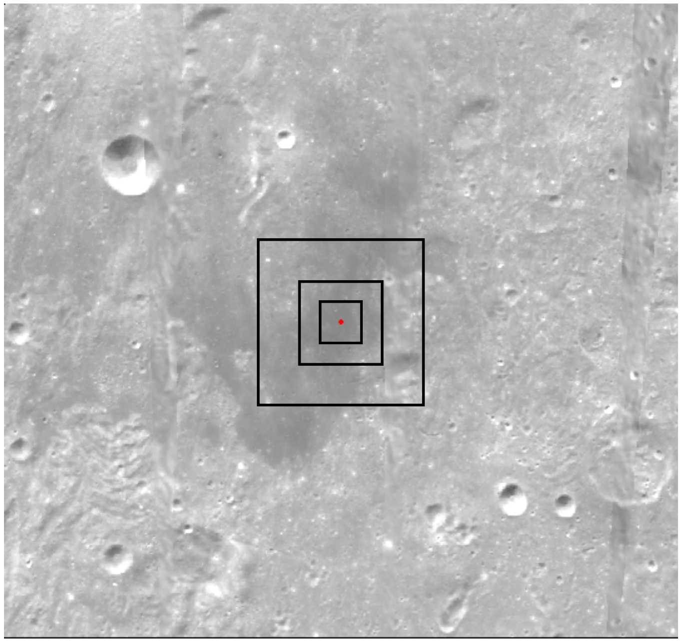
Resource Potential:
Mare regolith
Pyroclastic materials?
Endogenous volatiles?

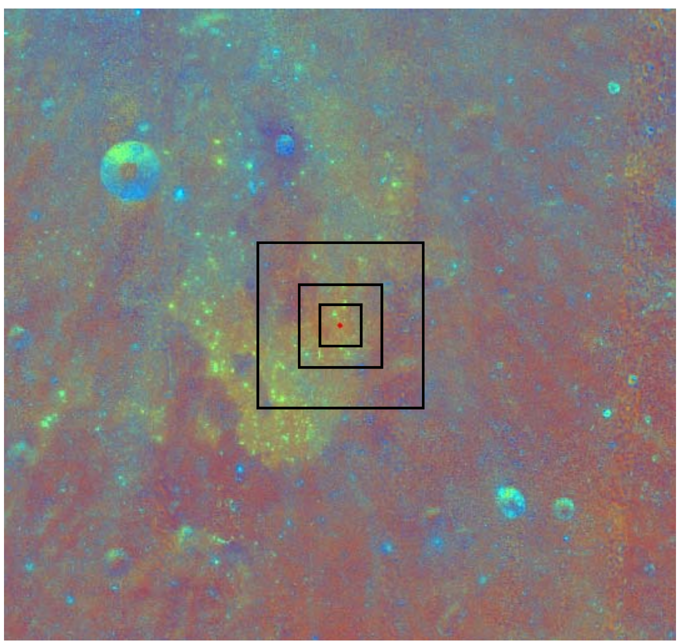
Operational Perspective:
Mare terrain
Some steep-sided domes and cones
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:
Campbell et al., *J. Geophys. Res*., 114, E01001, doi:10.1029/2008JE003253 (2009)

Heather et al., *J. Geophys. Res*., 108(E3), 5017, doi:10.1029/2002JE001938 (2003)





Mendel-Rydberg Cryptomare

Location (longitude, latitude): -93.07, -51.14

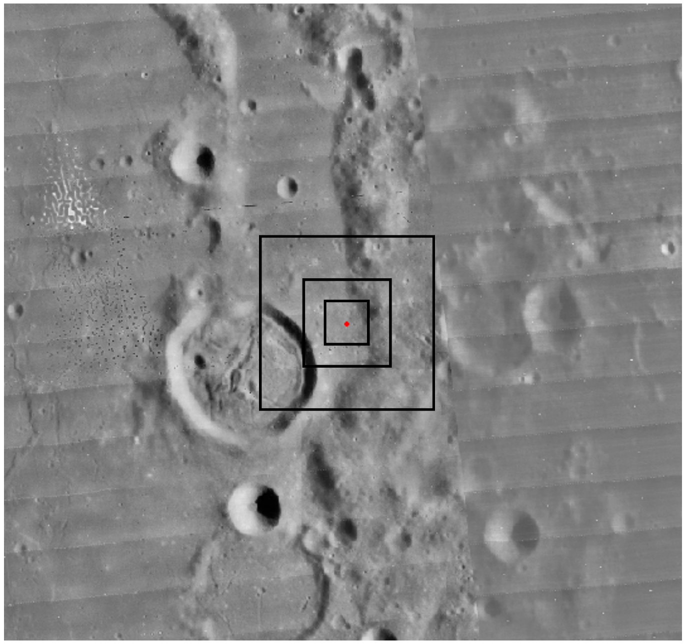
Scientific Rationale:
Ancient mare (e.g. ‘cryptomare’)

