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POST-FLIGHT ANALYSIS OF HAYABUSA2 SAMPLE RETURN CAPSULE

Abstract

An asteroid explorer Hayabusa2 returned to the earth after 6 years of interplanetary voyage. After the separation from the spacecraft, the sample return capsule (SRC) entered into the earth atmosphere passing through excessively severe aerodynamic heating at the velocity of about 12 km/s. Finally SRC successfully landed on the ground in the Woomera Prohibited Area (WPA), Australia on December (UTC) 2020. The present paper overviews the reentry operation and the post-flight analysis of the Hayabusa2 SRC. The post-flight analysis program is currently underway and is mainly comprised of the following three activities; 1) Reproduction of the best estimated trajectory (BET) based on the reentry orbit determination, ground observations, the SRC landing point, the atmospheric density and the wind on the reentry day. 2) Nonintrusive inspection for the recovered heatshields such as X-ray CT-scanning and 3-dimensional laser-scanning. 3) Estimation of the in-flight environment regarding vehicle dynamics during reentry and aerodynamic heating by using flight data recorded by the reentry flight measurement module (REMM) installed in the SRC. These activities will finally be integrated and studied for the SRC design validation purposes and for the better understanding of the flight results.