Lunar Exploration : Science perspectives of Chandrayaan-1

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Chandrayaan-1, with its ensemble of 11 payloads , well integrated to observe the Moon in X-ray, visible, near infra-red, and radio wavelengths should provide global chemical and mineralogic maps at high resolution. The two X-ray detectors (1-10 KeV and 20 to 250 KeV) should provide distribution of major chemical (Mg, Si, Ca, Fe, Ti etc) and some key radioactive elements (Th,^{210}Pb) and give some insight in to processes responsible for transport and deposition of volatiles (eg ^{222}Rn) on the Moon. Three optical spectrometers, covering 0.4 to $\sim$0.92 μ, 0.9 to 2.4μ and 0.7 to 3 μ are expected to provide distribution of major minerals and possibly water-ice and organics. Soil properties will be determined with help of mini-Synthetic Aperture Radar, which besides a radar imager also acts as altimeter, scatterometer and radiometer. The atmospheric neutrals (H-Fe) and their altitude variation as well as magnetic anomalies will be determined by SARA which also includes solar wind monitor and neutral atom analyser. The stereo camera (TMC) together with Laser ranging instrument should provide better digital elevation and gravity maps. The Radiation monitor and solar X-ray Monitor will give radiation dose and solar X-ray spectra, specially during solar flares. An impact probe has also been included in the payloads which, while landing at a predetermined location on the moon, will be observed by various instruments on board the orbiting Chandrayaan-1.

Chandrayaan-1, proposed to observe the Moon for 2 years during 2008-2010, should provide global surface as well as stratigraphic variations in chemical composition and mineralogy, leading to some insight into the processes responsible for early evolution of the Moon.