Lunar Landing Site Workshop Preliminary Findings

Jim Crowell, Erica Jawin, Sarah Valencia, Ryan Watkins

SSERVI

LUNAR SCIENCE for LANDED MISSIONS WORKSHOP

LEAG

LUNAR EXPLORATION ANALYSIS GROUP

Overarching Scientific Themes

LUNAR SCIENCE for LANDED MISSIONS WORKSHOP

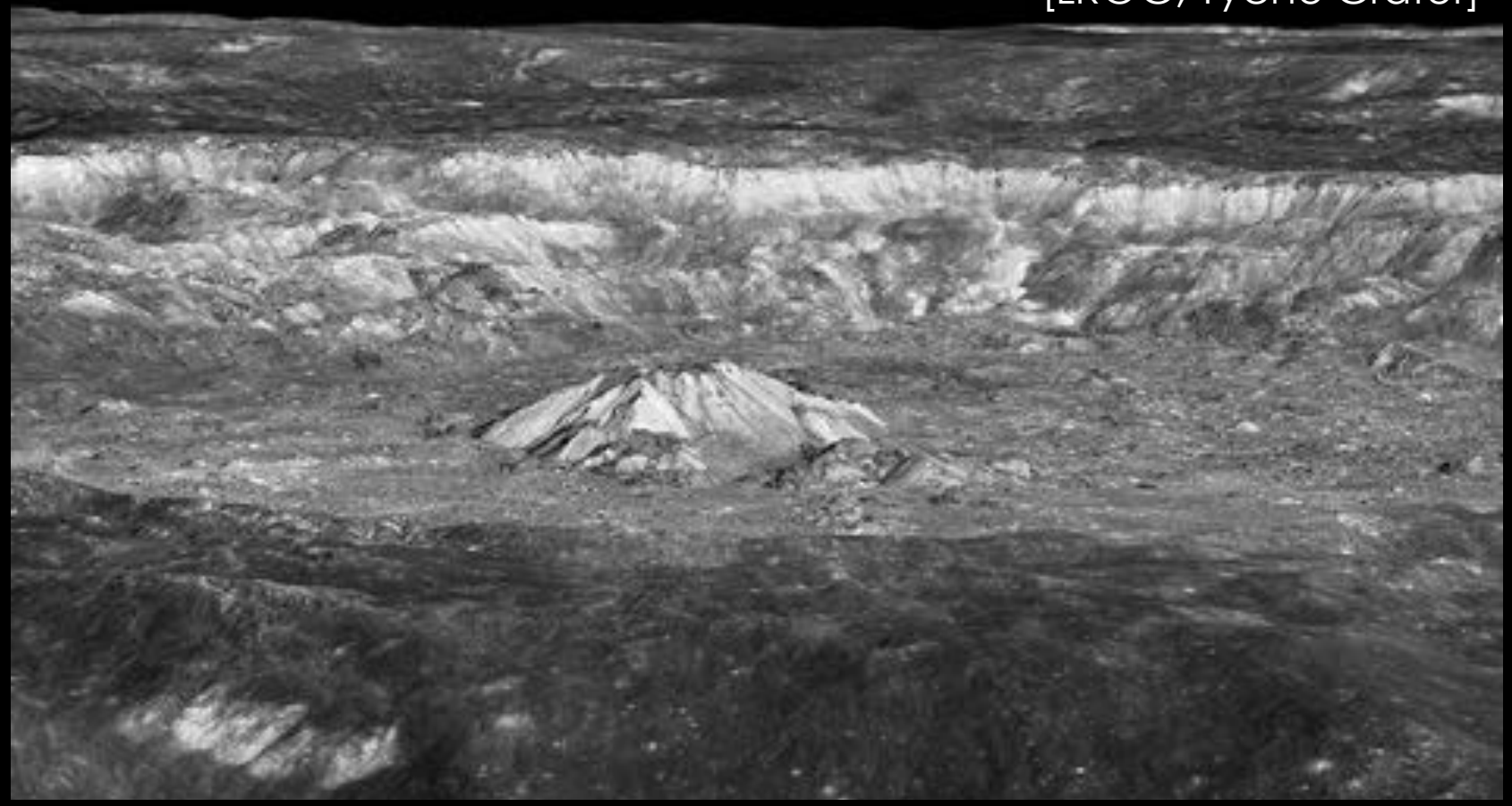
1. Impacts: Establish a precise impact chronology
2. Volatiles: Understand the source, form, and concentration of lunar volatiles
3. Volcanism: Determine the origin and evolution of lunar volcanism through space and time
4. Geophysics/Astrophysics: Constrain the interior structure and evolution of the Moon
5. Space Weathering: Examine regolith formation and space weathering processes

