

**LESSONS LEARNED FROM HAYABUSA II AT RYUGU: IMPLICATIONS FOR THE REGOLITH AND COHESION PROPERTIES FOR THE SURFACE OF APOPHIS.** M. Arakawa<sup>1</sup>, <sup>1</sup>Kobe University (1-1, Rokkodai-cho, Nada-Ku, Kobe, 651-8501, Japan; masahiko.arakawa@penguin.kobe-u.ac.jp).

**Introduction:** Hayabusa2 mission conducted by JAXA succeeded to increase knowledge of asteroid Ryugu which was a small rubble pile body with the diameter of ~900m [1]. Hayabus2 carried out an impact experiment on the surface of Ryugu by using Small Carry on Impactor (SCI) and in situ observation of the cratering process was done by Deployable CAMera 3 (DCAM3) [2]. As a result, the ejecta curtain shape was successively observed by DCAM3 and the crater diameter was measured to be 14.6 m. Furthermore, the surface change induced by this artificial impact was analyzed in detail and the effect of seismic shaking was observed [3]. These evidences indicate that the impact crater was formed in the gravity dominated regime even in the micro-gravity condition and/or the surface strength was less than about 1 Pa. Since the SCI crater depth was about 2m, it was elucidated that the cohesion of the surface layer as deep as 2 m could be very small on Ryugu. Although the size of Apophis is smaller than that of Ryugu and the spectrum type is different from that of Ryugu, the knowledge of the surface condition of Ryugu related to regolith and cohesion might be useful for the assessment on the surface feature of Apophis.

**Acknowledgments:** I would like to thank Hayabusa2 SCI/DCAM3 team and ONC team for their helps on all the studies related to this review.

**References:** [1] Watanabe et al. (2019) *Science*, 364, 268–272. [2] Arakawa et al. (2020) *Science*, 368, 67–71. [3] Honda et al. (2021) *Icarus*, 226, 114530.