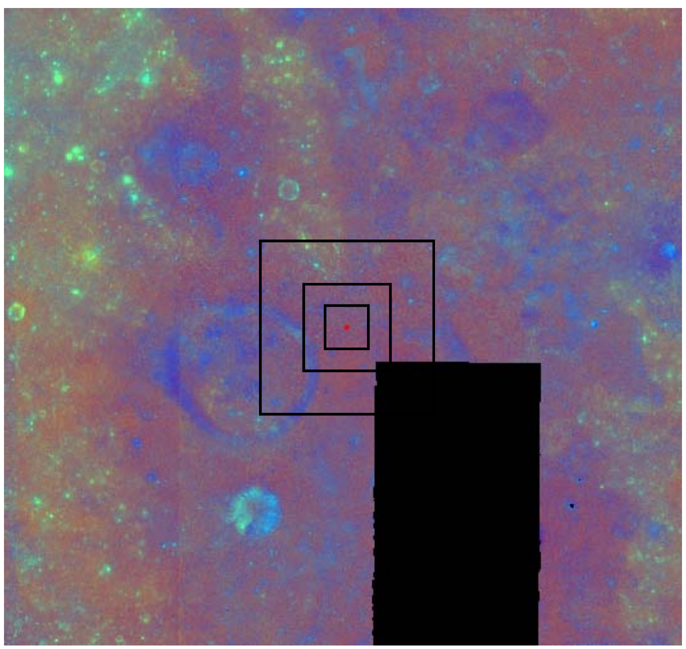
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain intermixed with highlands (Orientale ejecta)
Limb location

NASA References:

Other References:





Montes Pyrenaeus

Location (longitude, latitude): 40.81, -15.91

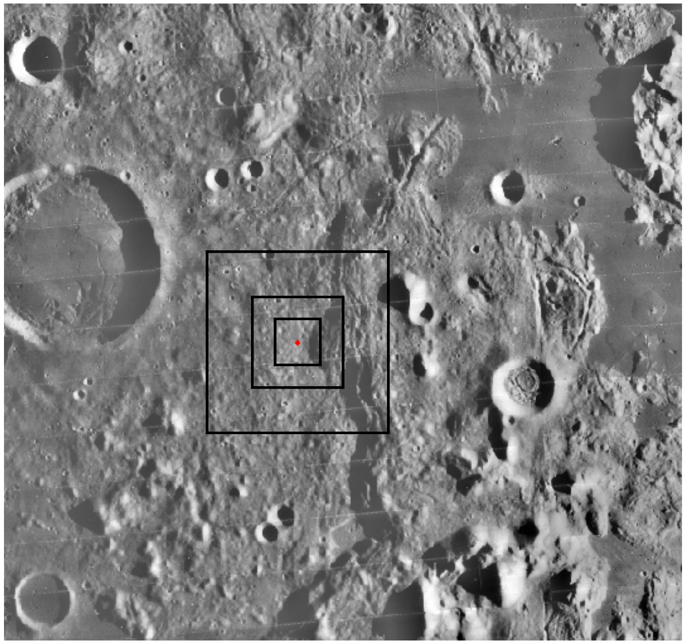
Scientific Rationale:
Nectaris basin impact melt and breccias
Basin geology
Impact process
Mare flows

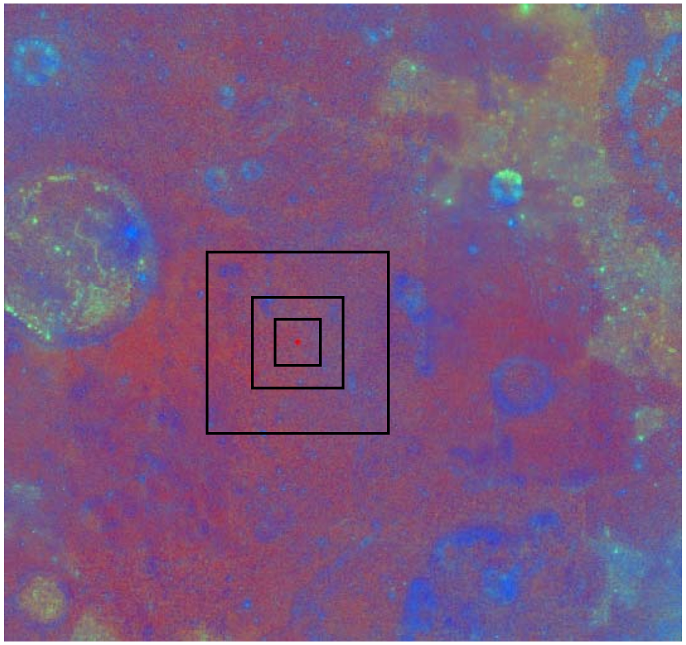
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain
Highlands terrain
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:





