

SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (4)

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DEVELOPMENT STATUS OF SMALL CARRY-ON IMPACTOR FOR HAYABUSA-2 MISSION

Abstract

JAXA's next asteroid investigator is now under development supposing a launch in 2014. The new mission is called HAYABUSA-2 and its design basically follows HAYABUSA. HAYABUSA-2 is a similar sample return mission to HAYABUSA, however its target asteroid is different from HAYABUSA's. From the point of the scientific objective, 1999JU3 which is the asteroid with the primitive composition (C-type) is chosen as the target.

HAYABUSA-2 are planned to be equipped with some new components. A small carry-on impactor (SCI) is one of the new challenges that were not seen with HAYABUSA. As its name indicates, SCI is a small impact system for creating an artificial crater. One of the most important scientific objectives of HAYABUSA-2 is to investigate chemical and physical properties of the internal materials in order to understand the formation history of small bodies. The impact system is considered one of the most effective methods for investigating the inner structure of asteroids. We can extend our knowledge about asteroids by observing the diameter, depth and shape of the artificial crater. Additionally, the direct investigation of the inner materials of the asteroid becomes possible by sampling materials inside of the crater.

Different from the typical impactor like DEEP IMPACT, our impact system is carry-on type which cannot fly to the asteroid by itself. It is attached to the mother ship and it is taken to the asteroid. Then after separated from the mother ship, this impactor accelerates itself and hits the asteroid. The advantage of the carry-on type is that we can choose the impact timing and site freely. However it is required to accelerate itself after the separation from the mother spacecraft and how to accelerate is a big challenge. To achieve the high speed impact, the new technology of the special type of shaped charge is applied to our impact system. The outline of our carry-on impactor has been already introduced in IAC 2011 (IAC-11.A3.4.6).

We are now conducting development tests to verify the design, production reliability and performance of SCI. This paper presents the development status of SCI and the results of its development tests.