

Re-entry of giant-impact fragments and early evolution of the Earth's ocean

*Takanori Sasaki¹

1. Department of Astronomy, Kyoto University

The late stages of Earth's formation remain a mystery. No building blocks remain in Earth's orbit and no geological evidence is available for the first 700 million years Earth's history. Herein we propose that protoplanetary fragments produced by the giant impacts during terrestrial planet formation may give some important clues to the era. Iron-bearing giant impact fragments provide significant reducing agent that could transform primitive CO₂-H₂O atmosphere and ocean into more reducing H₂-bearing atmosphere. Re-entry of the giant-impact fragments into early Earth would be important for the origin of Earth's life and its early evolution.

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