Investigating Lunar Central Crater Peaks with the SIR-2 NIR Reflectance Spectrometer on Chandrayaan-1

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Since the return of lunar samples by the Apollo missions the lunar crust, which is believed to have been formed by differentiation of a global magma ocean, is known to be mostly made up of anorthosite (a plagioclase-rich rock). Denser, iron-rich and magnesium-rich minerals such as pyroxenes and olivines are sunk deeper into the interior. The mineralogy of the crust provides key information for refining chemical and thermodynamical models of lunar formation and evolution. The mineralogical spectral deconvolution process of lunar crust observations is in itself quite complex. The identification of plagioclase itself has proven to pose a particular challenge [1]. Despite these difficulties, new near-infrared spectrometers recently flown around the Moon have led to the identification of plagioclase on the lunar surface [2,3]. Among this new generation of spectrometers is the SIR-2 instrument, [4] flown on Chandrayaan-1. This instrument is a grating-based, compact, high-resolution pointing spectrometer operating in the spectral range 0.9–2.4 μm. SIR-2 combines high spectral resolution (~ 0.06 μm) with a small field of view, thereby providing a ground sampling resolution of approximately 200 m from 100 km orbital altitude.
The presentation will first introduce the SIR-2 instrument, then show and discuss measurements of the central peaks of lunar craters (which are composed of material uplifted from varying levels within the crust), with respect to variations observed in their mineralogical composition, These measurements are further compared with existing spectral lunar data sets and the new information they can provide will be outlined.

References

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