

Overview to Session 7: Lunar geology

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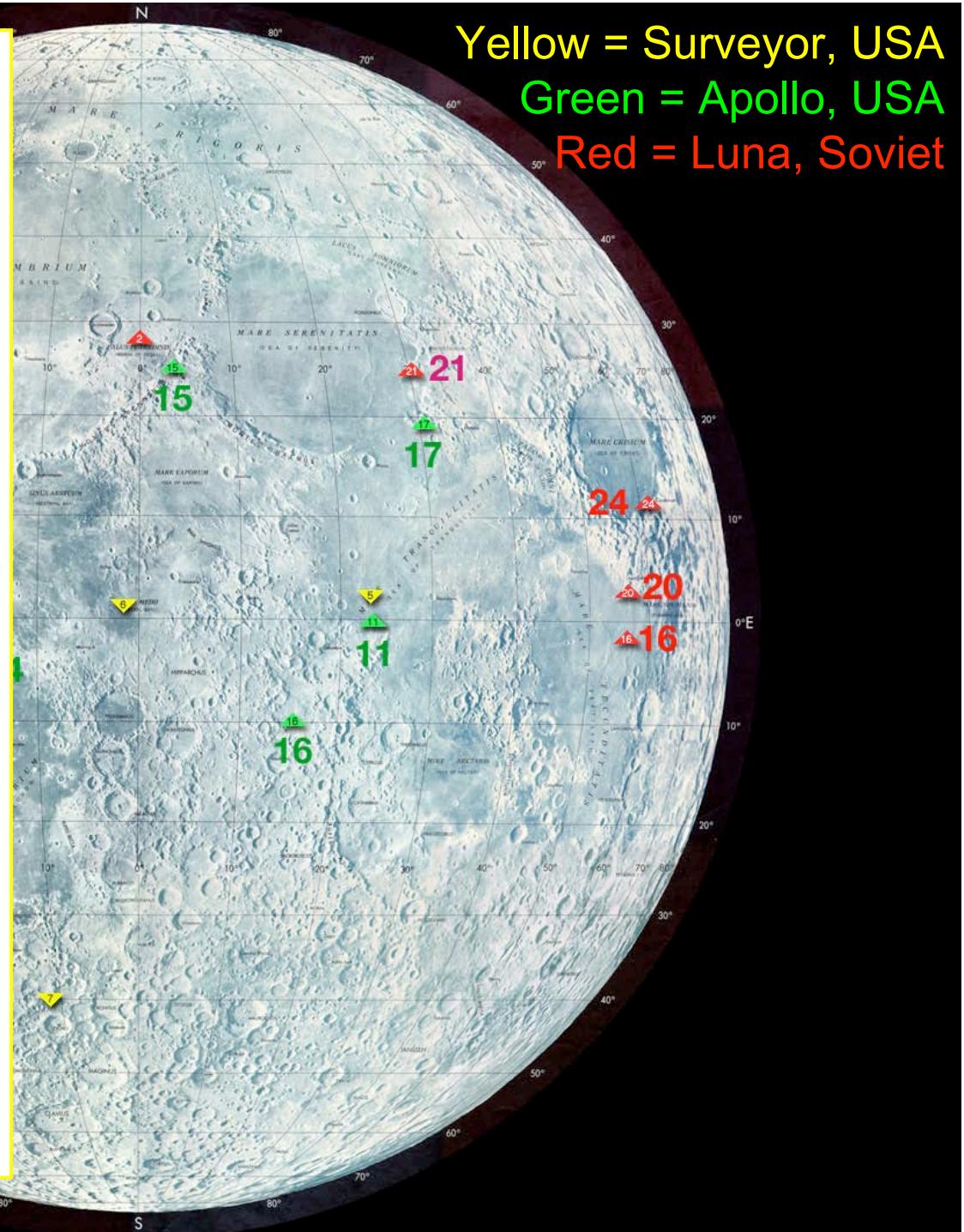


**Dept. of Civil Eng. & Geological Sciences,
University of Notre Dame, IN 46556**



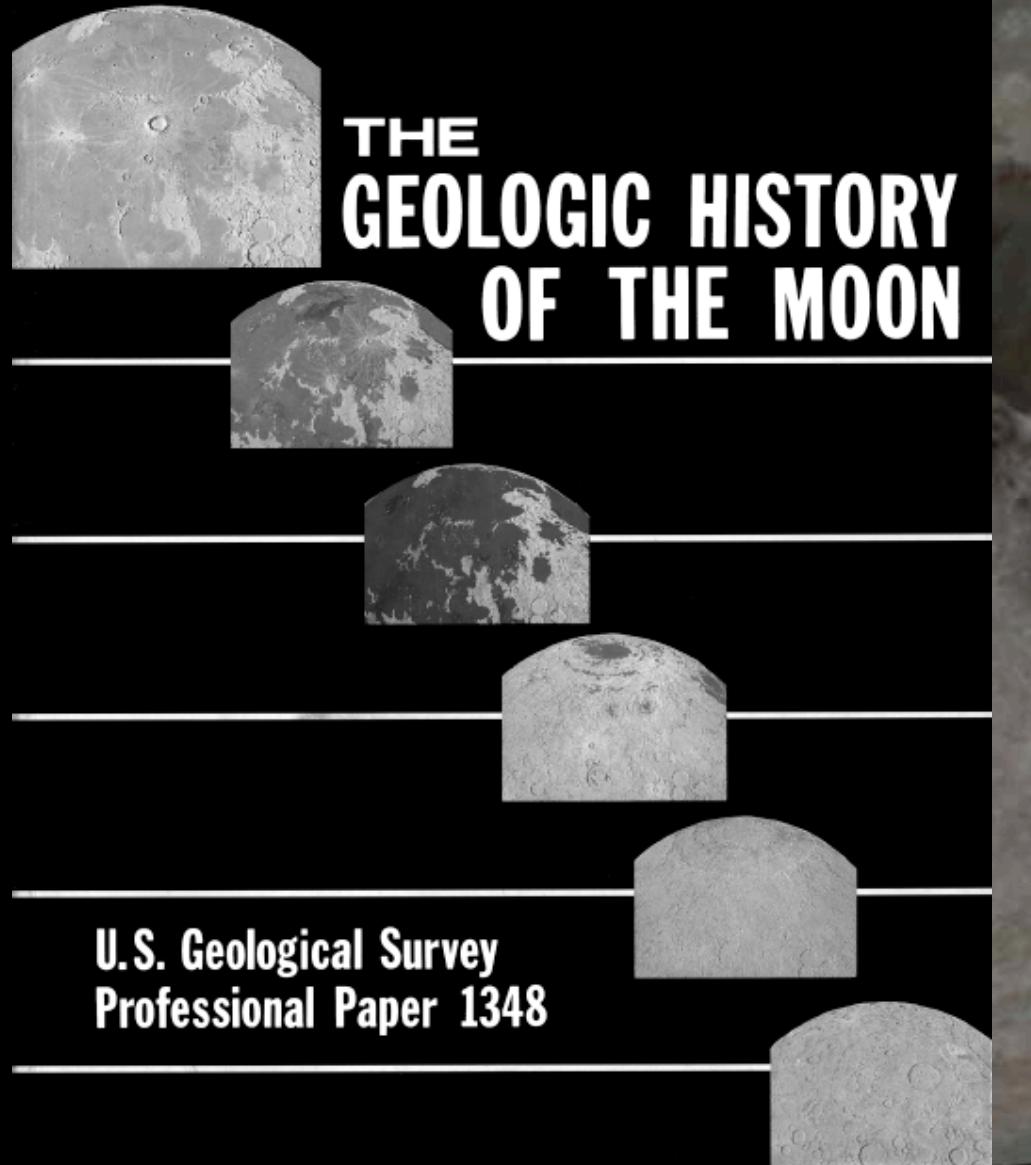
**Since Apollo/Luna,
Orbital/Flyby Missions:**

Lunar Orbiter;
Apollo!
Galileo (flyby) in 1990, 1992;
Hiten (Muses-A), 1990;
Clementine in 1994;
Lunar Prospector in 1998;
Hayabusa (Muses-C), 2003;
SMART-1, 2003;
SELENE, 2007;
Chang'e-1, 2007;
Chandrayaan-1 (2008);
LRO/LCROSS (2009)
Chang'e-2 (November 2010)
GRAIL (2011)
LADEE (2013)