Orientale 2

Location (longitude, latitude): -87.91, -18.04

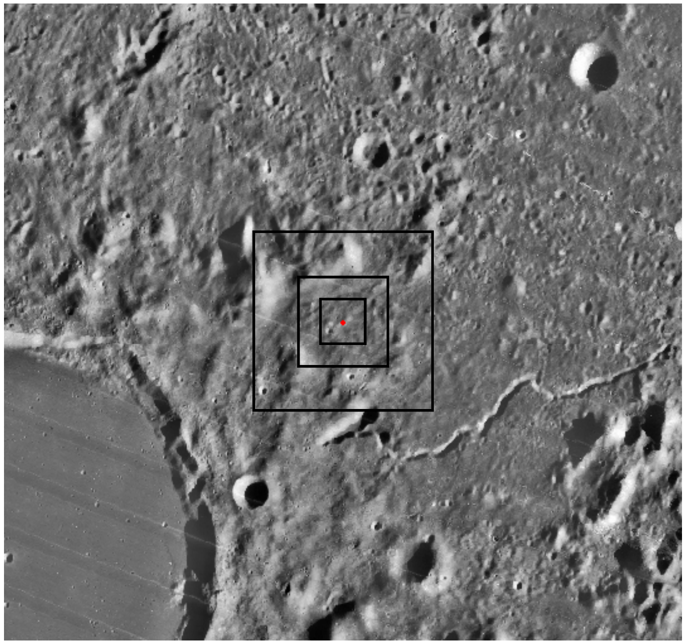
Scientific Rationale:
Maunder formation (e.g., basin impact melt)
Basin geology
Kopff crater geology (anomalous morphology)
Impact process

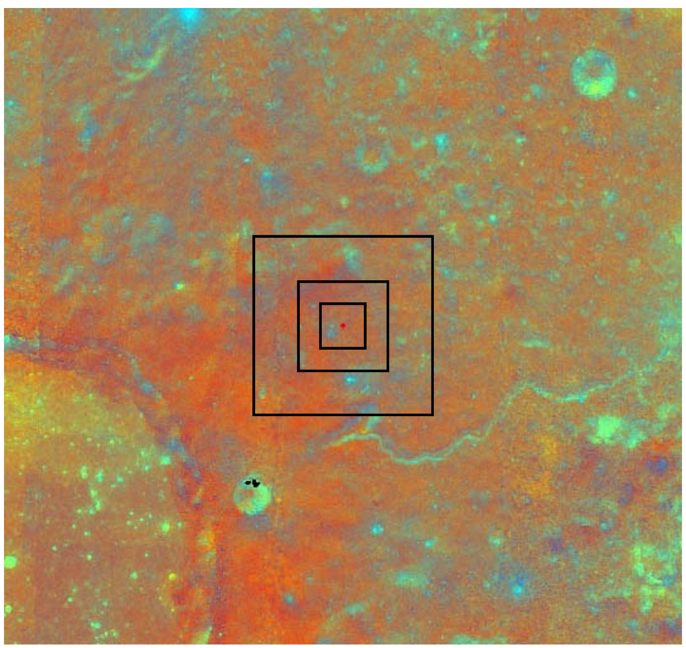
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Limb location

NASA References:
Exploration Systems Architecture Study (2005)

Other References:





