

CHANDRAYAAN-2 GAUGES SODIUM CONTENT ON MOON'S SURFACE

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The CLASS instrument in Chandrayaan-2. | Photo Credit: Special Arrangement

Scientists from Indian Space Research Organisation (ISRO) have mapped out the global distribution of sodium on the Moon's surface. They used the CLASS instrument (Chandrayaan-2 large area soft X-ray spectrometer) carried by the second Indian Moon mission, Chandrayaan-2.

This is the first effort to provide a global-scale measurement of sodium on the lunar surface using X-ray fluorescent spectra. The results have been published in a recent edition of *The Astrophysical Journal*.

X-ray fluorescence is commonly used to study the composition of materials in a non-destructive manner. When the sun gives out solar flares, a large amount of X-ray radiation falls on the moon, triggering X-ray fluorescence. The CLASS measures the energy of the X-ray photons coming from the moon and counts the total number. The energy of the photons indicates the atom (for instance, sodium atoms emit X-ray photons of 1.04 keV) and the intensity is a measure of how many atoms are present.

When compared to Earth, the moon is significantly depleted of volatile elements such as sodium. "The amount of volatiles on the moon today can be used to test formation scenarios of the Earth-Moon system. Sodium can be used as a tracer of the volatile history of the moon," explains the scientists from the Space Astronomy group of ISRO's U.R. Rao Satellite Centre.

Earlier moon missions, like Apollo-11, Luna and Chang'e-5, brought back rock samples. The amount of sodium in the rocks was precisely gauged. The new study by the Chandrayaan group shows that there is a thin veneer of sodium atoms that are weakly bound to the lunar surface apart from the minor quantities found in lunar rocks (as mentioned earlier).

These sodium atoms on the surface are liberated when enough energy is given to them by solar ultraviolet radiation and solar wind ions. The study shows a pattern in time that supports this, said the scientists.

Sodium is the only element apart from potassium that can be observed through telescopes in the lunar atmosphere (its exosphere). This new map of sodium would enable understanding of the surface-exosphere connection.

"As the solar cycle is in its ascending phase, we expect more solar flares that would ensure a larger coverage of all elements on the moon by CLASS at the highest spatial resolution ever," said the scientists.

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