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## EUROPEAN ACCESS TO THE LUNAR SURFACE: EL3 MISSION OPTIONS

**Abstract**

The European Large Logistic Lander (EL3) programme is an ESA initiative to contribute a flexible and, significantly, a recurring element to near-term future international lunar exploration efforts while

providing independent access to the moon for Europe. Flexibility is provided through the modularity of the element, which consists of three major components: a Lunar Descent Element (LDE), a Cargo Platform Element (CPE), and payload that can be very different in nature. The CPE, as the name suggests, supports the EL3 payload and provides the interface between the payload and the LDE. A detailed discussion of the LDE is provided in a companion paper on the generic LDE also presented in this Congress, whereas this paper focuses on the ‘specific’ mission options which EL3 could provide through different configurations of the payload.

Two potential specific mission concepts have been identified that will be studied in detail within the overall EL3 Phase A/B1 carried out by the two parallel industrial consortia due to be completed by the end of 2022. These are an ‘Artemis Support Mission’ and a ‘Polar Explorer Mission’. One of the two candidates (or an hybrid) will make its way to the ESA Council of Ministers end of 2022.

The Artemis Support Mission is focused on the provision of logistics delivery to the lunar surface to support human missions of NASA’s Artemis Programme. At this moment in time however, the precise nature of this cargo is not known.

Polar Explorer is an ambitious concept aimed at landing a comprehensive suite of scientific and technology demonstrator payloads, including key mobility element(s), at the lunar South Pole. The primary focus is on prospecting for core water ice/volatiles and on surface/subsurface geological analyses. In order to mature candidate scientific instrumentation for both the CPE and mobility element, a number of dedicated payload studies addressing the different instrument packages foreseen for this specific mission are planned to be completed by November this year.

In addition to the two primary mission options under consideration, another possibility could be a ‘hybrid’ mission, i.e. a combination of logistics, science, and technology demonstration payloads.

This paper will summarise the status of both candidate missions, highlighting specific technological challenges such as night survival, mobility element concept of operations (Polar Explorer) and logistics handling and crew safety on the lunar surface (Artemis Support) amongst others.