SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – missions current and future (3A)

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PHOTOGEOLOGICAL STUDY OF MARS FEATURES USING MARS COLOR CAMERA ONBOARD MARS ORBITER MISSION AND OTHER DATA.

Abstract

Abstract India has entered into planetary exploration with the launch of a very successful Chandrayaan-1 on 22nd Oct, 2008. Next stepping stone in planetary exploration is Mars Orbiter Mission launched by Indian Space Research Organization (ISRO) on November 5, 2013.

Mars Orbiter Mission (MOM), is the first mission of India to planet Mars launched by Indian Space Research Organization (ISRO) on November 5, 2013. This mission is a very cost effective mission which inserted in the Mars orbit in its first attempt itself. The mission has a unique and highly elliptical Martian orbit of about 261 km (Periareion) to 78,000 km (Apoareion). MOM is carrying five instruments out of which Mars Color Camera (MCC) is for photogeological studies. MCC is operating in the visible range (0.4-0.7) of EM spectrum and taking images of Mars in varying resolution ranging from 100m to 3Km.

1) Arsia Mons volcano in the Tharsis region was imaged by MCC and has been studied for photogeological interpretations. On the southern and northern flank of the Arsia Mons, collapsed terrain lead to formation of aprons with slopes of around 2° are clearly visible in the MCC image. The fractured zone through which lava flows vented out are also visible and marked in the image. MCC image draped over Mars orbiter Laser Altimeter (MOLA) DEM shows several terraces and concentric rim fractures are visible on the caldera rim formed due to subsidence of the summit. These morphological features were earlier described using MOLA profiles which revealed presence of several scraps formed by block faulting involving downward translation and inward rotation toward the caldera floor. The major characteristics of the northern caldera wall of the Arsia Mons are the presence of multiple graben like troughs which suggests extension in a direction radial to the edifice. Arsia Mons summit has undergone several deformations by subsidence and inward tilting and faulting due to subsidence of the caldera interior due to change in magma reservoir input output volume.

2) Scarps are linear or curvilinear tectonic features represent compressional regime and are present on all terrestrial planets. These features have also been identified on the lunar surface formed that as a result of small compressional stresses that likely arise from cooling of a magma ocean. Scarps from Martian surface have been imaged by MCC images and studied. Along with MCC images MOLA DEM data is also used to study scarps morphology and dimensions.