

# LSC Lunar Handbook

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## LunaRevolution-Role of the Moon in the Future of Human Space Activity

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### Abstract

The Moon, our closest celestial neighbor, was visited by astronauts nearly half a century ago, and a new wave of robotic missions are mapping it in extraordinary detail. Many nations and even private entities are in advanced stages of robotic lunar missions, deploying orbiters and landers to utilize, evolve and refine advanced space technologies and capabilities with the intent to set up permanent extraterrestrial infrastructure. LunaRevolution is a series of visions offered by USC graduate students in Astronautical Engineering in the fall of 2015 about what kind of projects are possible on the Moon in the near term (2015-2025) using the knowledge and systems that we already possess, and the ambitions of a new generation of space explorers and space professionals. The role of private space sector is seen as the key enabler for sustainable space activity. It is clear that a paradigm shift from "open-ended scientific exploration that drives the programs of the world's space agencies to one of self-sustaining utilization is the key for this 21<sup>st</sup> century space activity.

Topics explored in this six-week study spanned concepts in lunar science and relevance to evolution and climate change on Earth, cislunar laser communications, fuel production, advanced lunar agriculture and nuclear power testbed technologies. Creative robotic systems for construction and safe lander systems were proposed. An incremental strategy for evolving lunar tourism was presented. Planetary defense based on the Moon was also addressed.

The team project slides may be accessed at : [http://denecs.usc.edu/hosted/ASTE/527\\_20111/](http://denecs.usc.edu/hosted/ASTE/527_20111/) under the topic "08 -LunaRevolution-Role of the Moon in the Future of Human Space Activity."

The presentation will include highlights of these topics and show the potential of our Moon as the stepping stone for advancing human and robotic space activity. The Moon could develop into an ideal staging location for a variety of activities including enhancing planetary defense of Earth and providing critical support for testing and certifying vehicles and their critical systems for long duration expeditions, in preparation for more ambitious interplanetary missions in a timely manner.

Return to the Moon by human beings is absolutely fundamental and necessary for our evolution as a space faring species. The astronomical and biological sciences would also benefit from a renewed human presence on the Moon, especially from the establishment of a permanently occupied international scientific outpost. A permanent Overview Effect from the Moon will make us a more refined species that is ever more sensitive Earth's fragile biosphere and to the needs and aspirations of all humanity.

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