# Molybdenum cycling in deep marine, oxide-rich sediments: Implications for the Mo paleoproxy

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Molybdenum pathways are well known in euxinic surface sediments and from their integrated final records in ancient rocks but have been little studied in deep modern oxic marine environments, particularly those with abundant oxide recycling in the upper sediment layers. It is these oxic settings that are purported to drive much of the isotopic variability in ancient seawater. To investigate the pathways of Mo cycling in deep marine systems we analyzed solid phase and pore water samples from sediments taken at various water depths along the slope off Argentina and Uruguay.

At sites where sedimentation rates are low and only little reactive organic matter is available – and thus oxygen penetration is up to a few millimeters deep into the surface sediments – Mo appears to diffuse into the overlying water column. As the application of Mo as a proxy for paleo-oceanographic redox conditions hangs on the premise of long-term burial of highly fractionated Mo, we can ask whether our findings affect the application of Mo as a proxy.

Additionally, we investigated the fate of Mo exposed to diagenetic alteration – with focus on processes within and below the sulfidic zone. Our results show that the reduction of reactive Mn and Fe(III) phases below the sulfidic zone – where the appreciable availability of reactive metal phases in sediments can be attributed to rapid burial - leads to the remobilization of Mo in these layers and the formation of authigenic Mo enrichment fronts in deep-subsurface sediments.