Plato Ejecta

Location (longitude, latitude): -5.21, 53.37

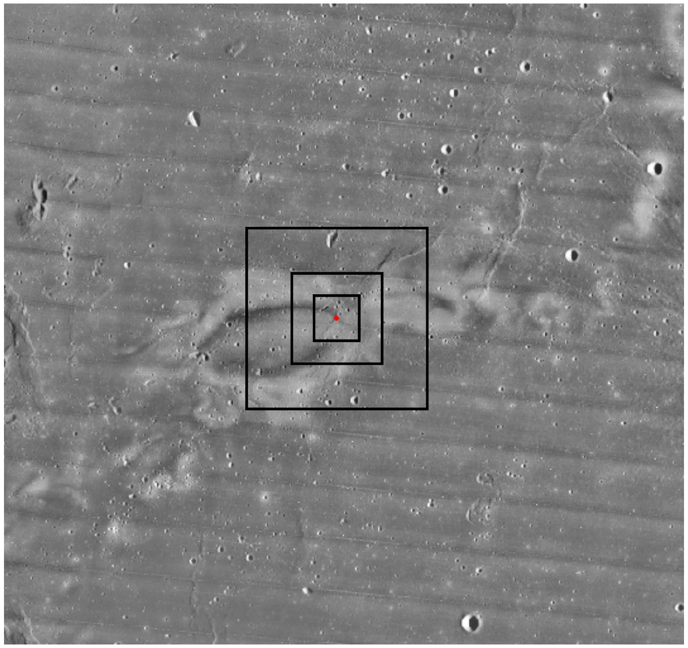
Scientific Rationale:
Radar-dark anomaly in ejecta

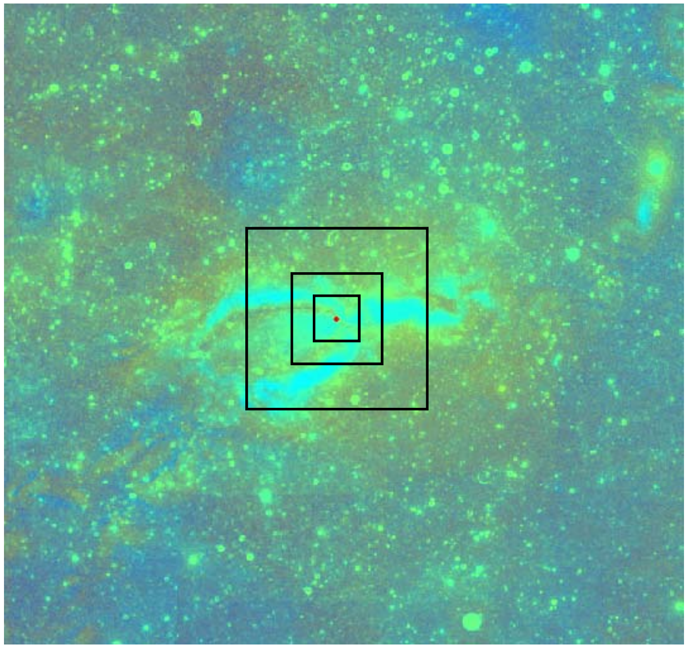
Resource Potential:
Highlands regolith
Pyroclastic material ?

Operational Perspective:
Highlands terrain
Crater ejecta terrain
Near side location

NASA References:

Other References:
Gaddis and Pieters, Icarus 61, 461-489 (1985)





Reiner Gamma

Location (longitude, latitude): -58.56, 7.53

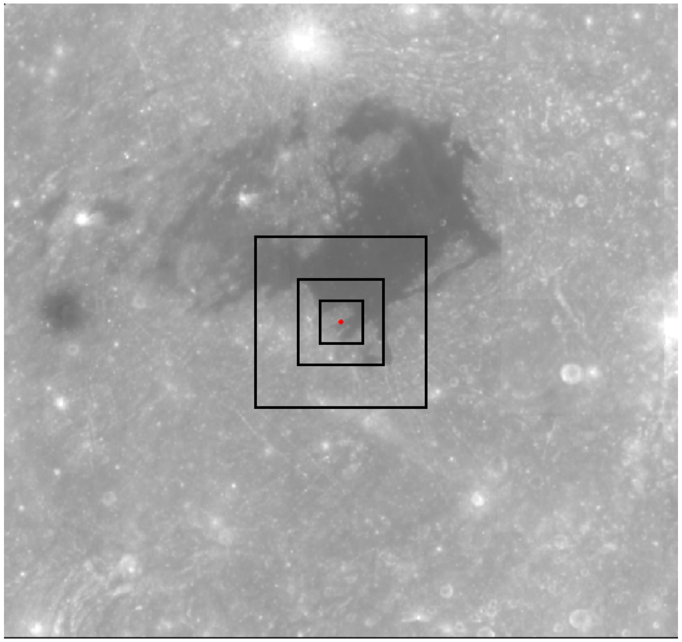
Scientific Rationale:
Magnetic anomaly (e.g., bright swirl)
Nearby wrinkle ridge and volcanic dome