1. Impacts: Establish a precise impact chronology

Locations that address science theme:

- Aristarchus
- IMPs/Ina
- Moscoviense
- Orientale
- P60 basalt unit
- Schrödinger
- SPA

[LROC, Tycho Crater]

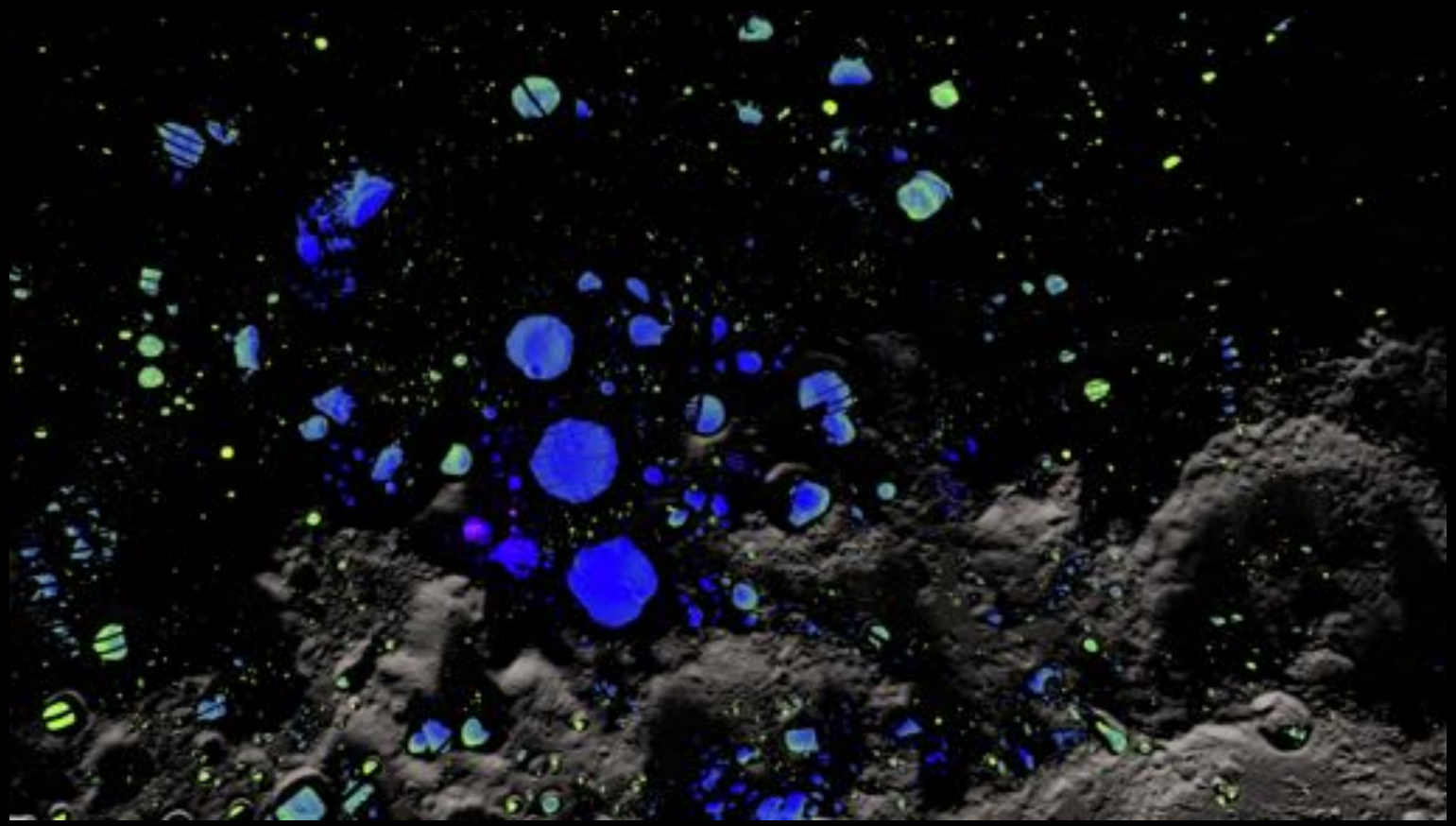


2. Volatiles: Understand the source, form, and concentration of lunar volatiles

Locations that address science theme:

