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MOLYBDNEUM ISOTOPES AS TRACERS OF SEDIMENT RECYCLING INTO THE MANTLE

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Understanding the role of recycled sedimentary material into the convecting mantle represents a key aspect to provide new constraints on the chemical budget of subduction zones. Mo isotopes are perceptive to redox conditions and have been shown to fractionate in the oceanic superficial environment during the incorporation into sediments. The variable composition of Mo isotopes recorded in different geochemical reservoirs offers the opportunity to use these isotopes as tracers of recycled material into the mantle. This is particularly true for sediment formed under anoxic conditions, which inherited from the seawater specifically heavy isotopic compositions. The potassic and ultrapotassic igneous rocks of the Roman Magmatic Province (Italy) show extremely variable and well distinct geochemical and radiogenic isotopic signatures, which are referred to a strong involvement of different subduction-related sedimentary components in their genesis. These magmatic products thus offer the unique opportunity to test the application of Mo stable isotopes to distinguish the contribution of different sedimentary melts/fluids during mantle metasomatism. High-precision Mo isotope measurements were performed on both magmatic rocks and sedimentary end-members. The latter formed at different redox conditions and can be considered as *proxies* of the recycled components. The obtained results indicate that the Roman igneous rocks display variable Mo isotope compositions, which are significantly heavier compared to any sediment-dominated subduction-related magmatic rocks measured so far (e.g., Lesser Antilles). Such heavy isotopic signatures, reveal a sort of "Mo anomaly", which is not observed in the nearby subduction-related magmatic regions. The heavy isotope composition, along with the pronounced sediment-dominated character, suggests the presence of an isotopically heavy component in the subducted material that is likely to derive from subducted, anoxic organic-rich sediments. In this context, the application of Mo isotopes to complex subduction settings highlights the potential of Mo isotopes as tracers of recycled anoxic sediment, hence the fate of organic carbon, in subduction zones.