IN CELEBRATION OF

Neil A. Armstrong

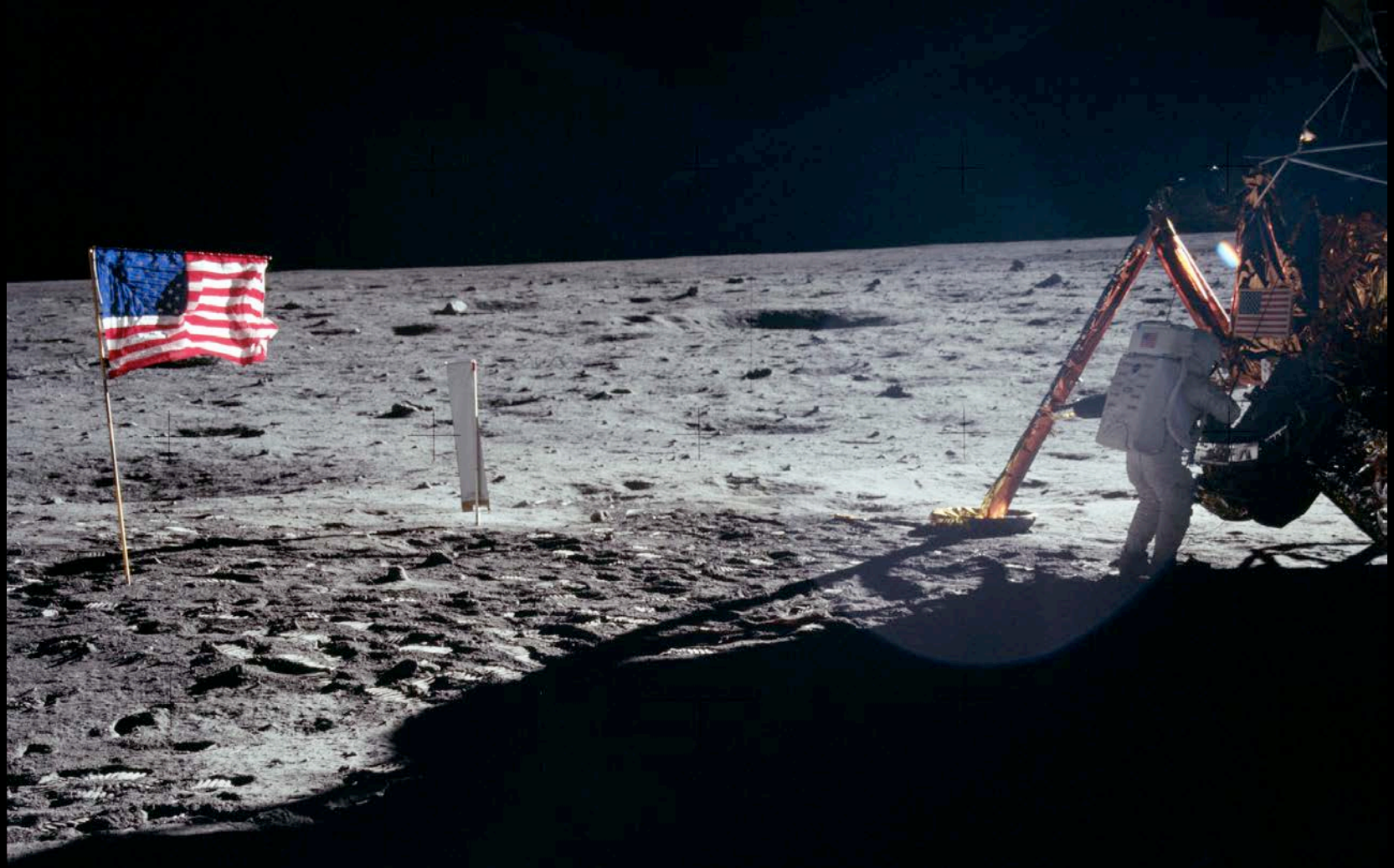
AUGUST 5, 1930 — AUGUST 25, 2012

THE CAMARGO CLUB - AUGUST 31, 2012

Apollo 11 Site
West Crater

Armstrong's Science Achievements Had There Been No Other Landings

- Sample Collection
  - Mare Basalts Are Old (3.9-3.6b.y.) - Large Basins Are Even Older
    - Early Solar System History Recorded On the Moon
  - Chemical-Age-Mineral-Eruptive Diversity of Mare Basalt Units
    - 5 Basalt Cooling Units in Upper 30m of the Site
    - 9 Separate Vesicle Assemblages
    - 2 Varieties of Pyroclastic Glasses
  - Magma Ocean-Fractional Crystallization-Remetling Hypothesis
    - Anorthositic Fragments, Differentiated Source Region for Basalt, Titanium-rich Source Region
  - Solar Wind Volatile Resources in Regolith
    - ~50%(?) Agitation Losses vs.. Regolith Breccias
- Experiment Deployment
  - Very High Seismic Q of Crust (Mega-regolith/Thermal Insulation)
  - Very Low Seismic Noise from Lunar Interior
  - High Precision Earth-Moon Distance Through Laser Ranging



