

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
New Technologies, Processes and Operating Modes Enabling Future Human Missions (7)

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EVALUATION OF COMMUNICATION PROTOCOLS BETWEEN MISSION CONTROL AND
ASTRONAUTS DURING A SERIES OF SCIENCE DRIVEN SIMULATED LUNAR MISSIONS

Abstract

Humankind has minimal experience with manned exploration of other planetary surfaces, limited to the Apollo missions. To address this, researchers led by Western University are conducting simulated human missions in planetary analogue environments on Earth. Lessons learned from these missions will direct future analogue studies supported by the Canadian space program and eventually guide planetary missions with Canadian involvement. During 2010 and 2011 two missions were conducted by Western at lunar analogue sites: Mistastin Crater, Labrador, Canada, and Meteor Crater, Arizona, USA. Two “astronauts” (engineer and geologist) and a “behind the scenes” support team were in the field and a mission control team coordinated exploration from Western. Mission goals included understanding the role of the mission control science team and its relationship to astronauts; and determining the most efficient and effective way to communicate with astronauts. The purpose of this paper is to discuss the three communication modes tested and pros and cons of each. It is hoped that these results will influence mission control communication protocol for future human planetary missions. During all communication modes the astronauts’ main contact point was CapCom. In mode #1 most information was exchanged during pre- and post-EVA briefings with CapCom and the Science Team lead, and communications with CapCom during EVAs were infrequent and brief. This mode was used for the entire Labrador mission due to technical difficulties which could also be encountered during planetary missions. In mode #2 briefings were important, but most communications took place during EVAs through constant communication with CapCom. This was the nominal mode for both missions, was used for most of the Arizona mission, and is most similar to Apollo and ISS protocols. In mode #3 briefings were minimized. During EVAs technical

and logistical information was communicated through CapCom, and scientific discussions took place directly between astronauts and a Science Liaison. The astronauts and mission control found that mode #2 was preferred over mode #1, and conducive to a more rapid and rigorous exchange of scientific data. However, astronaut workload increased with greater frequency of communications. Mode #3 was most efficient for scientific exchange and mission control team operations; however, this mode was only tested for one day. Although more testing is needed under mode #3, this new protocol for communicating with astronauts during planetary surface exploration may be more efficient and effective for scientific investigation than communication modes used to date, and warrants further investigation.