

THREAT OF HUMAN EARTH AND NATURAL RESOURCE SUPPLY BY ASTEROID IMPACTS.

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Introduction: Our planet Earth is very active water planet formed about 4.6 billion years ago, by revealing continuous activities with the biggest changes in the our solar system. Our intelligent human beings can observe major shock-wave phenomena of meteoritic impacts, earthquakes and volcanic eruptions by surface ground changes mainly after the shock- wave processes. However, we cannot stop any natural shock- wave events of earthquake, volcano and meteoritic impact by artificial methods on the terrestrial surface, because they are natural continuous processes of their changes beyond human recognition generally. These huge disaster reduction and mitigation depend largely on the intellectual supports for the leaders of each country on our Earth. In this study, it proposes basically new possible features of less hazards against the asteroid impacts on our Earth with tsunami for our risk strategy in human society and Earth's damages, and its contribution of Earth's natural resources by concentration to our human society [1-6].

Characteristics of three shock-wave phenomena: Shock-wave processes of meteoritic impact, earthquake and volcano are produced at high velocity over sound speed at high pressure and temperature (Fig. 1). The related activity of earth- quake and volcano produced on the crustal rocky ground is used to be short duration (Table 1). On the other hand, activity of meteoritic impacts on the crustal rocks in the sky can be observed as first detection in the sky to be changed the orbits with intelligent strategy (Table 1) [1, 6].

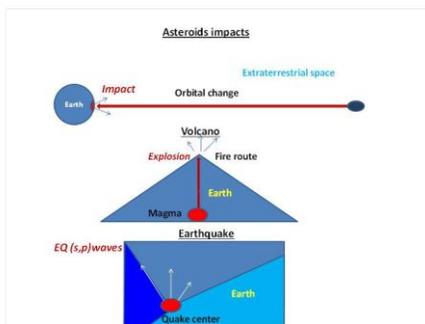


Fig. 1. Shock-wave processes of meteoritic impact (with tsunami), earthquake and volcano [1, 6].

Characteristics of asteroid collision: Asteroid collision with tsunami events to continuous changes of our Earth planet are general collision evolutions in the global solar system. In short, we should observe aster-

oid and meteorites from terrestrial stations and extra-terrestrial sites to be changes the orbits artificially as shown in Fig.2 and Table 2 [1, 4, 6].

Table 1. Characteristics of shock-wave processes.

Shock wave	Location and any detection
Earthquake, volcano	Detection on crustal ground, from.. the interior source without stops.
Asteroid collisions	Activity from sky to Earth after the entry. Plan of stop before the entry.

Table 2. Two detections of asteroids to Earth planet.

Observed site	Detection site and roles
Terrestrial site	Main observation from Earth, together with the Space Station.
Extra-terrestrial	Observation and change the orbits of the Asteroid before Earth entry.

Earth with human disasters by the collisions:

Macroscopic cycles of Earth planet from formation and broken process include microscopic cycles of life (including human being) from birth and death process. Therefore death process of life organism should be replaced to the next generation or new species as continued movements, which are the same process of younger Earth planet without primordial rocks. In this sense, we should make less damages by the best protection methods against any shock-wave processes of asteroids collision with tsunami, earthquake and volcano (Table 3) [5, 6].

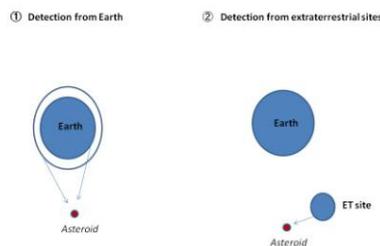


Fig. 2. Detection and changes the orbits of asteroids to our Earth planet [1, 6].

Effective strategy against asteroid collision:

Earth planet has very strong power to be kept and continued planetary activity against any shock-wave damages as seen the geological history [2-4], which we can check it by younger aged rocks and remnants on the surface. However, human life should think and invent more effective circumstances for the next gen-

eration and replaced new species (Table 4) [5, 6].

