DESTINY+ mission: Flyby of Geminids parent asteroid Phaethon

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DESTINY+ (Demonstration and Experiment of Space Technology for INterplanetary voYage, Phaethon fLyby and dUst Science) is a joint mission of technology demonstration and science observation, which was selected as a mission for JAXA/ISAS small-class program in 2017 [1]. It is currently under Phase-A study with a launch targeted for 2022. The science observation includes high-speed flyby imaging of asteroid (3200) Phaethon and in-situ dust analyses around 1 au. Surface geology and compositional variation for Phaethon are studied with two sets of cameras [2]. Velocity, arrival direction, mass and chemical composition of each interplanetary and interstellar dust particle are measured with a dust analyzer [3]. The science goal is to understand the nature and origin of cosmic dust brought to the Earth, in the context of exogenous contribution of carbon and organics for possible prebiotic seeds of the terrestrial life. Phaethon is a parent body of Geminid meteor shower, and thus a known source to annually provide dust to the Earth, via the dust stream. Phaethon is a B-type, active asteroid which ejects dust only at the perihelion passage [e.g. 4,5]. During Phaethon's close encounter with the Earth in December 2017, the international observation campaign, including photometric, spectroscopic, polarimetric and radar observation were successfully conducted [6].

References:

[1] Arai T. et al. (2018) LPSC 49th, abstract#2570.
[2] Ishibashi K. et al. (2018) LPSC 49th, abstract#2126.
[3] Kobayashi M. et al. LPSC 49th, abstract#2050. (2018)
[4] Jewitt D. and Li J. (2010) AJ, 140, 1519.
[5] Jewitt D. et al. (2013) ApJL, 771, L36. [6] Arai T. et al. (2019) LPSC 50th, abstract#3223.