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Does oceanic primary production lead to a cadmium isotopic fractionation? Field vs. culture data.

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Cadmium is biologically recycled in the ocean and its cycle is tightly linked to that of phosphorus. Its isotopes cover a large mass interval and phytoplankton could potentially fractionate Cd during uptake. If confirmed, such fractionation could provide a new tracer in oceanography and paleoceanography.

We present two profiles of Cd isotopic composition in seawater samples from sites in the North West Pacific Ocean and the North West Mediterranean Sea, together with measurements of Cd isotopic fractionation in phytoplankton (Chlamydomonas and Chlorella) cultures. The measurements were performed on a multi collector inductively coupled plasma mass spectrometer (MC-ICPMS). Whereas seawater isotopic ratios do not display significant variations (i.e. less than 1 per 10,000, per atomic mass unit), cultured phytoplankton cells are slightly but significantly lighter than the culture media (isotopic ratio differences of the order of 3 per 10,000, per atomic mass unit). These differences will be discussed mainly in terms of Cd speciation and bioavailability in seawater. These results imply that further development of Cd isotopes as an oceanographic tracer will require combined studies of the isotopic composition and chemical speciation of Cd .