- Aristarchus
- Compton-Belkovich
- IMPs/Ina
- Marius Hills
- Orientale
- Pit craters
- Polar regions
- Rima Bode
- Schrödinger
- Swirls

[S Pole PSRs]

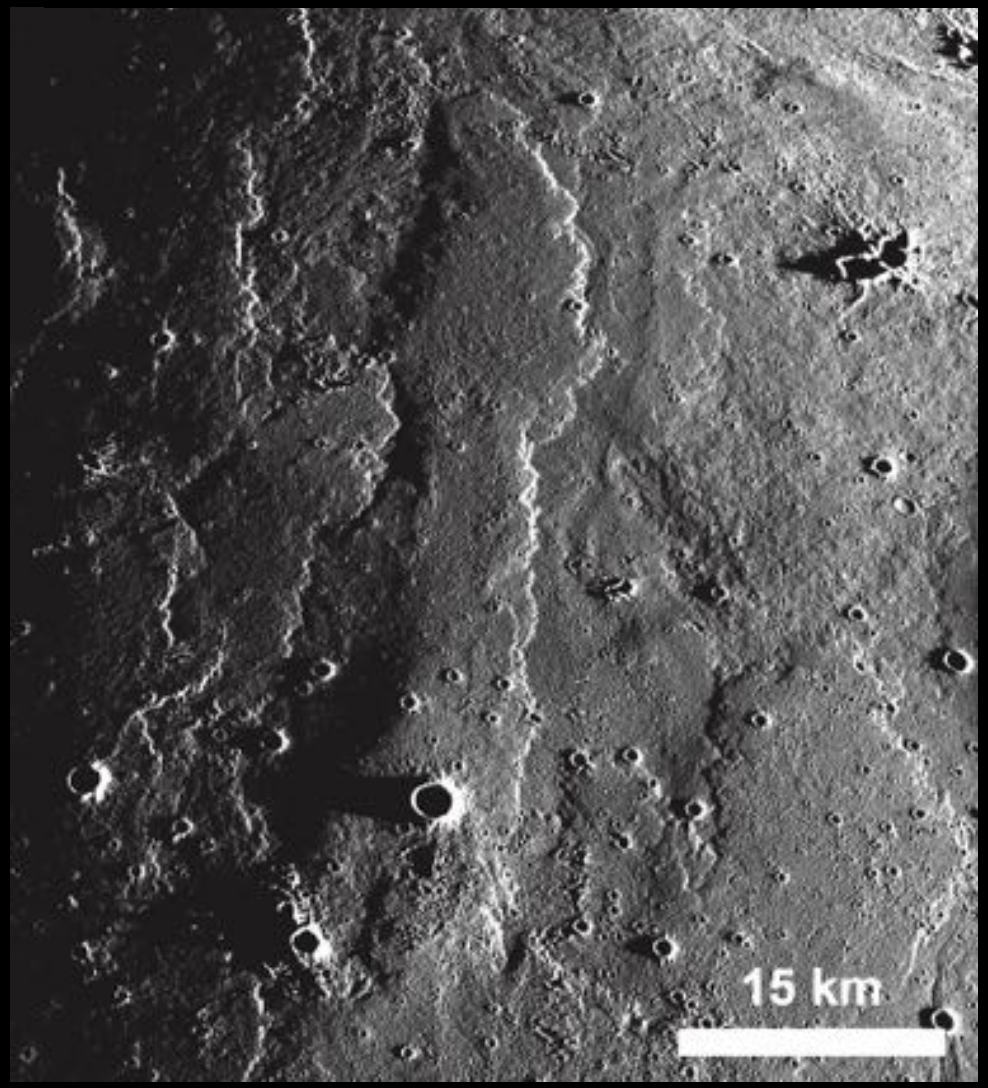


3. Volcanism: Determine the origin and evolution of lunar volcanism through space and time

Locations that address science theme:

