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Deep water upwelling and its implication for the Precambrian Cambrian boundary. Evidences from Molybdenum isotopes in black shales

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The environmental circumstances which have caused a decline in abundance and diversity of the soft-bodied Ediacara fauna at the end of the Precambrian followed by the "Cambrian explosion", is still a question of debate. It has been proposed that an increase in atmospheric oxygen concentration during the late Neoproterozoic period, and a subsequent change in ocean redox conditions could have played a key role in the evolution of eukaryotic organisms. The molybdenum isotope record is a good tool to investigate global paleoredox conditions and redox changes of the ocean.
We present Mo isotope signatures in black shales from two sample sets (Ara Group, Oman, and Yangtze Platform, China) which were deposited at and shortly after the Precambrian-Cabmrian (PC-C) boundary. At first view, the overall Mo isotopic signature of the early Cambrian black shales from Oman and China is similar to that found in mid-Proterozoic sediments [1] and might support the idea of a stratified ocean with anoxic bottom water through most of the Proterozoic.
On closer inspection, however, a transient Mo signal following immediately after the PC-C boundary in both sample sets indicates a short global non-steady state situation. Combined with extreme Mo enrichment, found in the Chinese sulfide marker bed at the PC-C boundary, which cannot be explained by Mo scavenging mechanisms known from the modern oceans, upwelling of euxinic bottom water masses provides a reasonable explanation for this Mo signal. This scenario not only explains the Mo isotopic signal, it can also be responsible for the sudden extinction of the Ediacaran fauna.
[1] Arnold G., et. al. (2004). *SCIENCE* **304**, 87-90.