

Plume Winter: cause of biosphere innovation

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Large scale uprising and downgoing flows within the Earth's mantle (superplume) represent episodic and irreversible transportation of heat/materials of the greatest magnitude. Superplumes activated several times in the 4.6 billion year long Earth's history, driving assembly and break-up of several supercontinents and major turnovers of biota in the biosphere. Superplume-related extraordinary volcanism, associated with unique swarm of environmental stresses such as acute temperature change, acid rain, and/or photosynthesis collapse leading oxygen depletion, appears like the ultimate cause of these biosphere catastrophes. Episodic activation of superplume and chain of associated events called "Plume Winter" may have been the main engine of the major biotic innovations in the past.