

Information analyses of buried and broken craters

Yasunori Miura[1]

[1] Earth Sci., Yamaguchi Univ

Circular and buried craters on Earth-type planet are totally decided by geological, topographical and drilled sample data whether it is a meteoritic impact crater or volcanic crater as follows. Volcanic crater has mountain shape body formed by magmatic uplift with geological and drilled data of volcanic origin. Meteoritic impact craters on stable continents are normal or buried crater on plain without magmatic mountain body and with geological and drilled data of shock metamorphism. These craters were broken in part by crustal movement. These crater structures are easily checked by satellite image analyses.

Extraterrestrial planets and parent bodies are studied by satellite image analyses as follows. On the lunar surface, rocks are collected by Apollo program and drilled samples. Smaller craters on Lunar Highlands and Maria are impact craters, whereas large craters on lunar Mare basin are buried craters filled by volcanic rocks after impact craterings. Other bodies of the Solar system shows non-broken impact craters and buried broken-craters by space exploration images so far. Japanese satellite image of Hayabusa, JAXA-ISAS, show buried crater with impact ejecta due to smaller crater of shaped rocks. Satellite image on extraterrestrial bodies is possible to show impact craters due to no volcanic activity.

On terrestrial circular structures cannot be solved only by satellite images. The detailed geological data on surface and drilled samples are required to be decided finally.

On the case of buried and broken craters of circular basin structure, the following information analyses are required to be collected.

- 1) Various images of satellite analyses.
- 2) Detailed image analyses of topographic data.
- 3) 3D image analyses of underground gravity anomaly.
- 4) Material analyses of drilled samples.

On this presentation, examples of volcanic islands are on Takamatsu, Kagawa and Akiyoshi, Yamaguchi as following summary.

Takamatsu, Kagawa is buried and broken impact crater from satellite, topographic, gravity anomaly and drilled sample data to decide curved remained granitic rocks ejected volcanic veins. These four image data are totally used to be solved, which is considered to be standard solution method. Akiyoshi, Yamaguchi, is remained limestone breccias of impact ejecta at the end of Permian Period buried under old China blocks to move to the North direction and to be uplifted near the surface by Takamatsu-Kagawa impact recently, which can be obtained by the three image data except gravity anomaly. These are examples of buried and broken craters on the Earth.

On the extraterrestrial bodies, these methods are applied to study on buried and broken craters as follows. Planets and parent bodies without volcanic activity (including asteroids) show impact craters which can be obtained only satellite image analyses, together with topographic and robotic material-analyses, whether it is broken or unbroken crater structures. However, planets and satellites with volcanic activity including Venus and Mars show impact craters which can be obtained satellite image analyses for non-broken crater, whereas buried and broken crater are required from drilled data which is limitation for unmanned mission.

It is too short reported example of impact craters by using only shocked sample data on the surface on volcanic islands except drilled and gravity anomaly data on the top of mountain near large fault zone easily to transport and broken pieces.