

IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Governmental Human Spaceflight Programmes (Overview) (1)

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ARTEMIS LUNAR MISSION AVAILABILITY & DESIGN

Abstract

The National Aeronautics and Space Administration's (NASA) Artemis Program is leading international space exploration in a return to human lunar missions. The mission design underpinning this program are a critical aspect in the integration of the multiple vehicles, processes, and capabilities to execute the most demanding human spaceflight missions to date. Frequently mission design is characterized solely by its trajectory and the associated delta-velocity to achieve the end to end mission on a single day of flight. However, in practical terms for spaceflight missions, actual performance must characterize the translation delta-velocity demand, integrated power and thermal, crew day operations, commodities limitations, launch vehicle opportunities, and numerous additional factors across numerous launch day dependent variables. These factors together provide a unified set of mission design constraints that must all be met in order to execute a fully integrated mission. The frequency of achieving all of the mission design constraints is thus characterized as mission availability. The mission availability reflects the number of opportunities in any given period (month, year, etc.) for which an end to end mission could be launched. Ensuring adequate mission availability for the Artemis Program is necessary to support long term viability and sustainability of human lunar exploration. This paper will characterize the driving factors in the Artemis mission availability including vehicle specific effects from the Space Launch System (SLS), Orion Multi-Purpose Crew Vehicle, Gateway, Human Landing System (HLS) and other contributing projects. This analysis will also summarize the relevant factors future vehicles and projects should consider for in the integration and expansion of exploration capabilities with the Artemis Program.