

MATERIAL EVIDENCES OF SEA-WATER IMPACT WITH HALITE AND CALCITE CARBONATES IN COMPOSITION

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Introduction: Main material indicators of impact-related mineral material with optical microscopic observation are studied on impacts on dry lands as remained samples of Earth, Moon, Asteroids and Mars. The present main purpose is to elucidate any microscopic evidences of sea-water impacts, which are easily disappeared after impact.

Samples of impact glasses and breccias: After sea-water impact, almost all fragments are broken immediately in the water. Only remained materials of sea-water impact are impact glasses and/or breccias formed as quenched process during impact as follows [1, 2, 3]:

- 1) Sample: impact glassed and/or breccias.
- 2) Size: nano-grains (normally 100nm in size)
- 3) Composition: halite (solidified from sea-water), or carbonates of calcite etc. (from shallow sea-bottom rocks)

Characteristics of carbon-bearing materials: Significant amounts of carbon are found from carbonate rocks of shallow sea-bottom target rocks, as well as some contribution from meteoritic projectiles. On deep sea-bottom without carbonates rocks, the highest amount of carbon of sea-water are solved in sea-water, which is considered to be formed carbonates during impact reaction to solidify as listed in Table 1 [1, 2].

Table 1. Origins of carbon and chlorine in sea-water impact

Carbon: Shallow origin from carbonate rocks (calcite etc.)
Deep origin from sea-water (carbonate ions etc.)
Chlorine: Sea-water origin to solidified halite (NaCl)
<u>Meteoritic origin to solidified akaganeite-like one</u>

Characteristics of chlorine-bearing materials: Significant amounts of chlorine are found from solidified materials of halite from salty sea-water from shallow to deep impacts, together with some contribution from meteoritic projectiles of akaganeite in composition as shown in Table 1 [1, 2].

Impact carbon- and chlorine-bearing particles: Fine carbon- and chlorine-bearing particles are founds in samples of sea-impacts of the drilled core and glasses of the Takamatsu (Kagawa, Japan), the Akiyoshi (Yamaguchi, Japan), Libyan desert silica glasses LDSG (Libya, Africa), and the KT and PT geological boundary samples (Spain and Meishan China) [1, 2, 3].

Summary: The present study is summarized as follows:

- 1) Material evidences of sea-water impact are found as carbon-bearing fine particles from carbonate rocks (with calcite) and deep sea-water, together with fine halite-particles from chlorine-bearing sea-water and meteoritic sources (as akaganeite).
- 2) Typical examples of fine carbon- and chlorine-bearing particles are found in the Takamatsu (Japan), the Akiyoshi (Japan), the Libyan glasses (Libya, Africa), the KT and PT geological samples (Europe and Meishan China)

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References: [1] Miura et al. (1995): Meteoritics (USA), 30(5), 552. [2] Miura Y. (2006): Antarctic Meteorites XXX (NIPR), 71-72. [3] Kaiho Y. et al. (2001): Geology (GSA), 29, 815-818.