Mo isotope signature of OAE 2

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Understanding variations of redox conditions during oceanic anoxic events (OAEs) is of primary importance, particularly as recent observations and modelling have shown that processes invoked to explain the origin of OAEs are being observed today as a consequence of anthropogenic change.

Here, we compare redox-sentsitive trace metal (RSTM) distributions and molybdenum (Mo) isotope variations during a major Cretaceous OAE (OAE 2, Bonarelli event) within the western Tethys and the Northern Atlantic. Whereas RSTM have the potential to provide insights regading local depositional conditions and processes in paleoceanographic systems, Mo-isotope data can, under certain circumstances, provide quantitative estimates of how the extent of seawater anoxia may have fluctuated in the past.

The RSTM contents indicate more reducing conditions during the OAE 2 interval, reaching from suboxic to euxinic conditions. The RSTM enrichment factors (EFs) also suggest different depostional conditions and paleoceanographic processes between the Tethys and the North Atlantic. Whereas the North Atlanic sites show evidence of weak watermass restriction associated with the action of a particulate shuttle within the water column, the EFs of the Tethyan sections are characteristic of unrestricted marine systems.

Mo isotopes show surprisingly negative values along the Tethyan sections. At the onset of OAE 2, an increasing trend in $\delta^{98/95}$Mo is observed with values ranging from -0.6 to 0.6 ‰. During the 2nd half of OAE 2, the $\delta^{98/95}$Mo curve shows a progressive shift towards more negative values. In the North Atlantic, Mo isotopes are generally heavier during OAE 2, fluctuating around an average value of 1.1 ‰.

Both the western Tethys and the Northern Atlantic sites show redox variations, reaching anoxic/euxinic conditions. However, light $\delta^{98/95}$Mo values in the western Tethys suggest redox conditions may not have been fully euxinic. For the North Atlantic, our results are consistent with fully euxinic conditions and may help to improve our understanding of the global extent of euxinia during OAE 2.

New U-Pb age and □Hf signature data of metassedimentary and metabasic rocks of the front of the Southern Brasilia Orogen, south of São Francisco Craton, Brazil

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The Brasília Orogen, located on the western and southern margin of the São Francisco Craton, corresponds to a horizontal nappe stack that was regionally transported eastward during the collision between the Paranapanema and Goiás Central Blocks and the Sanfranciscan Plate in the Ediacaran Period [1]. The front of the Southern Brasília Orogen is represented, at the base, by metassediments with lithic nature associated with amphibolite lenses, both objects of this study, followed by metapsamites and metapelites of the Carrancas Group, with a tectonically upper exotic unit of metawackes [2, 3].

The metassediments of the base are paragneiss rich in lithic fragments that vary from plagioclase-quartz-biotite-epidote gneiss with potassic feldspar and hornblende (EG) to epidote-plagioclase-biotite-quartz gneiss with carbonate (QG). Detrital zircons from EG rocks provided U-Pb ages (LA MC ICP MS) that range between 2.04 to 2.18 Ga, with mean peak age of 2.12 ± 13 Ga. The □Hf values of this crystals vary from -10.4 to +15.1, with predominance of the positive values. Detrital zircons from the QG rocks indicated a provenance age between 2.00 to 2.19 Ga, with mean peak age of 2.03 ± 11 Ga. The □Hf values range from -7.4 to +6.2, with prevalence of the negative values.

The amphibolite lenses are descontinously interbedded with the paragneiss, predominantly formed by hornblende and plagioclase (andesine), with tholeitic signature. The mean peak age of this rocks stands in 1.96 ± 22 Ga and the □Hf values vary from -16.8 to +23.5.

These data suggest that the deposition of the metassedimentary sequence iniciated after 2.0 Ga, with the related basic magmatism starting somewhat around 1.96 Ga. The □Hf values also suggest that the source area comprised rocks related to juvenile accretion and rocks having long crustal residence.

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