Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.24810

Tracing South Pacific Water Masses using Stable Oxygen Isotopes from GEOTRACES GP17-OCE

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The stable oxygen isotope composition of seawater, $\delta^{18}O_{sw}$, is controlled by mass fractionation of the water molecule during evaporation and precipitation, creating an isotopic fingerprint. Once formed, a water mass at the surface that is subducted retains the $\delta^{18}O_{sw}$ signal and serves as a conservative mass tracer in the ocean, much like temperature and salinity. Despite the abundance of paleoceanographic reconstructions using $\delta^{18}O$ of marine carbonates, which rely on assumptions of seawater $\delta^{18}O$, actual *in-situ* measurements of $\delta^{18}O_{sw}$ are few and far between. This lack of data is particularly prominent in the South Pacific and Southern Oceans.

Over the past several decades, the US GEOTRACES program has collected seawater samples for measurement of trace elements and isotopes across the world's major ocean basins. From December 2022 through January 2023, the GEOTRACES GP17-OCE line that extended from Tahiti to Chile, was completed. The cruise track crossed regions of high oceanographic importance to global nutrient and water mass formation, including the South Pacific Gyre, and the Antarctic Circumpolar Current and the boundaries between these water masses. In total, 722 seawater samples were collected for oxygen and hydrogen isotope analysis from all Ocean Data Facility (ODF) rosette stations and depths on GP17-OCE. Here, we present preliminary $\delta^{18}O_{sw}$ data from the GP17-OCE line, including stations that cross the Subtropical Front, Subantarctic Front, Antarctic Polar Front, and across the Chilean margin. Measured $\delta^{18}O_{sw}$ is used to trace water mass movement throughout the South Pacific and Southern Oceans.