

PPS005-05

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## Observation plan of HAYABUSA SRC reentry: for the third opportunity of man-made fireball from interplanetary orbit

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After 7 years challenging cruise in the solar system, JAXA's spacecraft HAYABUSA (MUSES-C) will come back to the Earth in June 2010. HAYABUSA, the first sample-return explorer to a minor planet, successfully landed on Itokawa (25143) in 2005, capturing surface particles on the S-type minor planet into its SRC: the first sample-return from the minor planet is expected. Following to the reentries of NASA's GENESIS (2004) and STARDUST (2006), the return of HAYABUSA will be the third reentry event directly from the interplanetary transfer orbit to the Earth at a velocity over 12 km/s. It will be the first opportunity of such kind of return for Japanese spacecraft.

In order to obtain precise trajectory information to ensure quick procedure of JAXA's SRC resumption team, we are planning to observe the HAYABUSA SRC reentry by optically in Australian night sky. High-resolution imaging and spectroscopy will be carried out with several high-sensitivity imaging and spectroscopic instruments to investigate thermal-protection process of TPA as well as coupling process between SRC surface materials and upper atmospheric components. Moreover, shock waves will be observed by infrasound and seismic sensor arrays on ground to investigate air-to-ground coupling process at the extremely rare opportunity. With respect to nominal trajectory of the HAYABUSA SRC reentry, three optical stations will be put near the WPA (Woomera Prohibited Area), Australia, targeting on peak-heat and/or front-heat profiles of ablating TPA for engineering aspect. Infrasound and seismic sensors will be installed on four stations to make direction findings of point sources of the shock waves from SRC as well as investigate precise parameters of pressure waves, their propagation processes in atmosphere, and energy transforming processes through air-to-ground coupling.

In this talk, the final plan of ground observation of HAYABUSA reentry by JAXA and collaborative scientists group will be shown. Especially, we'll show details of infrasound and seismic observation part and their science.

Keywords: fireball, reentry, shockwave, spectroscopy, HAYABUSA