The Bible of Lunar Geology

<http://ser.sese.asu.edu/GHM/>



The Geologic History of the Moon

By DON E. WILHELM

*with sections by JOHN F. McCUALEY
and NEWELL J. TRASK*

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1348

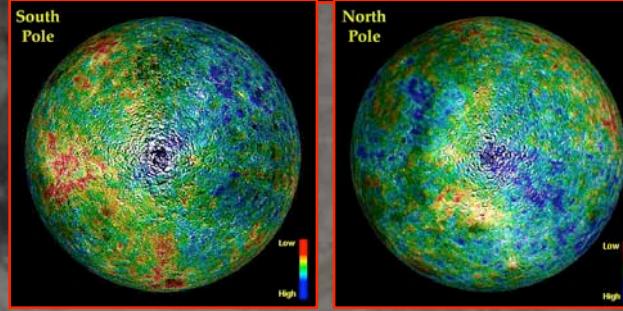
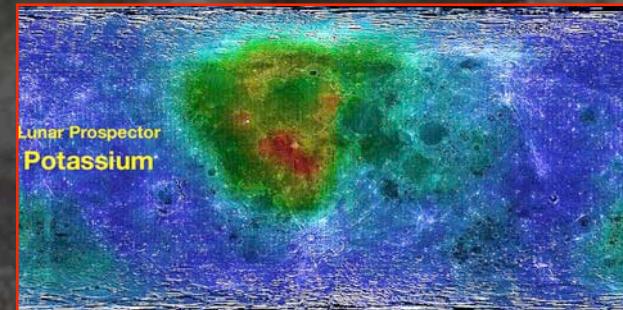
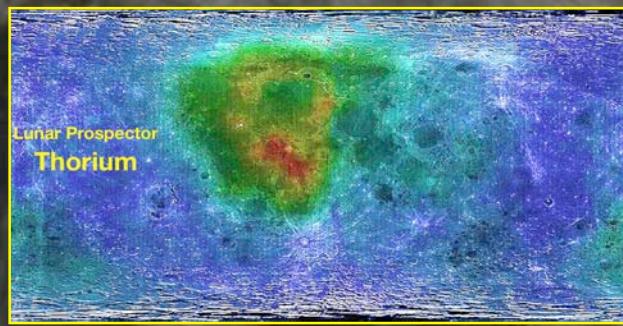
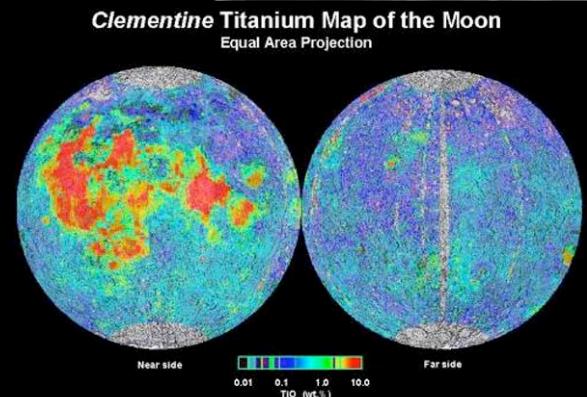
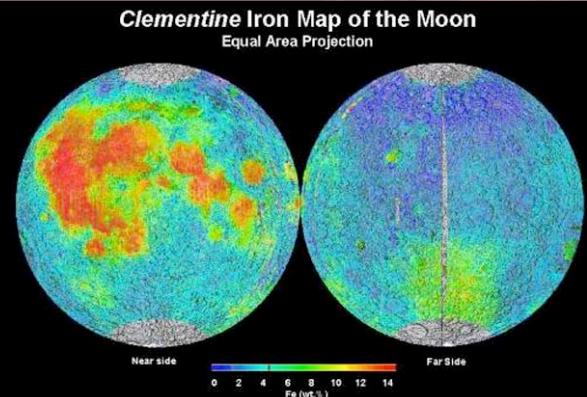
*A comprehensive review of lunar science and evolution
from the viewpoint of historical geology, based on data from
both photogeologic observations and lunar-sample analysis*



UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1987

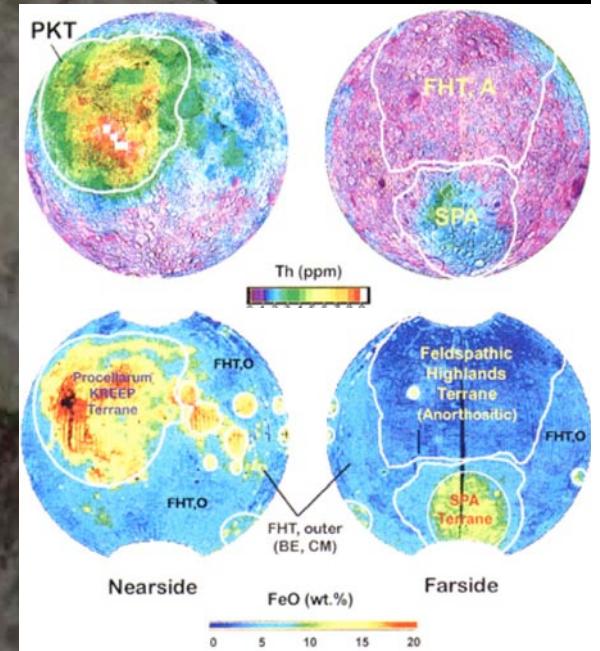
What Do We “Know” About the Lunar Surface?

Global Element Maps

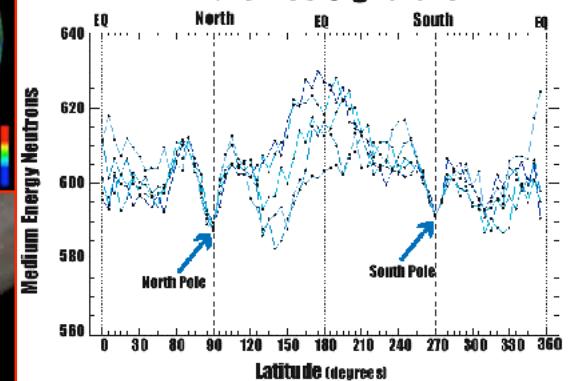


Hydrogen Deposits:
Lunar Prospector

Terrane Boundaries.

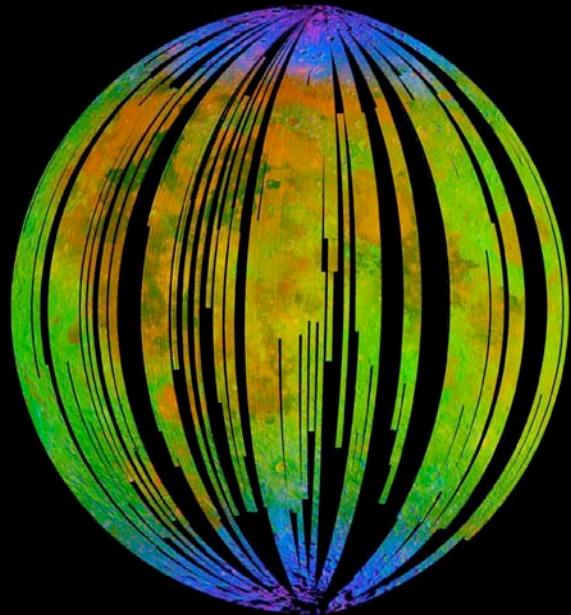


Water Ice Signature



Recent Mission Results

Blue: 3 μm - OH/H₂O adsorption.
Green: reflected solar radiation at 2.4 μm .
Red: Fe-bearing Pyroxene adsorption at 2 μm .



Chandrayaan-1 (M^3)

Volatile Deposits

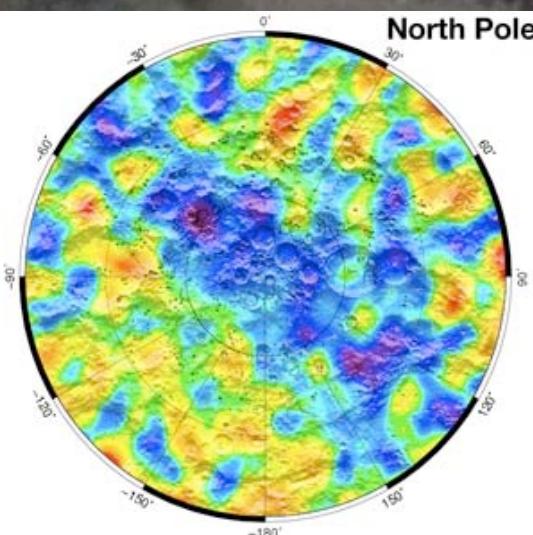
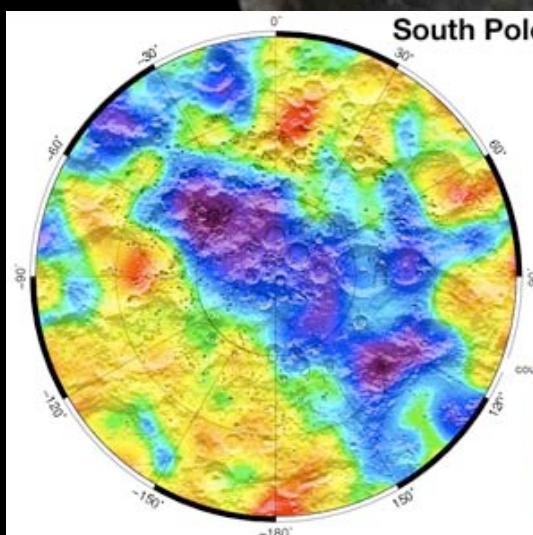
LCROSS Visible Camera Image of Ejecta Cloud

Field of View of instruments making measurements
of the vapor and debris composition

