

INTERACTIONS OF BIOGENIC OPAL, SEDIMENT, AND SEAWATER
IN THE CENTRAL EQUATORIAL PACIFIC

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ABSTRACT

The solution rate of biogenic opal in near-surface sediments in the Central Equatorial Pacific is three to eight orders of magnitude lower than that of similar acid-cleaned samples. Iron, magnesium, and calcium alumino-silicates may be the minerals which are forming on the surface of the opal and reducing its solution rate. The scale height of the system studied suggests that diffusive and not advective processes are primarily responsible for the removal of dissolved silica in sediments. Solution budget calculations for this area suggest that 90 to 99 per cent of the biogenic opal produced in surface waters dissolves before reaching the sediment-water interface; an additional amount dissolves within the sediment and diffuses into bottom waters leaving 0.05 to 0.15 per cent of the original amount of opal produced by organisms in the sedimentary record. The relative solution potential of the upper 1000 m of the water column varies by more than an order of magnitude from the Antarctic to the Equator and may have a pronounced effect on the accumulation rate of biogenic opal in underlying sediments.