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TOPICAL REVIEW

The grand mirror of isotope anomalies

Huiming Bao [1,2]

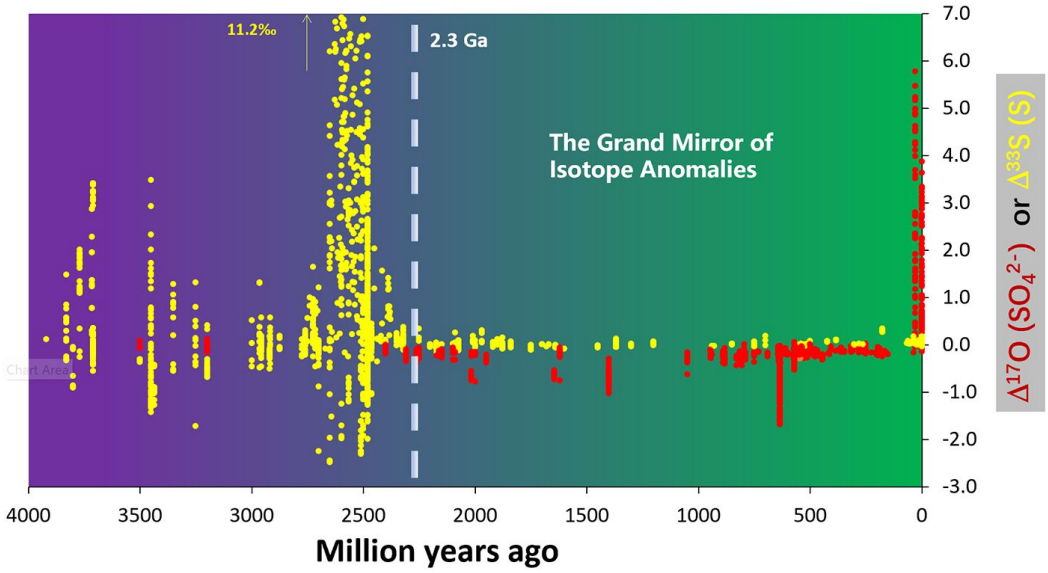
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Author introduction

Huiming Bao, Professor and Director of the International Center for Isotope Effects Research (icier-nju.org), Nanjing University, China. He got his BSc from Peking University in 1986 and his MSc from the Chinese Academy of Sciences (CAS) in 1989. After four years as an assistant professor at CAS, he moved to the US in 1993 and got his PhD from Princeton University in 1998. After a 3-year postdoctoral experience at UC San Diego, he joined Louisiana State University (LSU) in 2001 and moved up the ranks from assistant, associate, full, and Charles L. Jones Professor in Geology and Geophysics. In 2021, he retired from LSU and moved to Nanjing University. One aspect of Bao's scholarly contributions is the conceptual development, technical innovation, and applications of high-dimensional isotope compositions to geology, the atmosphere, and environmental problems, including the discovery of non-mass-dependently enriched and depleted oxygen-17 anomalies among Earth minerals. While his research interests cover a wide spectrum of disciplines, including Earth, planets, environments, biology, and engineering, he found himself drawn toward research problems that seek mechanistic explanations at the molecular level.



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Abstract The existence of a pO_2 threshold that switched off one photochemical reaction, i.e., deep UV SO_2 photolysis in the troposphere, and switched on another photochemical reaction, i.e., the CO_2–O_2–O_3 reaction network in the stratosphere, has resulted in a grand mirror of isotope anomalies over the 4.6 Ga Earth history. The rock record reveals this grand pattern.

Keywords troposphere, stratosphere, non-mass-dependent isotope effects, sulfides, sulfate, oxygenation, Great Oxidation Event, Shuram, Neoproterozoic, anomalies

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