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Mass extinction and glactic cosmic radiation

ISOZAKI, Yukio[1*]

[1]The University of Tokyo

The possible link between mass extinction and the secular change in galactic cosmic radiation (GCR) is discussed. The biggest mass extinction in the Phanerozoic occurred at the end of the Paleozoic, in particluar, with the first major global change in the surface environments around the Middle-Late Permian (G-L) boundary. Sedimentological, paleontological, and geochemical (isotopic) data suggest the onset of global cooling immediately before the G-LB extinction. Paleomagnetic records demonstrate that a large change took place in geodynamo at the end of middle Middle Permian, in the terms of frequency change in geomagnetic reversals (Illawarra Reversal). The activation of a large mantle plume with respect to the initial breakup of Pangea likely changed the conditions of geodynamo. In order to explain these various phenomena in a single picture, the integrated ”plume winter” scenario was proposed. By weakening the intensity of geomagnetic shield, a larger flux of GCR might drive the surface climate toward cooling. Possible application/analytical methods to much older examples in deep past are discussed.

Keywords: mass extinction, P-T boundary, G-L boundary, galactic cosmic radiation, paleomagnetism, deep-sea sediments