

“Raising TRL of your Lunar Payload”

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5/15/2026

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Abstract for ISDC Conference presentation Sunday June 7th 2026

Preparing payloads for the lunar surface requires rigorous testing that accurately captures the extreme environmental and operational conditions. This presentation provides an overview of the lunar-relevant test capabilities at NASA JSC’s Astromaterials Research and Exploration Science (ARES) laboratories as well as the Energy System Test Area (ESTA) Lunar Development and Test Facility. These facilities allow teams to assess hardware performance in dusty vacuum environments, characterize interactions with high-fidelity lunar regolith simulants, evaluate mechanical and thermal durability, and understand the effects of micrometeoroid and orbital-debris impacts—critical factors for certifying payloads that will operate on the lunar surface or in orbit.

While Lunar power challenges such as variable illumination, extreme temperatures, and dust-driven degradation will be briefly summarized, the focus of this talk is on how JSC’s test infrastructure enables developers to validate designs, reduce mission risk, and ensure compatibility with CLPS and Artemis objectives. NASA JSC’s expertise and experience help industry, academic, and government teams prepare robust hardware ready for successful delivery and operation on the surface of the Moon.

Artificial Intelligence (AI) Usage Disclosure

This document was created with assistance from Copilot for editing the document for grammar and composing some of the sentences. The content has been reviewed and edited by Anastasia Ford. More information on the extent and nature of AI usage is included in the Methods or Acknowledgements sections of the document if that section exists.