10 km

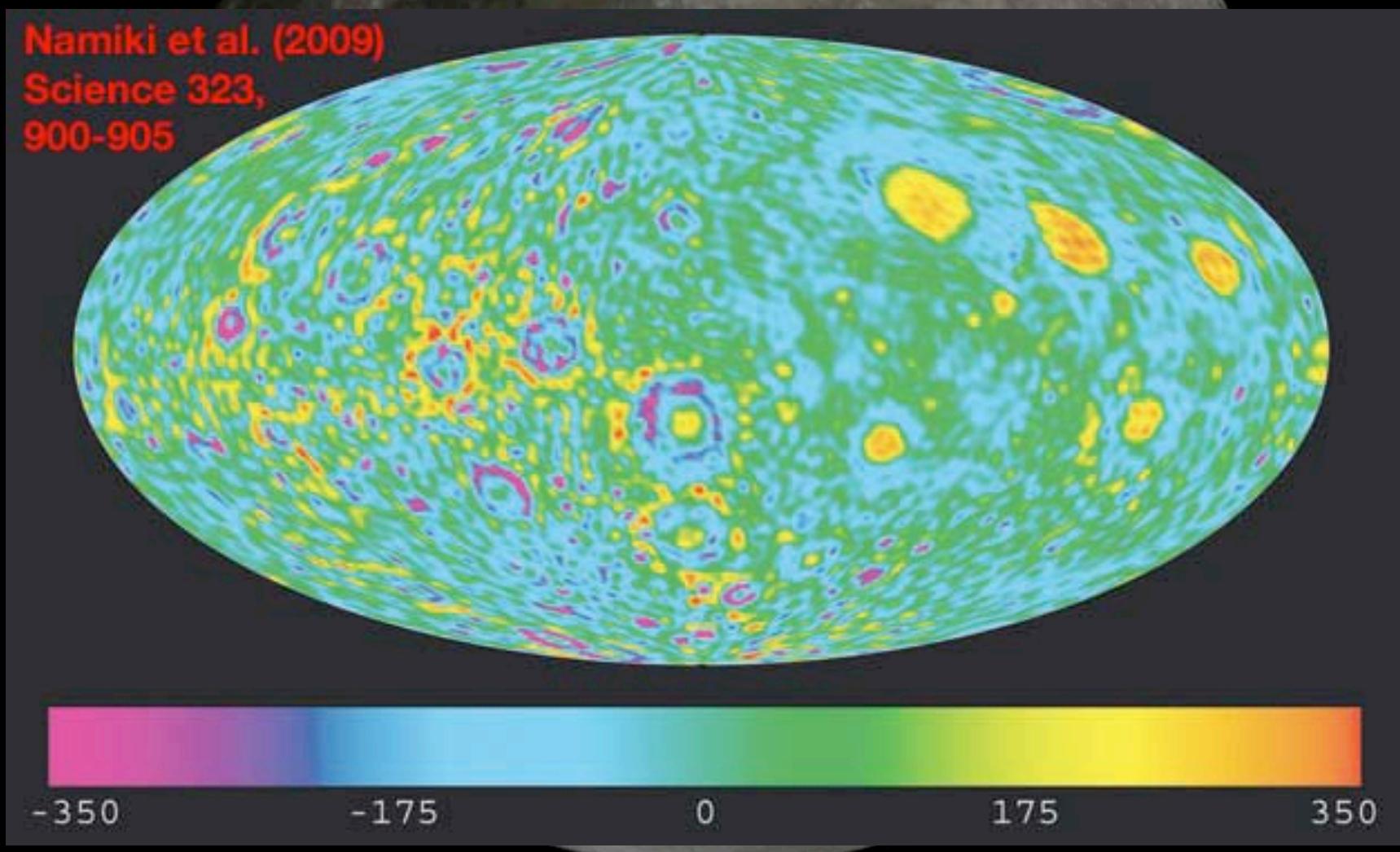
LCROSS

LRO LEND Hydrogen Data

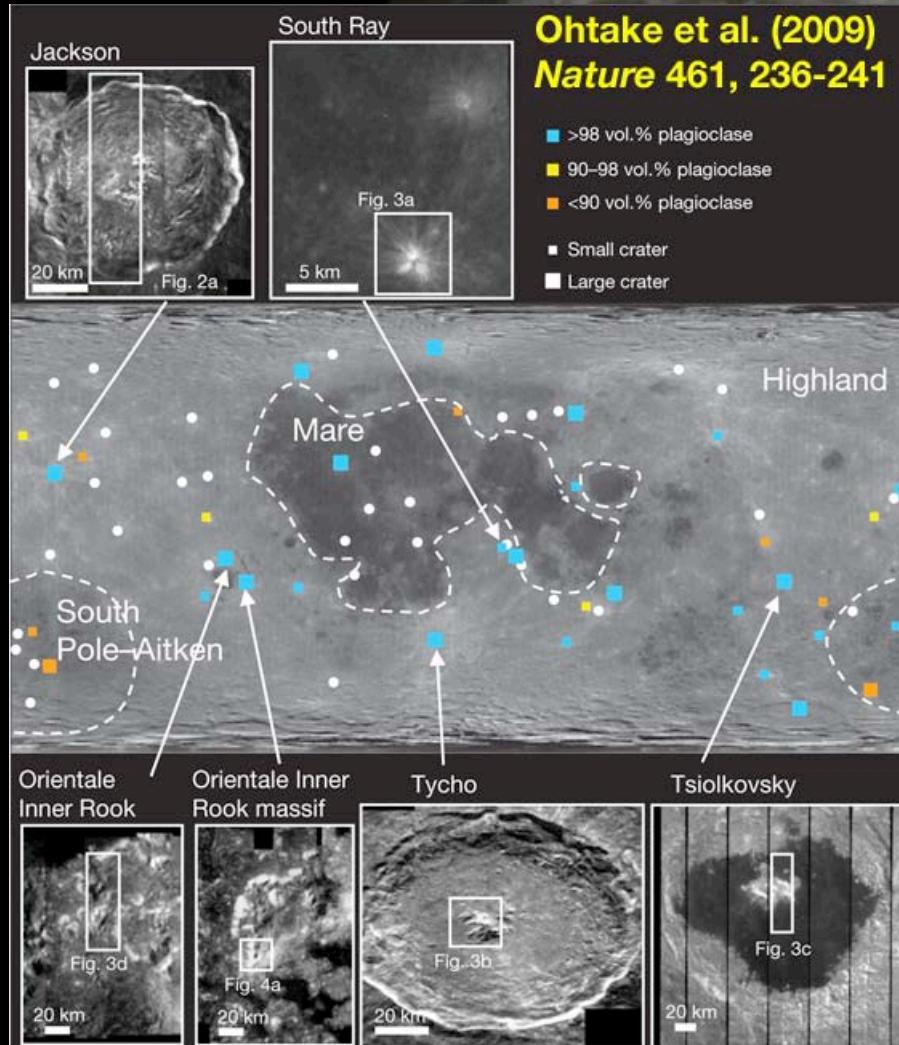


Recent Mission Results

Kaguya (SELENE) Farside Gravity Map



Recent Mission Results

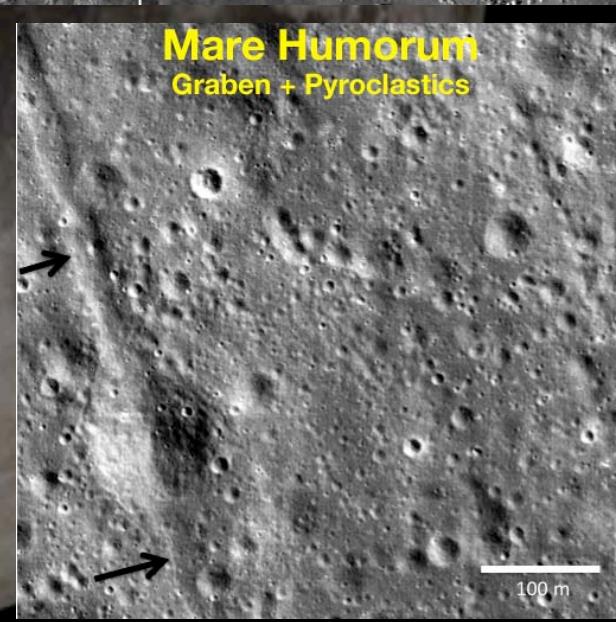
