Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.3565

Impact Craters: A New Paleo-Indicator for Plate Tectonics

SHANIA JAMES[1], SARANYA R CHANDRAN[1] AND SAJIN KUMAR KS[1,2]

[1]University of Kerala

[2]Michigan Technological University

Presenting Author: shaniajames@keralauniversity.ac.in

Terrestrial Impact craters remain the most accessible yet, intriguing entities that have left indelible mark of the bodies from the extraterrestrial realm. The impact cratering phenomena has spanned across the entire geologic time-scale. Yet, majority of studies on impact craters largely rely and adhere to the present geographic coordinates of the same. To this day, less than a few studies have been concerned with paleo-position of impact craters. Here, we reconstruct the paleo-positions of impact craters on Earth. Thus, the derived paleo-coordinates of craters are utilised for studying several geological processes. Here, we showcase three major derivatives achieved from this study.

(i) **Quantifying the impact cratering history of Earth and its related latitudinal dependency:** The Earth, is dotted with impact craters. The traces of the same were erased due to plate tectonics and other surface processes. Quantification of the original crater count on Earth is achieved by estimating crater count of Moon and Mars. Given the diverse size and crater count range, planetary bodies are divided into latitudinal zones and percentage of craters in each was calculated; thereafter compared. The results clearly indicate that distribution of impact craters on Earth are unrestrained by latitudes.

(ii) **Characterisation of specific plate tectonic events:** Impact craters (present on an plate) can be used as proxies for recording the apparent movement of tectonic plates. Linear and angular motion characteristics of a point feature, such as impact crater, can be used as signatures of tectonics processes like plate amalgamation, supercontinent cycles and associated constructive (orogenic) and destructive (subduction) processes. The changes associated with crater movement are reflective of the changes underwent by a tectonic plate and hence, can be correlated to significant tectonic events.

(iii) **Paleoclimatic influences in crater morphology modifications:** As a crater moves from its original paleo-position to present position, it crosses different climate zones. This result in differing rates of weathering and erosion and the cumulative product is depicted by current morphology of craters. This will help in elucidating the denudational processes characteristic of different climatic zones. Thus, the reconstruction of meteorite impact craters can be a potential passage to the past.