

## Evaluation of Radiation and Design Criteria for a Lunar Habitat

Hayley E. Bower, Daniel Gomez, Antonio Bobet, and Julio A. Ramirez  
Lyles School of Civil Engineering, Purdue University  
Shirley J. Dyke  
Departments of Mechanical and Civil Engineering, Purdue University  
H. Jay Melosh  
Department of Earth and Atmospheric Science, Purdue University

### ABSTRACT

Extraterrestrial habitation has long been the object of science fiction, and experts in the fields of science and engineering have proposed many designs for a lunar base. The research conducted has focused on either structural stability, radiation protection, or meteorite-impact vulnerabilities, but rarely have these been considered together. The Resilient ExtraTerrestrial Habitats (RETH) project aims to design a lunar habitat from a hazards perspective, considering general degradation, meteorite impacts, seismic activity, radiation exposure, thermal extremes, and geomagnetic storms in addition to the physiological, psychological, and sociological aspects of astronauts living in such a habitat. Several members of the RETH team will begin the project by each quantifying an individual hazard and proposing a solution which, when combined with other members' research, will provide specific parameters used in designing a safe, self-sustaining lunar or planetary outpost. This paper focuses on the effects of cosmic and solar radiation which can be detrimental to the health of future lunar inhabitants, and as such, quantifying the amount of radiation present in the environment is vital. Different materials such as aluminum, polyethylene, water, and regolith can provide adequate shielding with varying thickness, though the possibility of using lunar lava tubes remains open.

### KEYWORDS

Moon, radiation, regolith, hazards