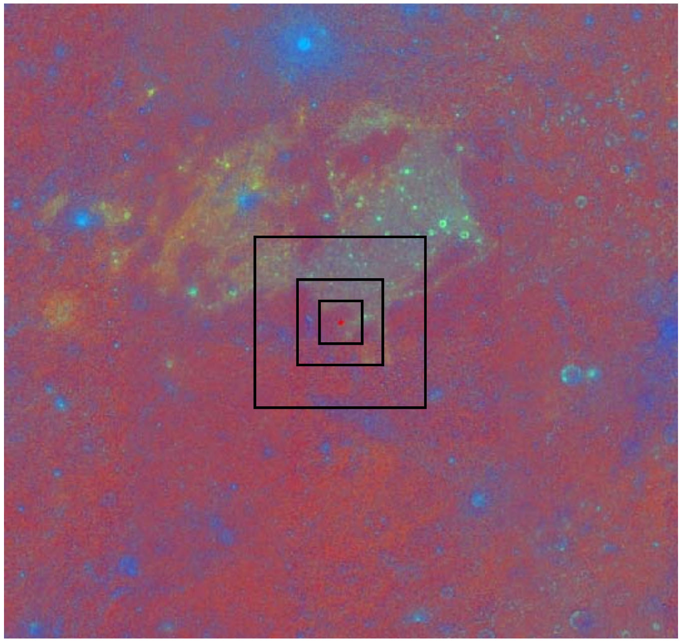
Resource Potential:
Mare regolith

Operational Perspective:
Mare terrain
Near side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:





Riccioli Crater

Location (longitude, latitude): -74.28, -3.04

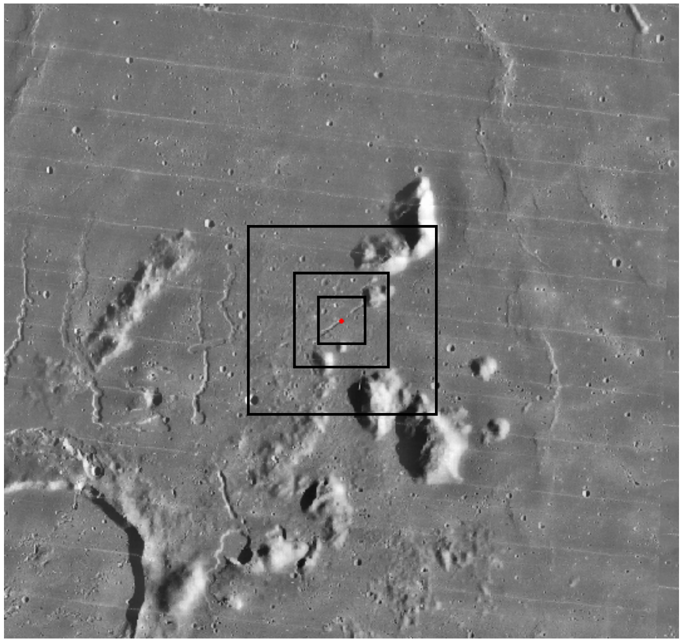
Scientific Rationale:
Thin mare
Orientale ejecta

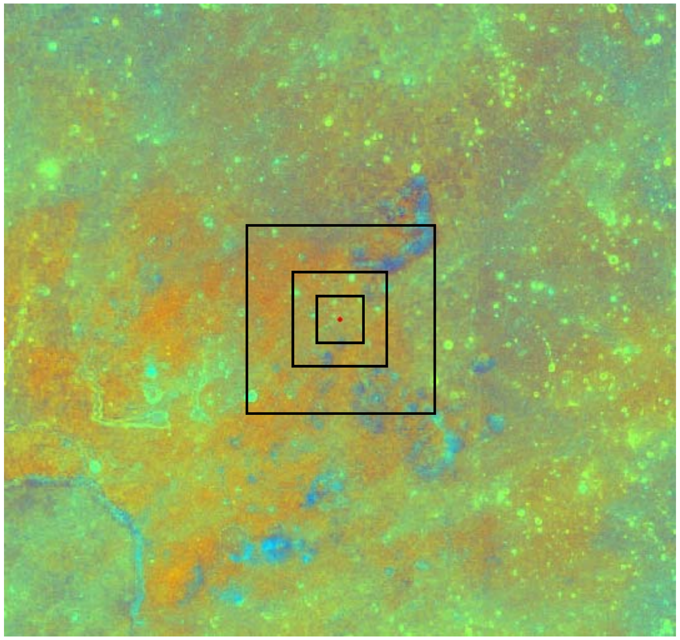
Resource Potential:
Mare regoilth
Highlands regolith

