

GEOTRACES GP17 Planning Workshop Statement of Interest for GP17-OCE

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We wish to express our interest in measuring noble gases (including helium isotopes) and along the oceanic leg of US GEOTRACES section GP17-OCE in the Noble Gas Laboratory of the Lamont-Doherty Earth Observatory.

We are particularly interested in using mantle derived helium (indicated by a relatively high $^3\text{He}/^4\text{He}$ ratio) to constrain hydrothermal contributions to trace element and isotope distributions across the South Pacific. Biogeochemical modeling based on previous GEOTRACES observations from the Eastern Pacific Zonal Transect (section GP16) suggests that hydrothermally-sourced dissolved iron may stimulate up to ~15-30% of modern carbon export in the Southern Ocean, south of the Polar Front (e.g., Resing et al., 2015). In this work, we aim to quantify the flux and downstream transport of hydrothermal material emitted from the East Pacific Rise and the Pacific-Antarctic Ridge. Tracking the hydrothermal ^3He tracer across the southern component of GP17-OCE will additionally provide valuable constraints on circulation, upwelling, and ventilation processes in the Southern Ocean.

We seek to collaborate with other GP17-OCE participants to test the hypothesis that hydrothermal iron injected into the deep sea is ultimately transported to the surface waters of the Pacific Southern Ocean, providing a significant nutrient contribution to otherwise iron-limited waters. Our research goals for GP17-OCE support the overall mission of the GEOTRACES program to improve our understanding of the large-scale distribution of trace elements and their isotopes in the marine environment and their role in global biogeochemical cycles.

We are open to coordinating and collaborating with other noble gas groups with similar research interests.