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# Formation age and geomorphologic history of the Lonar impact crater deduced from in-situ cosmogenic Be-10

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Impact cratering is a dominant surface modification process on planetary surfaces. In the inner solar system, the large majority of impacts occur on bodies covered by primitive igneous rocks. However, most of the impacts remaining on Earth surface are on different rock types than that of the inner planet and hence geologic knowledges derived from Earth's surface cannot be translated readily. The Lonar crater is a 1.88-km-diameter crater located on the Deccan basaltic traps in India (ca. 65 Ma), and is one of the very few craters on Earth emplaced directly on basaltic lava flows. Therefore, the Lonar crater provides a rare opportunity to study impact structures observed on the basaltic surfaces of other terrestrial planets and the Moon. Since the ages of terrestrial impact structures is an key to understand geomorphological processes following to the impact, various dating methods has been applied to the Lonar Crater such as fission track (Storzer and Koeberl, 2004), radiocarbon (Maloof, 2010), thermoluminescence (Sengupta et al., 1997), and $^{40}Ar/^{39}Ar$ (Jourdan et al., 2011). Yet, a large discrepancy between these methods ranging from ca. 15 to 570 ka has been resulted. Here we report surface exposure ages based on in-situ cosmogenic $^{10}Be$ in order to obtain a precise age of the Lonar crater as well as to study the geomorphologic evolution of the Lonar Crater. The samples are collected from the topographic highs on the rim of the crater and from the ejecta blanket. In-situ $^{10}Be$ exposure age together with newly obtained radiocarbon age of pre-impact soil suggest potential problems of previous ages recently reported by (Jourdan et al., 2011) that $^{40}Ar/^{39}Ar$ dates are biased because of inherited $^{40}Ar$ in impact glass. Systematically young exposure age from the rim samples compared to the samples from the ejecta blanket indicate that the rim of the Lonar crater is being actively eroded. Spatial age distributions observed from the Lonar creator is not the same as the pattern reported from the well-studied Barringer crater in Arizona (Nishiizumi et al, 1991, Phillips et al., 1991), highlighting the different geomorphologic history of the two craters under different climatic and lithologic settings.

Keywords: exposure age, in-situ cosmogenic nuclide, impact crater, Lonar crater, erosion, geomorphology