Overview of NASA Gateway Lunar Dust Mitigation and Contamination Modeling and Analysis

Ronald G. Lee, Jr[a*], Gary L. Brown[b]

[a] *Booz Allen Hamilton, Houston, TX, 77058, USA,* lee_ronald@bah.com
[b] *Barrios Technology, Houston, TX, 77058, USA,* gary.l.brown-1@nasa.gov
* Corresponding Author

The planned NASA Artemis campaign has several lunar surface missions in which the NASA Gateway is the waypoint between lunar orbit and the lunar surface for Human Lander System (HLS). Each of these missions is an opportunity for lunar dust to be introduced into the Gateway environment, post surface mission, potentially causing end of life (EOL) performance degradation due to lunar dust contamination of sensitive hardware and systems on the exterior of Gateway and Visiting Vehicles. The Gateway Systems Engineering and Integration (SE&I) and Induced Environments teams are addressing the challenge of lunar dust with a two-pronged approach. Characterization of the lunar dust induced environment around Gateway and contamination risk is accomplished with a comprehensive physics-based framework, the Gateway On-orbit Lunar Dust Modeling and Analysis Program (GOLDMAP), which is currently in development. Analysis results from GOLDMAP define Gateway-level induced environments requirements and are flowed to elements and subsystems. In parallel, a dust mitigation strategy is being developed with a focus on lunar dust protection, dust mitigation technologies, mitigation and testing guidance, and cross-program coordination and is informed by outputs from GOLDMAP analyses. Activities supporting both components include hardware susceptibility assessments and testing, and scientific experiments on lunar regolith.