OCEAN IMPACT EVIDENCES OF SANTA FE IMPACT STRUCTURE WITH SHOCKED GRAINS

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Introduction: Impact craters on dry lands of water-planet Earth have been studied by shock metamorphism of dry rock minerals through short melt and vapor condition to be formed quenched solid remnants [1-4]. However impacts on wet condition of global ocean-water and followed sedimentary rocks have not been studied so far deeply. Author's group who work it based on broken and buried impact structures mainly in Japan and USA [5-8], have been investigated on the Santa Fe impact structure, New Mexico, USA by field-guidance with scientists of the University of New Mexico [9-10] after the related meeting at the Carlsbad limestone site within the same New Mexico State as the present comparative purpose.

Geology of Santa-Fe district with shallow reef period: From plate tectonic movement model of the United State, characteristic geological features on the Santa Fe district are obtained as major two events of a) ocean-intrusion with the Mississippian shallow reef sedimentary rocks to center to the United State continent and stretching to be formed as higher Mountain (the Sandia to the Sangre de Cristo) and b) broken events by depression of the Santa Fe district associated with the Rio Grande rift followed by the New Mexico earthquakes [9-10].

Electron observation method of impacted ocean-sediment samples: Author's research group has been established investigation method of impact-remained samples formed by ocean sediments naturally in water condition and by laboratory shocked experiments [5-8], where two different ways to observe in-situ surface (as grains) and artificial polished thin-section coated carbon-bearing resin to be checked in-situ carbon-bearing materials remained both ways. This is significant method of ocean sediment rocks because volatile elements in wet sedimentary rocks are easily evaporated with quenched carbon-bearing grains regarded as ocean-impact evidences.

Electron microscopic observation results: The author's samples collected mainly on sedimentary rocks at the present Santa Fe mountain district guided with a few New Mexican scientists have been investigated at author's investigation by in-situ analytical scanning electron microscopy (analytical FE-SEM of the JEOL Co. Ltd) as follows [5-8].

1) Carbon-rich breccias are observed at all three-kinds samples of a) granitic rocks, b) limestone carbonates and c) plagio-granites, which suggest that carbon-rich grains with Ca or Mg are originated from broken carbonate rocks.

2) Carbon-rich fluid-flow textures with Ca, Mg and Fe which are fluid-like formation during quenching in colder sea-water, are obtained at all types of a) and b) samples penetrating to these original rocks, and c) samples of sea-bottom crust of plagioclase (anorthite)-granitic rocks mixed by penetrating texture remained [9-10], which suggest evidences of impacted ocean floor rocks formed by quenched to be remained during its ocean shallow impact process, and after young Cretaceous weathering process there.

Summary: Present study is summarized as follows:

1) Ocean impact remnants by carbon-bearing grains are obtained from two types of grains and thin section.-

2) Carbon and carbon-bearing materials from ocean sediments separated by impact process are obtained all samples of granitic breccias, limestone breccias and plagio-granitic rocks of ocean floor-related crusts.

3) Carbon-rich fluid textures with Ca, Mg and Fe quenched from ocean sediments of carbonate rocks are obtained at three samples penetrating to these original rocks, which are considered to be strong evidences of impacted ocean floor rocks.

4) Main reason to observe the ocean impact remnants as quenched grains on the present higher mountain is associated with the Rio Grande rift with the New Mexico earthquake different with other quakes of colliding (Japan) and side-slipping (California).

5) The present result will be applied to other impact structures related with ocean impact and tectonic movements to be broken or buries impact structure on water planet Earth.

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