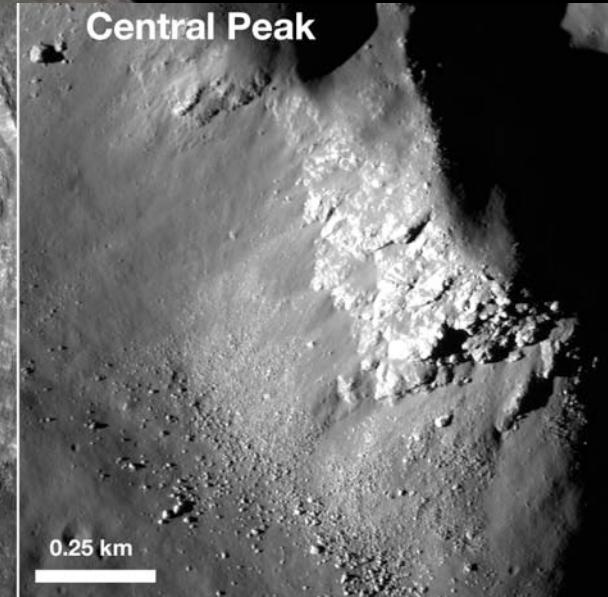
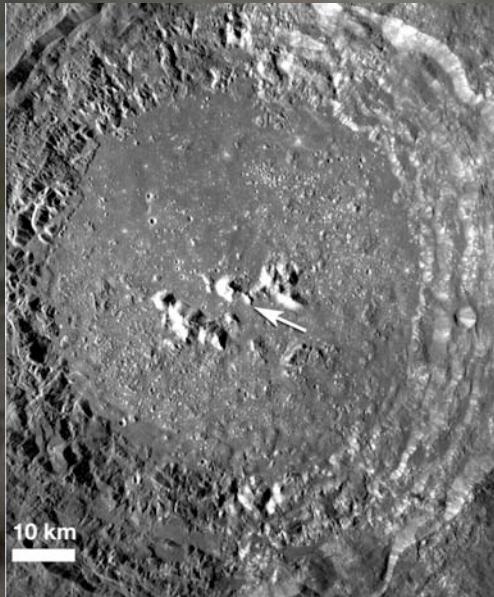
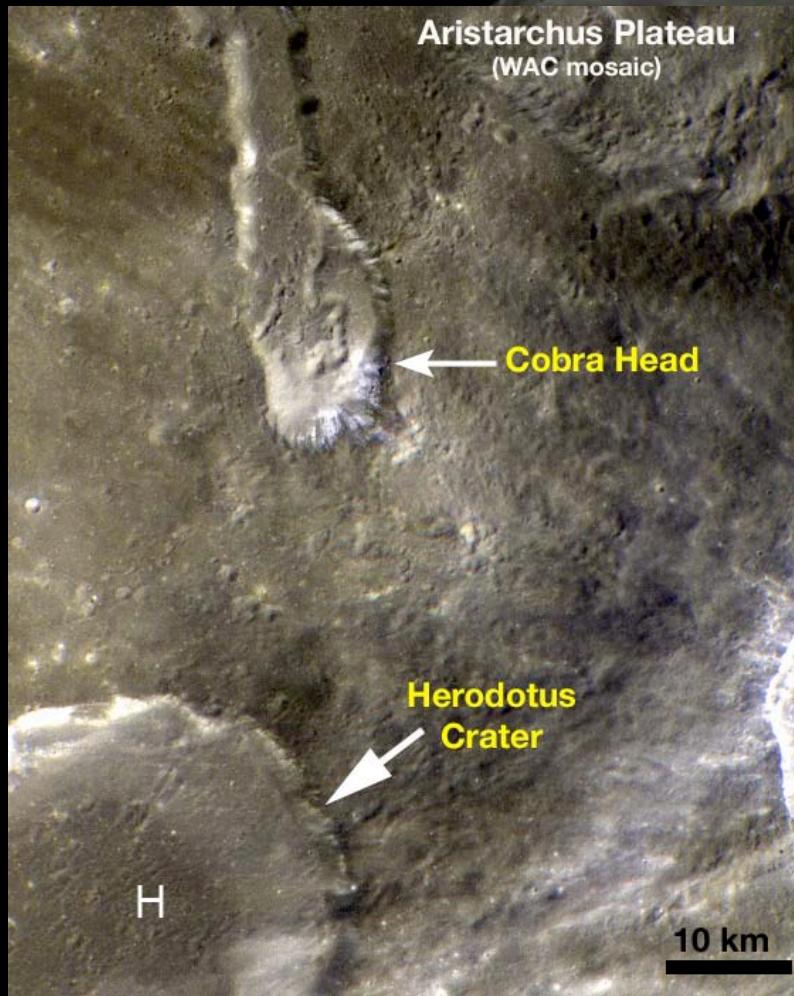


New Rock Types not represented in the sample collection.

Spinel-rich lithologies:
Chandrayaan-1

Pure Anorthosite: Kaguya (SELENE)

