

## Mechanisms of pelagic barite precipitation

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Barium has been used to estimate past ocean export production. However, the precise mechanisms underlying barite precipitation in the undersaturated marine water column are not yet fully understood. A detailed mineralogical and crystallographic analysis of barite from size-fractionated particulate material from the ocean water column has demonstrated that marine barite forms from an initial amorphous phosphorus-rich phase that binds Ba, which eventually evolves into barite crystals whereby phosphate groups are substituted by sulfate. It is also shown that barite particles are associated with organic matter aggregates and with extracellular polymeric substances (EPS) produced by microbes. Evidence for microbial mediation is also consistent with experimental work showing that in bacterial biofilms Ba binds to phosphate groups in both live cells and EPS, which promotes locally high concentrations of Ba leading to saturated microenvironments favoring precipitation.