Volcanic related methylmercury poisoning as the possible driver of the end-Devonian Mass Extinction

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The end-Devonian global Hangenberg event (359 Ma) is among the most devastating mass extinction events in Earth's history, albeit not one of the "Big Five". This extinction is linked to worldwide anoxia caused by global climatic changes. These changes could have been driven by astronomical forcing and volcanic cataclysm, but ultimate causes of the extinction still remain unclear. Here we report anomalously high mercury (Hg) concentration in marine deposits encompassing the Hangenberg event from Italy and Austria (Carnic Alps). The Hangenberg event recorded in the sections investigated can be here interpreted as caused by extensive volcanic activity of large igneous provinces (LIPs), arc volcanism and/or hydrothermal activity. Our results imply volcanism as a most possible cause of the Hangenberg event, similar to other first order mass extinctions during the Phanerozoic. For the first time we show that apart from anoxia, proximate kill mechanism of aquatic life during the event could have been methylmercury formed by biomethylation of a volcanically derived, huge concentration of inorganic Hg supplied to the ocean. Methylmercury as a much more toxic Hg form, potentially could have had a devastating impact on end-Devonian biodiversity, causing the extinction of many pelagic species.