

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)  
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INTERNATIONAL INDUSTRY CONCEPTS FOR HUMAN EXPLORATION FROM THE  
EARTH-MOON L2 REGION

**Abstract**

For the past few years a team of large space companies from several countries has been working together to develop possible collaborative missions for human exploration beyond low Earth orbit. The team consists of Boeing, EADS Astrium, Lockheed Martin, MDA, Mitsubishi Heavy Industries, RSC Energia, and Thales Alenia. Our goal is to extend the successful cooperative relationships developed during the International Space Station program to future exploration missions. We considered several possibilities, searching for affordable missions which could begin around the end of this decade. We concluded that the first missions should be astronaut flights to an orbiting outpost in the region of the Earth-Moon Lagrange Point 2 (EM-L2) approximately 65,000 km beyond the Moon. From there, astronauts could teleoperate rovers on the lunar surface. These missions would also build a foundation for later, more challenging missions to other destinations. The outpost could be used to practice human spaceflight operations in deep space, and might evolve into a transportation node for trips to the lunar surface or more distant destinations. One of the attractive features of L2 missions is that they can be performed using systems already in development, such as NASA's Orion spacecraft, SLS launch system

and ESA's Ariane 5 ME; or evolutions of existing vehicles, such as the ATV or HTV cargo spacecraft. A farside outpost at EM-L2 is ambitious but achievable for all of the partner nations. Our studies are intended to offer suggestions to our respective national space agencies. Any decisions on whether and how to implement such missions will be made by the agencies and not by the industrial partners. Therefore, this paper describes the characteristics and capabilities of several potential spacecraft configurations, rather than a single solution.