Exploring Pit Craters to Understand the Lunar Maria

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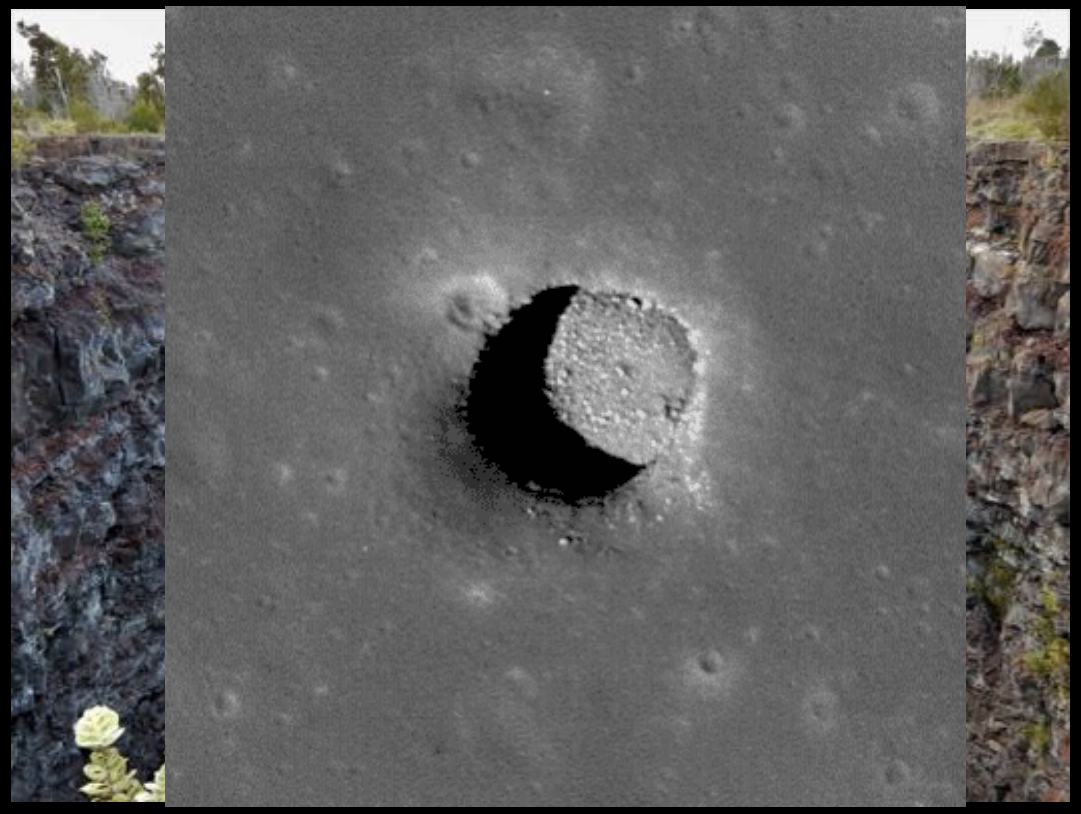
