

Assessing the impact of large scale reorganization of ocean circulation in the Pacific Ocean on Si distribution over the Cenozoic

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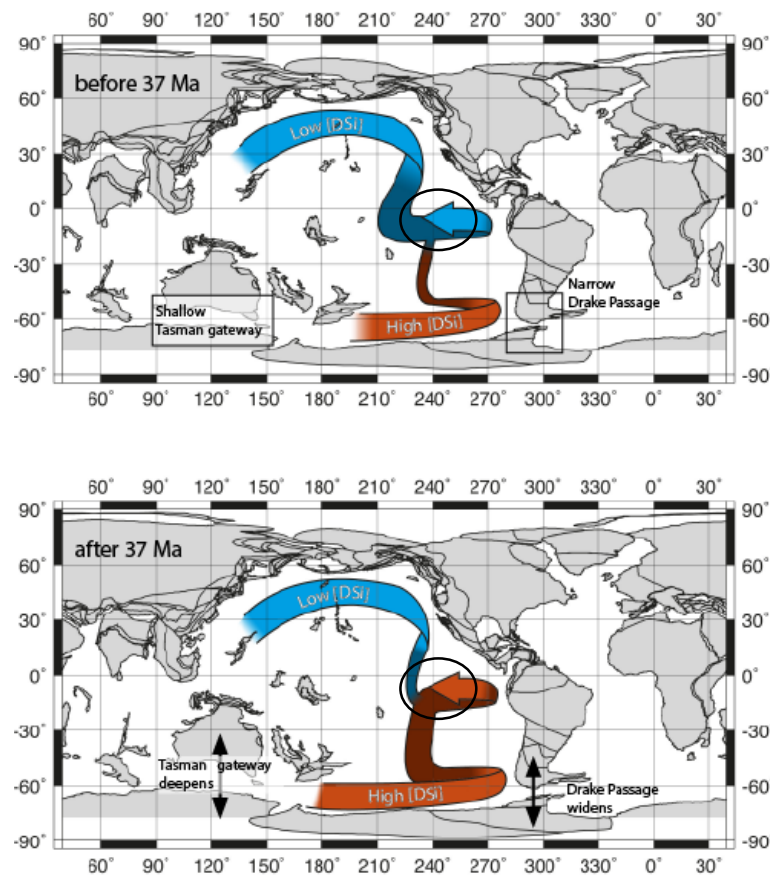
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Stable silicon isotope compositions of siliceous microfossils are a novel tool to get insights into past silicon cycle. Silicon isotope composition is set during the formation of skeletal structures and is dependent on various environmental parameters which can therefore be reconstructed from siliceous remains in sediments. In this project, Si isotopes from radiolarian tests and siliceous sponge spicules are investigated to reconstruct past seawater Si concentration and isotopic composition.

The main goal of this project is to investigate changes in the distribution of Si and its isotopic composition caused by reorganization of the ocean circulation in the Pacific Ocean over the last 60 million years. Samples are collected from IODP Leg 199.

Previous studies showed a rapid shift in Si concentration in the Equatorial Pacific around 37Ma coinciding with a change in the source of deep waters reaching the low latitudes. However, reconstructed Si concentrations from siliceous sponge spicules are much lower than modern ones, indicating that similar events must have happened after 37Ma leading to modern settings. This project will reconstruct timing and magnitude of the Si concentration increase in the Equatorial Pacific.

In parallel, we are investigating the possibility of species specific fractionation in radiolarians, which may provide information on the living habitat (primarily living depth) of extinct radiolarian species.



Schematic of the change in ocean circulation that occurred around 37Ma in the Pacific. Low Si concentration deep waters coming from the North Pacific are replaced by higher concentration waters originating from the Southern Ocean (Fontorbe et al., 2017). Black circles indicate the approximate paleolocation of IODP Leg 199.