Operational Perspective:
Mare terrain
Highlands terrain
Near side location

NASA References:
A Site Selection Strategy for a Lunar Outpost (1990)

Other References:





Rimae Prinz

Location (longitude, latitude): -41.72, 27.41

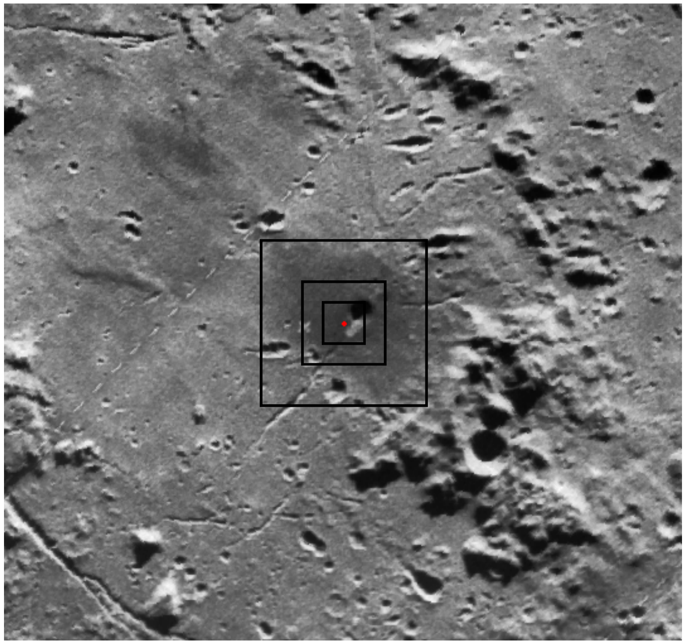
Scientific Rationale:
Rille
Possible lava tube
Nearby highlands massifs (Imbrium basin related)

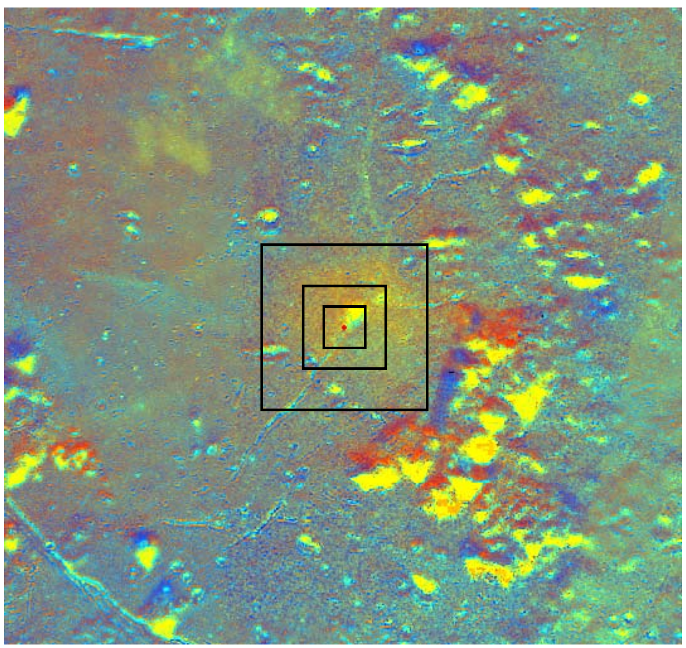
Resource Potential:
Mare regoilth

Operational Perspective:
Mare terrain
Sinuous rille (e.g., similar to Apollo 15 Hadley rille)
Near side location

NASA References:

Other References:
Hörz, Lunar Bases and Space Activities of the 21st Century (1985)





Schrödinger

Location (longitude, latitude): 138.77, -75.40

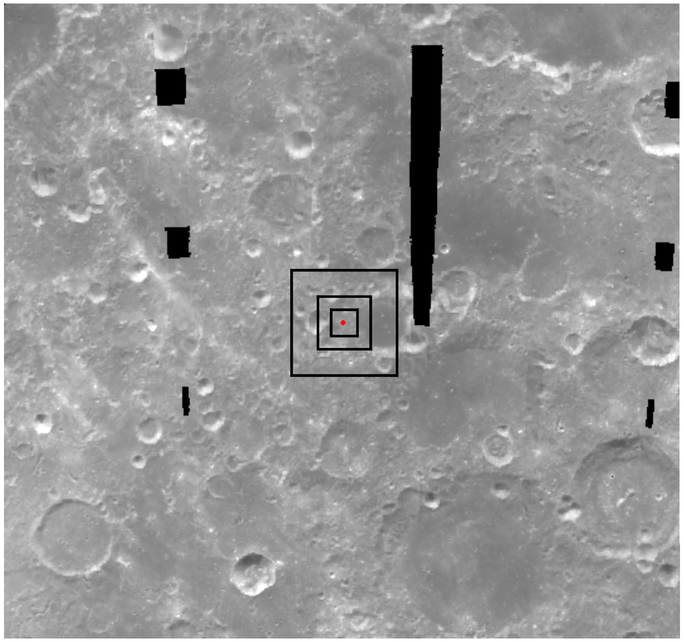
Scientific Rationale:
Pyroclastic materials
Mantle xenoliths
Schrödinger basin impact melts and breccias

