

DISSOLVED ALUMINUM:
CONTROL BY REACTIONS WITH ALUMINOSILICATE MINERALS
IN SEAWATER

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Abstract

The reactions of eight aluminosilicates in seawater at 2°C were investigated as a possible mechanism for the control of the concentration of dissolved aluminum in the oceans. The dissolved aluminum equilibrium concentrations were found to be at least an order of magnitude greater than existing seawater concentrations. The concentrations ranged from ca. $0.5 \times 10^{-6} \text{M}$ for albite to ca. $8.0 \times 10^{-6} \text{M}$ for illite. This range encompasses the theoretical solubility range of cryptocrystalline gibbsite. The rates of release of dissolved aluminum from these minerals ($0.005 \times 10^{-17} - 0.9 \times 10^{-17} \text{ moles/cm}^2/\text{sec}$) were incorporated into a simple box model in order to determine the significance of aluminosilicate dissolution on the aluminum cycle. The results of this study suggests that the dissolution of aluminosilicates could account for as much as 40 % of the dissolved aluminum in the water column.