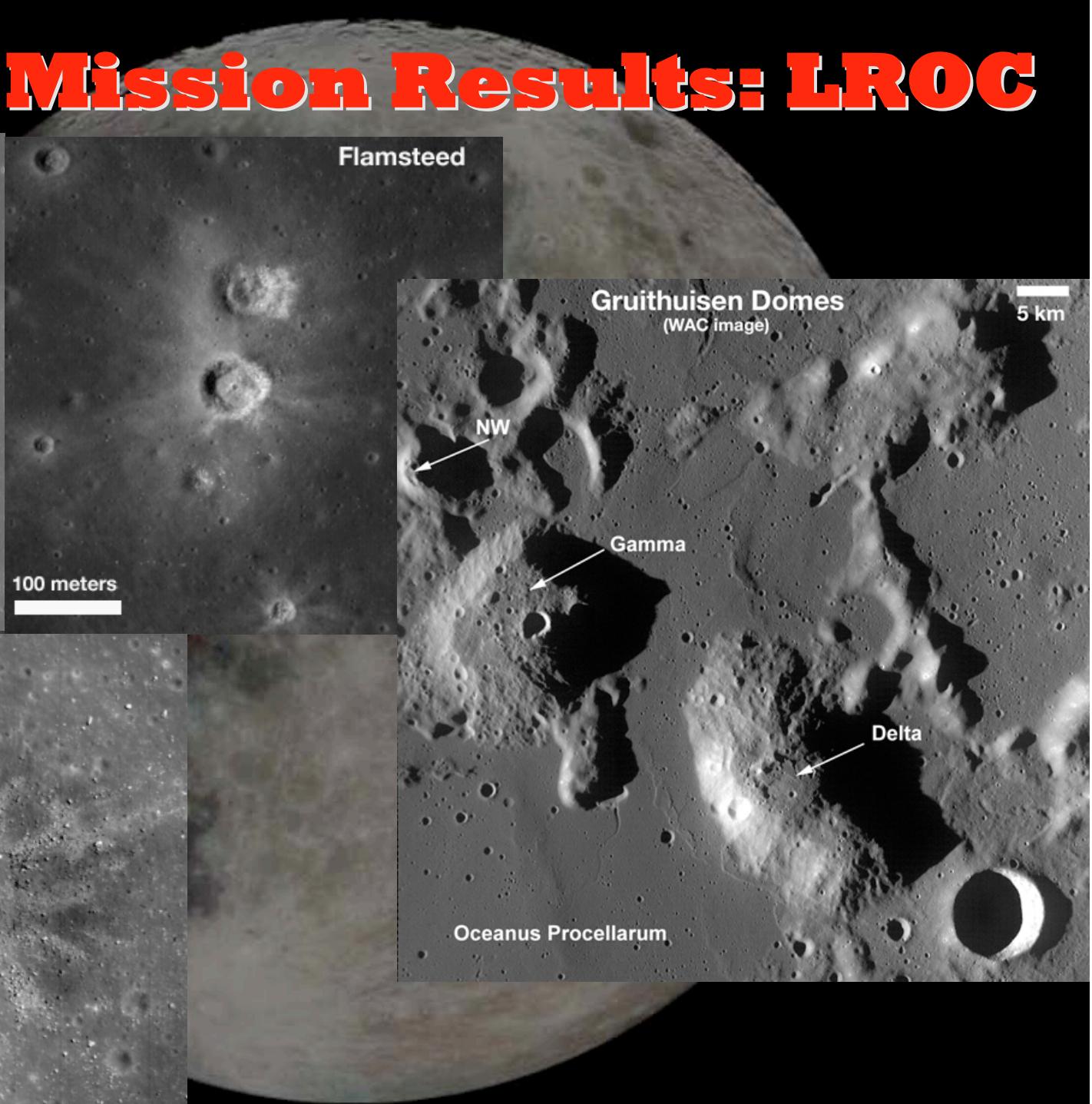
Recent Mission Results: LROC



Recent Mission Results: LROC



100 meters

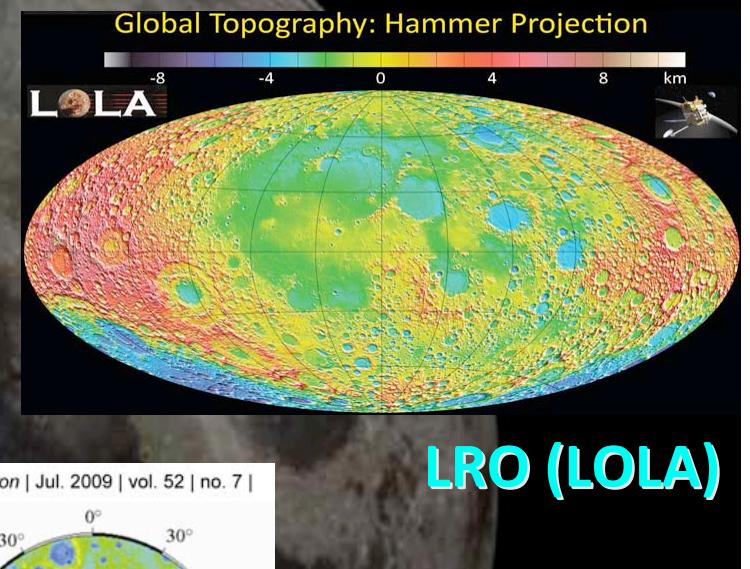
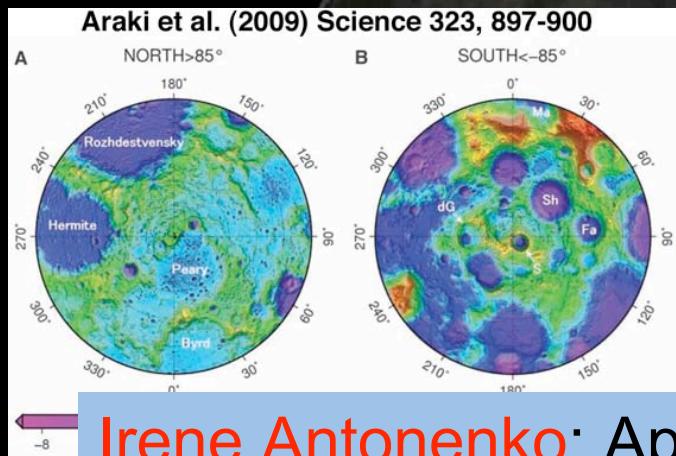


Crater in Balmer Basin

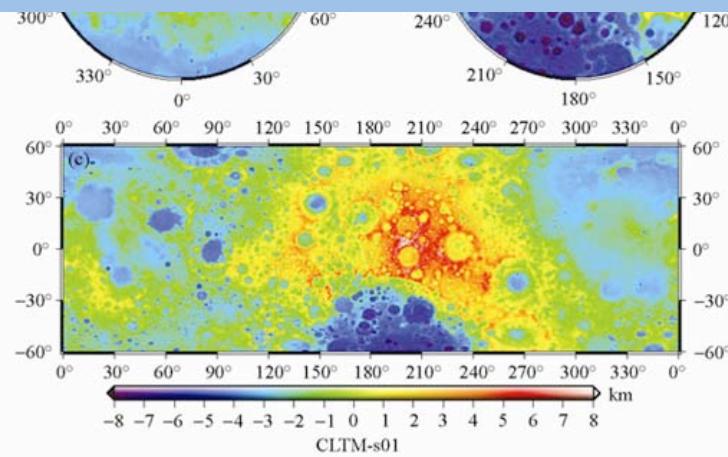
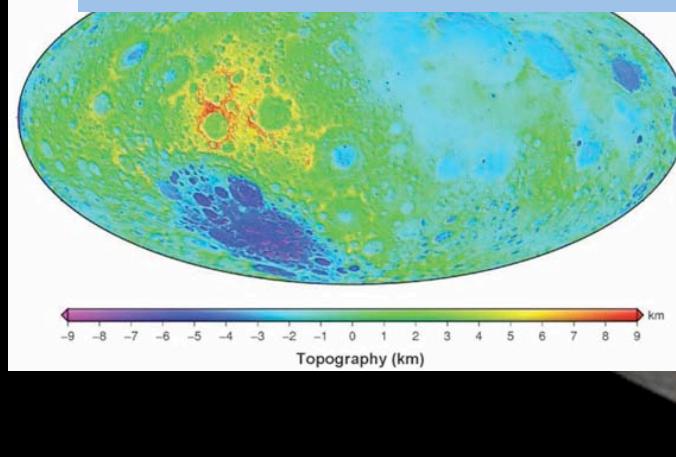
Recent Mission Results

Lunar Topography

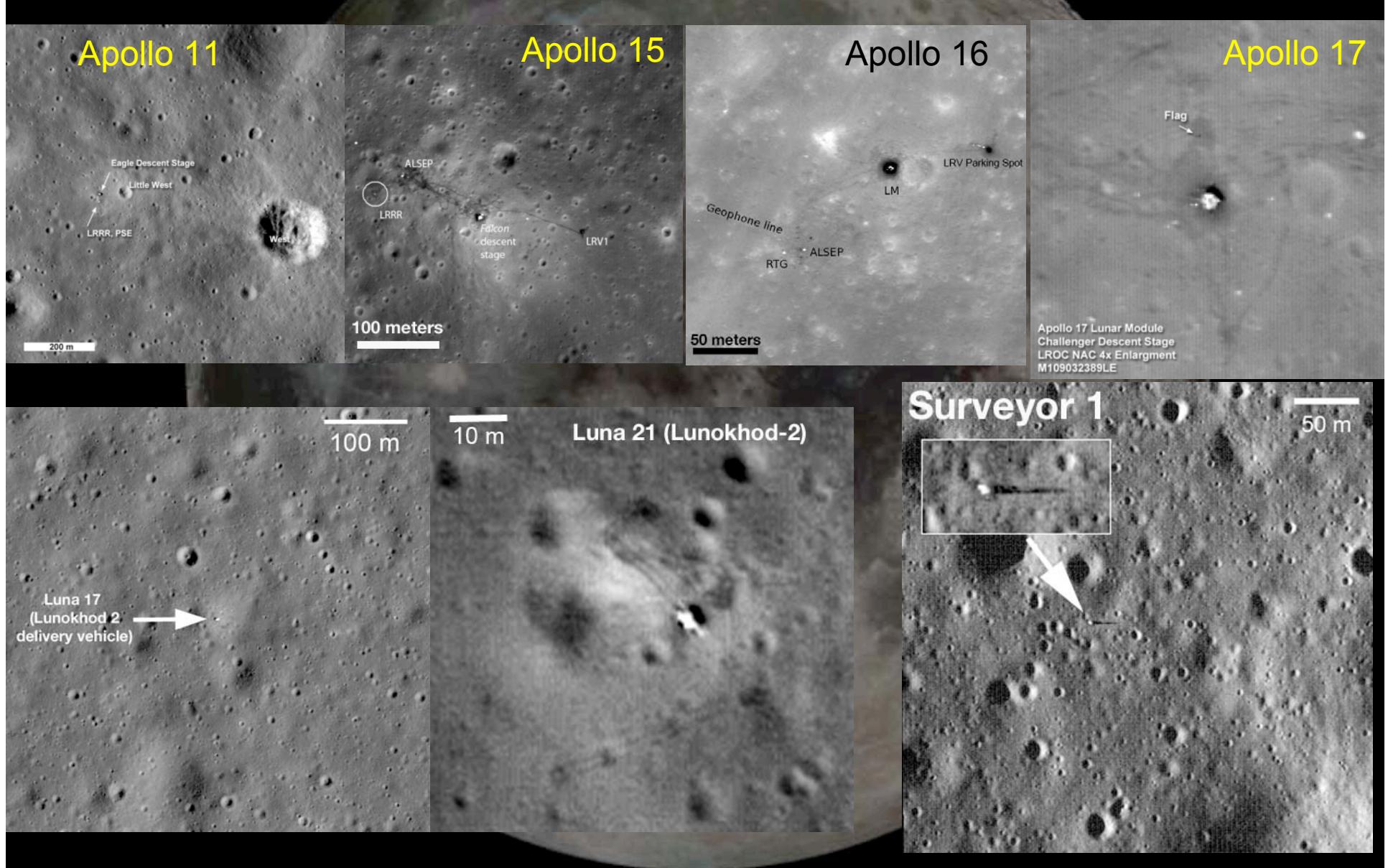
Kaguya (SELENE)



