DESTINY$^+$によるフライバイ探査を模擬した地上撮像試験
Imaging experiment simulating DESTINY$^+$ flyby exploration

*洪 鵬[1]、石橋 高[1]、岡本 尚也[2]、奥平 修[1]
*Peng Hong[1], Ko Ishibashi[1], Takaya Okamoto[2], Osamu Okudaira[1]

1. 千葉工業大学 惑星探査研究センター、2. 宇宙航空研究開発機構 宇宙科学研究所
1. Planetary Exploration Research Center, Chiba Institute of Technology, 2. Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency

DESTINY$^+$ (Demonstration and Experiment of Space Technology for INterplanetary voYage, Phaethon fLyby and dUst Science) mission plans to conduct high-resolution imaging during close flyby of asteroid (3200) Phaethon, which is considered as a parent body of Geminid meteor shower. During the high-speed flyby, the asteroid tracking mirror of Telescopic Camera for Phaethon (TCAP) will rotate to obtain unblurred high-resolution images with a spatial resolution up to 3.5 m/pixel at closes approach. Because of the nature of flyby mission which has limited duration of spatially-resolved imaging by TCAP, it is very important to design imaging sequence in order to maximize scientific achievements. Currently TCAP plans to observe the surface of Phaethon with a spatial resolution less than 120 m/pixel for about 9 minutes with an imaging rate of about 1 frame per second, which results in about 50 images with spatial resolutions less than 10 m/pixel. We have conducted ground-based experiment simulating the imaging sequence of TCAP during the flyby to understand how much scientific achievements, especially for creating 3D shape models, would be obtained with the current mission design. Also, the optimization of the imaging conditions during the flyby would be possible based on the results of the experiment, We used a CMOS camera using a candidate sensor for TCAP and a downscaled telescopic lens in order to realize the actual TCAP imaging sequence in a 20m-wide dark room. Asteroid models made by a 3D printer were irradiated with a collimated light source simulating the sunlight. We slid the camera mounted on an optical rail and took images of the asteroid models simulating the observation sequence of TCAP from 151 seconds to 0 seconds before the closest approach. We will report 3D shape models produced from the obtained images and discuss potential scientific results achieved by the current mission design and implication for optimizing the TCAP imaging conditions during the flyby.

キーワード：DESTINY+、撮像観測、カメラ、3次元形状モデル
Keywords: DESTINY+, imaging observation, camera, 3D shape model

