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## STUDY AND TRADE-OFF REVIEW OF NEW CONCEPTS FOR LUNAR HYDRO ANALYSIS

**Abstract**

Water is an essential element both in terms of life sustaining requirement for long human endeavours in space and as a potential fuel by splitting the hydrogen and oxygen atoms. This has prompted many space missions to look for water as a resource in the nearby astronomical bodies. Possibility to harness such an essential resource would prove as a great alternative to carrying water from Earth as payload. With extensive research carried out by missions like the Clementine probe, Lunar Prospector, Chandrayaan and the LCROSS, water has been confirmed on the Moon in form of ice crystals in the permanently shadowed regions of the moon. The hydrogen that are blasted out into space by the Sun combine with the oxygen present in form of minerals on the lunar surface to form water and freeze up. Drilling on moon has its limitations because of presence of micrometeorites and low gravity which poses as a risk to the electronics of the drilling equipment. This limits the possibility of close site analysis and since these areas are permanently shadowed the use of radiowaves to analyse the composition of surface also becomes difficult.

This paper reviews and presents trade-off study between three new concepts to study presence of water on moon. The concepts are all different in respect of method of application. The first concept is the close site study in which presence of water is confirmed by heating the surface of the Moon with the help of reflector array. The second concept studied is the Moon Orbiter which confirms the presence of water by studying the spectrum of radiowaves from faraway stars over the permanently shadowed regions of the Moon. The third concept confirms the presence of water on the Moon through a comparative ratio study of water formation by hydrogen bombardment at varying intensity. Trade-off study is conducted between various factors for example feasibility, application location of the experiment on the surface of the Moon, cost effectiveness, timeline. These are the basic factors that the concepts are studied on but trade-off between other critical factors are also done to select and present the best as well as feasible method to check the presence of water on the surface of the moon.