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INTEGRATION OF A SHORT DURATION PAYLOAD FOR THE AXIOM-1 MISSION TO THE ISS

Abstract

INTRODUCTION: The Axiom-1 (Ax-1) mission represents a new and exciting chapter of short duration missions to the International Space Station (ISS) and increases opportunities for research productivity and technology demonstrations in low-Earth orbit (LEO). Commercial-spaceflight-led science extends current platforms and research interests currently championed by government spaceflight. The commercial sector also has the opportunity to highlight the research and interests of multiple areas through the directed work of spaceflight participants increasing the reach and profile of various organizations and researchers through these high-profile missions. **METHODS:** We present an anecdotal review of the plans, operational considerations and lessons learned by the Leap Biosystems team while tasked with developing, integrating and training the payload for a private astronaut on the Ax-1 mission. **RESULTS:** Leap Biosystems was chosen as the payload lead to integrate science, earth observation and education outreach, for a private astronaut's mission to the ISS. Initial calls for science research were sought from government and academia in Canada, including the Canadian Space Agency and research institutions that were part of the philanthropic portfolio of the private astronaut. A technology demonstration portfolio was also added to the mission. Earth observation and education outreach was blended into the payload with careful review of the 9 day mission timeline. To select appropriate and completable science, a matrix of feasibility and research benefit was prepared to help the private astronaut select their ground-based and space-based science. Once chosen, integration of the payload began in collaboration with NASA and the Axiom payload team. Consultation and training with the researchers were required as many were new to spaceflight research. This ultimately led to the development of the specific research protocols and procedures suitable to the ISS. Local institution and NASA IRB approval was required and subsequently approved for every project. **CONCLUSION:** Commercial spaceflight participants present a different approach and novel method of selecting and developing spaceflight research studies and tailored science payloads. It can be anticipated that future spaceflight participants and private astronauts will desire the opportunity to follow in the footsteps of the Ax-1 team and pursue science in low-Earth orbit. Lessons learned on this landmark mission will benefit future missions and increase the volume and value of science performed.