

Dust settles to reveal asteroid truth

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Hayabusa re-entering the atmosphere

(PhysOrg.com) -- Early results from analysis of dust on the Hayabusa space capsule, which landed in South Australia last year, have revealed an indisputable link between the asteroids we see in space and meteorites that we collect on land.

Published recently in *Science*, six papers on the findings of the Hayabusa mission provided samples of a pristine [asteroid](#), known as Itokawa.

Earth Chemistry Professor Trevor Ireland from The Australian National University is a coauthor of four of the papers, and said the dust contained an exciting message.

"Previously there had been problems relating the nature of asteroids with meteorites because the surfaces of meteorites are destroyed as they come in through the atmosphere," he said.

"The samples taken from Itokawa are the previously unknown 'skin' of an asteroid and their investigation has confirmed that meteorites that land on [Earth](#) are indeed related to the asteroids we see in space."

The Hayabusa Mission involved two touchdowns on the asteroid. Professor Ireland noted that the original intent was for a gun to fire into the surface of Itokawa when Hayabusa touched down, with the

ejected sample collected into the chamber, but a software interlock prevented the gun from firing.

"This was fairly disappointing in that we didn't get as much material returned as was intended, which would have provided us with a bulk sample of the asteroid to analyse," he said.

"In hindsight though, a bulk sample would not necessarily have provided the same information as we have obtained from these small dust grains that sat on the very surface of the asteroid.

"These were the samples we really wanted because they illustrate the dynamic nature of the [solar system](#), and these have been delivered back to us.

"The samples from the skin of the asteroid show that they have been exposed to cosmic rays and solar wind for less than 10 million years meaning that the asteroid is very young in solar system terms.

"The ages of the parent bodies are over 4.5 billion years old, and when the parent body had a collision, material was broken off and reassembled into Itokawa and sent on an orbit through the inner solar system.

"This demonstrates that inner solar system asteroids are only with us for a short time - geologically speaking," he said.

"They're ejected from the asteroid belt and their orbits will decay until they fall into the Sun, collide with planets, or otherwise get accelerated away when they come close to planets."

Provided by Australian National University

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