Apollo 17
Fortieth Anniversary

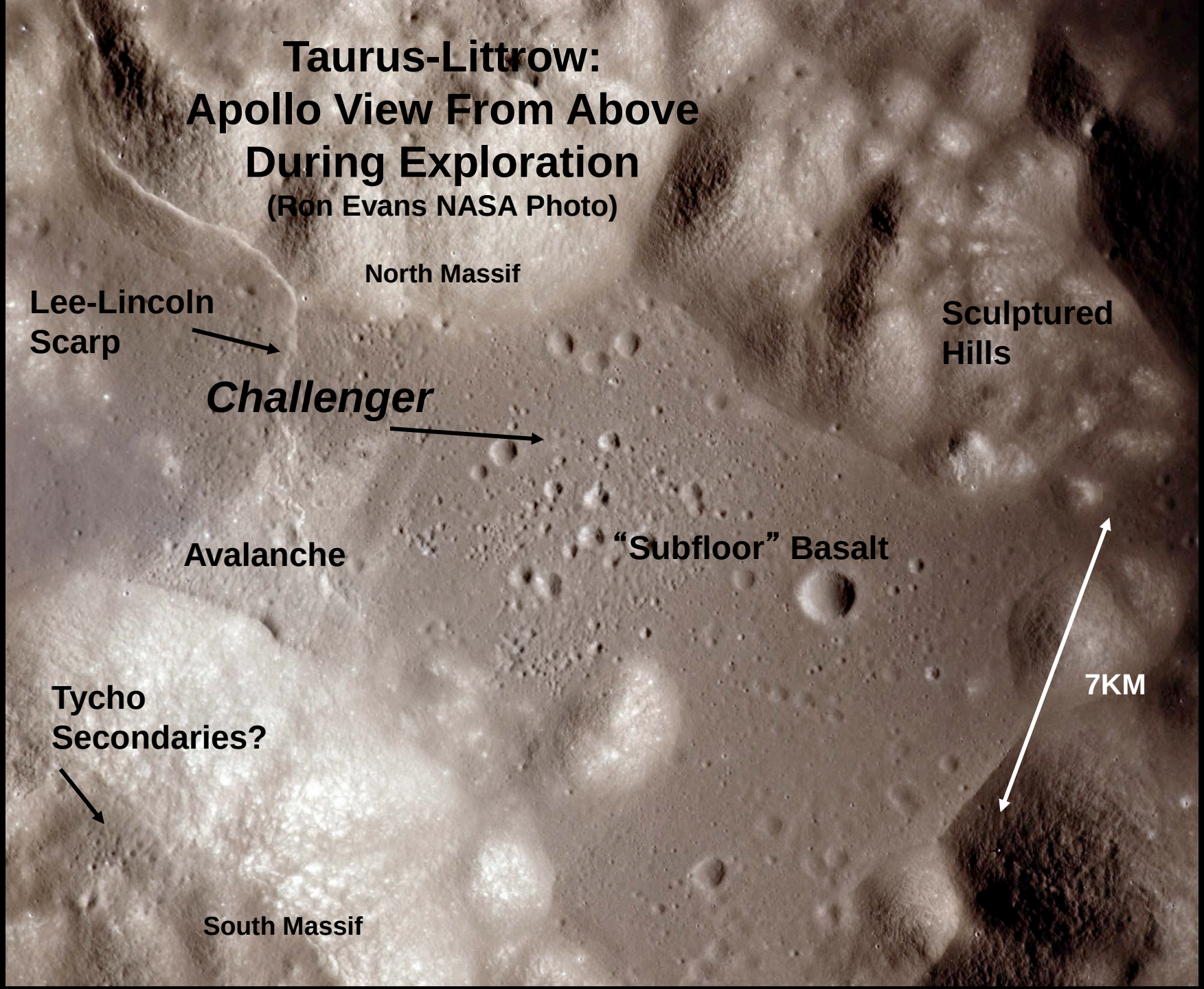
Harrison H. Schmitt

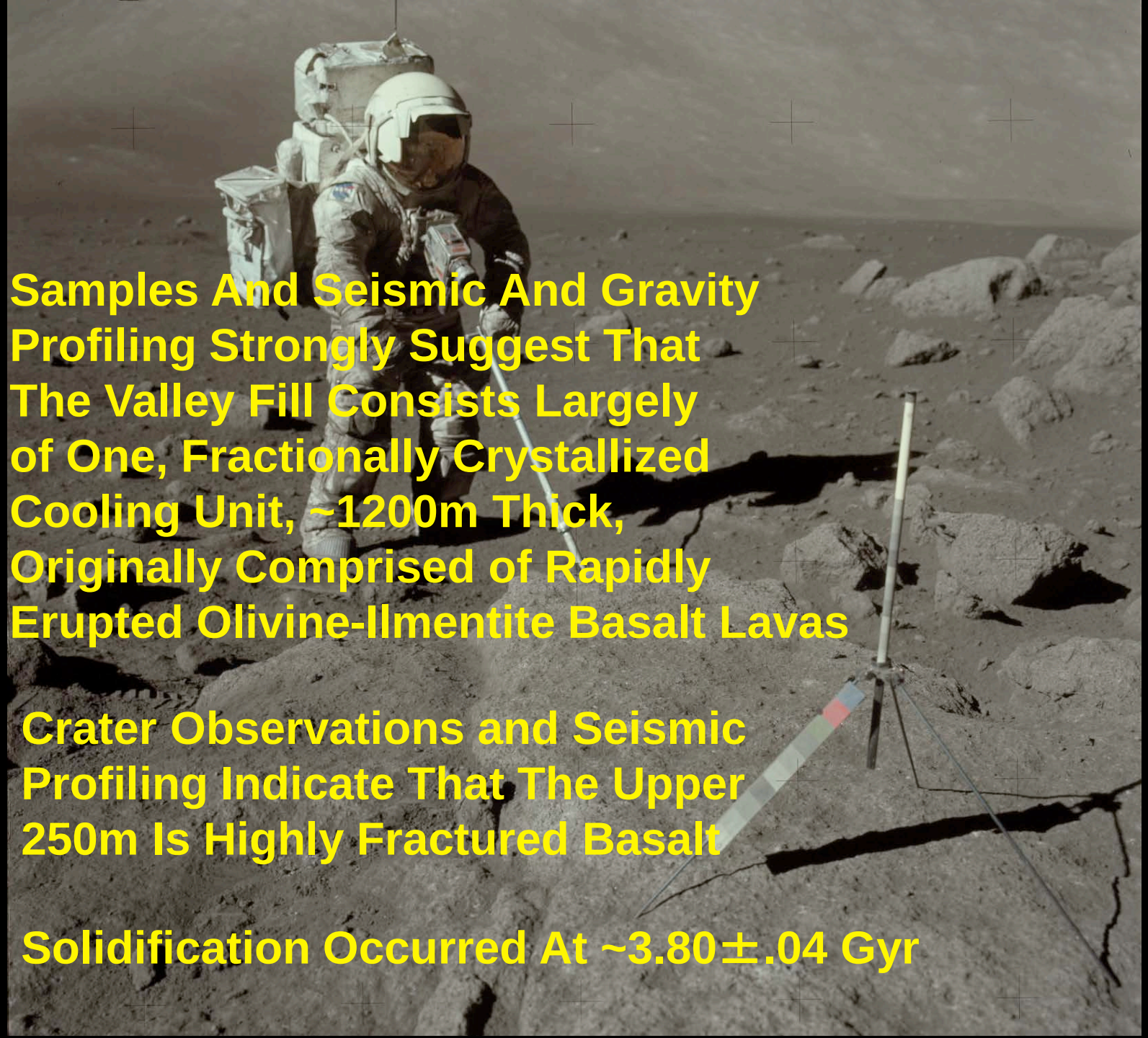
LEAG 2012

Goddard Space Flight Center

October 22, 2012

Fortieth Anniversary Apollo 17: Most Recent Lunar Surface Exploration


Taurus-Littrow:
Apollo View From Above
During Exploration
(Ron Evans NASA Photo)
North Massif
Lee-Lincoln
Scarp
Sculptured
Hills
Challenger
Avalanche
“Subfloor” Basalt
7KM
Tycho
Secondaries?
South Massif

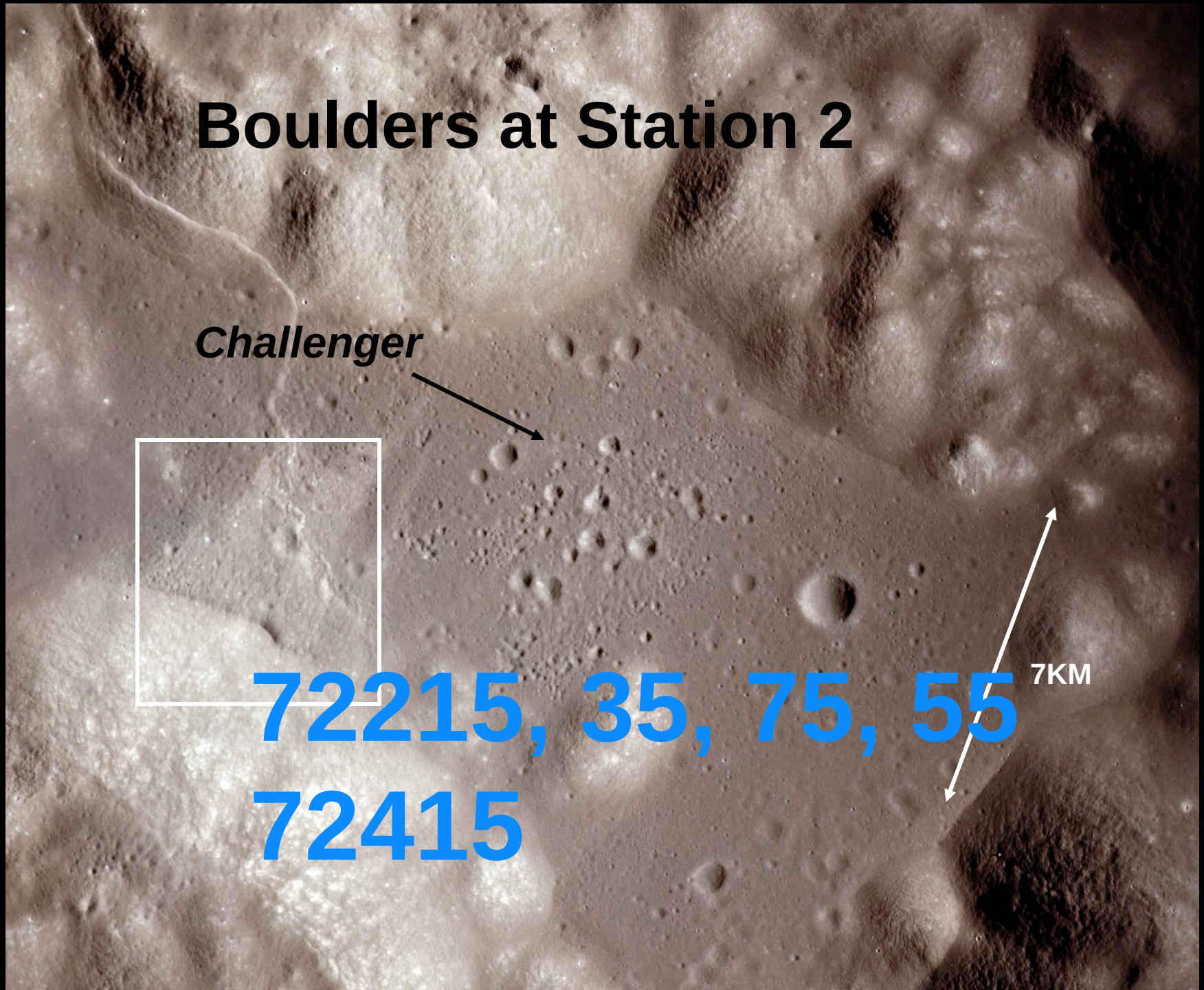


Samples And Seismic And Gravity Profiling Strongly Suggest That The Valley Fill Consists Largely of One, Fractionally Crystallized Cooling Unit, ~1200m Thick, Originally Comprised of Rapidly Erupted Olivine-Ilmentite Basalt Lavas

