

“Investigation into hydrated, frozen and cemented soils in support of NASA’s in -situ resource utilization efforts”

Robert L. Worley II, Civil & Environmental Engineering, University of Vermont

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Background & Significance

The Apollo program’s six human missions to the moon tested exiting hypotheses of lunar regolith and confirmed the surface condition observations made during the unmanned Surveyor Program. Understanding the expected surface regoliths, to accurately simulate their composition and characteristics will influence humans’ ability to explore, exploit, or habitat on these extraterrestrial bodies. Although there has been a considerable gap, there is a revitalization of NASA’s lunar program as a catalyst for the goal of going from the “Moon to Mars.” The renewed interest in human lunar missions is in part to use the lunar environment as a test bed for training and technology demonstrations. As interest in human missions to the moon, Mars, and other extraterrestrial bodies grow, we will need to bolster our understanding of the lunar regolith, and extrapolate the geotechnical information gleaned from the Apollo missions to future missions to other extraterrestrial bodies such as Mars.

Project Goals

The research objectives are to: Investigate the potential regolith cases on the Moon where water

(a)

(b)

1.5 1.6 1.7 1.

(c)

Figure 7: GRC-3 lunar simulant (a) displacement vs. stress curves at 80%, (b) shear normal curves for D_r 80%, and (c) vertical cut laboratory test cohesion estimates for Lunar simulants JSG1A and GRC-3.