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Redox conditions and marine microbial community changes during the end-Ordovician mass extinction event

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Abstract

The end-Ordovician (Hirnantian) crisis is the first globally distinct extinction during the Phanerozoic, but its causes are still not fully known. Here, we present an integrated geochemical and petrographic analysis to understand the sedimentary conditions taking place before, during and after the Late Ordovician ice age. New data from the Zbrza (Holy Cross Mountains) and Gołdap (Baltic Depression) boreholes shows that, like in other worldwide sections, the total organic carbon (TOC) content is elevated in the upper Katian and uppermost Hirnantian to Rhudannian black shales, but depleted (below 1%) during most of the Hirnantian. Euxinic conditions occurred in the photic zone in both TOC-rich intervals. This is based on the maleimide distribution, occurrence of aryl isoprenoids and isorenieratane, as well as a dominance of tiny pyrite framboids. Euxinic conditions were interrupted by the Hirnantian regression caused by