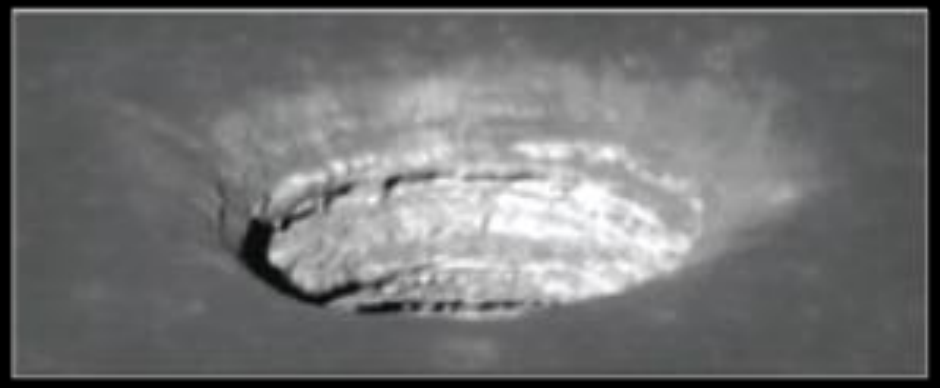
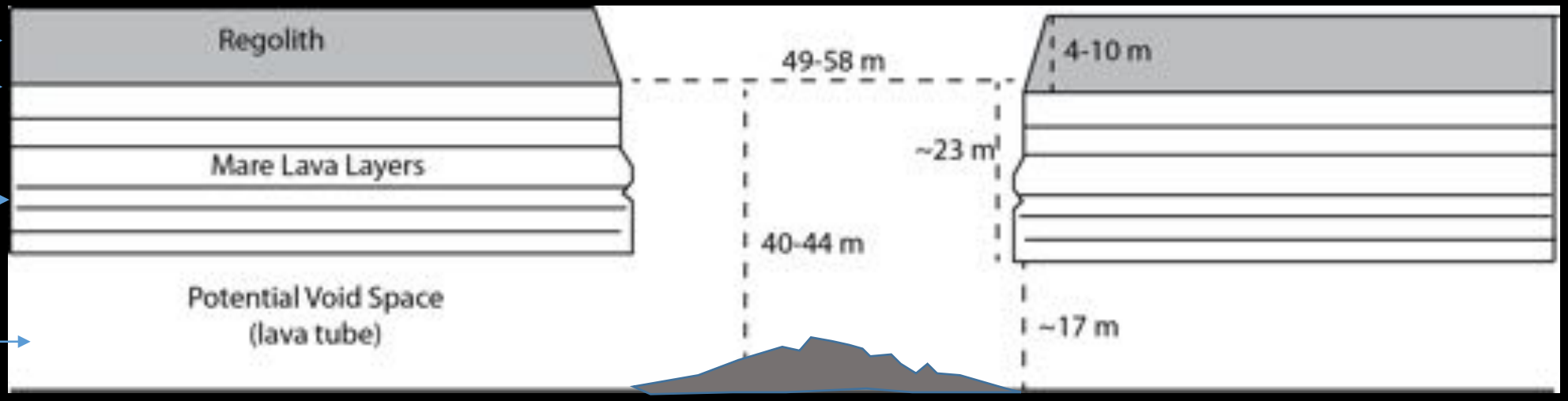
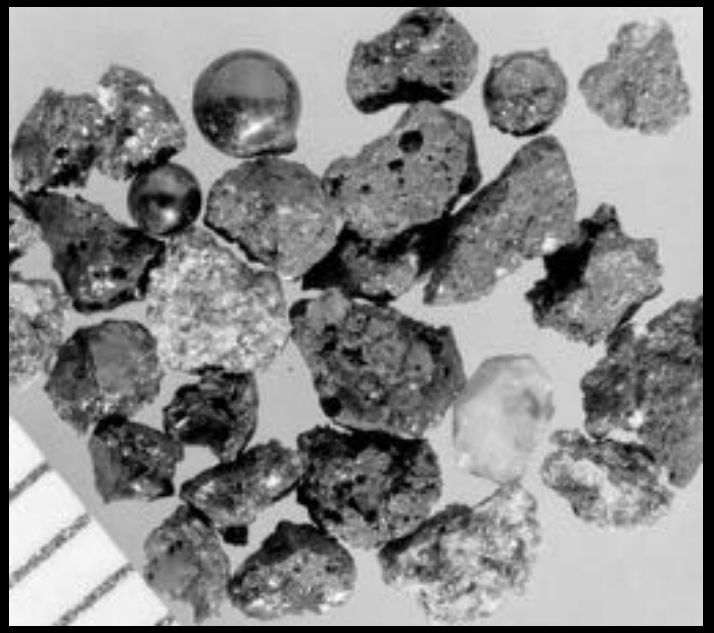




