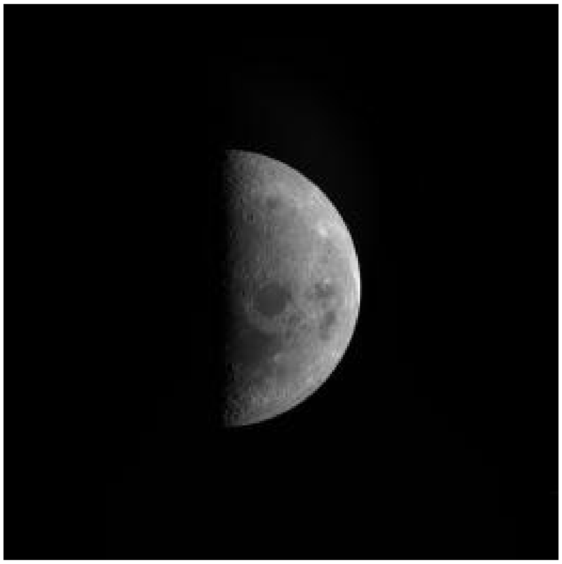
Looking at the volatile side of the Moon

June 1 2011



This image of the Moon was taken with by Rosetta's OSIRIS Narrow Angle Camera (NAC) at 07:36 CET on 13 November 2007, about nine hours after Rosetta's closest approach to Earth during one of its gravity assist manoeuvres. OSIRIS has been designed to image faint objects, so a neutral density filter was placed in the optical path to reduce the sensitivity of the camera to one fiftieth. The above image was acquired through the far-focus red filter of the camera (750 nanometres). Credit: ESA ©2007 MPS for OSIRIS Team MPS/UPD/LAM/IAA/RSSD/INTA/UPM/DASP/IDA

Four decades after the first Moon landing, our only natural satellite remains a fascinating enigma. Specialists from Europe and the US have been looking at ESA's proposed Lunar Lander mission to find out how to seek water and other volatile resources.

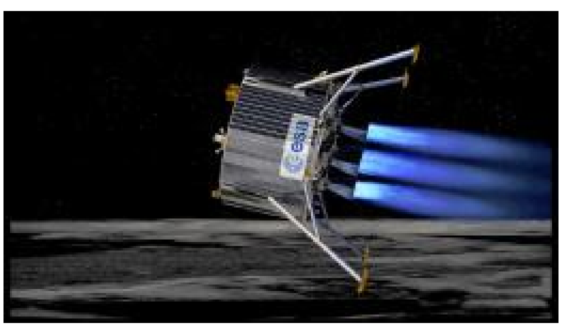
Europe is developing the technology for the Lunar Lander mission, a precursor voyage to the Moon in preparation for human exploration beyond low Earth orbit.

“Our ambition is to see one day a European astronaut working on the Moon,” says ESA’s Bruno Gardini.

Expected to be launched in 2018, the unmanned craft will land near the lunar South Pole.

In Bruno’s words, “It is the mission that will provide Europe with the planetary landing technology of the future.”

Specialists, including prestigious scientists who worked on the Apollo programme, recently gathered at ESA’s ESTEC space technology centre in the Netherlands to discuss the mission.



The ESA's lunar lander mission aims to land in the mountainous and heavily cratered terrain of the lunar south pole, possibly in 2018. The region may be a prime location for future human explorers because it offers almost continuous sunlight for power and potential access to vital resources such as water-ice. New peopulsion technologies are one of the key areas of the ‘Phase-B1’ study, now going on under the leadership of EADS-Astrium Bremen and some of the key technologies will be developed and tested for the first time. Credit: ESA

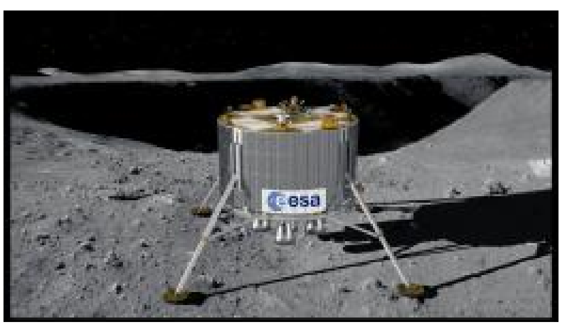
The lander’s scientific payload addresses a number of key aspects of the unique environment on the Moon: radiation, dust, habitats and volatiles.

Volatiles, such as water, are those delicate chemical components that under certain conditions would just disappear.

Volatiles may be readily extracted from lunar soil and provide valuable resources such as carbon, nitrogen, phosphorus or sulphur to aid future human exploration.

Like water, these chemical elements have been implanted by billions of years of exposure to the solar wind and are especially likely to be found at the poles.

“To analyze the volatiles or the water that is all over the Moon in very small quantities, we have to take samples of the materials we find on the surface and analyze them in situ”, says Bruno.



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Recent missions have transformed our view of the Moon. This new era of lunar science was well represented by Colin Pillinger. Having begun his career analyzing samples of moon rock for the Apollo program, he is now professor of planetary science at the Open University in the UK.

“We certainly don’t know where the water comes from until we get down there and do more experiments. That’s why the Lunar Lander is so important,” notes Prof. Pillinger.

“I play the devil’s advocate,” says Larry Taylor, from the University of Tennessee, a scientist who guided the US astronauts in the quest for samples on the Moon.

“I’m giving my knowledge about lunar soil, something that I’ve been working on for 40 years. I have a different perspective, so I’m saying to the engineers: are you sure you are going to find this?”

Finding the right landing site is also crucial for science. “You have to go to the exact places where we think these valuable resources might be concentrated,” says Prof. Pillinger.

ESA has selected the South Pole as a landing site for two main reasons. First, there are long periods of illumination that would allow the lander to rely on solar power alone.

Secondly, concludes Bruno, “We will go to a very different place from the equatorial regions explored during the Apollo era, giving the scientists the opportunity to do new experiments and get completely new insights.”

Provided by European Space Agency