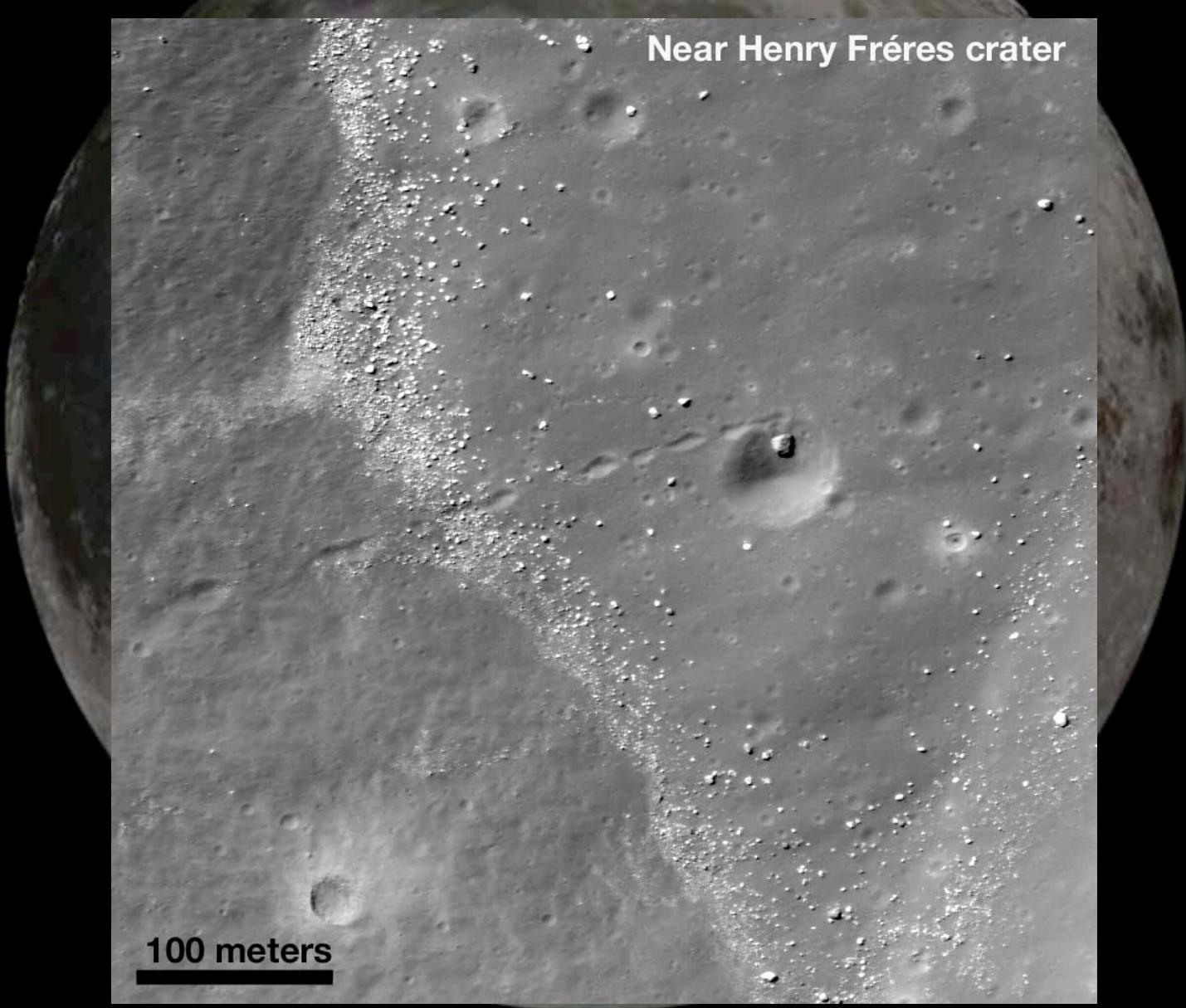
Irene Antonenko: Applications of LOLA and other fused data sets to studies of lunar geology.



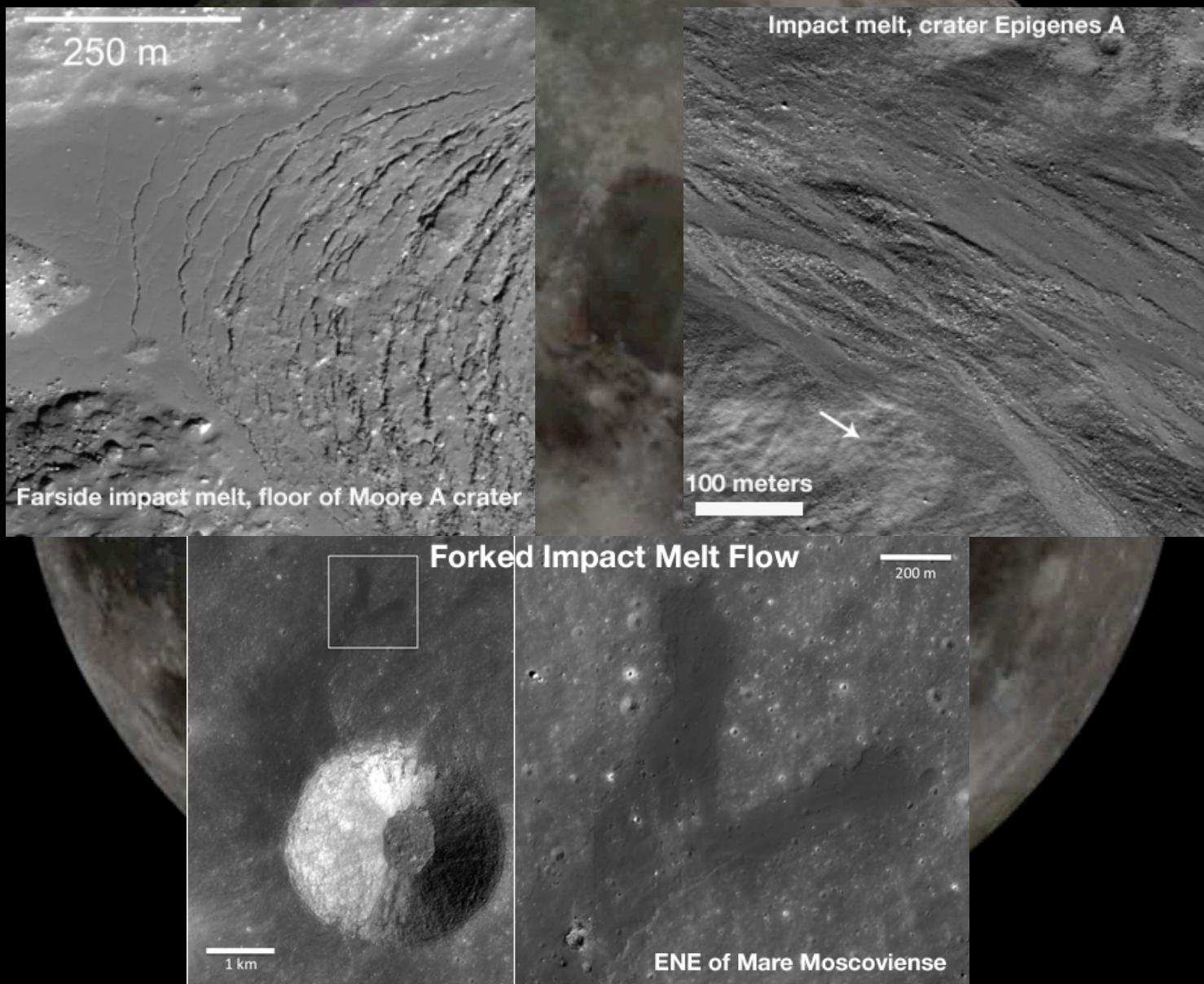
Jeff Plescia: US and USSR spacecraft positions on the Moon: Understanding the geologic context.



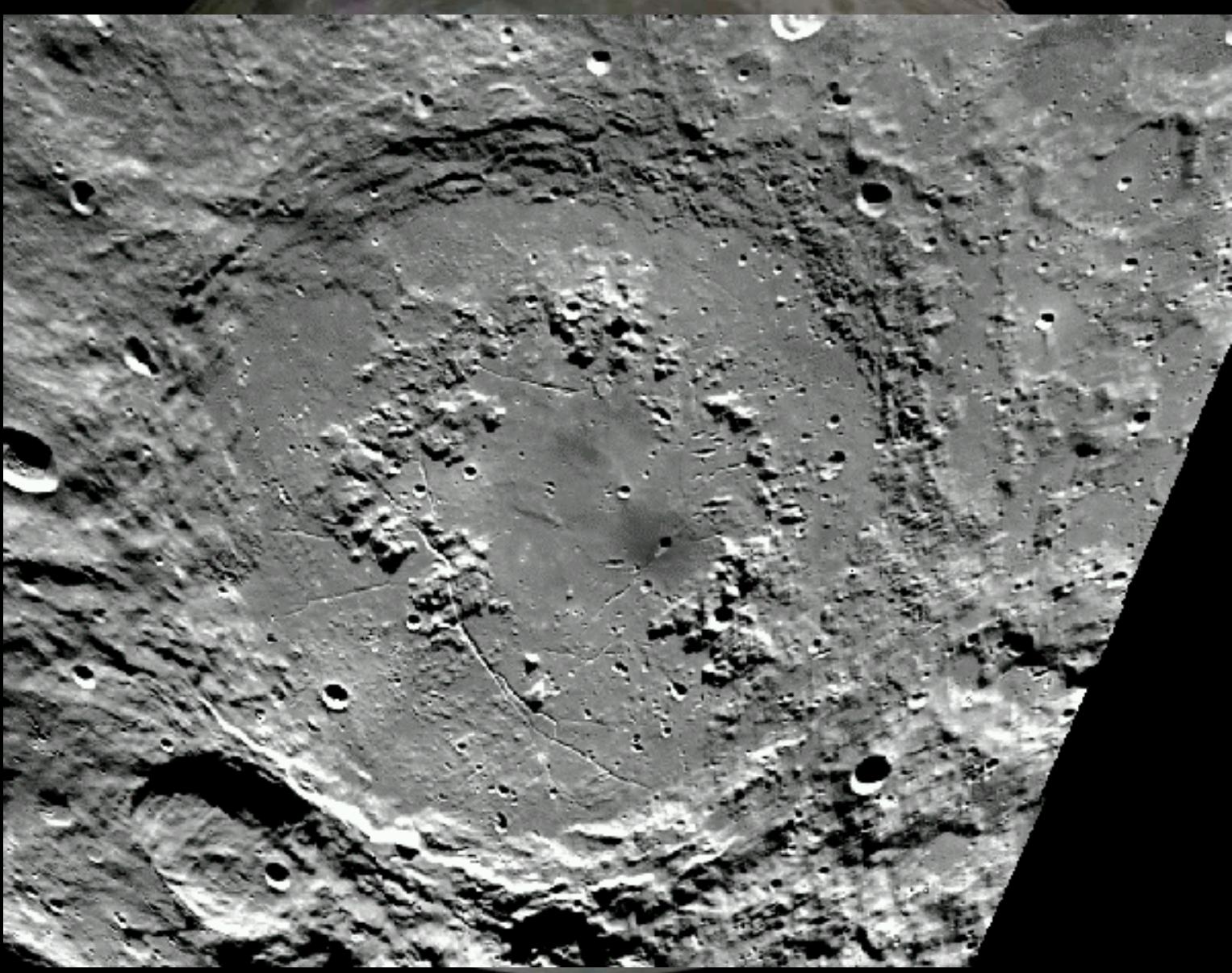
Joshua Bandfield: Lunar surface rock abundance derived from LRO Diviner data.



