

SPACE EXPLORATION SYMPOSIUM (A3)

Moon Exploration - Part 1 (2A)

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HIGH RESOLUTION REMOTE SENSING STUDY OF THE MOON: RESULTS FROM THE CHANDRAYAAN-1 MISSION

Abstract

The launch of Chandrayaan-1 on October 22, 2008, and its successful insertion into a 100km lunar polar orbit on November 8 were landmark events in the history of India's space endeavour. The first Indian planetary exploration mission, Chandrayaan-1, launched by using a variant of the indigenous Polar Satellite Launch Vehicle (PSLV-XL), will carry out high resolution remote sensing studies of the moon to further our understanding about its origin and evolution. Hyper-spectral imaging in the UV-VIS-NIR region along with a low energy X-ray spectrometer will provide mineralogical and chemical composition of the lunar surface at high spatial resolution. A terrain mapping camera will provide three dimensional images of the lunar surface at 5m resolution and will be supplemented by a laser ranging instrument that will provide data on lunar altimetry. Three payloads, a high energy X-gamma ray spectrometer, a sub-keV atom reflecting analyzer, and a miniature imaging radar, will be used for the first time for remote sensing exploration of a planetary body to investigate transport of volatiles on the lunar surface, presence of localized lunar mini-magnetosphere and possible presence of water ice in the permanently shadowed lunar polar region, respectively. A radiation dose monitor will provide information on energetic particle flux en route to the moon as well as in lunar orbit. Following lunar orbit insertion an impact probe was released from the spacecraft on November 14 that landed at a predestinated lunar site near the south pole. It took images of lunar surface during its descent and tried to detect possible presence of trace gases in the lunar exosphere. All the ten instrument on-board were successfully commissioned and they are performing as per specifications. A summary of results obtained so far and their implications for lunar science will be presented. An Indian Deep Space Network (IDSN) and an Indian Space Science Data Center (ISSDC) have been established as a part of Chandrayaan-1 mission and will cater to the need of future Indian space and planetary science missions.