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# Global Survey of Impact Craters on the Earth by Satellite Hyperspectral Remote Sensing

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Although more than 140 terrestrial impact craters are currently known [1], it is not clear how frequently impacts occurred in ancient Earth history. This is mainly because most of the old impact craters on the Earth are too degraded (owing to weathering and/or tectonic modification) to be identified, although intensive global survey to find impact crater structures using satellite remote sensing has not been conducted.

In this study, we try to find the traces of old impact structures on the Earth based on the visible and near infrared spectra data obtained by satellite remote sensing. Recently, the global survey using hyperspectral data by Spectral Profiler (SP) onboard SELENE/Kaguya revealed the global distribution of olivine-rich exposures on the Moon [2]. Although this global survey did not use any terrain information for the lunar surface, the location map of the detected olivine-rich spectra shows concentric distribution pattern associated with large impact structures (impact basins) on the Moon. This finding suggests that we may also find the traces of ancient impacts for even degraded impact craters on the Earth, if we focus on the distribution pattern of specific spectral features in visible and near infrared wavelength. (Here the specific spectral features do not mean the shock indicators such as Coesite and Stishovite.) If so, we can reveal the global distribution of terrestrial impact craters by satellite hyperspectral remote sensing.

To this end, it is important to understand how the terrestrial impact craters are observed in the visible and infrared spectral data by satellite remote sensing. Therefore, we examined some terrestrial impact craters, which have been identified as impact origins, using the spectral data obtained by ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer), which is an imaging instrument?with 14 bands, from the visible to the thermal infrared wavelengths, onboard NASA Terra satellite. Based on the results, we will discuss the feasibility of global survey of terrestrial impact craters by future satellite hyperspectral remote sensing.

[1] R.A.F. Grieve & E.M. Shoemaker, in Hazards due to Comets & Asteroids (T.Gehrels eds), 417-462 (Univ. of Arizona Press), 1994.

[2] S. Yamamoto, et al., Nature Geoscience, 3, No. 8, 533-536 (NGEO897) 2010.