

# Termination of Cryogenian ironstone deposition by the spread of euxinia: Fe-S-C isotope evidence

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Widespread deposition of iron-rich sediment (ironstones) occurred during Cryogenian “Snowball Earth” glaciations. However, the reasons for termination of Cryogenian Iron Formation (CIF) deposition remain poorly understood. Here we report a high-resolution, multi-isotope (Fe-C-S) study of the Xinyu CIF in South China that can directly address this question. The isotopic compositions of these multivalent elements exhibit remarkable covariant trends and perturbations (see Figure below), suggesting that termination of CIF deposition was directly caused by depletion of dissolved oxygen and prevalence of H<sub>2</sub>S in water columns, rather than oxygenation of ocean bottom and depletion of Fe<sup>2+</sup> supplies. The depletion of oxidants and enrichment of reduced S and C species in deep oceans reflect enhanced oxidative weathering of continents and enhanced burial of organic matters, which were consequences of a biological bloom after deglaciation of the “Snowball Earth”. Cycling of major redox elements (O, Fe, S, C) increased the diversity of redox structure in oceans at the Earth’s major environmental turning point during the Cryogenian.

