# Abrupt decline in primary productivity coincident with the end-Ordovician mass extinction: Cadmium isotopic evidence from South China

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Although the end-Ordovician mass extinction caused the disappearance of >80% of contemporaneous marine species, many aspects of this biocrisis remain poorly understood. For example, changes in primary productivity, an important monitor of ecosystem health, remain undocumented. Here, we apply cadmium isotopes ($\delta^{114/110}Cd$) in carbonates from the Ordovician-Silurian boundary GSSP section at Wangjiawan, South China, to track changes in primary productivity during the end-Ordovician biocrisis. Our results show substantial variation during the Ordovician-Silurian transition: $\delta^{114/110}Cd$ decreased from +1.13‰ to +0.25‰ during the Katian, peaked at +0.59‰ during the early Hirnantian, declined abruptly to –0.17‰ during the late Hirnantian (i.e., O-S extinction event), and finally rose to 0.64‰ in the Early Silurian. Elevated productivity is associated with higher $\delta^{114/110}Cd$ values because marine phytoplankton prefers lighter isotopes of Cd, causing seawater to become enriched in $^{114}Cd$. Our Cd-isotope record thus reflects an increase in productivity at the onset of the Hirnantian followed by a sharp decline during the extinction of the latter Hirnantian. This productivity decrease is also supported by other proxies such as Zn and P enrichments. While all Phanerozoic biocrises were associated with sharp reductions in taxonomic diversity, the present study is one of the first demonstrations of a major decline in marine productivity linked to a mass extinction event.