

From Earth Missions to Deep Space Exploration (05)  
Exploration Capabilities (1)

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TRANSITIONING FROM SMALLER TO LARGER LAUNCH VEHICLES AS THE FOCUS OF SPACE  
EXPLORATION MOVES FARTHER AWAY FROM EARTH

**Abstract**

An on-going and basic question which must be answered when selecting the preferred launch architecture for space exploration beyond Low Earth Orbit (LEO) is the decision of whether to use multiple launches of smaller boost vehicles or the alternative of launching fewer but much heavier vehicles. There are several Launch Vehicles (LVs) available today which are used on current Earth Missions which can and do support small, robotic, Deep Space Exploration missions. The Space Launch System (SLS) LV will provide a quantum increase in launch capability for LEO missions as it simultaneously enables BEO exploration missions with much larger payload masses and volumes when compared to those available today. The paper will update the Small vs. Large rocket debate to include the anticipated capabilities of the SLS and will address the related issues of cryogenic fluid management and in-space propulsion alternatives.