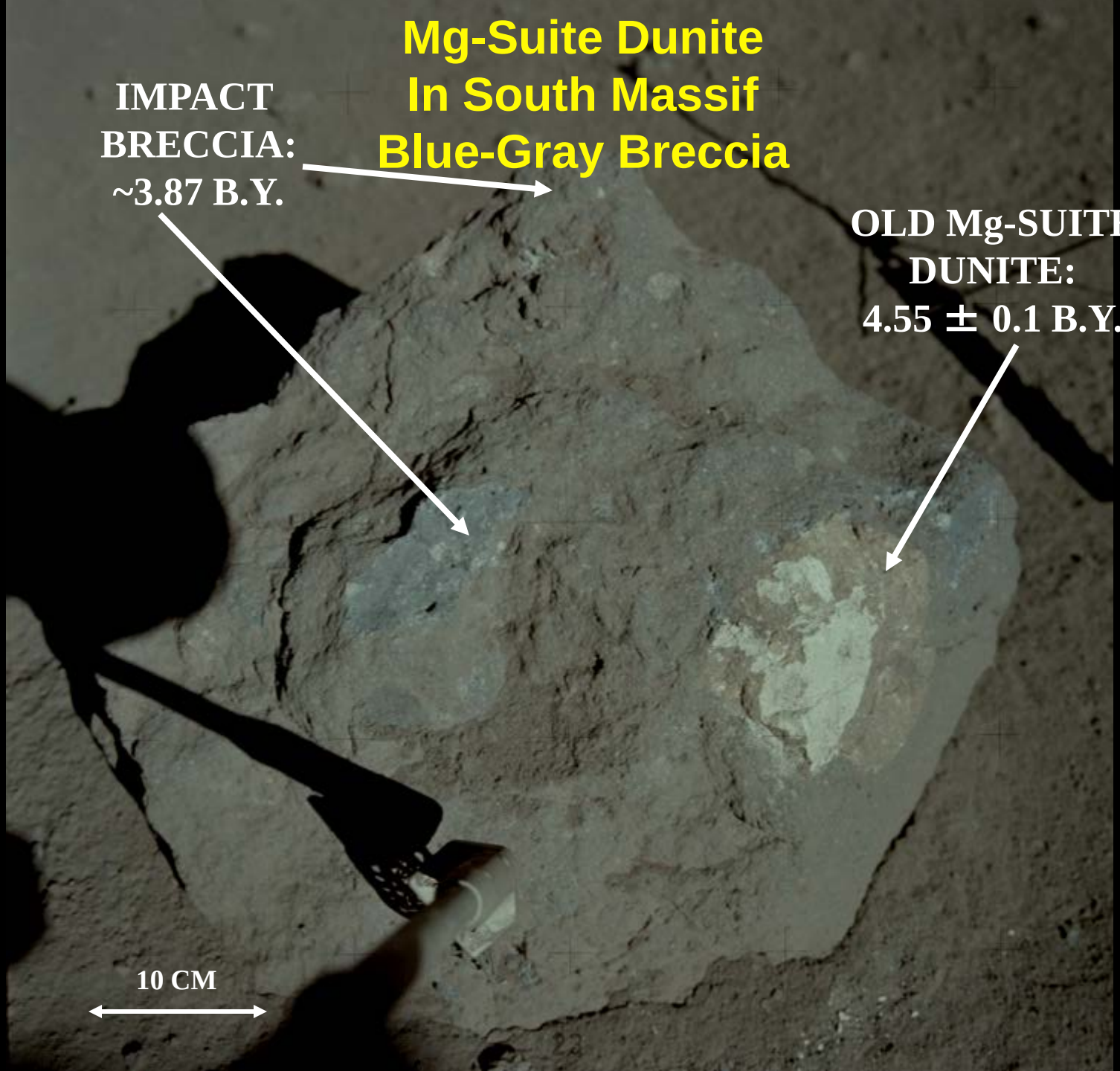
Crater Observations and Seismic Profiling Indicate That The Upper 250m Is Highly Fractured Basalt

Solidification Occurred At ~3.80±.04 Gyr

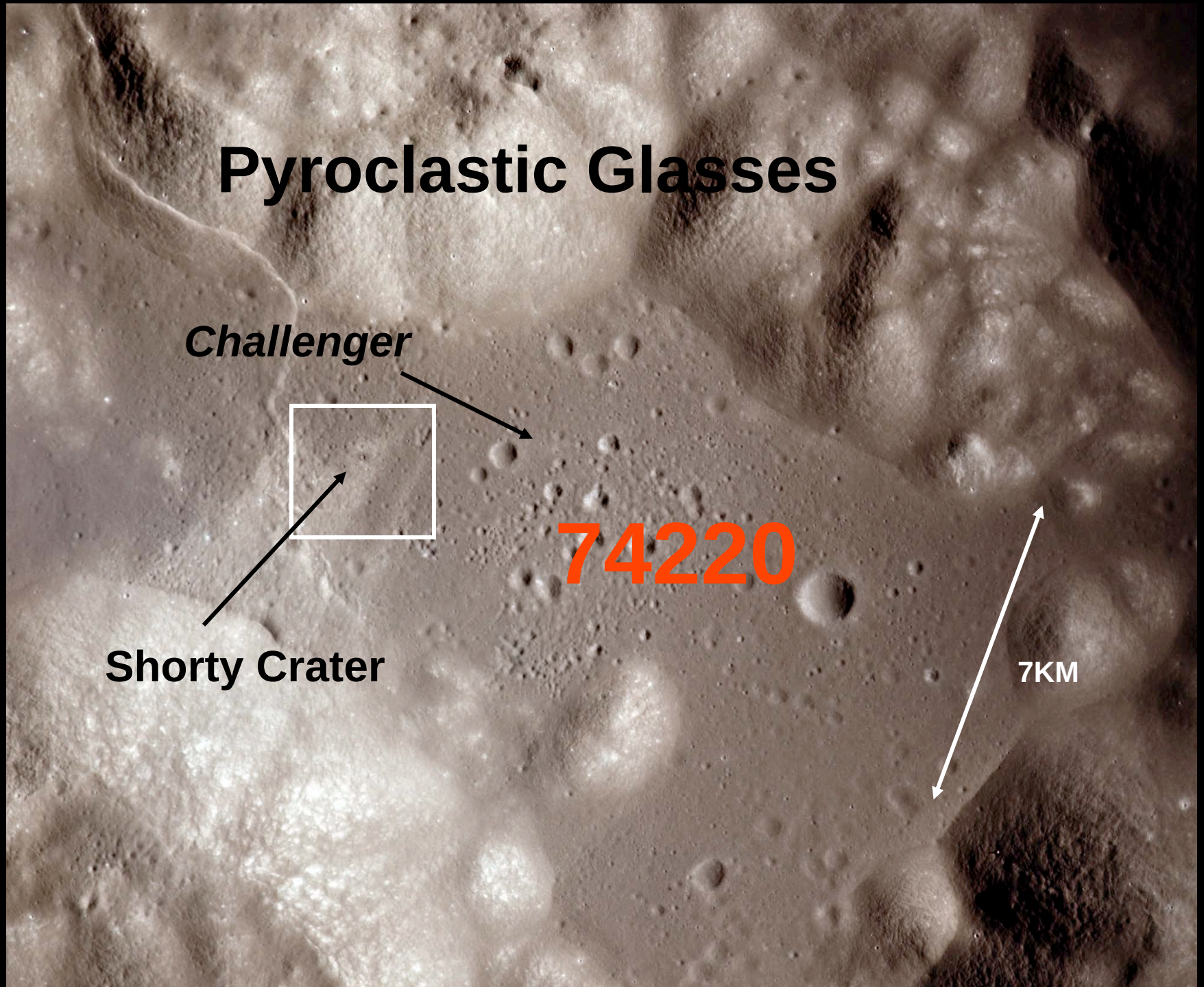
Boulders at Station 2



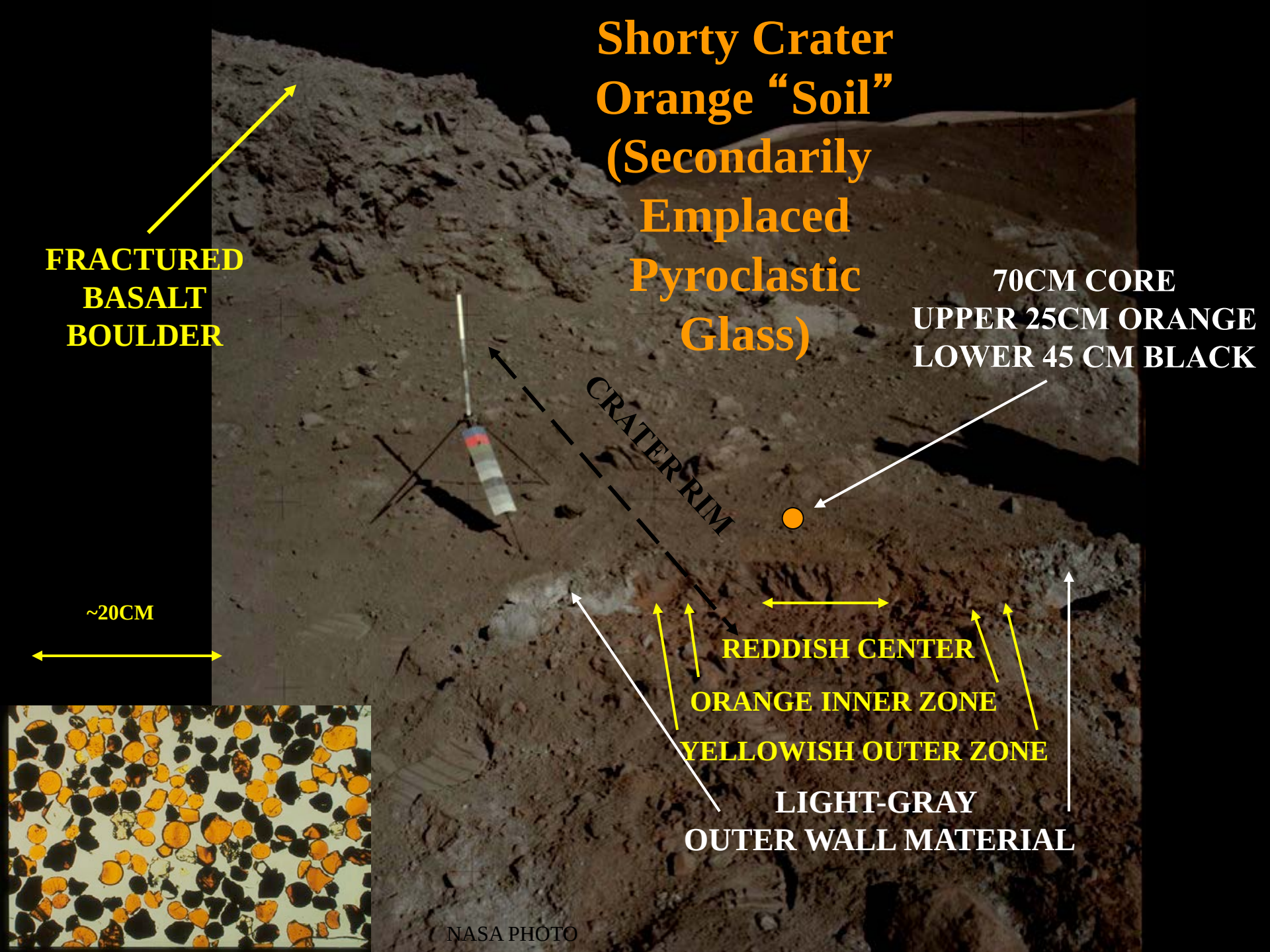
Layered South Massif Breccia - Boulder 1, Station 2