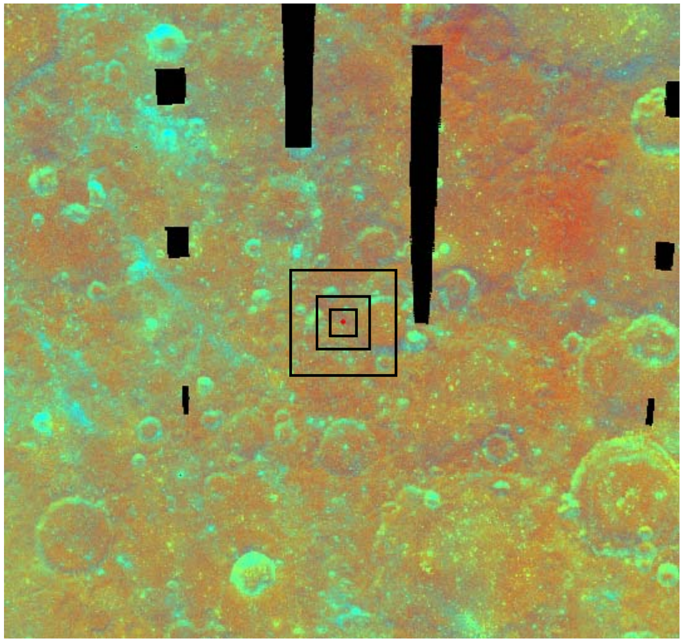
Resource Potential:
Pyroclastic materials

Operational Perspective:
Pyroclastic covered surface
Far side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References:





South Pole-Aitken Rim

Location (longitude, latitude): 170.92, -51.00

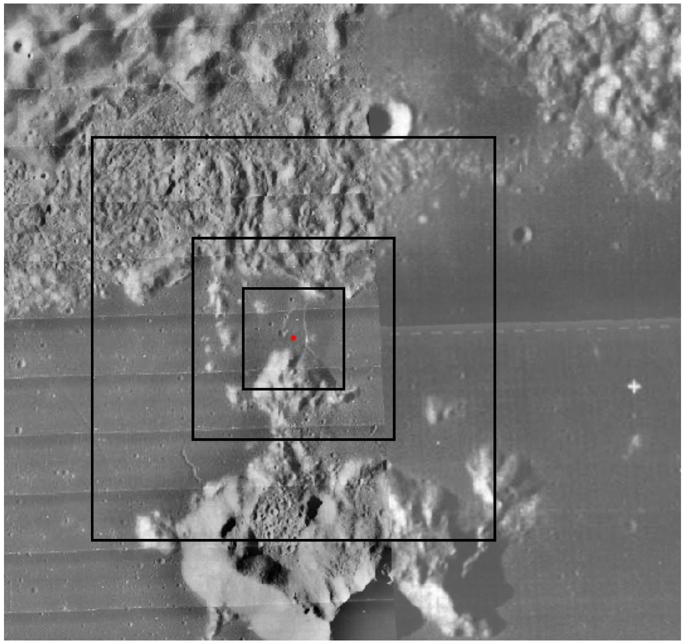
Scientific Rationale:
SPA rim materials
Basin formation (rim of transient cavity)
Th anomaly

