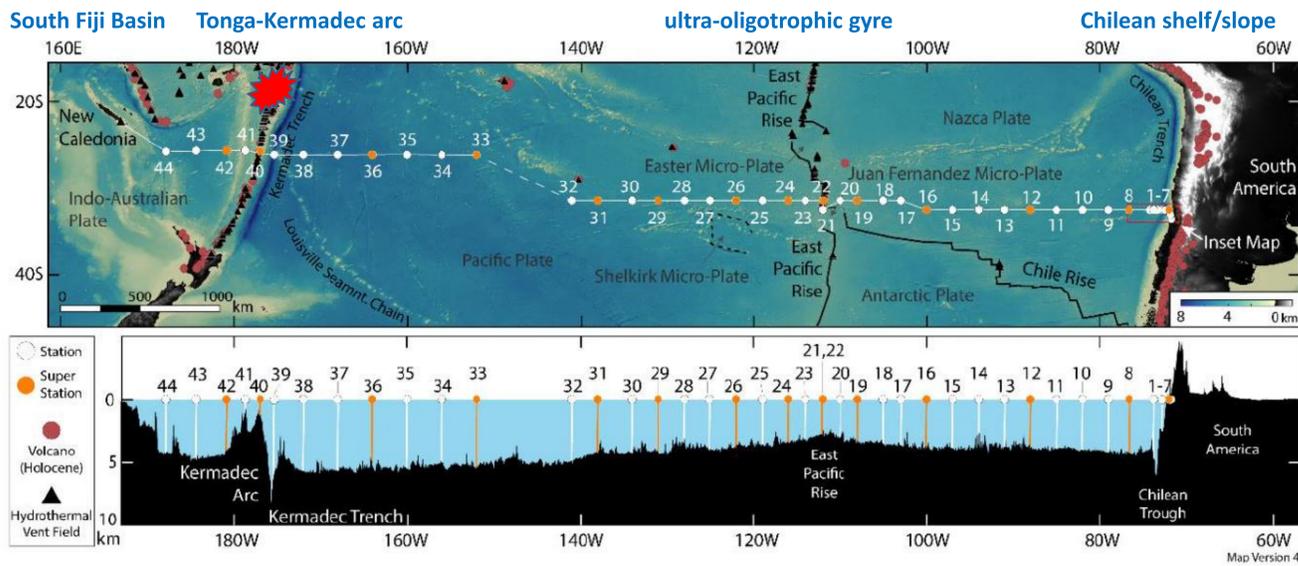


# Tracing TEIs Sources and Water Mass Mixing in the South Pacific Ocean Using Neodymium Isotopes and Rare Earth Elements (SO289)



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## GEOTRACES Subtropical South Pacific GEOTRACES Transect GP21 aboard the R/V SONNE (SO289) (18.02.2022 - 08.04.2022)



15.01.2022  
Hunga Tonga-Hunga Ha'apai eruption

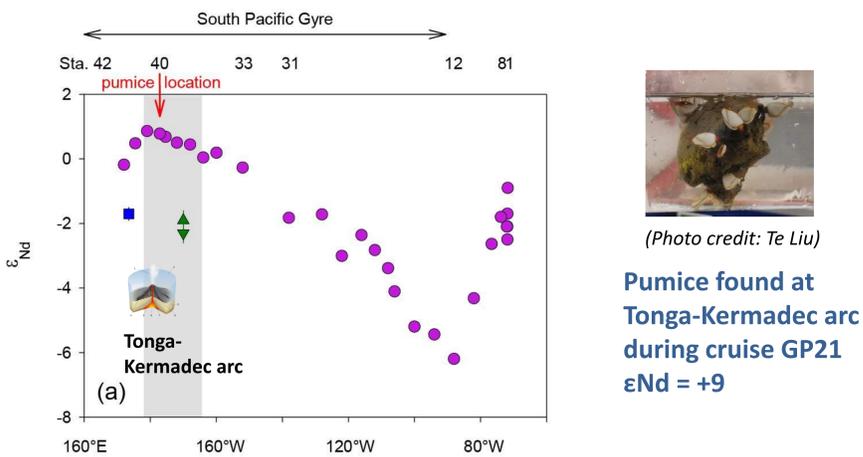


(Photo credit: Tonga Geological Services, via Reuters)

