

## Impact experiments on dehydration of hydrated asteroids

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### Introduction

Hydrated asteroids have been identified by telescopic observation of near-infrared reflectance spectra. We can infer their surface composition and condition by such observations, however, we don't know much about the interior of asteroids. Therefore, we perform impact experiments and investigate the effect of hydrated minerals in hydrated objects when hydrated objects collide with other objects. We performed impact experiments using serpentine blocks as hydrated objects. We investigated the effect of dehydration of serpentine on fragment ejection.

### Experiment

We performed impact experiments using a two-stage light-gas gun at Institute of Space and Astronautical Science (ISAS). We used 8 cm and 5 cm cubic serpentine rocks as targets and disc-shaped iron meteorites (about 4 mm diameter, 1 mm thick) attached by a cylindrical polycarbonate (about 7 mm diameter, 6 mm long) as projectiles. Impact velocities were about 3 km/s. We took high-speed images by a high-speed camera. All pictures were taken with framing interval of 8 micro sec, exposure time of 2 micro sec, with 312 x 260 pixels. The spacial resolution was about 0.6 mm/pixel and A/D conversion was 8 bits. The target was illuminated from the back.

### Analysis and Discussion

We calculated the initial peak pressure by impedance match method using Hugoniot parameters of serpentine and iron. The peak pressure was more than 40 GPa. Previous studies (Tyburczy J.A. et al 1990, Lange M.A. et al 1985) showed that the shock pressure of solid serpentines caused the incipient dehydration at about 11 GPa. Thus we expected that serpentines dehydration should have occurred in our experiments. On the other hand, in an earlier study about ejecta of gypsum and anhydrite (Naoya Ogura Master thesis of Kobe Univ. 2008), it was shown that the shape of ejecta cloud of dehydrated target were more round than usual cone-shaped ejecta from dry material. However, such difference of ejecta wasn't observed in our experiments.

### Future

We will perform similar impact experiments using dunite blocks as targets and investigate the ejecta. We will discuss the results and the comparison at our presentation.