Exploring Pit Craters to Understand the Lunar Maria

Critical Areas

Regolith

Mare Lava Layers

Potential Void Space (lava tube)

49-58 m

23 m

40-44 m

4-10 m

~17 m
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?

Paleoregolith layers?
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
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

Critical Areas
Which is best?

- Thickness of section
- Verticality of regolith cone
- Context
- Possibility of a large tube
Mare Tranquillitatis Pit
Access: The Axel Rover
- Powered by solar panels on the surface
- Communication link through its tether

Operation of Lunakhod
Diving into the history of the mare
Payload:
• Context cameras
• Microimager
• APXS
• SWIR spectrometer