# An Undocumented Water Column Sink for Cadmium in Open Ocean Oxygen Minimum Zones

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Cadmium (Cd) is a micronutrient(1) and a tracer of biological productivity and circulation in the ocean (2). The correlation between dissolved Cd and the major algal nutrients in seawater has led to the use of Cd preserved in microfossils to constrain past ocean nutrient distributions. However, linking Cd to marine biological processes requires constraints on marine sources and sinks of Cd. Here, we show a decoupling between Cd and major nutrients within oxygen minimum zones (OMZs) in both the Northeast Pacific and North Atlantic Oceans, which we attribute to Cd sulfide (CdS) precipitation in euxinic microenvironments around sinking biological particles. We find that dissolved Cd correlates well with dissolved phosphate in oxygenated waters, but is depleted compared to phosphate in OMZs. Globally, we calculate that CdS precipitation in ODZs is an important previously-undocumented marine sink of Cd. Our results suggest that water column oxygen depletion has a substantial impact on Cd biogeochemical cycling, impacting the global relationship between Cd and major nutrients and suggesting that Cd may be a new tracer for ocean oxygen deficiency on geological timescales. Similar depletions of copper and zinc in the Northeast Pacific indicate that sulfide precipitation in ODZs may also have an influence on the global distribution of other trace metals.

[1] Xu Y & Morel FMM (2013) Cadmium in Marine Phytoplankton. *Cadmium: From Toxicity to Essentiality,* Metal Ions in Life Sciences, eds Sigel A, Sigel H, & Sigel RKO (Springer Netherlands), Vol **11**, pp 509-528 [2] Boyle EA (1988) Cadmium: chemical tracer of deepwater paleoceanography. *Paleoceanog*. **3** (4):471-489