

Hayabusa2 orbit determination using c5++ software

*山本 圭香¹、大坪 俊通²、松本 晃治¹、野田 寛大¹、並木 則行¹、千秋 博紀³、水野 貴秀⁴、尾川 順子⁴、大野 剛⁴、三桝 裕也⁴、吉川 健人⁴、高橋 忠輝⁴、武井 悠人⁴、藤井 淳⁴、照井 冬人⁴、佐伯 孝尚⁴、中澤 暁⁴、吉川 真⁴、津田 雄一⁴

*Keiko Yamamoto¹, Toshimichi Otsubo², Koji Matsumoto¹, Hiroto Noda¹, Noriyuki Namiki¹, Hiroki Senshu³, Takahide Mizuno⁴, Naoko Ogawa⁴, Go Ono⁴, Yuya Mimasu⁴, Kent Yoshikawa⁴, Tadateru Takahashi⁴, Yuto Takei⁴, Atsushi Fujii⁴, Fuyuto Terui⁴, Takanao Saiki⁴, Satoru Nakazawa⁴, Makoto Yoshikawa⁴, Yuichi Tsuda⁴

1. 国立天文台、2. 一橋大学、3. 千葉工業大学、4. 宇宙航空研究開発機構

1. National Astronomical Observatory of Japan, 2. Hitotsubashi University, 3. Chiba Institute of Technology, 4. Japan Aerospace Exploration Agency

Hayabusa2 arrived at the target asteroid Ryugu in June 2018 and is currently conducting remote sensing observations with various onboard instruments. So far, we have improved orbit determination software c5++, originally developed for the analysis of satellite laser ranging (SLR) data of the Earth, so that it can be used for the analysis of laser ranging data between Hayabusa2 and Ryugu obtained by Hayabusa2 LIDAR. Then we used it for the estimation of Hayabusa2 trajectory and the GM value of Ryugu. However, in the case of Hayabusa2, it is difficult to determine all of the 6 components of the initial state vector precisely if only LIDAR range data was used, and the simultaneously estimated GM value also had large uncertainty. To overcome this problem, in addition to LIDAR ranging data, we used Automated-Image-Tracking (AIT) data obtained by wide-angle optical navigation camera (ONC-W1) for the estimation of Hayabusa2 trajectory. In principle, LIDAR data gives information on the radial direction and AIT data give the ones on the across and along track directions. Thus, both data sets are complementary and help to improve the precision of the trajectory estimation. For this purpose, we improved c5++ so that it can deal with AIT data as observation data. In the presentation, we will show the results of trajectory and GM estimations using LIDAR and AIT data, and show how much the precision and accuracy are improved compared to the case using LIDAR data only.

キーワード：はやぶさ2、軌道推定、リュウグウ

Keywords: Hayabusa2, Orbit Determination, Ryugu