Highlights of Astronomy, Volume 16
XXVIIIth IAU General Assembly, August 2012
T. Montmerle, ed.

doi:10.1017/S1743921314005171

Temperature shocks at the origin of regolith on asteroids

Patrick Michel[1], Marco Delbo[1], Guy Libourel[2], Clément Ganino[3], Chrystèle Verati[3] and Benjamin Rémy[4]

[1]Univ. Nice/CNRS/Côte d'Azur Observatory, F
email: michelp@oca.eu
[2]CRPG/CNRS, [3]Univ. Nice, F, [4]ENSEM, F

Abstract. Space-based and remote sensing observations reveal that regolith – a layer of loose unconsolidated material – is present on all asteroids, including very small, subkm-sized near-Earth asteroids (NEAs) such as (25143) Itokawa. Classically, regolith is believed to be produced by the ejecta of impact craters produced by small particles hitting asteroid surfaces. Such an explanation works for bodies whose gravity field is strong enough for substantial reaccretion of impact debris, but it fails to account for the ubiquitous presence of regolith also on small asteroids with weaker gravity. Several works have proposed that the thermal fatigue due to a huge number of day/night temperature cycles is a process that contributes to the formation of regolith on the Moon, Mercury, and on the NEA (433) Eros by fracturing boulders and rocks on their surfaces. However, this process lacks a demonstration: in order to study under which conditions rock cracking on NEAs occurs, we calculated typical temperature cycles for NEAs and we performed laboratory experiments of similar thermal cycling on meteorites taken as analogue of asteroid surface material. We will present results of these experiments and discuss their implications regarding regolith formation on asteroids.