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TOO HOT TO HANDLE? PLANETARY PROTECTION CONCERNS FOR NUCLEAR SPACE
MISSIONS TO PLANETARY SURFACES

Abstract

Missions to planets and other bodies in the solar system are extremely valuable scientific opportunities, despite all of the challenges these missions present to designers. One challenge that planetary science missions must face is that of Planetary Protection, the prevention of contamination between the Earth and the planetary body a craft is studying, undertaken to ensure an uncompromised scientific environment. Biological contamination has been a significant area of focus in Planetary Protection, but it is not the only type of compromising factor that a spacecraft from Earth might bring with it on its mission. Many exploration spacecraft have been or currently are powered by radioisotope power systems, which provide constant energy and thermal output without regard to solar irradiance. Radiation (both thermal and ionizing) from radioisotope power systems aboard exploration spacecraft may become a greater issue in the coming decades, as new actors are developing new radioisotope power systems, some with new, un-flown heat source isotopes. As such systems come online and/or enter the market, developers and mission designers must keep this in mind when working to incorporate radioisotope power systems into future planetary exploration missions. This paper analyzes existing planetary protection regimes for content relevant to the potential impact of radiation exposure as a result on spacecraft systems. The regimes studied include actual space agency regimes as well as relevant academic literature. The paper also includes recommendations for future study.