Critical Areas

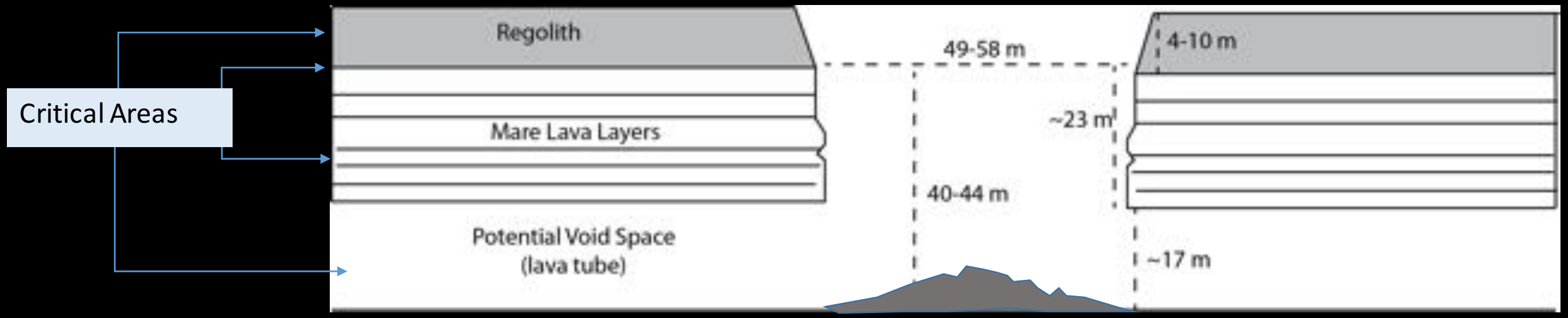




Lunar Regolith Larry Taylor

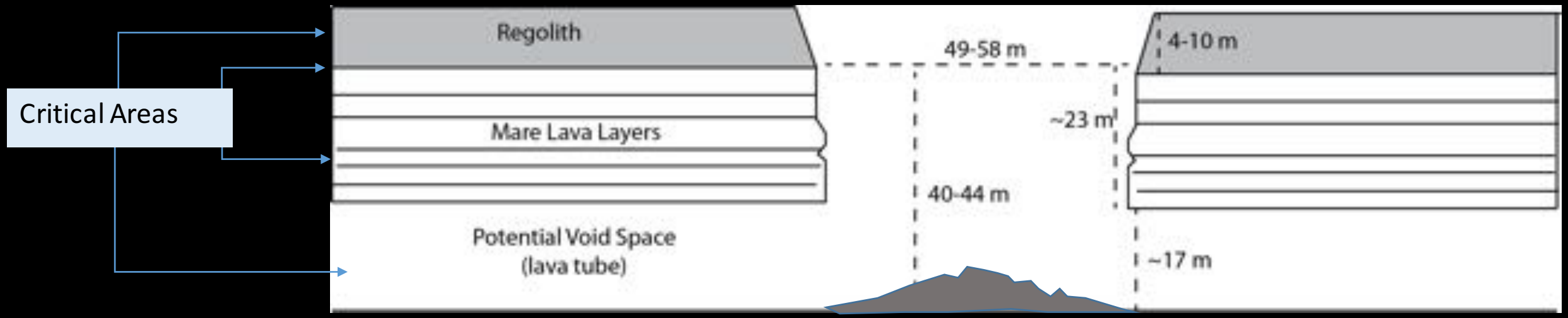
Sand with MAHLI. NASA/JPL

BP-1 simulant, E. Suescun-Florez et al. 2014



The Regolith/Bedrock Interface:

