

EXPLORING THE MOON TOGETHER: ESA'S PLANS FOR LUNAR EXPLORATION THROUGH INTERNATIONAL COOPERATION. J. D. Carpenter¹, B. Houdou, B. Huffenbach, R. Fisackerly, M. Landgraf, D. De Rosa, J. Schiemann, B. Patti, ¹ESA ESTEC, Keplerlaan 1, 2201 AZ, Noordwijk, The Netherlands, james.carpenter@esa.int.

The European Space Agency has identified the Moon as the next destination for human exploration after Low Earth Orbit [1]. At the surface of the Moon humans can learn to live and work on another planetary body in a sustainable and optimal way and in partnership with robots. This exploration will be achieved through international cooperation, in a scenario in which different international partners contribute complementary capabilities and elements, sharing the costs, the risks and the benefits that such a programme will bring. ESA is working to build up core capabilities that can be contributed to this international effort, as well as working with international partners to define this new era of lunar exploration; bilaterally, through the ISS partnership and through the International Space Exploration Coordination Group (ISECG), whose efforts are recorded in the Global Exploration Roadmap [2].

The Moon is a planetary body of unparalleled importance to Earth. Earth and Moon share a common history. We cannot understand our own history without also understanding that of the Moon. The Moon also provides the basis for understanding the rest of the solar system as it provides a model for planetary formation and preserves a record of solar system history. In addition its surface provides a unique platform for performing fundamental research and observing the cosmos. A sustained presence at the lunar surface would enable new and important scientific research and transform our understanding of our place in the Universe (see for example [3]).

At the lunar surface we can also take the next steps towards new destinations deeper in the Solar System. Here we can learn to live on another planetary body for long periods, develop the capabilities and technologies that will be needed to live and work for long durations on Mars and begin to utilize local resources for fuel, materials and consumables. These resources may also provide the propellant that carries us beyond. For example hydrogen and oxygen harvested from polar ice deposits could conceivably be employed as fuel, allowing the Moon's low gravity to be exploited as a stepping stone for exploration missions to Mars and beyond. All this at a location only three days journey from home.

Perhaps most importantly an international effort to explore the Moon, in cooperation, can have profound implications for life on Earth; as the nations of the world work together on a new adventure for everyone [4].

In this presentation we will present an overview of current activities within ESA, current international partnerships and steps that are being taken by ESA towards the broad international cooperation needed to achieve lunar exploration in the future.

References:

- [1] Exploring together: The ESA Space Exploration Strategy, http://esamultimedia.esa.int/multimedia/publications/ESA_Space_Exploration_Strategy/
- [2] The Global Exploration Roadmap, http://www.globalspaceexploration.org/wordpress/wp-content/uploads/2013/10/GER_2013.pdf
- [3] Scientific Preparations for Lunar Exploration, Planetary and Space Science Vol. 74, Iss. 1, Ed. J. Carpenter, R. Jaumann., I.A. Crawford, C. Cockell, December 2012.
- [4] Destination Moon, http://www.esa.int/spaceinvideos/Videos/2015/01/Destination_Moon