Back to the Moon:
New Opportunities for Geological Exploration and Lunar Science

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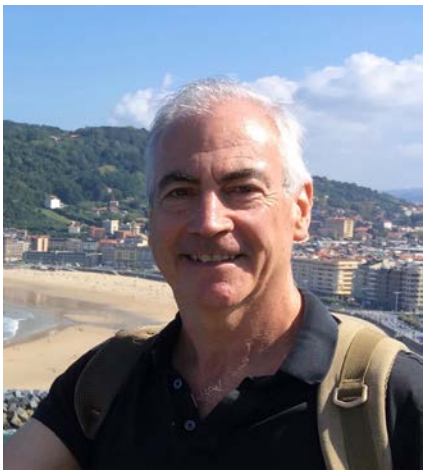
It is approaching 50 years since the last human walked on another planetary body (Apollo 17, 1972), but there is now renewed interest in returning to the Moon, with multiple space agencies currently planning lunar exploration activities. This includes a proposed lunar-orbiting space station (Lunar Gateway) and associated ground operations. The NASA-led Artemis program plans to send the first woman and the next man to the south pole of the Moon by 2024, with the goal of achieving sustainable exploration by 2028 via collaboration with commercial and international partners, including Canada. Drivers for this new phase of lunar exploration are several, some of the more important are:

(1) A growing appreciation that the Moon is more complicated and varied in its composition, internal structure and overall geology than was initially presumed following the Apollo (USA) and Luna (Russia) landings. This has important scientific implications regarding the origin and evolution of the Moon, and how these relate to Earth's first 1 billion years of activity;

(2) The discovery of water ice and other volatiles in cold, shadowed regions of the poles is revolutionary. H_2O can provide water and O_2 for humans to live, as well as H_2 for fuel. The discovery of other volatiles has additional positive implications with regard to in situ resource utilization (ISRU);

(3) The need to develop and prove technology capabilities on a near-Earth planetary body in preparation for future deeper space exploration by robots and humans (e.g., Mars, asteroids, and certain gas giant moons). This alludes to the Moon as a technology proving ground for future space exploration.

The presentation will provide an overview of the geology of the Moon, including future opportunities for geological exploration, and lunar science and associated technology development.



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Abridged BIO

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John is Director of the Planetary and Space Science Centre at the University of New Brunswick. He currently manages a research team of eight, comprising research scientists, engineers, graduate and undergraduate students and staff. The team's research activities focus on investigating planetary materials, frictional melting, impact cratering mechanics, the geology of the Moon and Mars, and processes associated with hypervelocity impact and shock effects. He currently directs the Canadian (International) Regional Planetary Image Facility (RPIF), where the focus is on managing the Earth Impact Database. John received his BSc in Geology from Cardiff University (Wales) and his PhD in Earth Sciences from Cambridge University (England). He held the Canada Research Chair in *Extreme Deformation and Planetary Materials* from 2006-2018, and is currently a co-investigator on the science teams for NASA's Mars Science Laboratory (MSL) and the upcoming European Space Agency's ExoMars rover missions.