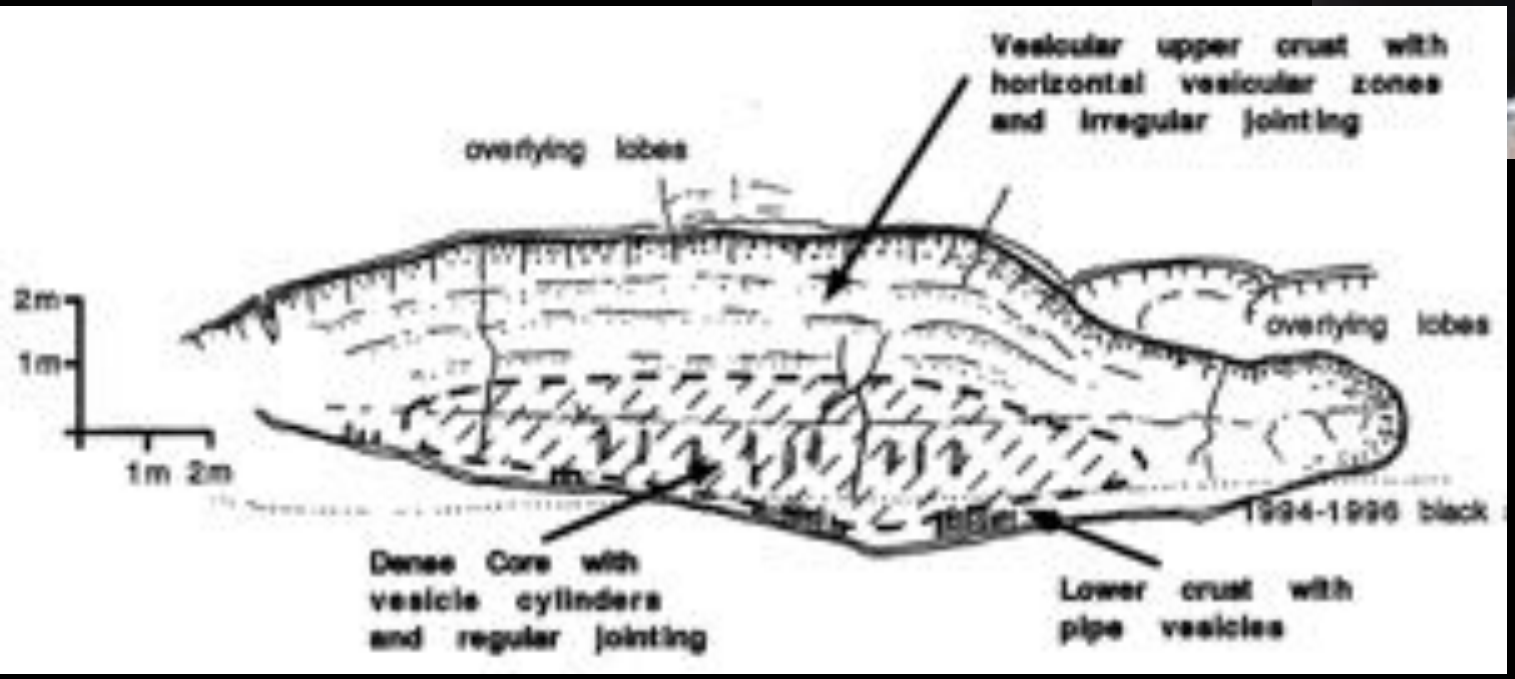
- How regolith is made (fractures in the bedrock?)
- How the composition of the regolith compares to the lavas underneath it



The mare: Thick, flood-like flows, or slower, complex inflated flows?

http://volcano.oregonstate.edu

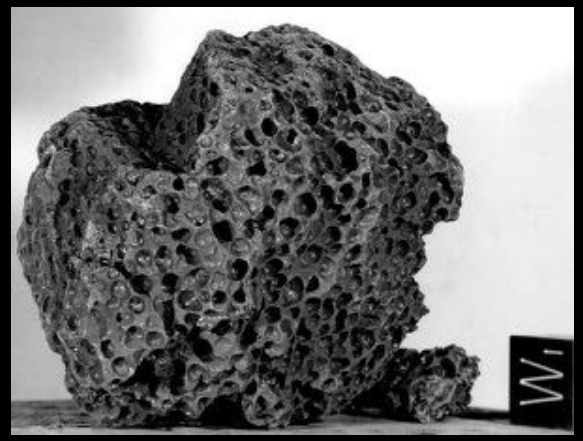
Quinn Dombrowski



Keszthelyi et al.

Paleoregolith layers?

Context!



