SPACE WEATHERING EFFECTS AND THE CASE OF (162173) 1999 JU_3.

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Introduction: The exposure of airless bodies to solar ion irradiations, micrometeorite bombardments, UV radiations leads to surface alterations affecting the interpretation of composition made from spectra. But these space weathering effects have been widely studied for the S-type asteroids using laboratory simulations on analog oridinary chondrites [1] and have been confirmed thanks to space missions like NEAR-Shoemaker on Eros [2]. There are a darkening and a reddening of the spectra and mitigation of the absorption bands. A strong confirmation has also been given by the first asteroid sample return mission Hayabusa onto S-type Itokawa [3, 4]. Very little is known for space weathering on primitive dark asteroids [5]. Hayabusa-2 mission will represent a great opportunity to discover in situ the effects of this alteration on a primitive surface with the target asteroid (162173) 1999 JU_3, classified as a C-type and associated to Murchison meteorite [6, 7].

Results: To investigate the possible space weathering effect on carbonaceous asteroids spectral signatures, we started with the study of CM chondrites compared to parent bodies Ch/Cgh-type asteroids [5]. The differences between spectra of particulate samples of the meteorites (assumed to represent asteroid subsurface material) and spectra of the regolith of asteroids have been associated to asteroid surface processes. Our results indicated a blueing effect on the spectra associated to space weathering, as predicted by previous studies on organics [8, 9].

To better understand this alteration process on dark primitive material and to support the choice of sampling site for Hayabusa-2 mission, we are conducting in parallel laboratory simulations on primitive meteoritic analogs. We have already done irradiations on the Allende [10] and Murchison meteorites [11] exposed to 40keV He^+ and Ar^+ ions using fluences up to 3.10^{16} ions/cm^2 as a simulation of solar wind. If a reddening/darkening of Vis-NIR reflectance spectra is confirmed on Allende [12], we observe negligible spectral variations in the case of Murchison with respect to viewing geometry or sample preparation. Other different carbonaceous chondrites (CI, CK, CM, CO, CV) will be irradiated and analyzed to decypher the contradictory space weathering studies of the darkest asteroids and with the aim to build a preliminary model of space weathering on low-albedo asteroid. Our preliminary results will be presented and discussed.

References: [1] Moroz et al. 1996 *Icarus* 122 pp. 366-382 [2] Clark et al. 2002 *Meteoritics & Planetary Science* 36 pp. 1617-1637 [3] Hiroi et al. 2006 *Nature* 443 pp. 56-58 [4] Noguchi et al. 2011 *Science* 333 pp. 1121-1125 [5] Lantz et al. 2013 *Astronomy & Astrophysics* 554 A138 [6] Takagi et al. 2011 American Geophysical Union Fall Meeting abstract #P21E-04 [7] Sugita et al. 2013 44th Lunar & Planetary Science Conference p. 2591 [8] Moroz et al. 2004 *Icarus* 170 pp. 214-228 [9] Nesvorny et al. 2005 *Icarus* 173 pp. 132-152 [10] Brunetto et al. 2014 *Icarus* 237 pp. 278-292 [11] Lantz et al. in prep. [12] Lazzarin et al. 2006 *The Astrophysical Journal* 647 pp. 179-182