Mg-Suite Dunite
In South Massif
Blue-Gray Breccia
IMPACT
BRECCIA:
~3.87 B.Y.
OLD Mg-SUITE
DUNITE:
4.55 ± 0.1 B.Y.
10 CM

Pyroclastic Glasses

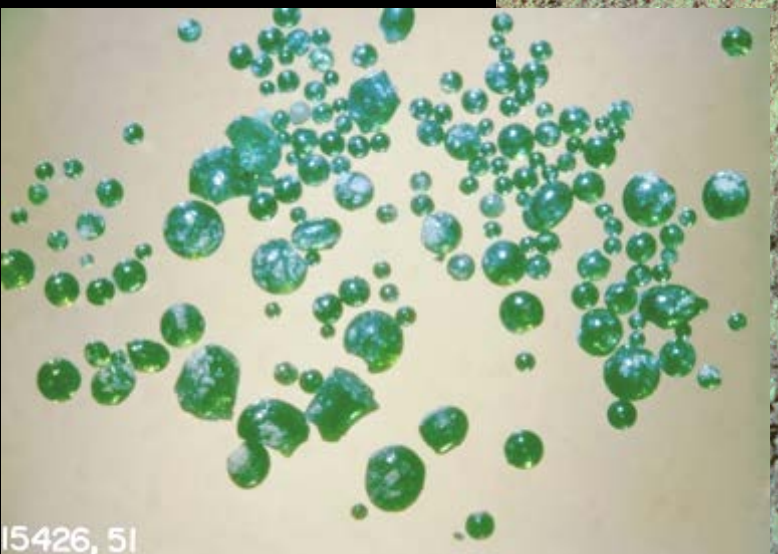


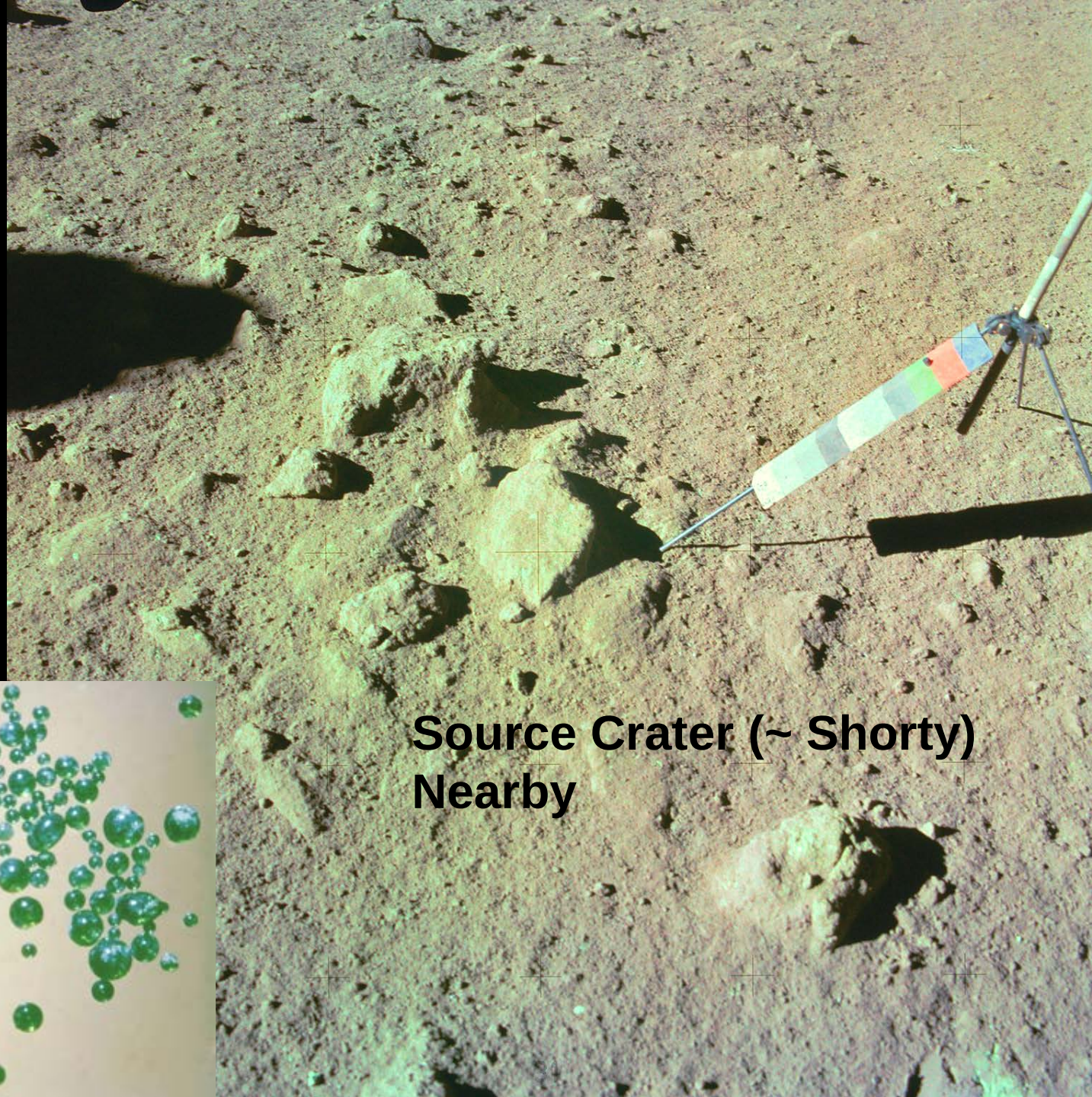
Shorty Crater Orange "Soil" (Secondarily Emplaced Pyroclastic Glass)



