OCEAN IMPACT EVIDENCES OF SANTA FE IMPACT STRUCTURE WITH SHOCKED GRAINS

Yasunori Miura

Yamaguchi University, Yamaguchi, Yamaguchi 753-0074, Japan. yasmiura50@gmail.com

Abstract

The Santa Fe impact structure shows all samples with remained carbon-bearing grains separated by impact from original sedimentary carbonates of the Paleozoic shallow floors, which can be applied to other ocean impact structures.

1. Introduction

Impact craters on **dry lands** of Earth have been studied by **shock metamorphism of dry rock minerals** through short melt and vapor condition [1-4]. Impacts on **wet condition** have not been studied so far deeply. Author's group who work it based on **broken and buried impact structures** in Japan [5-8], have been investigated on present purpose of the **Santa Fe impact structure**, New Mexico, USA [9-10] compared with the Carlsbad Cave limestone within the same State.

2. Geology of the Santa Fe district

From planetary **tectonic movement model** of the United State, characteristic geological features on **the Santa Fe** district are major two major events of **ocean-intrusion** with the **Mississippian shallow reef sedimentary rocks** to center to the United State and **continent and stretching** to form **higher Mountain** (the Sandia to the Sangre de Cristo) and **depression** of the Santa Fe district associated with the **Rio Grande rift** with the **New Mexico** earthquakes [9-10] (Fig.1).

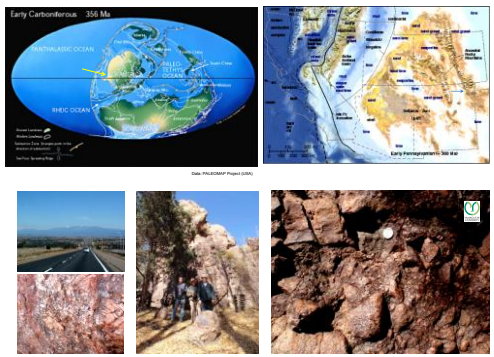

Fig.1. Santa Fe for its outcrops and Paleozoic maps.

3. Observation of analytical FE-SEM

Author's research group has been established **investigation method** of impact samples formed by natural **ocean sediment** in water condition and by **laboratory shocked** experiments [5-8], where **two different methods** are used to observe **in-situ surface** (as **grains**) and **polished thin-section** for carbon-bearing remnants.

The samples collected at the **Santa Fe mountain** district guided with the New Mexican scientists have been investigated by in-situ analytical scanning electron microscopy (**analytical FE-SEM** of the JEOL Co. Ltd.) as follows [5-8] (Fig.2):

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

2) **Carbon-rich fluid-flow textures** with Ca, Mg and Fe which are **fluid-like formation** during quenching in sea-water are obtained at three a) and b) samples **penetrating** to these original rocks, and c) samples of sea-bottom crust of plagioclase (anorthite) -granitic rocks by **penetrating texture [9-10]**, which suggest evidences of *impacted ocean floor rocks*.

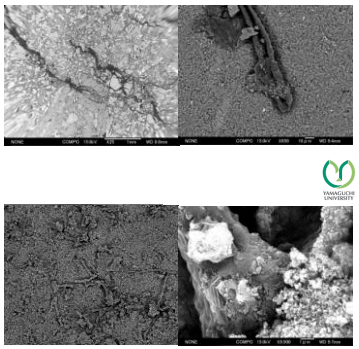

Fig.2. Thin section (above) and impact grains (below) of the Santa Fe impact structure, New Mexico, USA [5]. Impact melt breccias.

4. Conclusion

The Santa Fe impact structure samples is summarized in this study as follows:

1) **Ocean impact remnants** by carbon-bearing grains are obtained from two types of **grains** and **thin section** at the Santa Fe impact structure-

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

3) **Carbon-rich fluid** textures with Ca, Mg and Fe quenched from **ocean sediments** are obtained at the three types 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** on the **higher mountain** is associated with the **Rio Grande rift** in the New Mexico earthquake different with other **quakes of colliding (Japan)** and **side-slipping** (California).

References

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