Morphology of craters on asteroid Itokawa

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Hayabusa spacecraft will arrive at asteroid Itokawa in 2005 fall. Because of its weak gravity field, the surface of Itokawa is expected to be covered by only a very thin regolith layer. It can be assumed that most crates on Itokawa are formed in the strength regime of scaling relations by Holsapple and Schmidt (1982).

It is difficult to reproduce craters in the strength regime by laboratory impact experiments on brittle materials. Small laboratory scale craters are usually dominated by surface spall effects rather than the excavation mechanism. Large explosion craters and craters on very weak materials such as sintered powder are examples we know of simple bawl-shaped craters. Craters on Itokawa should be good examples of strength regime impact craters formed on brittle rocks.

Furthermore, they may give clues to understanding the transition from a spall-dominant regime to a excavation-dominant regime of crater morphology, if there are both bawl-shaped craters and spall craters on Itokawa.