IMPACT GEOLOGY OF FRESH SIMPLE CRATERS ON MOON I .Varatharajan[1] and U. Sruthi[2], [1]Institute for Planetary Research, German Aerospace Center DLR, Rutherfordstr. 2, Berlin–Adlershof, Germany (indhu.varatharajan@dlr.de), [2]Centre for Earth Evolution and Dynamics, University of Oslo (sruthi.uppalapati@geo.uio.no),

Introduction: The detailed mapping of fresh simple craters for their structure, geometry, morphology, and mineralogy will help us to understand the early stage modification processes of simple craters on earth and other planetary surfaces. Though terrestrial craters are studied in detail through field geology, these craters have undergone continuous weathering since their formation. One such example is Lonar crater on Earth which is formed in ~65 Ma old Deccan flood basalts at 19°58′N, 76°31′E, near Lonar village in Buldhana district of Maharashtra State in India [1]. The detailed mapping of both geologic and mineralogic units of these freshly preserved craters will give us a window to understand the early impact scenario of Lonar crater (Fig. 1).

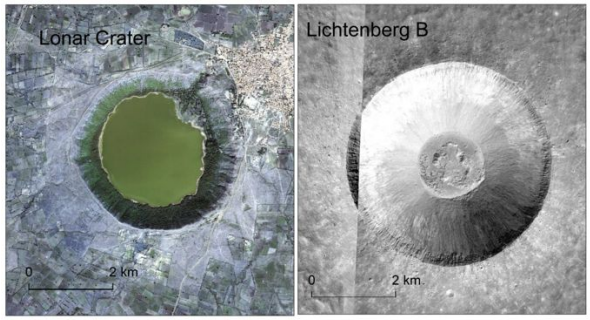

Figure 1. a) Quickbird extent map of Lonar crater, b) LROC NAC image showing Lichtenberg B (M1103959207RE).

Datasets used: The Lunar Reconnaissance Orbiter (LRO) Narrow Angle Camera (NAC) datasets having ~0.5 m/pixel spatial resolution and Chandrayaan-1 Moon Mineralogy Mapper (M3) hyperspectral datasets having spatial resolution of 140 m/pixel are used to study the morphology and mineralogy of the impact features.

Results: In this study, we identified 37 craters out of ~1349 craters of lunar surface that falls under the diameter of 3-6 km which displays freshly preserved impact structures. Interestingly, all of the 37 craters are found in the lunar nearside. 30 out of 37 are formed in the basaltic terrain (Fig. 2).

One of these craters is Litchenberg B which has a diameter of ~5 km located at 33.25°N, 61.52°W. It is a fresh crater formed at the boundary of two lava flows in Oceanus Procellarum, namely P9 (~3.47 Ga) and P53 (~1.68 Ga) [2]. This crater preserves various morphological features including melts, fractures, boulders, slumping of wall, the crater floor polygons, detailed ejecta morphology with wrinkled symmetrical crescent ridges, and the rock outcrops in the crater wall showing the successive thin lava flows of Oceanus Procellarum as old as ~3 Ga (Fig. 3). We estimated the absolute model age of this crater using Crater Size-Frequency Distribution (CFSD) and found to be ~17.9±0.6 Ma.

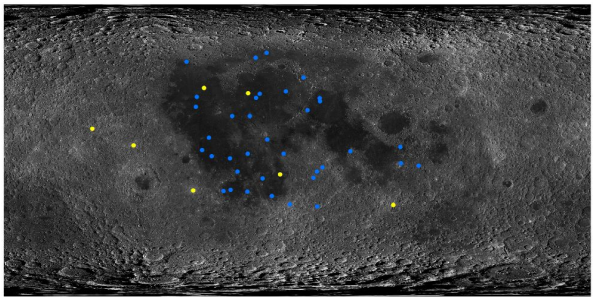

Figure 2. Blue dots represent the distribution of freshly preserved craters having diameter ~3-6 km; yellow dots are the fresh craters which are outside the range of 3-6 km crater diameter.

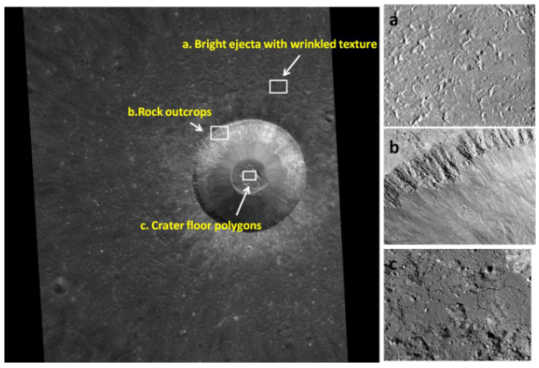

Figure 3. LROC NAC image of Lichtenberg B showing the details of a) wrinkled bright ejecta, b) rock outcrops in the crater wall, and c) melt cracks in the floor.

Conclusions: Morphologically, Lichtenberg B is comparable to the Lonar crater as both are formed in the flood basalts in Oceanus Procellarum and Deccan plateau respectively. Thus the studies of Lichtenberg B (and other fresh simple craters) and Lonar will improve understanding of the formation of simple craters in basaltic targets.

References: [1] Kumar, P. S. (2005) JGR, 110, B12402, [2] Hiesinger H. (2003) JGR, 108, E7, 5065.