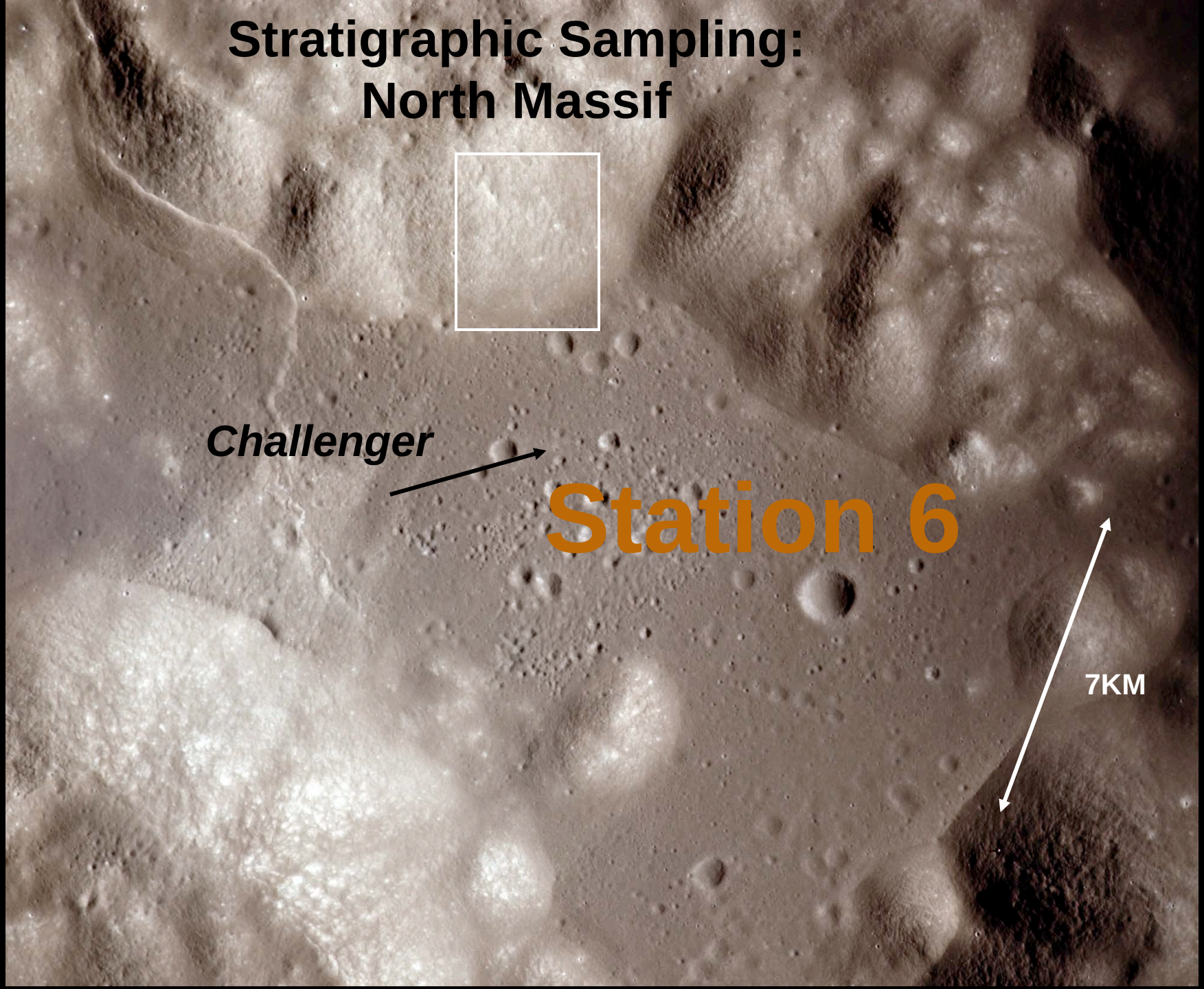
Apollo 15

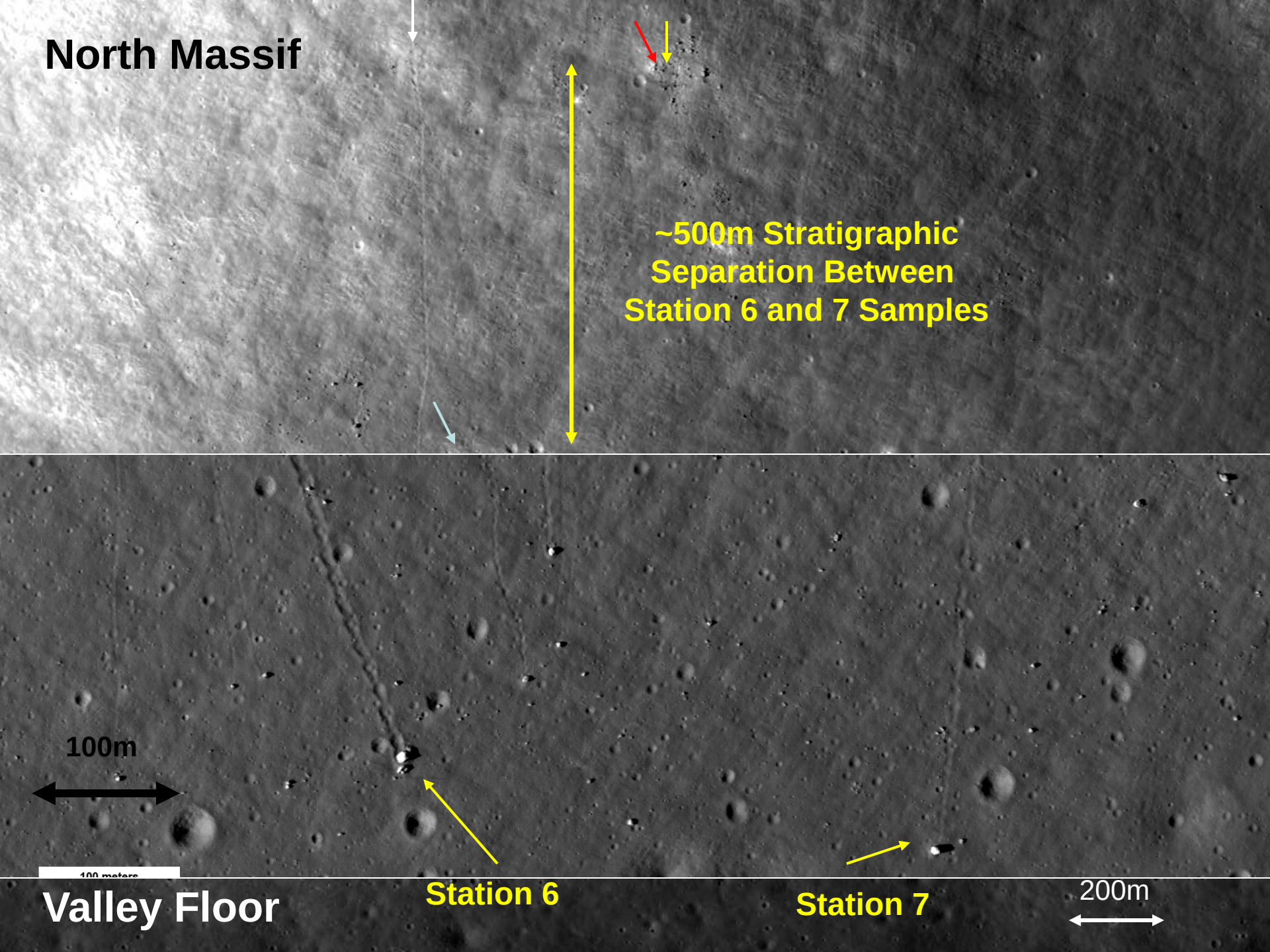
Green Glass Sample Location



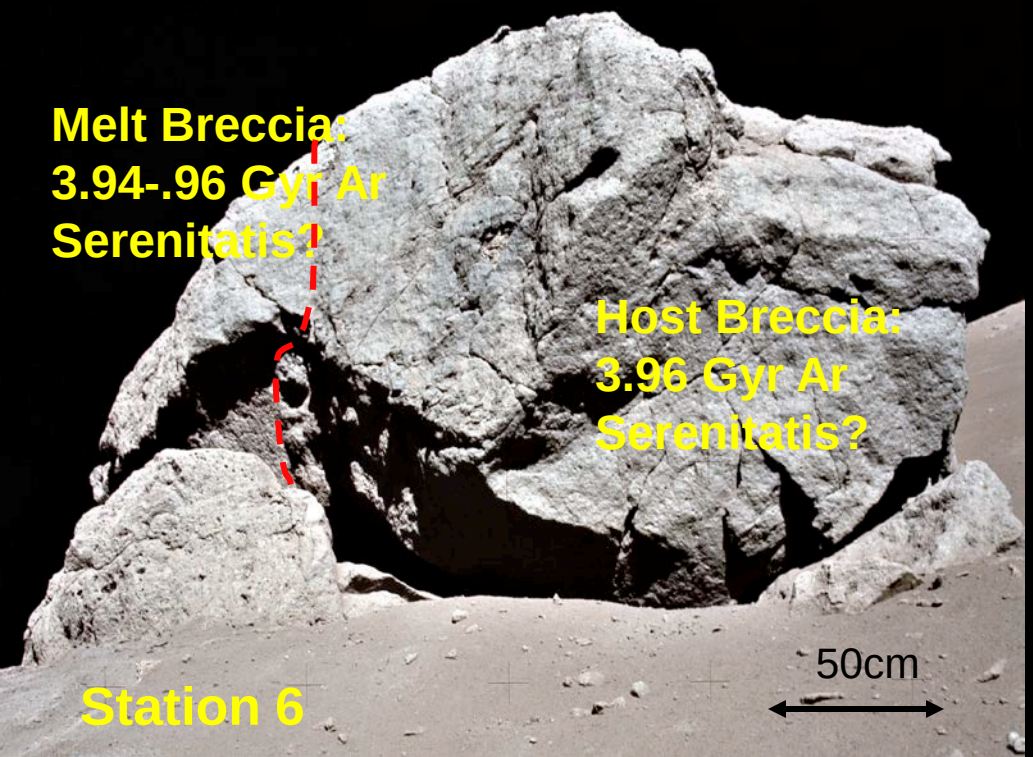


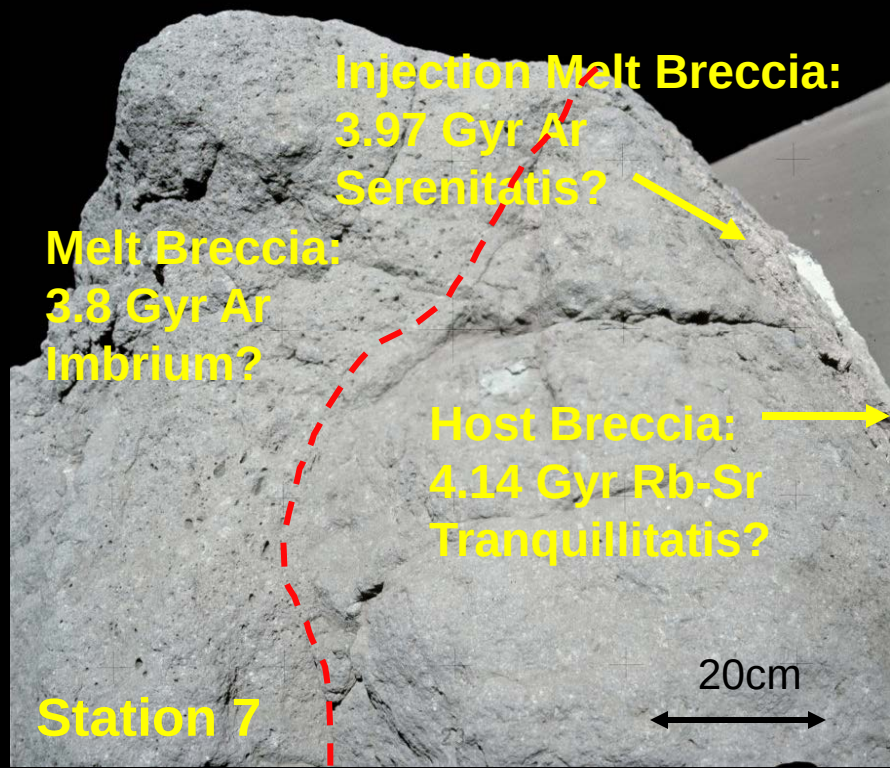