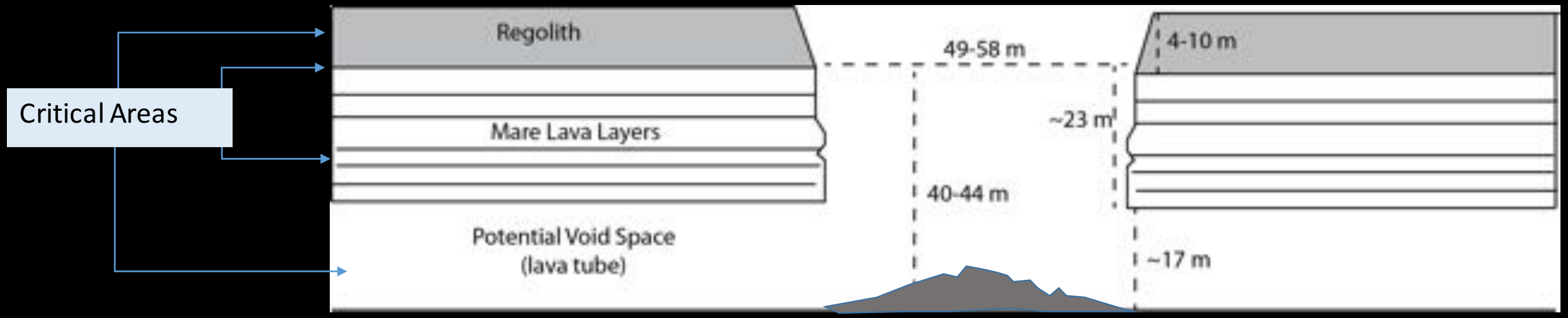
Even within these groups, the compositions of high-Ti basalts vary significantly from sample to sample. Explanations for these differences are complicated by the fact that virtually all mare basalt samples were collected as loose blocks in the regolith, and no identifiable lava flows were sampled directly on the lunar surface (although sampling at the Apollo 15 site came within a few meters of lava bedrock). Nevertheless, studies of terrestrial lava flows suggest that the observed variations from sample to sample reflect variation both within and between individual lava flows. -The Lunar Sourcebook