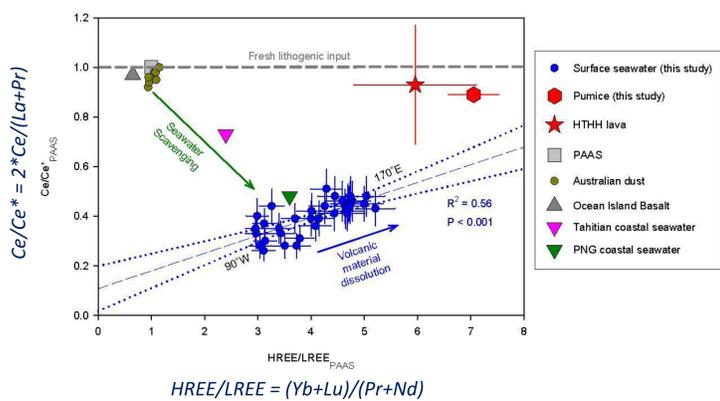
- released the most water vapor into the atmosphere by a volcano on record
- sent a volcanic plume of ash 58 km high into the air
- created floating pumice spreading in the Pacific

### Highlight 1: Nd isotopes and REEs in the surface water trace volcanic input (Zhang et al., 2024)

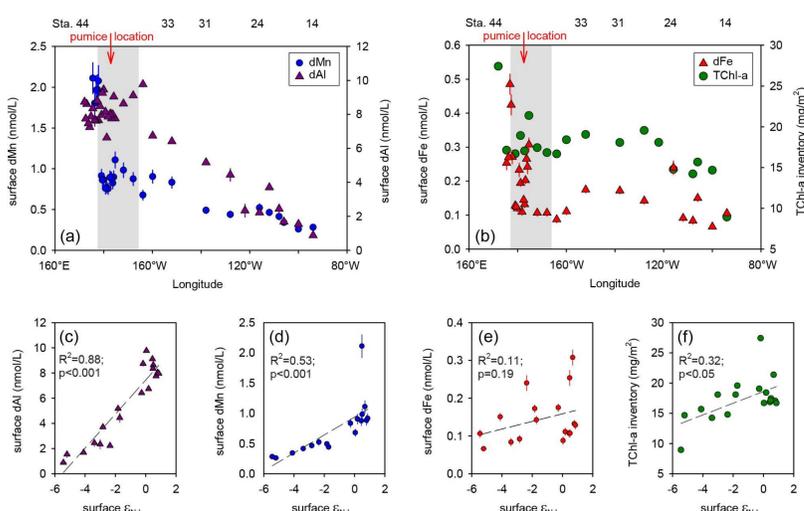
- Changes of Nd isotopes and REE patterns in the surface water



- Surface REEs in the South Pacific subtropical gyre (90°W-175°E)

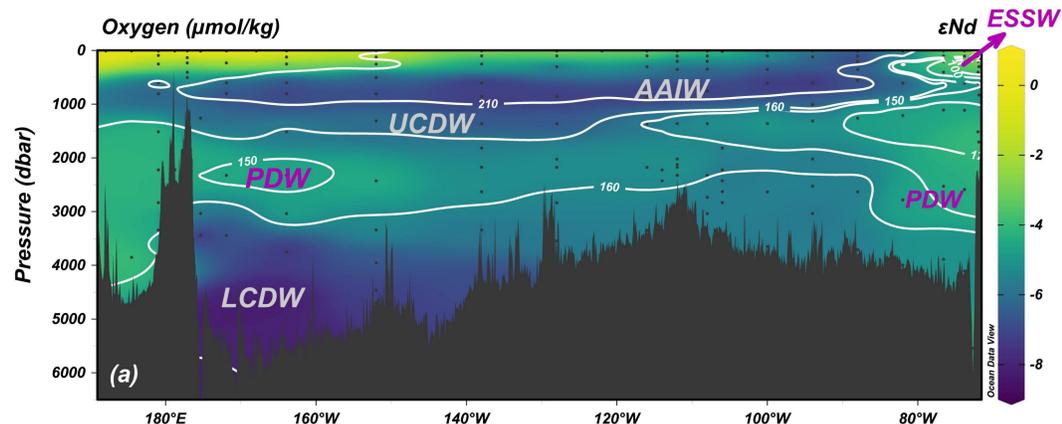


- Response of phytoplankton growth in the gyre



### Highlight 2: Conservative behavior of radiogenic neodymium isotopes in the South Pacific interior (Zhang et al., 2026)

- The distribution of εNd along our transect trace major water masses

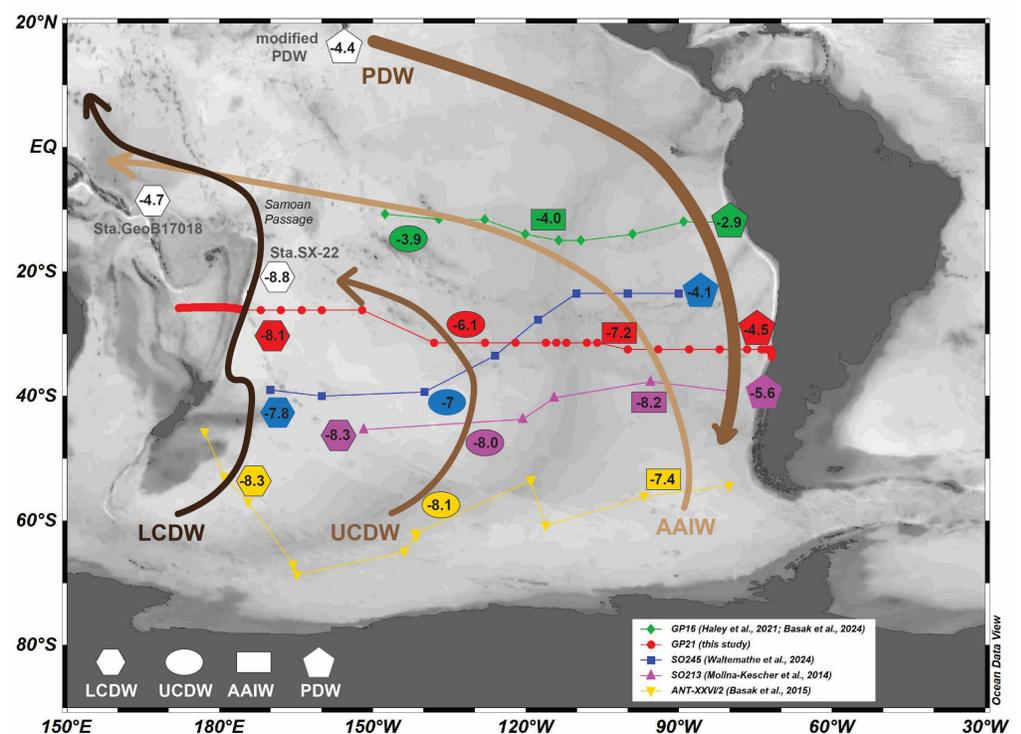


Northward:  
AAIW: Antarctic Intermediate Water  
UCDW: Upper Circumpolar Deep Water  
LCDW: Lower Circumpolar Deep Water

Southward:  
ESSW: Equatorial SubSurface Water  
PDW: Pacific Deep Water

\*Using fractional water mass contributions derived from an Optimum Multi-Parameter Analysis, we found that  $\epsilon Nd$  and  $[Nd]$  concentrations behave conservatively across the oligotrophic South Pacific Gyre, with detectable modifications restricted to the eastern and western boundaries. Figures not shown here.

- Modification of εNd in the cores of water masses in the South Pacific



Zhang, Z., Xu, A., Chen, X., Hathorne, E., Gutjahr, M., Frank, M., 2026. Conservative behavior of radiogenic neodymium isotopes in the South Pacific interior. *Earth Planet. Sci. Lett.* 678, 119850. doi.org/10.1016/j.epsl.2026.119850

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**HELMHOLTZ**