Size and Structural Stability
Assessment of Lunar Lava Tubes

A. Modiriasari1, and A. Theinat1, A. Bobet1, H. J. Melosh2, S. J. Dyke1,3, J. Ramirez1, A. Maghareh1, D. Gomez1
1Lyles School of Civil Eng., Purdue University, 2Department of Earth, Atmospheric, and Planetary Sciences, Purdue University 3School of Mechanical Eng., Purdue University. *amodiria@purdue.edu

www.purdue.edu/reth/
The 49th Lunar and Planetary Science Conference March 19-23, 2018

Objectives

- Develop analytical solution to find the width and size.
- Numerical simulation of structural stability.

Geometry and Size

- The analytical solution incorporates knowledge of the parameters of lunar rocks and the mechanics of lava flows. Our results below are comparable with GRAIL data.

Structural Stability

- Are lava tubes stable and what factors might affect stability?

Conclusions

- Size and width of lunar lava tubes are comparable to data from GRAIL.
- Stability of lunar lava tubes decreases as the cross section becomes more elongated horizontally.
- As the roof thickness and/or tensile strength of the lava increases, yielding decreases.

Future Experimental Modeling

- Modeling columnar jointing and geological formation of lava tubes