Stratigraphic Sampling: North Massif



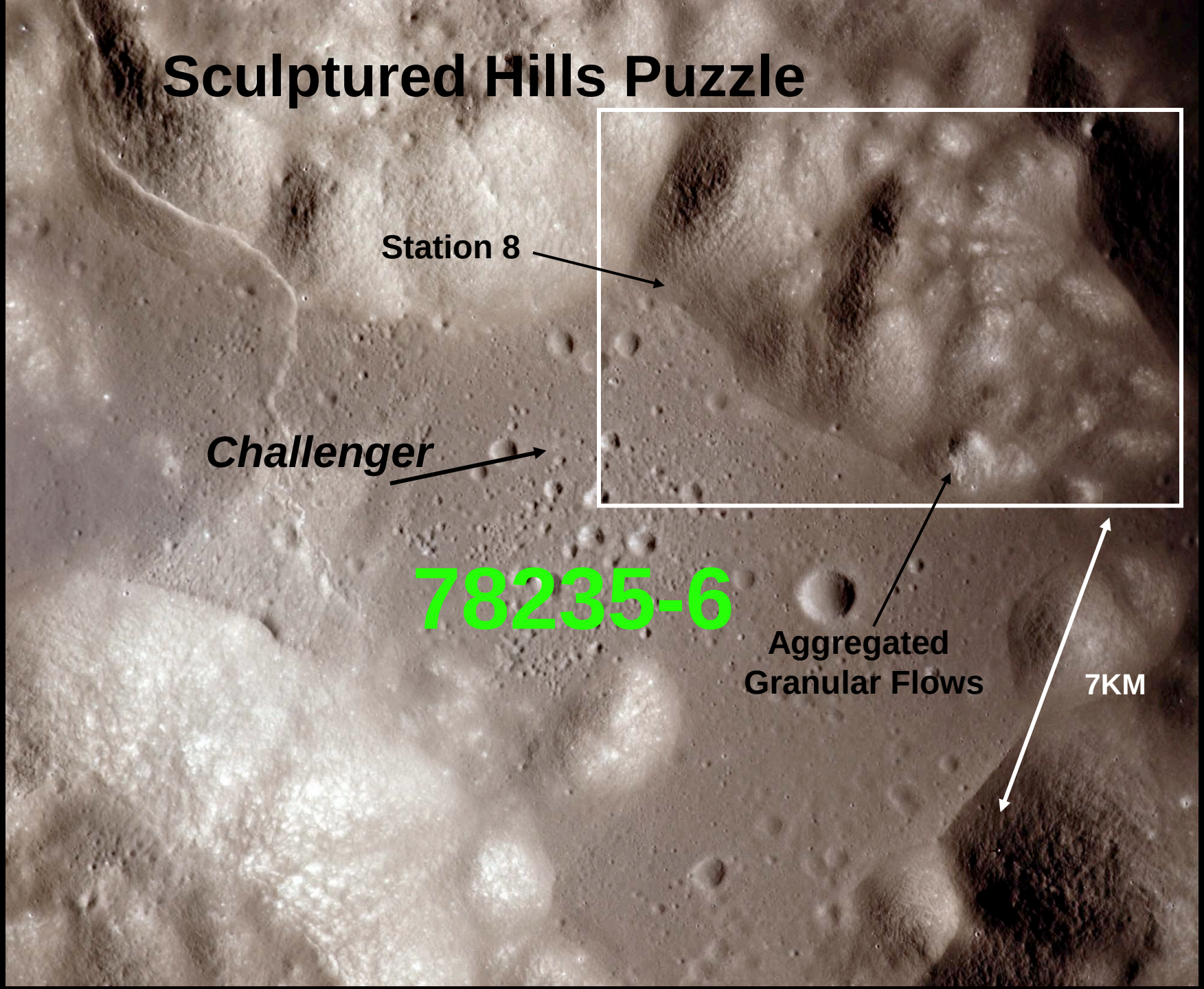

North Massif
~500m Stratigraphic Separation Between Station 6 and 7 Samples
100m
Station 6
Station 7
200m
Valley Floor

