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Evaluation of the impact of irregular geometry on the stability of lava tubes

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The presentation will introduce a recently proposed approach for analyzing the irregular geometries of lava tubes and assessing their impact on cave stability. It is shown that irregularities can significantly influence predicted collapses and the safety conditions inside the caves. This enables preliminary estimates of lava tube dimensions on the Moon (and other planetary bodies) and allows forecasts of the environmental conditions that future robotic missions will have to deal with. Thousands of artificially generated irregular geometries have been analyzed, allowing for interesting observations regarding the geometry and types of the collapses. Lava tubes are of great interest due to their potential for hosting future bases and scientific instruments. They may also serve as valuable sites for sampling paleoregolith and conducting unique geological investigations. For these reasons, issues related to their structural stability are expected to attract increasing attention from the scientific community.

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