

# FORMATION OF LUNAR AND MARTIAN CRATER-LIKE DEPRESSION STRUCTURES MAINLY BY CARBON-BEARING UNDERGROUND EXPLOSIONS.

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## 1. Introduction:

There are two types of crater depression structures on the Earth planet, which can be applied for other planetary bodies. The main purpose of the present paper is to make clear new types of crater structures on various planetary bodies [1, 2].

## 2. Crater depression structures:

From explosion sites, there are two types of crater-like structures as follows (Table 1):

- 1) *Surface explosion by meteoritic impacts:* Crater structure on the surface rocks is formed by gravitational collision with shock wave (more than sound velocity), which are observed almost all planetary bodies [1-3].
- 2) *Underground explosion by high pressure:* Crater-like depression structures are formed originally at underground rocks mainly by a) high pressure process in the solid rocks (called as “quake” as final event), or b) high pressure explosion process in the light-elements (hydrogen or carbon)-bearing gas or liquid materials (called as “volcanic” as final high-temperature with evaporated gas fluids) [4-9].

Table 1. Two types of crater structures

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- 1) *Meteoritic impact:* Crater the surface rocks
  - 2) *Depression structure:* Spherical cavity or chimney-like structure in underground rock
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## 3. Formation of underground cavity:

Uplift process of fluids and gas with high pressure in underground rocks (called as volcanic process mainly in the Earth planet), is formed in the following processes (Table 2):

- 1) *Plate-tectonic process at water and air planet of the Earth:* Gas and fluids of the Earth planet are transported by plate-movements by subduction and ridge fronts as cyclic material processes. “Mud-volcano (small volcanic process with mudstones)” with liquid and gas evaporation process is observed mainly at earthquake regions of the Earth which is classified as wide-cyclic process of water-rich planet with shock wave process [10].
- 2) *Underground explosion process at water-poor planetary bodies:* Gas and fluids stored at underground rocks (not by plate-movement, but by previous store process on early planetary impacts with small to giant sizes) are exploded by shock wave at interior high-pressure, which are obtained at Moon and other planetary bodies (including asteroids) by one of shock wave process in underground rocks of the interiors (Table 2) [10].

Table 2. The formation types of interior cavity

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- 1) *Plate-tectonic process:* Water-rich planet Earth
  - 2) *Interior explosion:* Water-poor planet. bodies (including the Moon, Asteroids, and Mars)
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#### 4. Formation of crater-like depression:

The following is proposed formation process of interior cavity and depression structure (Fig. 1) [10].

- 1) *Quake interior explosion:* High-pressure explosions by shock wave with hydrogen and carbon-bearing gas fluids are formed at the underground rocks of the interior.
- 2) *Spherical cavity formation :* High-pressure explosion can make spherical cavity, which is similar with up-lifted magmatic melt rocks or surface impact rocks of the Earth.
- 3) *Chimney-like structure during cooling:* During cooling process, a chimney-like structure is formed by wall-rocks fallen to the bottom of the cavity.
- 4) *Crater-like depression structure formation:* By sinking down from the surface, the depression structure is formed leaving sausage-like structure substances of melted explosion materials.

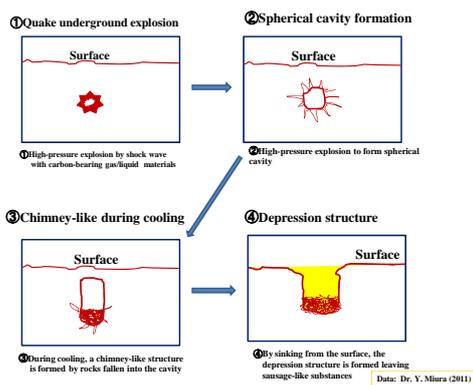


Fig.1. Schematic diagram of formation of crater-like depression structure of water-poor planetary bodies [10].

#### 5. Application of crater-like depression:

The present model of crater-like depression

structure can be applied not only to water-rich planet Earth and water-poor planetary bodies of the Moon, Asteroids, Mars and Venus etc. [10].

#### 6. Summary:

The present results are summarized as follows [10]:

- 1) There are two types of crater depression structures, which can be applied for other planetary bodies.
- 2) There are two types of crater-like depression structures of surface and interior explosions by meteoritic impacts and quake explosions.
- 3) Uplift process of fluids and gas with high pressure in underground rocks (called as “volcanic process” mainly in the Earth planet), is formed in plate-tectonic process at water-rich planet of the Earth, and “interior explosion process” at water-poor planetary bodies.
- 4) Formation process of “crater-like structure” is proposed by major four steps in interior explosions, including carbon-rich air and fluids.

#### References:

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