Stratigraphic Sampling of Boulders





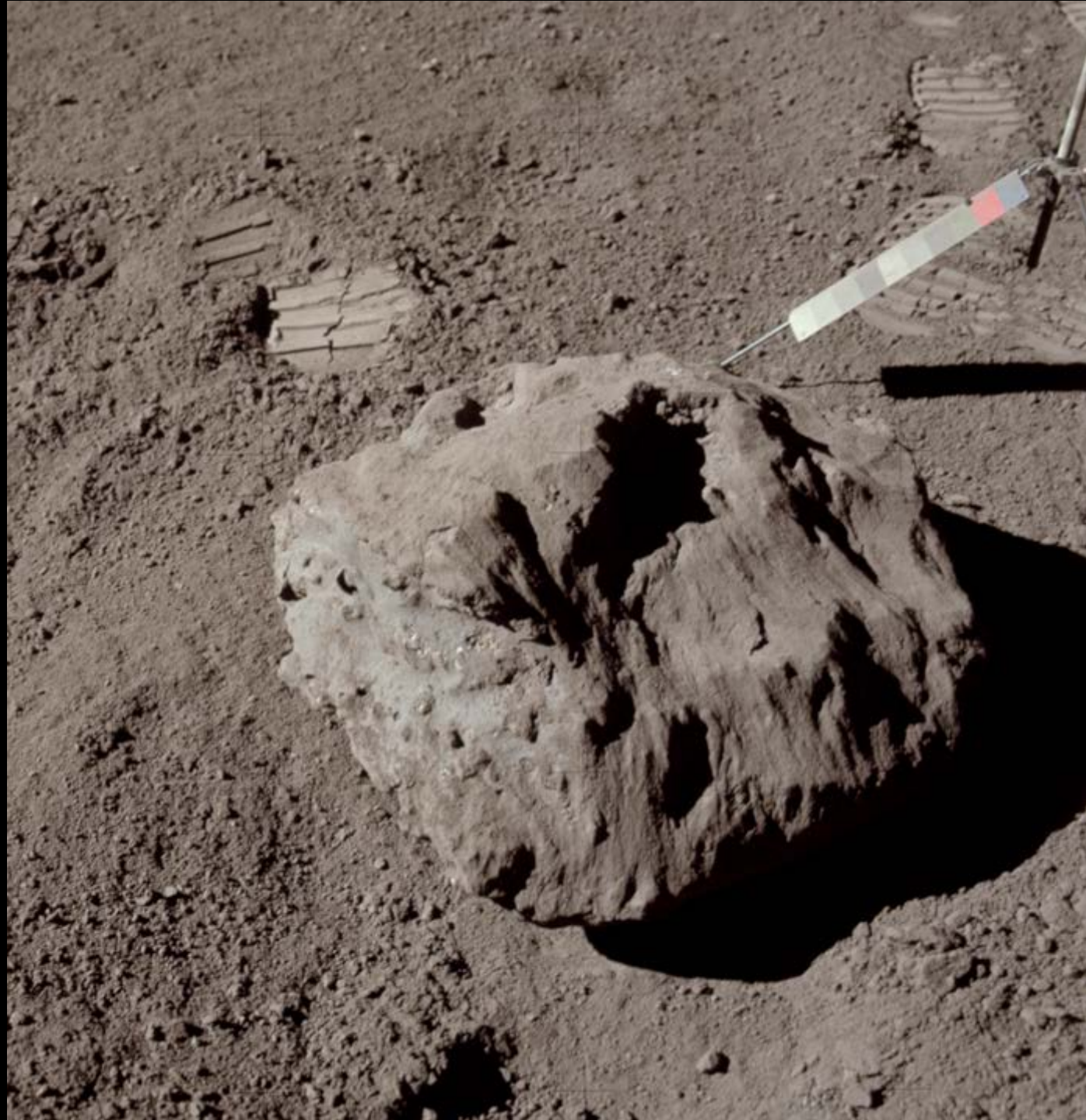
Sculptured Hills Puzzle



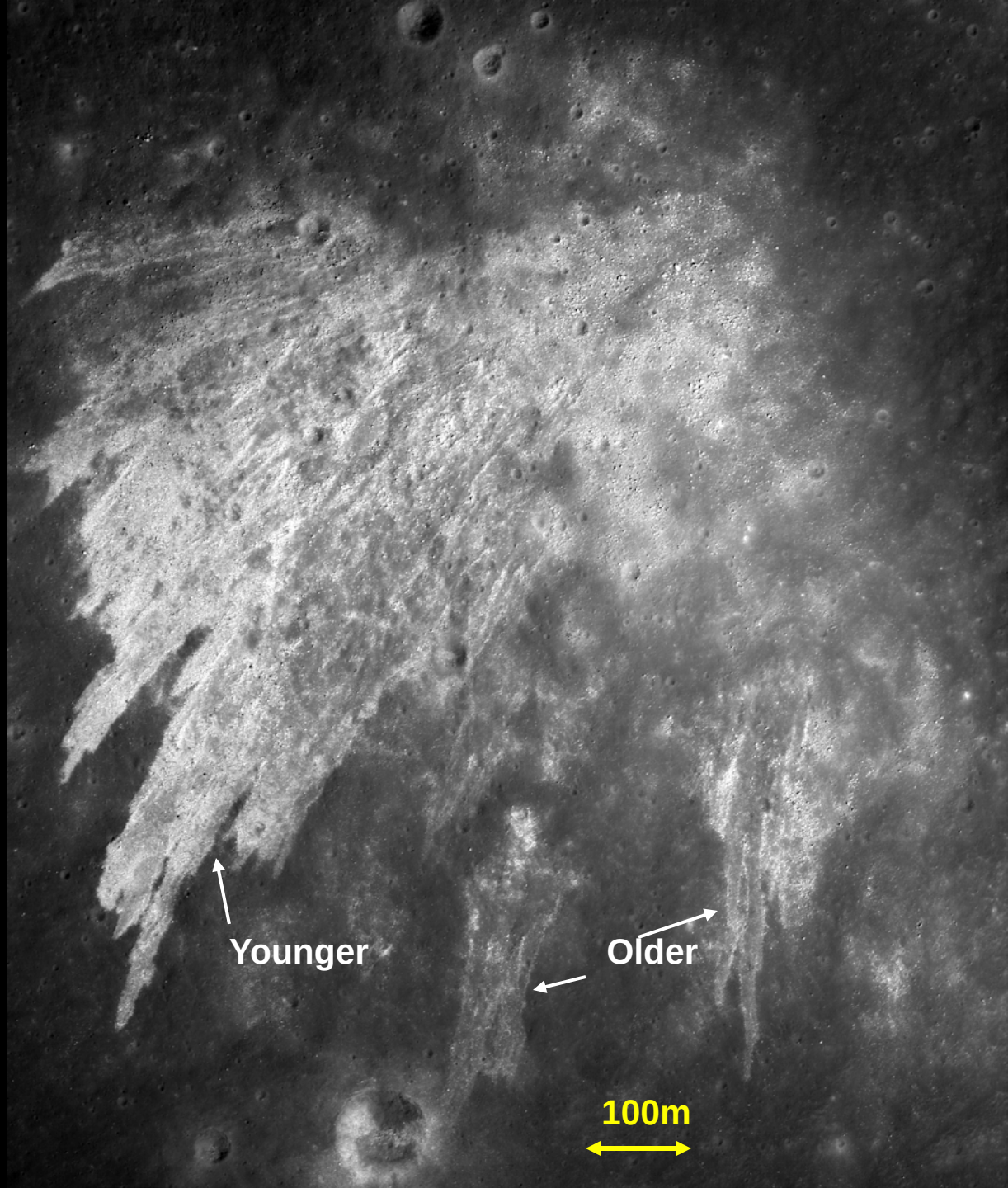
Station 8
Norite Boulder
4.35 ±0.08Gyr

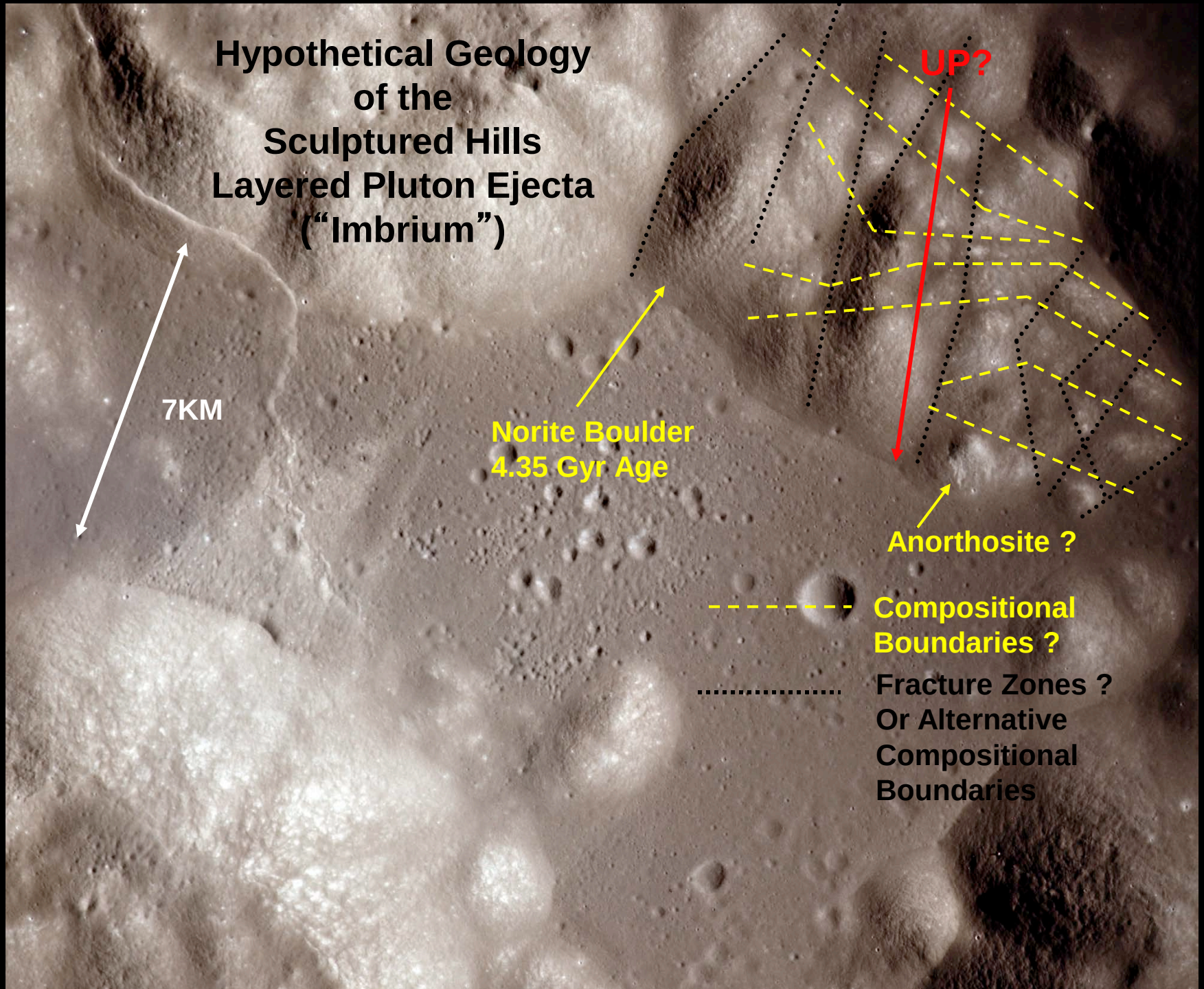
Sculptured Hills Sample?

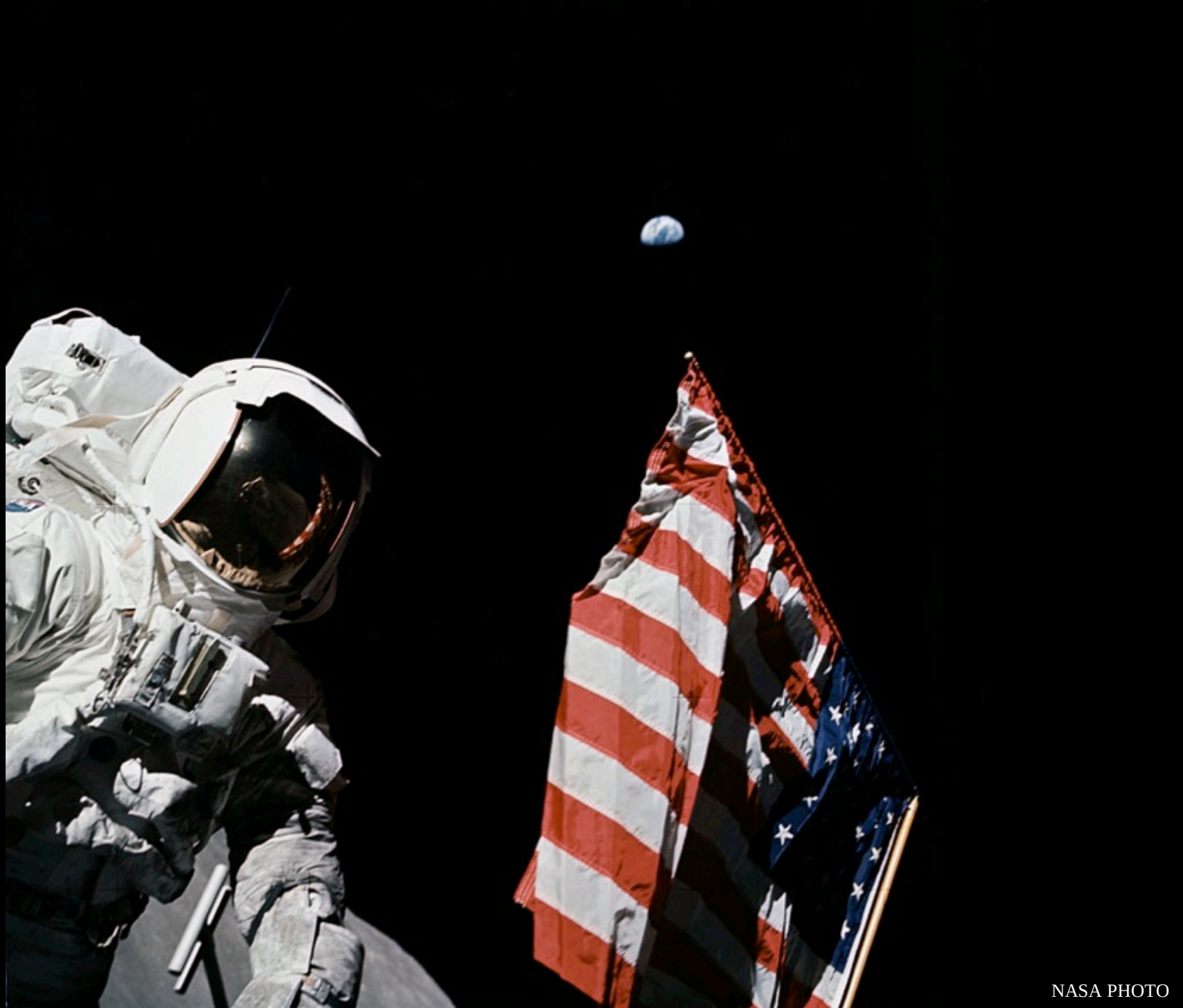
Sculptured Hills May be Excavated Mg-Suite Layered Pluton