Texture, mineralogy, and elemental chemistry

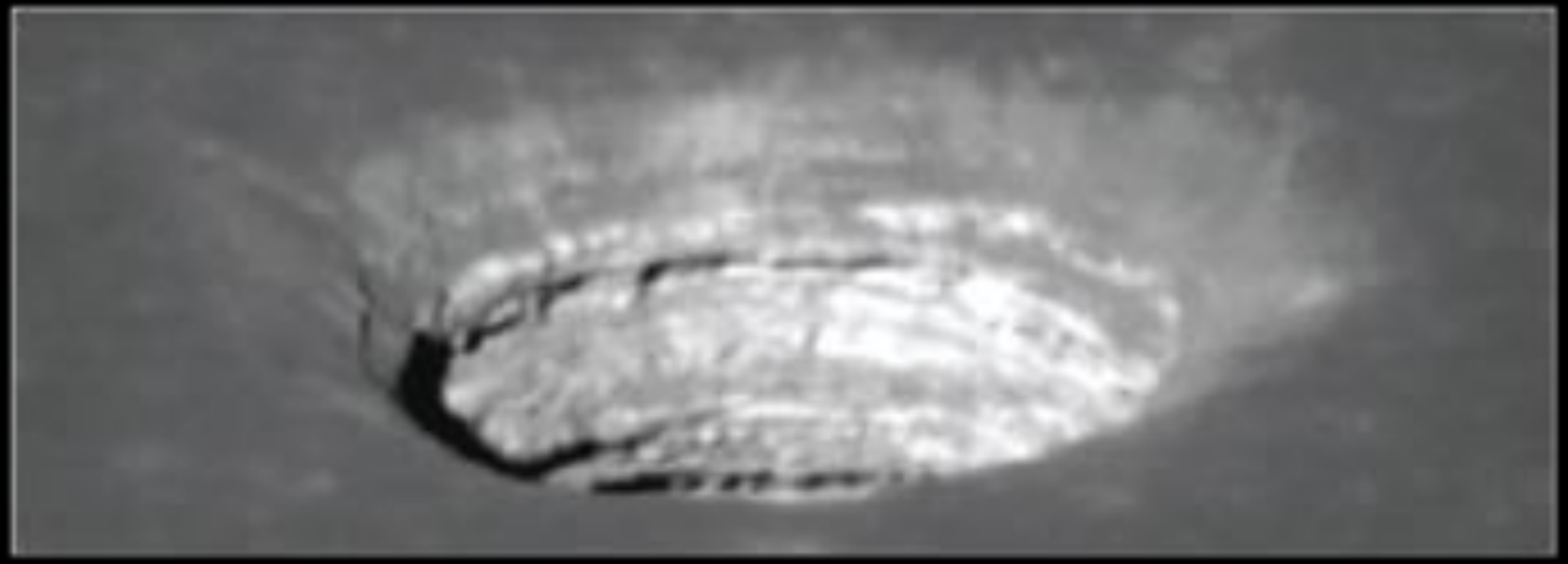
C.E. Jones

The Lava Tube:

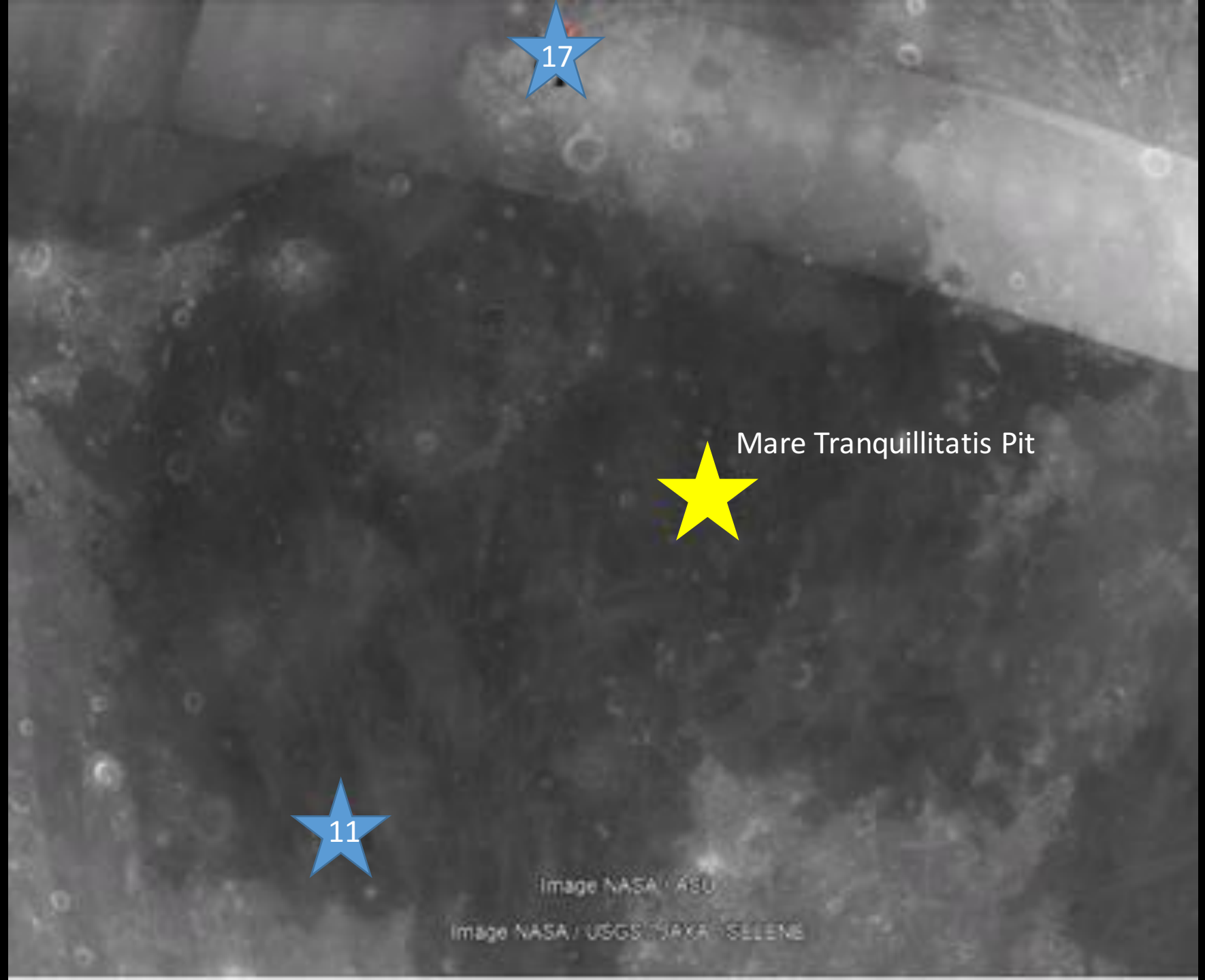
- Pristine lava on the floor and walls
- Geometry
- Precursor for human exploration
  - Protected from radiation and micrometeorites
  - Balmy temperature of -30 C year-round