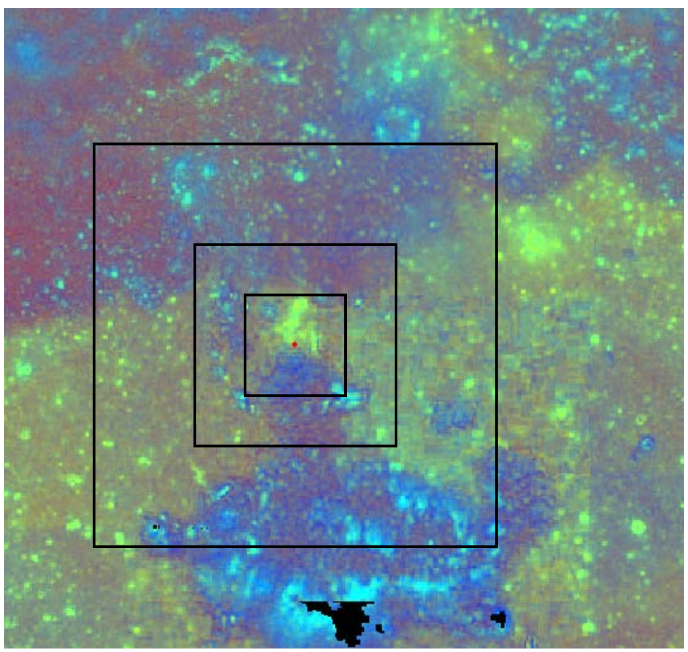
Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Far side location

NASA References:

Other References:





Tsiolkovsky Crater

Location (longitude, latitude): 128.51, -19.35

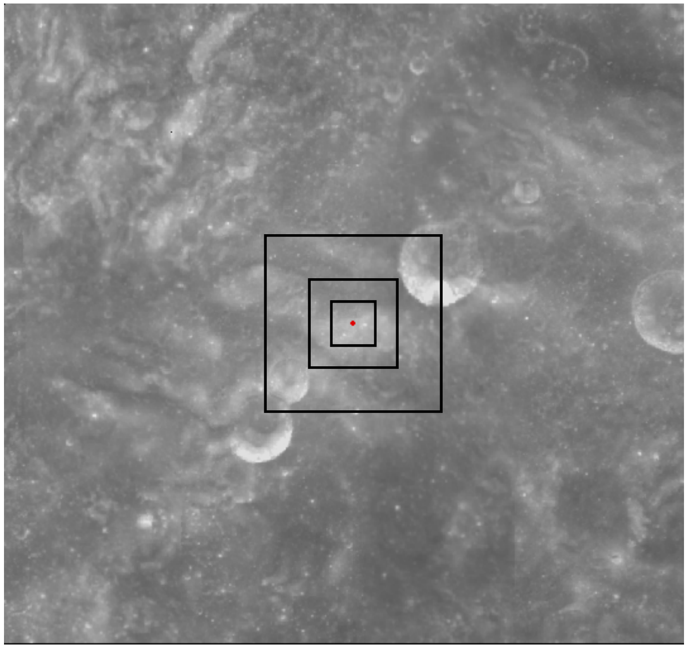
Scientific Rationale:
Far side mare materials
Central peak
Impact melt and breccias
Impact process

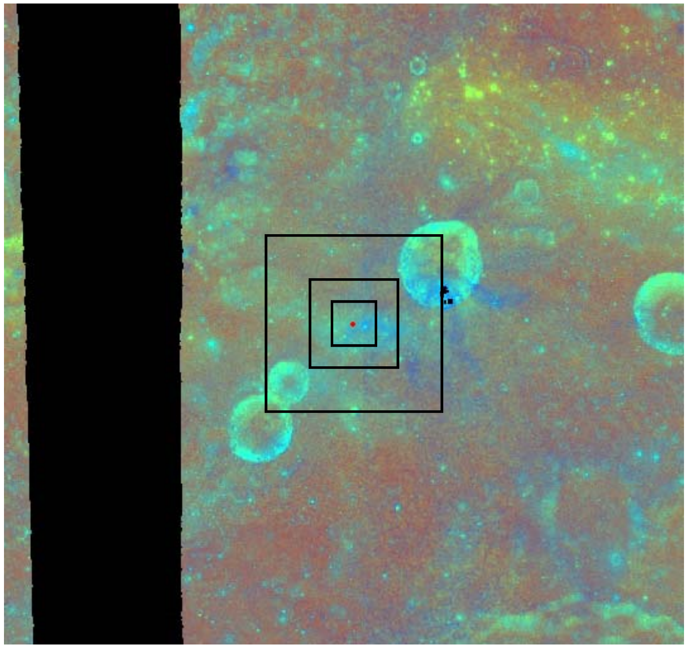
Resource Potential:
Mare regolith

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

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:





Van De Graaf Crater

Location (longitude, latitude): 172.08, -26.92

Scientific Rationale:
Antipode to Imbrium basin
Magnetic anomaly (e.g., bright swirls)
Impact process

Resource Potential:
Highlands regolith

Operational Perspective:
Highlands terrain
Far side location

NASA References:
Geoscience and a Lunar Base (1990)

Other References: