

“Diatomaceous ocean weathering”: a new concept to understand the paleoceanic environment

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“Diatomaceous ocean weathering” is a novel physiological action of diatoms, where diatoms disintegrate silicate minerals and incorporate metals in the minerals into their frustules.

The action was inferred in discussing the rare earth element (REE) composition of siliceous matter in diatom-rich settling particles in the Bering Sea. Since then, we have foraged pieces of evidence for the radical action of diatoms. The evidence includes: 1) a fully-consistent picture of the oceanic REE cycling, 2) a balance in REE budget in a water column identified using Nd isotope ratios, 3) evenly-distributed SEM images of Al in diatom frustules, 4) presence of authigenic Al, which is spectroscopically different from that in clay minerals, and 5) numerous earlier analytical studies reporting failure to separate elements in clay and those in diatom frustules.

In this paper, how the new knowledge on the diatomaceous action will affect the interpretation of the distribution of Nd isotope ratios. An example to apply the action to Nd isotope variation recorded in ferromanganese crusts will be presented. It will be shown that quite distinct, but surprisingly reasonable changes in the paleoceanic environment (pCO<sub>2</sub> and Si concentration) will be emerged from the discussion.

Keywords: diatoms, weathering, Nd isotope ratio