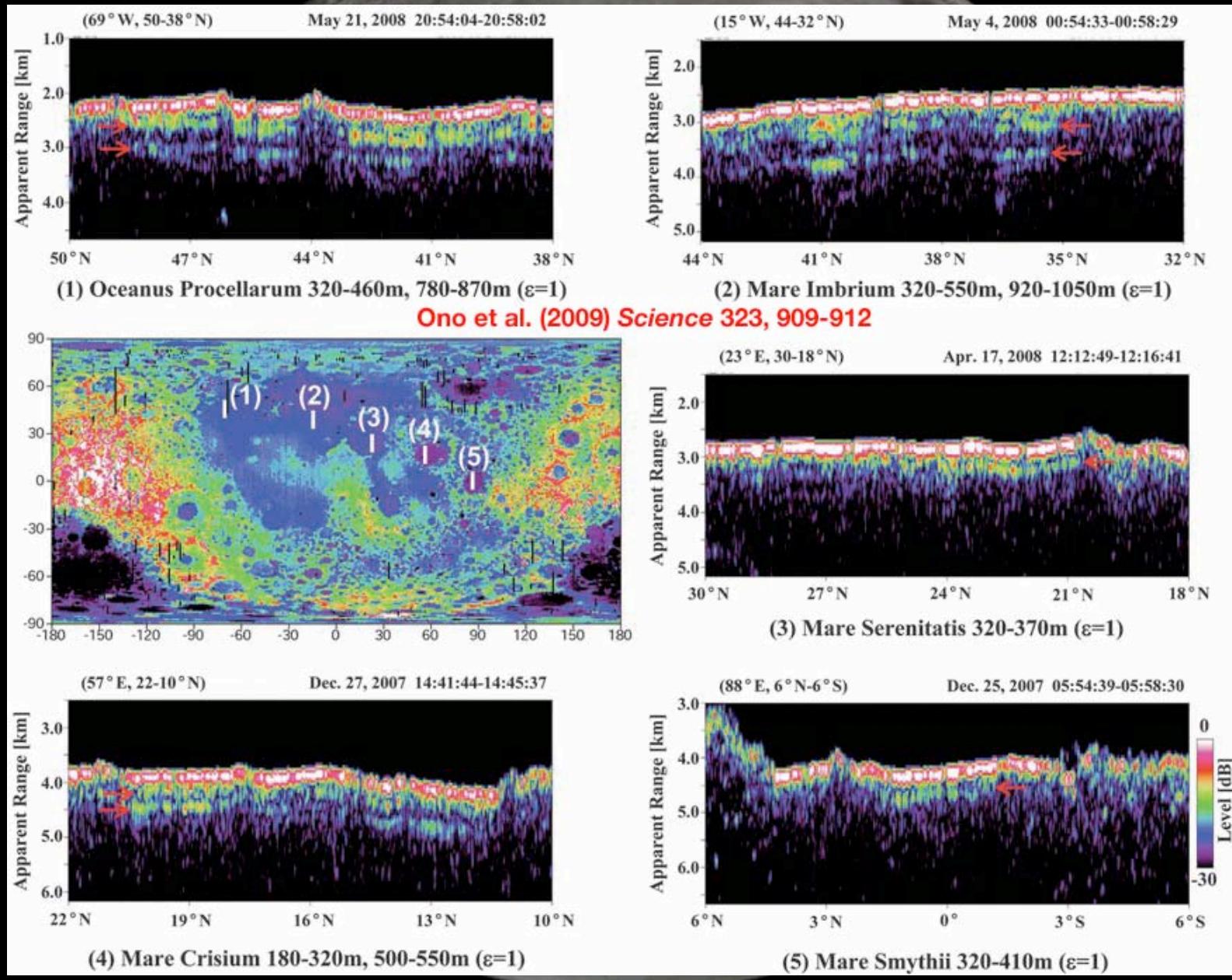
Brett Denevi: Physical properties on impact melt properties from LROC NAC images.



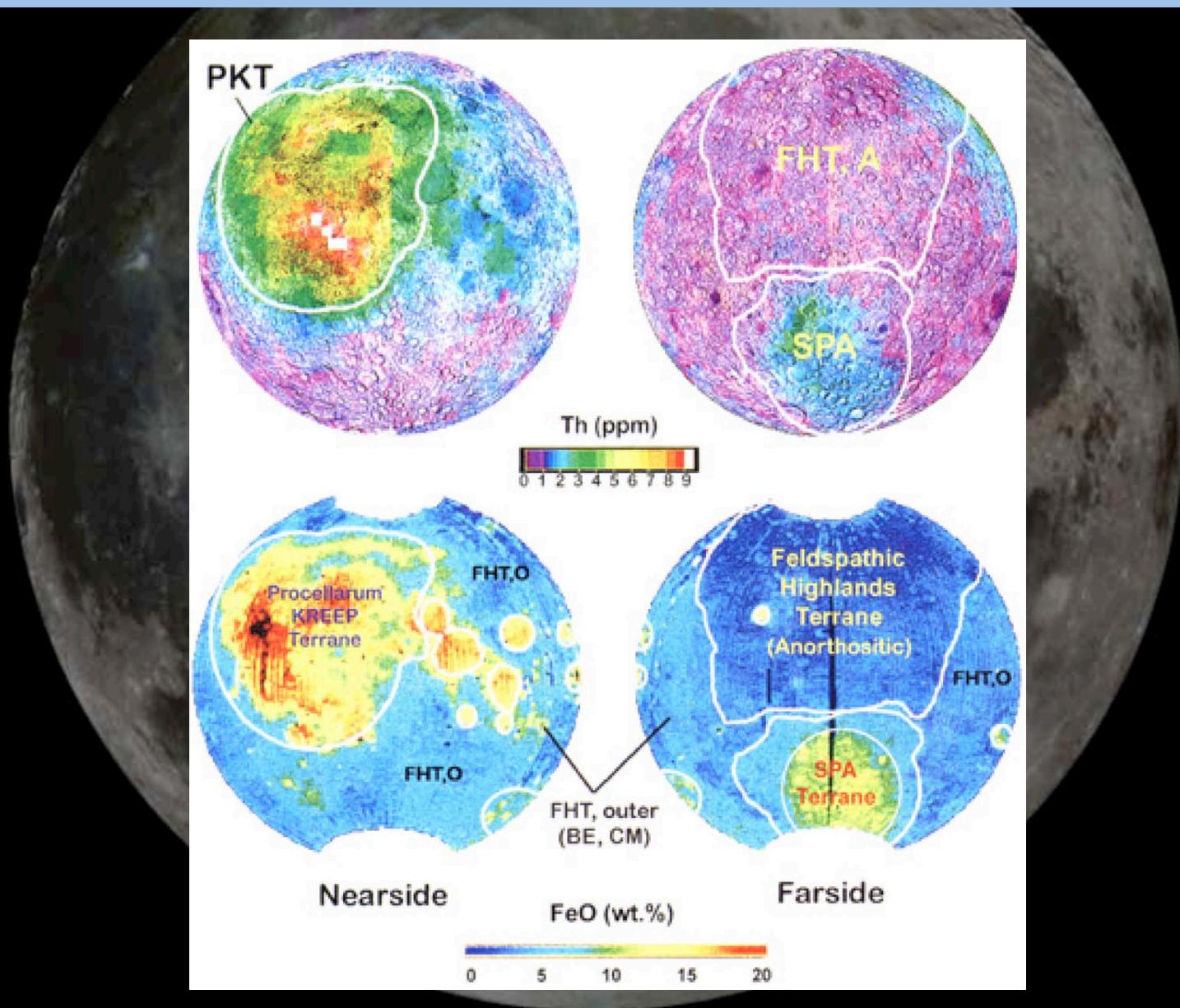
Bhairavi Shankar: Revisiting the geology of the Schrödinger impact basin.



