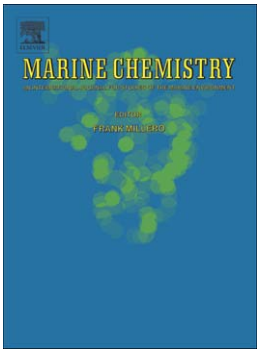

Stationary sinking velocity of authigenic manganese oxides at pelagic redoxclines

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Stationary sinking velocity of authigenic manganese oxides at pelagic redoxclines

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Abstract

The redox-sensitive trace metal manganese (Mn) is an important electron donor and acceptor in aquatic environments. In stratified basins, the transformation between dissolved $Mn^{2+,\ 3+}$ and particulate Mn(III/IV) oxides constitutes the "manganese pump" at the redoxcline, which separates the oxic surface from anoxic bottom waters. In addition to fluxes of dissolved components and reaction rates, accurate estimates of the sinking velocities of authigenic Mn oxides (MnO_x) are an important prerequisite to balance and model such euxinic systems. However, models describing biogeochemical cycles suffer from the lack of measured particle sinking velocities and instead must rely on values calculated according to Stokes' law or on estimates derived from budget calculations. Here we present the first stationary sinking velocities of authigenic MnO_x particles from the pelagic redoxclines of the currently anoxic Landsort and Gotland Deeps (Baltic Sea). Sinking velocities were determined on board ship by using high-resolution backlit imaging (shadowgraphy) and manual particle tracking. Within the typical size range of MnO_x particles (2–20 µm), the average sinking velocity of 1,972 particles was determined to be 0.76 m d^{-1}, distinctly lower

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