

Role of Plate Tectonics for Habitable Planet

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Plate tectonics plays a role of global material circulation from the surface of the earth to the bottom of mantle since ca.4.0Ga. This is a due function both to bear habitable planet and to evolve as a habitable planet.

In spite of empirical recognition of importance of plate tectonics, nobody succeeded to synthesize the role of plate tectonics. However, the author completed this task by using following data; (1) geophysical constraints for the mechanism of plate tectonics, (2) petrological and geochemical characteristics of lithosphere, and (3) geologic history of the Earth, specifically the structural and petrological remarks of rock components and dynamics recorded in orogenic belts over the world.

As the result, basic condition for the operation of plate tectonics and following 6 roles of plate tectonics were summarized. The reason why plate tectonics is operated on the Earth is because mid-oceanic ridge is hydrated to enable plate to subduct which is helped by the lubricant water-rich fluids on the bottom of lithosphere. Roles of plate tectonics are (1) Global material circulation of CO₂ and H₂O, (2) Role of tectonic erosion, (3) Production of nutrients-source rocks at subduction zone, (4) Driving force of Earth's magnetic field, (5) The buffer of Earth's system, and (6) The controller of thermal history of the Earth.