

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Space Exploration Overview (1)Author: Mr. Madhu Thangavelu
University of Southern California, United StatesUSC 2019 ARTEMIS PROJECT: MAXIMUM IMPACT MOON MISSION(MAXIM) TRIBUTE TO
APOLLO**Abstract**

USC ARTEMIS Project: Maximum Impact(MAXIM) Mission Tribute to Apollo 2019 USC ASTE527
Graduate Space Concepts Synthesis Studio Project

M.Thangavelu, Conductor

The current US administration has laid out a series of Space Policy Directives intended to reaffirm American preeminence in space in general and human space activity in particular. The directives provide a clear mandate to NASA to quickly return humans to the Moon with the clear intent to gain vital know-how to execute a long duration, endurance-class Mars expedition in the 2030s timeframe. In March 2019, the space policy of the US administration advanced the timeline for execution, directing NASA to land a woman and a man on the Moon by 2024. In 2019, on the 50th anniversary of the historic Apollo 11 Moon landing, the studio chose to look for fresh, new ideas that support policy, while drawing attention to new and age-old customs and sensitivities our species seem to resonate with, that were not within the traditional domain of the scientific and engineering communities, at least not until recently. As scientific and engineering methods are employed to better appreciate and shape outcomes of those soft, anthropological, sociological, cultural and behavioral science disciplines, human spaceflight could pioneer the use of these values and tools to promote developments in other hard technological arenas of endeavor as well. In the Viterbi School of Engineering, we promote this outlook as ENGINEERING+.

The 2019 USC ARTEMIS Project chose to pay tribute to a unique group of high-achieving engineers and scientists and astronaut explorers who created and executed the Apollo program with such daring and precision.

Great civilizations and cultures of the world actively seek to preserve and protect their heritage. As a step toward that goal, this USC ARTEMIS:MAXIM Project chose to examine, study and deploy methods to protect those Apollo sites and preserve Apollo artifacts on our Moon, from natural degradation, and protect them from present and future artificial agents, for posterity.

An Apollo-type equatorial free-return mission profile was selected for a seven Earth-day daylight lunar surface traverse mission. A daylight rover traverse mission on mare terrain offers several safety advantages over a polar mission, especially for the first few lunar visits, five decades after Apollo. A phased approach to incrementally complex mission operations as executed by the Apollo program is proposed. The USC MAXIM mission will help to prepare both astronaut crew and allied space systems for more challenging operations in the lunar polar regions. As American vision and largesse in supporting the International Space Station program is being extended beyond international partners now to make a truly global coalition with all nations participating to promote, preserve, protect and share the space cultural heritage of our species, we thought it fitting and proper that Americans pay tribute to the scientists, the engineers and the Apollo astronaut explorers who walked, drove, sang, prayed and played golf, and safely came home. We thought it important to remind the world and show a whole new generation where we had been fifty years ago, and what we did there. As some of the heroes have departed and others age gracefully, it is time past to honor those very brave and unique corps of astronauts and their support

team who showed what is possible for our species, if only we set our collective will and minds and hearts to do.

The USC 2019 ARTEMIS Project: MAXIM Mission Tribute to Apollo offers some visions to rev up the past to power up the future of human spaceflight. Slides may be seen at : <https://sites.google.com/a/usc.edu/aste527/home>