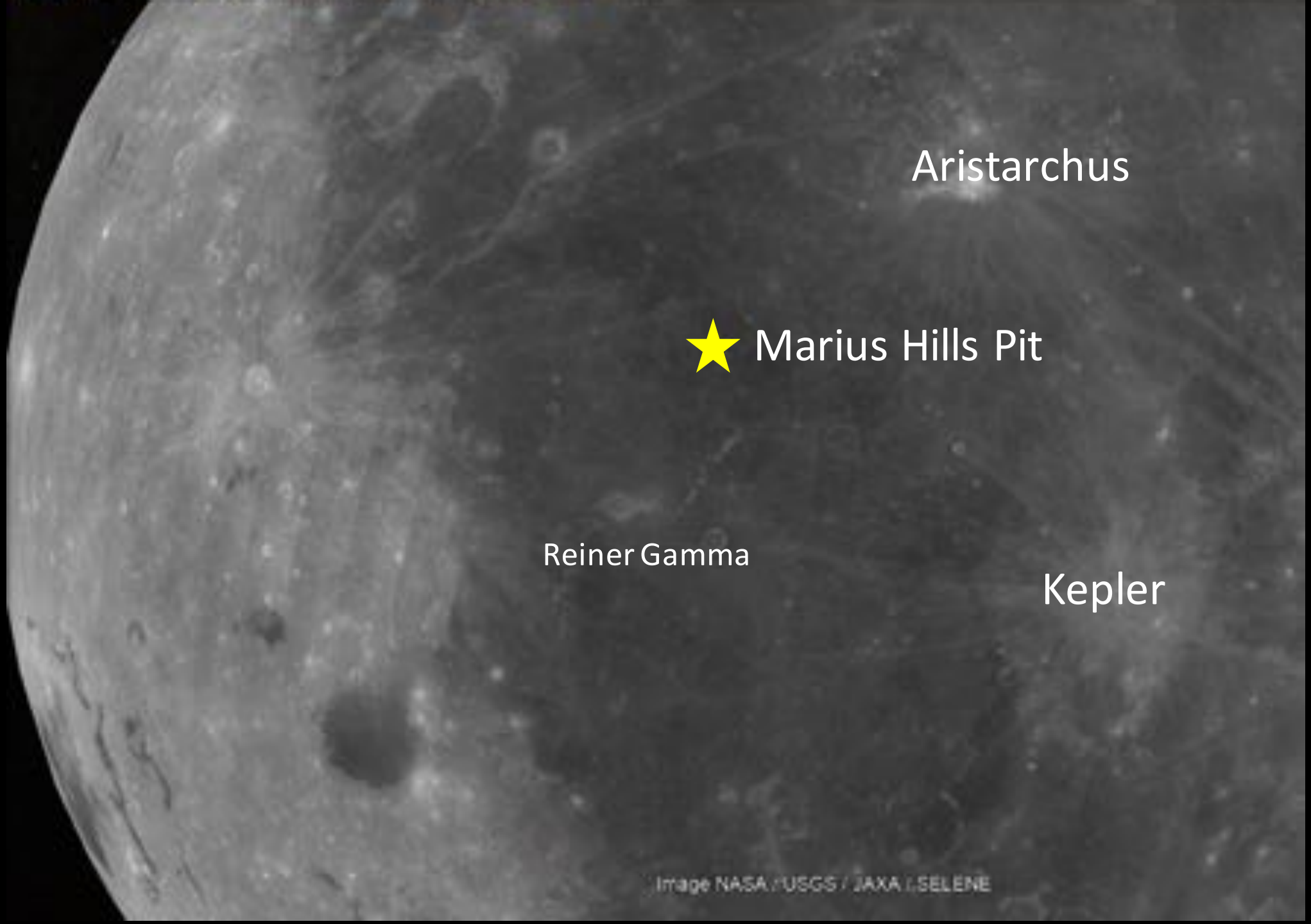


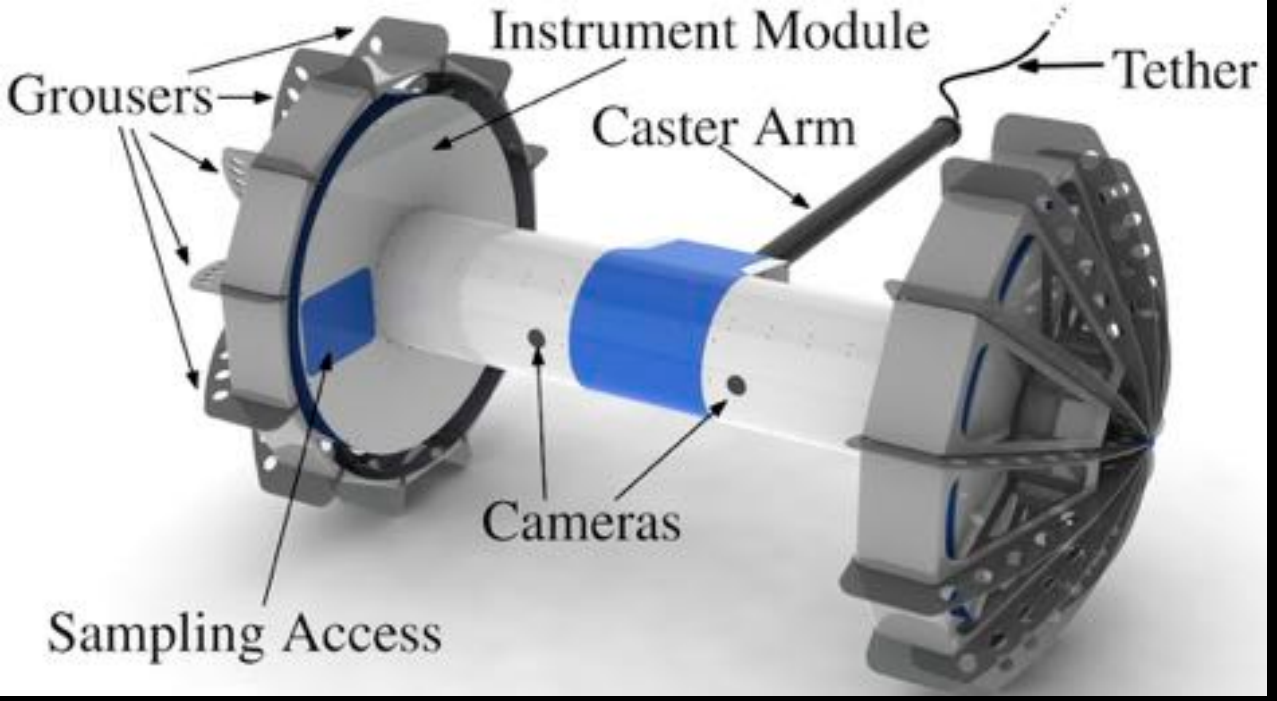
Which is best?



- Thickness of section
- Verticality of regolith cone
- Context
- Possibility of a large tube


17
Mare Tranquillitatis Pit
11
Image NASA / ASU
Image NASA / USGS / JAXA / SELENE


Aristarchus
Marius Hills Pit
Reiner Gamma
Kepler
Image NASA / USGS / JAXA / SELENE



Access:
The Axel Rover

- Powered by solar panels on the surface
- Communication link through its tether

Operation of Lunakhod

MOON DIVER

Diving into the history of the mare

MOON DIVER

Payload:

- Context cameras
- Microimager
- APXS
- SWIR spectrometer