

IAF SPACE EXPLORATION SYMPOSIUM (A3)

Space Exploration Overview (1)

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WHAT WILL WE DO ON THE MOON?

Abstract

As the world returns to the Moon a question that is often asked is, “what will we do on the Moon?”. This presentation identifies some of the things that will be undertaken on the Moon and the benefits they are expected to bring, reporting on a series of studies and preparatory activities undertaken by ESA during 2021.

The Moon is a unique repository of the history of the Solar System, it records the early history of Earth and provides much of the basis for our understanding of the formation and evolution of planets. The Moon provides a unique platform for observations of the Universe. The Moon is where humans will learn how to live and work away from Earth, understanding how biology and technology can function and thrive whilst learning to use local resources to provide for our needs.

Scientific activities in preparation include:

- analysis of new Lunar Samples, returned from the Moon to Earth
- characterisation of cold trapped polar volatiles including ice as potential resources and as scientific repositories of the origins of life enabling chemistry.
- geophysical measurements to explore the structure of the Moon’s deep interior as a guide to fundamental processes of planetary evolution and to understand the seismic environment for exploration.
- measurements of plasma, exosphere and dust environment and effects, to understand the dynamics of this unique environment before it is forever altered by human activity and to provide operational information to support exploration activities.
- near surface geology, geophysics, mineralogy and geochemistry investigations to understand the nature and diversity of geological processes and to understand potential resources.
- measure biological and physiological effects of the lunar environment to establish how humans and other biological systems can live and work effectively and healthily in environments away from Earth.
- use the Moon to study physics and astronomy which is enabled by the unique characteristics of the Lunar environment.

Space resources activities in preparation include:

- demonstration of production of oxygen or water from lunar materials.
- testing of technologies critical to resource extraction processes.
- analysis of potential feedstocks to understand their properties and establish approaches to processing them.
- prospecting for potential resources, with an emphasis on water ice at the lunar poles.

Access to the Moon is planned primarily through the development of a large lunar lander delivering around 1.5 tones of payload to the lunar surface by the end of the decade. This platform will be able to deliver cargo, scientific payloads and robotics. The lander will become the workhorse of European exploration the decade to follow, supporting both robotic and human exploration activities through international partnerships. ESA is also supporting the establishment of communication and navigation services through partnerships with the private sector.