Why a race to the lunar south pole?

Surendra.Singh@timesgroup.com

Why are there so many missions aiming to land at Moon's south pole?

Unlike the equatorial region of Moon, where the US, Russia and China have landed several missions, the south pole has only been photographed by orbiters. But, these orbiters have established that the region is suitable for a human outpost.

The 90°South lunar pole is of special interest to scientists because of water ice in the permanently shadowed craters. The region is also rich in minerals. Both would aid explorers.

Besides, the craters contain a fossil record of hydrogen, water ice and other volatiles dating from the early solar system. This would help scientists learn more about our solar system.

Near-constant sunshine on mountain peaks near the lunar south pole could be used to provide solar energy to an outpost. Nasa scientists used LOLA (lunar orbiter laser altimeter) to provide an accurate topographical model of Moon. They found locations near the south pole at Connecting Ridge, which links Shackleton Crater to the de Gerlache Crater, yielded sunlight for 92–95% of the time at altitude ranging from 2 metres to 10 metres above ground. At the same spots, the longest continuous periods of darkness were only for 3 to 5 days.

The lunar south pole is also a place where scientists could perform unique astronomical observations of radio waves under 30 MHz.The Chinese Longjiang microsatellites were launched in May 2018 to orbit Moon, and Longjiang-2 operated in this frequency until July 31, 2019. Before Longjiang-2, no space observatory had been able to observe astronomical radio waves in this frequency because of interference from equipment on Earth. Thus lunar south pole would be an ideal place to receive astronomical radio signals from an Earth radio observatory.

Elements known to be present on the lunar surface include hydrogen, oxygen, silicon, iron, magnesium, calcium, aluminium, manganese and titanium. Among the more abundant are oxygen, iron and silicon. The oxygen content is estimated at 45% (by weight).

Nasa's Artemis programme plan to send several robotic landers and rovers in preparation for the 2025 Artemis III crewed landing at the south polar region of Moon. It will study data from Chandrayaan-3 to finetune its mission parameters. Russia and China are also likely to send more missions to the lunar south pole in the near future.