Table 3. Two types of Earth and life cycles

Type	Recycle process
Earth	Change from old (primordial) to younger (broken) rocks.
Life	Changer from birth (high molecules) to death (static inorganic molecules)

Effective strategy against asteroid collision:

Earth planet has very strong power to be kept and continued planetary activity against any shock-wave damages as seen previous geological history [2-4], which we can check it by younger aged rocks and remnants on the surface. On the other hand, human life should think and invent more effective circumstances for the next generation and replaced new species finally (Table 4) [5, 6].

Table 4. Effective strategy of Earth and life

Objects	Strategy to be survived
Earth planet	Less damage to Earth rocks by two filters of air and ocean water.
Life (human)	Life species to be lived more longer to next generation step.

Highest ocean impact energy among three types:

Active planet of Earth body has multiple global energy characteristics of Earth-type shock waves [1]; that is, surface volcano and interior earthquake and extraterrestrial shock waves of collisions by asteroid, meteorite or comet (Fig. 3). Ocean impact energy shows the highest energy on Earth-type shocked energy [7]. On the other hands, surface eruption of volcano can be observed on all celestial bodies, because volatiles in the deeper interior are pulled to surface by gravitational forces among main celestial activities [1,7]. In fact, typical surface energy of "volcano" is observed globally by interior driving forces of the "water-Earth-type" planet, and locally by any tidal forces of "Venus-type" of Mars, Io and Venus etc. relatively [7].

Summary: The present study can summarized as follows [5, 6].

- 1) Shock-wave processes on Earth planet are meteoritic impact, earthquake and volcano, where activity of meteoritic impacts above the crustal rocks can be observed as first detection in the sky to be changed the orbits.
- 2) Asteroid collisions with tsunami events to continuous changes of our Earth planet are general collision evolution in the global solar system, which .can be observed asteroid and meteorites from terrestrial stations and extraterrestrial sites to be changed the orbits artificially.

3) Macroscopic cycles of Earth planet from formation and broken process with tsunami events include microscopic recycles of human life from birth and death process, where death process of life organism should be replaced to the next generation or new species as continued movements as in the water-planet Earth.

4) Earth planet with global ocean shows continued planetary activity against any shock-wave damages and planetary way, where human life should make more effective circumstances for the next generation and replaced new species finally.

5) Earth planet has the highest surface energy of asteroid impacts through global ocean with followed volcanic event, which are triggered to be elemental concentration to be formed various metallic and nonmetallic ore resources for human society's application. This is considered to be space resources on planetary bodies.

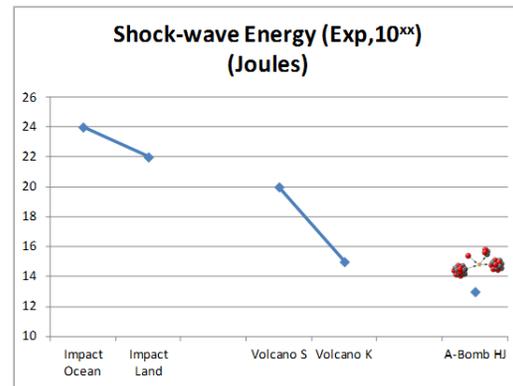


Fig. 3. Earth-type shock energy compared with impact (ocean and land), volcano (sea-coast S and land K) and atomic bomb (Hiroshima, Japan as standard one). Ocean impact energy shows the highest energy on Earth, which are triggered to be main causes of elemental change and concentrations to be formed as natural resource of active planet Earth, together with "space resources". [5].

References: [1] Miura, Y. (1996) Shock-Wave Handbook, Shock metamorphism of the celestial planets. (Springer, Tokyo),1,1073-1176. [2] Ernst, W.G. (1990) The Dynamic Earth, Col. Univ. Press, 1-280. [3] McKay. M. F., McKay, D.S. and Duke, M. B.(1992) Space Resources. Vol.3. Materials. NASA SP-509,.1-316. [4] Miura, Y. and Fukuyama, S. (1999) Journal of Materials Processing Technology (Elsevier), 85, 192-193. [5] Miura, Y. (2011) ISTS-2111, 1-4. [6] Miura Y. (2015) Tokyo Conference on International Study for Disaster Risk Reduction & Resilience (Univ. Tokyo), 1, 17.[7] Miura Y. et al. (2015, 2016) *ISAS Space Energy Symposium*, pp.4.