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VANADIUM ISOTOPES

A Proxy for Ocean Oxygen Variations

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Vanadium Isotopes

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Abstract: Vanadium isotope ratios ($^{51}V/^{50}V$) have potential to provide information about changes in past ocean oxygen contents. In particular, V isotopes may find utility in tracing variations at nonzero oxygen concentrations because the redox couple that controls V elemental and isotopic abundances in seawater (vanadate–vanadyl) appears to operate around 10 μM O_2. This characteristic sets V isotopes apart from many other metal isotope redox proxies that require more reducing conditions to register significant changes in their isotope budgets. The oxygen abundance sensitivity range of V isotopes suggests that this paleo-proxy could be particularly useful in tracing marine oxygenation changes throughout the Phanerozoic and potentially beyond.

Keywords: Vanadium isotopes, ocean oxygenation, redox sensitive, marine mass balance

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