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ARTEMIS LUNAR STUDENT DRILL: A NOVEL DRILL SEARCHING FOR LUNAR VOLATILES IN  
THE LUNAR SOUTH POLE

**Abstract**

The Artemis III mission will be the first crewed missions to return to the moon since the Apollo program. As a part of the Canadian Space Payload Accelerator program, a team of engineers at the University of British Columbia working with industrial partners in Canada developed a new drill payload to fulfil Artemis III's science objectives, namely, the characterization of lunar subsurface volatiles in the Moon's south pole. Finding, measuring, and studying volatiles such as water is critical to fostering a sustainable human presence on the moon and providing key insight into humanity's exploration of Mars and beyond.

This paper presents the development of Artemis Lunar Student Drill (ALSD, an homage to the preceding Apollo Lunar Surface Drill) and key benefits over similar missions, namely, the VIPER rover and Prospect payload. ALSD is designed to operate on the McCandless Lander, drilling into the lunar subsurface beneath the landing site and using a mass spectrometer to capture and measure volatiles released by localised heating during the drilling process. Additionally, this mission aims to monitor the drilling process through in-situ rotary torque and penetration speed measurements. This secondary goal can retire risk for future exploratory or commercial drilling missions.