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DUST PROPERTIES AND THEIR EFFECT ON THE SPACE HABITAT MICROBIOME

Abstract

All human-occupied built environments will inherently contain an indoor microbiome. The indoor microbiome can affect the integrity of the built environment and can impact the health of its occupants. Spacecraft and space habitats are a unique built environment where the indoor microbiome is critical for mission success and astronaut health. Bacterial and fungal communities have already been observed in such built environments such as the International Space Station (ISS). Dust generated by astronauts' daily activities is a major source where microbial growth can occur on the ISS. Future missions that involve lunar habitats and excursions on the lunar surface will also introduce lunar dust. However, it is not yet known how dust generated by astronauts in their spacecraft and dust tracked in from the lunar surface will interact to influence microbial growth. The Apollo missions demonstrated that lunar dust is difficult to remove from astronaut spacesuits and equipment. There are currently several lunar dust mitigation techniques being developed to prevent its introduction into a habitat, but a better understanding of the interactions between the two dust types and its effect on microbial communities on board is needed to ensure mission success. The goal of this study is to examine the properties of ISS dust from samples collected from the Humidity and Microbial growth in ISS Dust (HUMID) project and synthetically created lunar dust while observing changes in the microbial communities present when the two dust types are combined. The knowledge gained will help inform microbial procedures in the event of lunar dust contamination. This will help ensure integrity of spacecraft and habitat systems while mitigating impact of potential microbial changes on the health of the astronauts.