

IAF SPACE EXPLORATION SYMPOSIUM (A3)  
Solar System Exploration including Ocean Worlds (5)

Author: Dr. James Green  
Space Science Endeavors, United States

Mr. Douglas Cooke  
United States

Mr. Arthur Beckman  
The Boeing Company, United States

Mr. Benjamin Donahue  
The Boeing Company, United States

FROM SATURN V TO THE SLS: LEARNING FROM THE PAST TO OPTIMIZE FUTURE SPACE  
MISSIONS**Abstract**

After the conclusion of the Apollo program in 1972, two fully functional Saturn V launch vehicles and one fully functional Saturn 1B remained. The main reasons for the termination of the Apollo missions to the Moon has been reported to be due to the large cost, a change in the technical direction from exploration of space to exploring low Earth orbit with the Shuttle, and fears within some sectors of the government that, like Apollo 13, another life-threatening accident was just a matter of time. The super heavy lift launch vehicle (SHLLV) Saturn V was the critical element that allowed each mission to be accomplished with one launch and enabled human exploration beyond low Earth orbit. Instead of using these launch vehicles, NASA chose to put them on display at various locations in the United States.

This paper examines the potential for more strategic utilization of NASA's Saturn rocket assets across the Exploration and Science Divisions, presenting an alternative history that may have seen the unused Saturn rockets employed for significant planetary exploration missions. NASA could have used the complete Saturn V vehicles to launch both Viking 1 & 2 missions to Mars (on a single Saturn V vehicle), the Voyager 1 & 2 missions to the outer planets (on a single Saturn V vehicle), and the two Pioneer Venus missions (orbiter plus probes) on the remaining Saturn 1B launch vehicle, thus saving the costs of multiple Titan 3-Centaur and Atlas Centaur rockets. The Titan 3-Centaur, developed to bridge a performance and cost gap, was not limited to planetary missions, suggesting that repurposing Saturn V would not have rendered the Titans obsolete. The financial analysis suggests that utilizing Saturn V for the Viking, Voyager, and Pioneer Venus missions could have saved NASA approximately \$1.098 billion in today's currency.

Fast forward to today, in which a similar mindset, with the Space Launch System (SLS), is to be used exclusively by human exploration and not as an Agency resource leaving the Science Mission Directorate responsible for acquiring its own non-SLS launch vehicles for future missions such as the Mars Sample Return, the Uranus orbiter, and the Interstellar Probe, just to name a few. We are now at a similar crossroads and should not repeat the mistakes of the past. The SLS should be considered an Agency resource and to be used by Human Exploration and Science Mission Directorates.