

Lunar Exploration (3)
Lunar Missions planned (2A)

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A JOINT INTERNATIONAL EXPLORATION ARCHITECTURE

Abstract

Human presence in cislunar space for both exploration of the moon and staging for exploration of Mars continues to be a primary goal of space agencies and companies around the world. International collaboration has been critical to the success and safe operation of the International Space Station and is expected to be similarly critical to future human space exploration though leveraging the strengths of the partners and creating opportunities for cost sharing. The Boeing Company and RSC Energia have jointly studied cislunar stations and developed joint designs for hardware and architectures that use current and emerging technologies to build efficient outposts in cislunar space. This paper describes our current concepts for early exploration mission architectures that emphasize international partnerships and elements and provide opportunities for a wide variety of mission goals.

The concepts feature the integration of the systems developed by Boeing and RSC Energia in one integrated complex. An early human presence and outpost in cislunar space is critical to extend mission duration and enable partner goals. Additional elements and systems are added over time to increase vehicle functionality. This station will facilitate exploration and exploitation of the lunar surface, deep space systems maturation, space science, human performance evaluation, and vehicle assembly and staging. This approach provides the flexibility to accomplish near term objectives, such as lunar surface interactions and asteroid exploitation while steadily developing deep space capability. The cislunar station can also provide capabilities during uncrewed periods, such as communication relay with the lunar surface and long term, extreme micro-gravity research. Boeing and RSC Energia have also studied the technical feasibility of launching the planned Russian Crew Transfer Vehicle (CTV) on the American Space Launch System (SLS), including integration of CTV to SLS and possible operations scenarios. Uses and advantages of an SLS-launched CTV for crew delivery to cislunar space are discussed. A variety of module and transportation concepts will be presented and discussed. The vehicle concepts are described within a proposed mission sequence, including required capabilities and key features.