**R2-S2: Robotic Remote-Sensing Scout.** D. P. Brogan, University of Southern California, dbrogan@usc.edu

**Introduction:** Space Policy Document 1 calls for the U.S. to lead commercial and international partners in returning humans to the Moon “for long-term exploration and utilization” [1]. The Moon Village Association shares this vision and adds on the importance of sharing information between these partners to facilitate cooperation [2]. This call is being answered by the NASA Artemis program, which plans to lead commercial and international partners towards establishing a sustained human presence on the Moon [3-5]. The Robotic Remote-Sensing Scout (R2-S2) concept is proposed to assist lunar EVA crews for Artemis III and following crewed lunar missions. R2-S2 is a versatile robotic rover intended to dramatically reduce the risk associated with lunar EVA missions.

R2-S2 has two primary modes of operation: 1) Teleoperated mode and 2) Autonomous crew-assist mode. In teleoperated mode, the lunar crew remotely operates R2-S2 from inside their lunar habitat to assess the safety of planned EVA crew missions (mission recon) or to conduct some tasks that would otherwise require a crewed EVA (remote exploration and inspection). For EVA mission recon, the teleoperator directs R2-S2 to the desired mission destination while gathering valuable sensor data that will aid in determining mission safety. In autonomous crew-assist mode, R2-S2 provides support alongside the crew during EVA excursions. In this mode, R2-S2 livestreams EVA operations to Earth, carries tools, and performs specific tasks when commanded by the crew (sample collection, telescoping, microscopy, detecting radiation, and other in-situ sensor readings). R2-S2 also carries spare oxygen tanks and suit repair materials for contingency scenarios.

R2-S2 comes in two configurations such that it may accommodate either equatorial or polar missions. Renderings of the equatorial and polar configurations are shown in Figures 1 and 2 respectively. The main differences between the two configurations are the solar panel placement (different solar incidence angles), wheel width (different regolith consistency), and battery pack insulation thickness (different thermal conditions).

R2-S2 is proposed as a concept for a commercial and international effort that could be led by NASA, where all data collected would be shared with those commercial and international partners. The Artemis program poses challenges and risks that have not been faced before. R2-S2 aims to help mitigate those risks as much as possible to ensure the safety of the crew and facilitate productivity on the lunar surface.

**References:**