Aggregated Mono-Lithologic, Granular Flows on Sculptured Hills

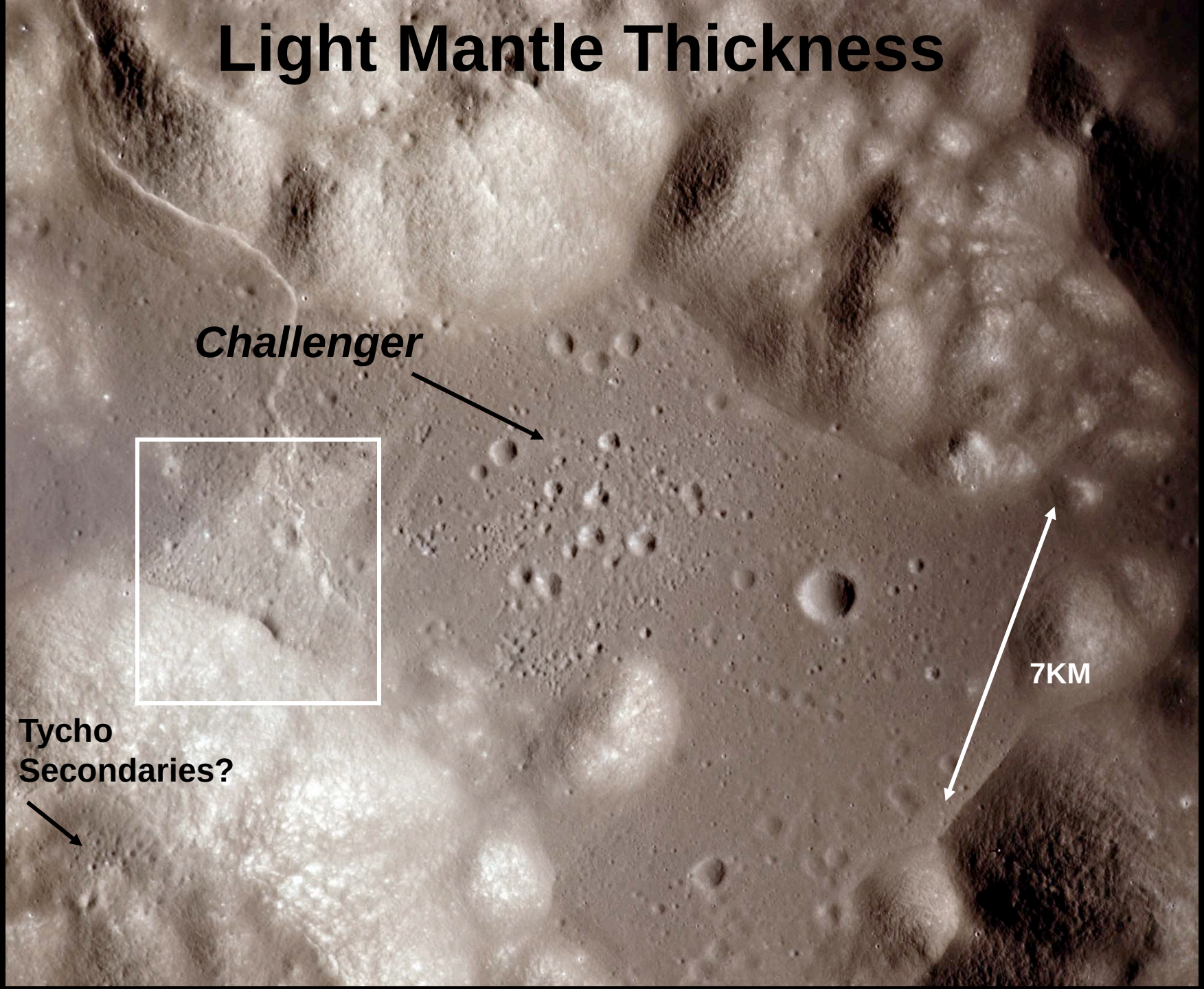


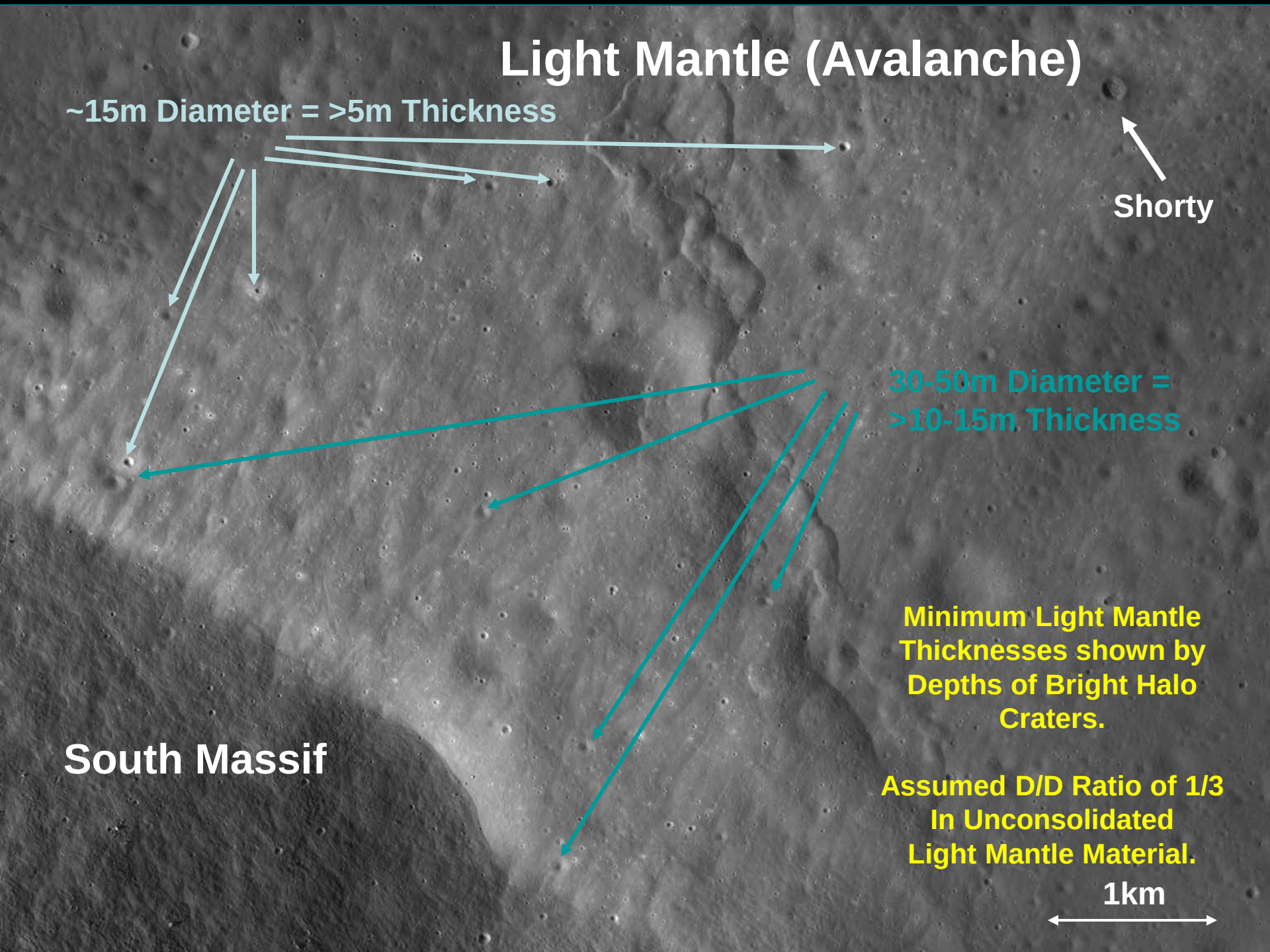

Hypothetical Geology
of the
Sculptured Hills
Layered Pluton Ejecta
("Imbrium")
UP?
7KM
Norite Boulder
4.35 Gyr Age
Anorthosite ?
Compositional
Boundaries ?
Fracture Zones ?
Or Alternative
Compositional
Boundaries



NASA PHOTO

Light Mantle Thickness




Light Mantle (Avalanche)
~15m Diameter = >5m Thickness
Shorty
30-50m Diameter =
>10-15m Thickness
Minimum Light Mantle Thicknesses shown by Depths of Bright Halo Craters.
South Massif
Assumed D/D Ratio of 1/3 In Unconsolidated Light Mantle Material.
1km