- Aristarchus
- Compton-Belkovich
- Gruithuisen domes
- IMPs/Ina
- Marius Hills
- Moscoviense
- Orientale
- P60 basalt unit
- Pit craters
- Rima Bode
- Schrödinger
- SPA

[AS15-M-1559, SW Mare Imbrium]



4. Geophysics: Constrain the interior structure and evolution of the Moon

Locations that address science theme:

- Moscoviense
- SPA
- Global network of nodes

[LROC, Wrinkle Ridge/Loate Scarp]

5. Space Weathering: Examine regolith formation and space weathering processes

Locations that address science theme:

- Moscoviense
- Pit craters
- Swirls
- Global network of nodes

[LROC, Reiner Gamma]

Enabling Technologies

- Communications Relay
- Surviving the lunar night
- Cryogenic sampling, transportation, storage, analysis
- Automated hazard avoidance
- mobility

	Overarching Themes†					Mission Capabilities		
	Impacts	Volatiles	Volcanism	Geophysics	Space Weathering	Mobility Required?	In Situ	Sample Return
Aristarchus	×	×	×				×	×
Compton-Belkovich		×	×			×	×	×
Gruithuisen Domes			×					×
Ina	×	×	×				×	×
Marius Hills		×	×			×	×	×
Moscoviense	×		×	×	×		×	×
Orientale	×	×	×				×	×
P60 Basalt Unit	×		×				×	×
Pit Craters/Lava Tubes		×	×		×	×	×	
Polar Regions		×				×	×	×*
Rima Bode		×	×				×	×
Schrödinger	×	×	×				×	×
SPA	×		×	×				×
Swirls		×			×		×	
Global Network of Nodes				×	×		×	

Potential communication issues

*Cryogenic storage and handling?

†Classification of landing sites as they were presented at this workshop
Each site addresses various SKGs, a detailed analysis will be presented at a later date

Summary: Top locations

	Overarching Themes					Mission Capabilities		
	Impacts	Volatiles	Volcanism	Geophysics	Space Weathering	Mobility Required?	In Situ	Sample Return
Moscoviense	×		×	×	×		×	×
Aristarchus	×	×	×				×	×
Ina	×	×	×				×	×
Orientale	×	×	×				×	×
Schrödinger	×	×	×				×	×
Pit Craters/Lava Tubes		×	×		×	×	×	
SPA	×		×	×				×
Compton-Belkovich		×	×			×	×	×
Marius Hills		×	×			×	×	×
P60 Basalt Unit	×		×				×	×
Rima Bode		×	×				×	×
Swirls		×			×		×	
Global Network of Nodes				×	×		×	
Gruithuisen Domes			×					×
Polar Regions		×				×	×	×*

Summary: Critical Sites

	Overarching Themes					Mission Capabilities		
	Impacts	Volatiles	Volcanism	Geophysics	Space Weathering	Mobility Required?	In Situ	Sample Return
Moscoviense	×		×	×	×		×	×
Aristarchus	×	×	×				×	×
Ina	×	×	×				×	×
Orientale	×	×	×				×	×
Schrödinger	×	×	×				×	×
Pit Craters/Lava Tubes		×	×		×	×	×	
SPA	×		×	×				×
Compton-Belkovich		×	×			×	×	×
Marius Hills		×	×			×	×	×
P60 Basalt Unit	×		×				×	×
Rima Bode		×	×				×	×
Swirls		×			×		×	
Global Network of Nodes				×	×		×	
Gruithuisen Domes			×					×
Polar Regions		×				×	×	×*

Moscoviense meets most science themes, but communications issue

Aristarchus, Ina, near-side pit craters meet most science requirements with no communications issues