FIRST SIMULATION OF AN EARTH-MOON L2/FARSIDE WAYPOINT MISSION AND TELEOPERATION OF A PLANETARY ROVER FROM THE ISS. J. O. Burns[1,3], L. Kruger[1]; T. Fong[2] and M. Bualat[2], [1]University of Colorado Boulder, [2]Intelligent Robotics Group, NASA/Ames, [3]NLSI Lunar University Network for Astrophysics Research (LUNAR), NASA/Ames.

Abstract: The NRC Astrophysics Decadal Survey identified *Cosmic Dawn* (i.e., first stars and galaxies in the early Universe, about 100 million years after the Big Bang) as one of the top three science priorities for this decade. The NLSI LUNAR team has shown that such observations are best conducted from the radio-quiet lunar farside using an array of low radio frequency telescopes, operating at frequencies <100 MHz, to measure highly redshifted 21-cm signals from neutral hydrogen that surround the first stars and galaxies. We have developed a concept for a deployable low-mass radio antenna array on the Moon using Kapton film as a backbone. Our team has proposed that such an array could be deployed with a modest rover on the lunar farside teleoperated by astronauts in the Orion crew vehicle stationed in orbit about the EM L-2 libration point. To demonstrate the feasibility for such a mission, we have recently conducted the first surface telerobotics engineering tests using the K-10 rover at the NASA Ames Roverscape under the command of an astronaut aboard the ISS. During three 3.5-hr ISS crew sessions in the summer of 2013, Kapton film strips were successfully unrolled from the back of the K-10 rover (Figure 1). These ISS crew sessions achieved a number of "firsts" including the first real-time teleoperation of a planetary rover from the ISS, the first astronaut to interactively control a high fidelity planetary rover in an outdoor analog testbest, and the first realistic simulation of a human-robot "Waypoint" mission concept.

Figure 1. Deployment of Kapton film by crew aboard the ISS using the teleoperated K10 rover at the NASA/Ames Roverscape.