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Generating Payload Environments for a Lunar Lander Mission

In today’s space industry many organizations develop payloads or other components that will fly on a vehicle or lander developed by a different organization. This creates a challenge for the payload developers of knowing the thermal environment, including effects from the spacecraft, of their instrument because the payload engineers will not have continuous access to an up-to-date thermal model of the spacecraft. To circumvent the vehicle developer having to provide a thermal model of the spacecraft to payload developers for detailed thermal analysis, the vehicle developer can provide environmental data to the payload engineers to apply to their payload model, instead. This data must include the boundary temperatures where the payload is mounted, sink temperatures, and both incident solar and infrared thermal flux. This paper will describe the method used to generate thermal environments for payloads on the Astrobotic Lunar Lander and how those environments were applied to an example payload, the Neutron Measurement at the Lunar Surface (NMLS) instrument. This work is unique because a standard method for generating and delivering payload environments does not exist. Benefits and drawbacks of using this method will also be discussed.