

# **Reactivity of Marine Biogenic Silica: Reconciling Water Column and Sediment Data**

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Diatoms contribute up to half of the global primary production of the oceans. A large fraction (more than 50%) of diatom opal is recycled within the euphotic zone. High specific dissolution rates of biogenic opal in the surface ocean contrast with order-of-magnitude lower values in deep-sea sediments. Such large differences in silica dissolution rates are consistent with experimental kinetic data. After correcting for differences in temperature, degree of undersaturation, as well as Al(III) content

and specific surface area of diatom shells, the specific silica dissolution rate in average surface ocean water is predicted to be 430 times higher than in core top biosiliceous sediments. The observed average opal dissolution rate in the upper 100-200 meters of the ocean, however, is about 4 times lower than the experimentally-predicted value. This supports the view that silica recycling in marine surface waters is limited by the degradation of protective organic coatings by bacteria.