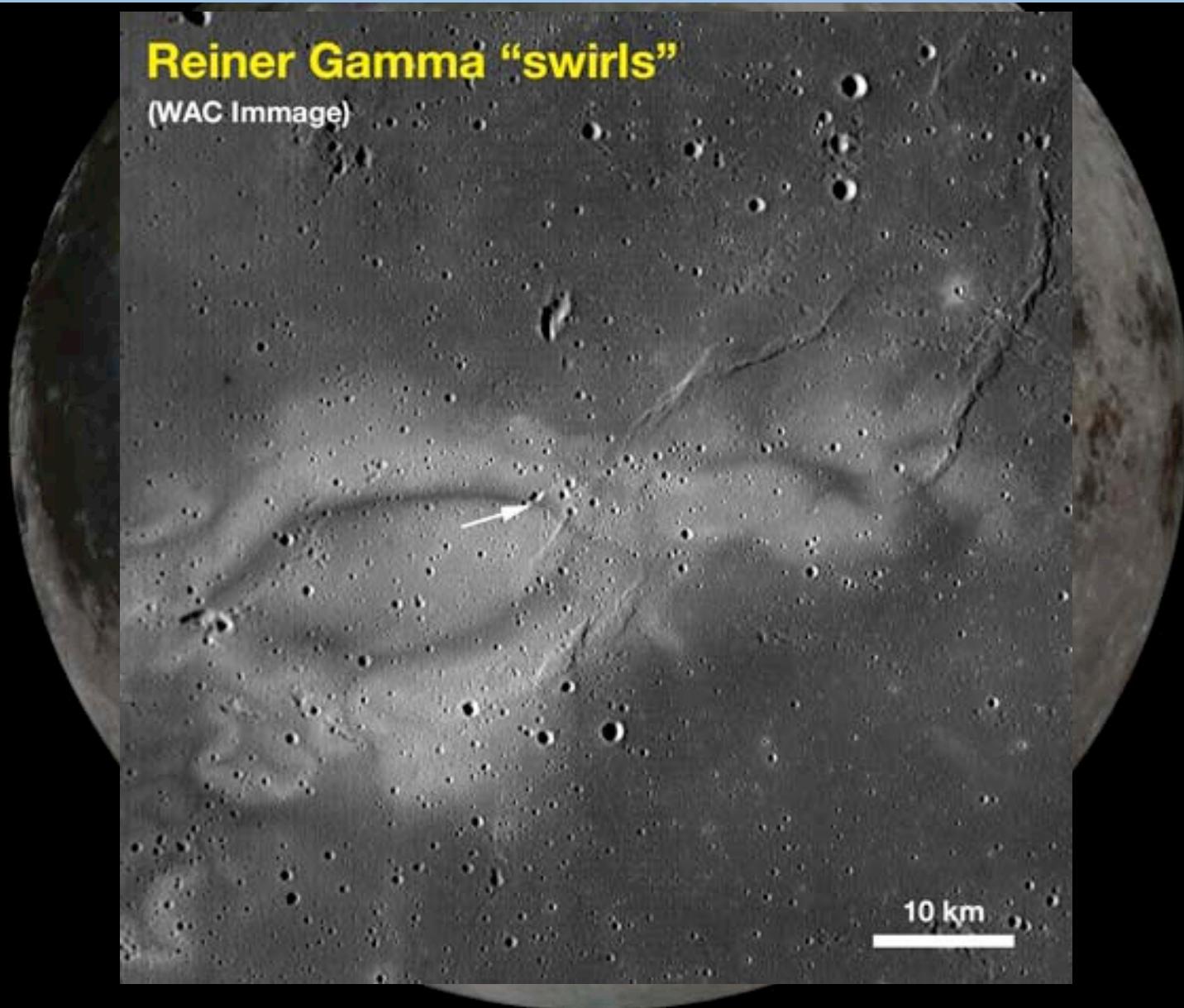
Gwen Bart: Global survey of lunar regolith depth.



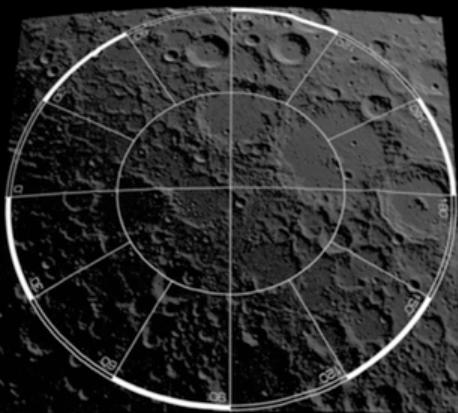
Kyeong Ja Kim: Comparison of the PKT and SPA regions of the Moon revealed through the Kaguya GRS.



Timothy Glotch: Diviner observations of Lunar Swirls:
Implications for space weathering.



Kerri Donaldson Hanna: Diviner thermal infrared observations of mare basalts within Oceanus Procellarum.



A Comment on E-PO

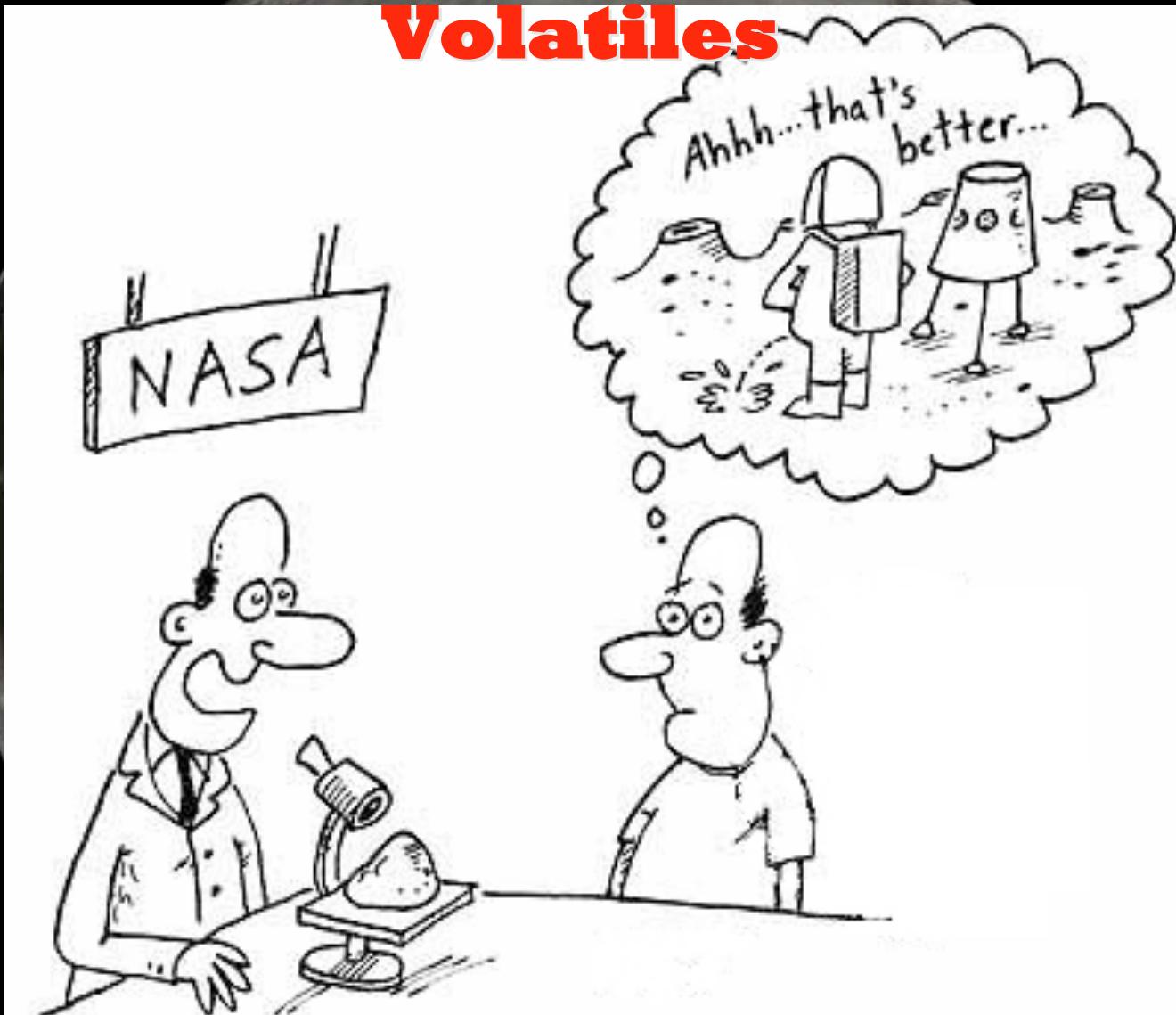
We HAVE to do this!!!



ELEPHANTS

Larger than the moon

A Final Comment on Lunar Volatiles



"Amazing Buzz! These moon rock samples you brought back in '69 contain evidence of water on the moon."



