Physical Research Laboratory, Ahmedabad

Colloquium 19-15

Speaker: Dr. Megha Upendra Bhatt

Scientist - SD, Planetary Sciences Division, PRL

Title: " An indirect approach of estimating lunar refractory elements "

Time: Wednesday, 27 November 2019, 16.00 hrs.

Venue: K.R. Ramanathan Auditorium, PRL

Abstract

The quantitative estimation of elemental concentrations of the lunar surface is an important tool for understanding the processes relevant for the origin and evolution of the Moon. India's Chandrayaan-1 mission equipped with three spectrometers provided unprecedented observations of the Moon surface with nearly global coverage in the near infrared (NIR) wavelength range at a spatial resolution in the range of hundreds of meters. The NIR observations can be used efficiently for indirect estimation of refractory elements e.g. Fe, Ti, Ca and Mg for obtaining high resolution global elemental maps. This is in contrast to the direct observations, gamma-ray (GRS) and X-ray spectrometers, where the spatial resolution is at least two orders of magnitude lower. The estimation of refractory elements in the NIR range either relies on empirical relationships between the derived spectral parameters of remote observations and in situ chemical analyses of returned lunar samples or on a global elemental estimation derived using remotely sensed GRS data as a reference. The successful estimation of refectory elements depends on the choice of spectral parameters that can decouple maturity from lunar soil composition. In this talk, I will present a new approach of estimating lunar refractory elements using machine learning technique of support vector regression between spectral parameters derived from the Moon Mineralogy Mapper and global elemental maps derived from the GRS measurements. The results obtained from this new approach are consistent in distribution and range with the GRS elemental maps and do not show artifacts in immature areas due to its robustness to space-weathering effects. I will discuss a couple of site specific cases and illustrate how the concept can be applied to the Chandrayaan-2 data-sets.

The Speaker

Dr. Megha Bhatt is a faculty member in the Planetary Sciences Division at PRL. She obtained her Master's degree from Rani Durgavati Vishwavidyala, Jabalpur and PhD from the Max Plank Institute for Solar System Research (MPS) and Clausthal University of Technology, Germany. Dr. Bhatt developed calibration protocols to extract iron abundance of the lunar surface using Chandrayaan-1 data as a part of her PhD and Post-Doc work while at MPS. She was an affiliate scientist with the Planetary Science Institute, USA before joining the Space Physics Laboratory, VSSC as a Research Associate. She developed calibration for interpreting spectrometer data from the Hayabusa mission to asteroid Itokawa and worked on understanding the surface composition of Jupiter irregular satellites during her tenure at VSSC. Her research is focused on understanding the evolution of our solar system by studying the surface composition of airless bodies. In particular, her interest lies in mapping the major lunar elements and mineral exposures at the top most layer of the Moon surface. Her major interest is in the spectrometric observations in the Visible-Near infrared wavelength range. She has published sixteen research papers and has coauthored one book chapter. She has been awarded prestigious DAAD and Dortmunder Gambrinus Fellowships.

Tea at 15:30 hrs
ALL ARE WELCOME