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New Observations on the Origin of Volcanic Elongated Ridges Proximal to the Mid-Pacific Mountains

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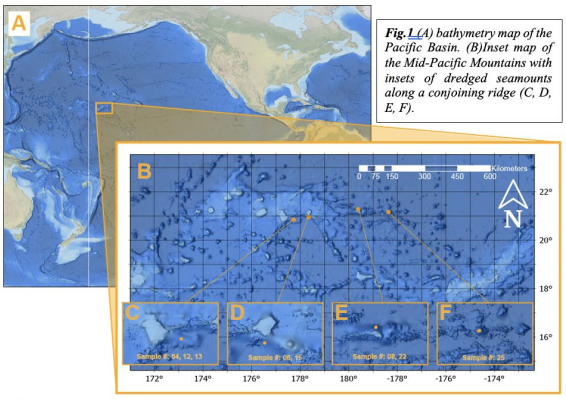


Fig. 1. (A) bathymetry map of the Pacific Basin. (B)Inset map of the Mid-Pacific Mountains with insets of dredged seamounts along a conjoining ridge (C, D, E, F).

The Pacific Plate is home to >40,000 extinct underwater volcanoes (seamounts; Gevorgian et al., 2023) that rise from the ocean crust in various sizes, shapes, and configurations. Less than 10% of these seamounts have been explored, and of these seamounts, the least characterized of all are those of lower volumes present off-axis to hotspot tracks or far from active mid-ocean ridges The Mid Pacific Mountains (MPM) is a prominent oceanic rise south of the Northwestern Hawaiian Ridge on the Pacific Plate. The feature is primarily composed of large guyots that dot a larger basaltic platform with overlying thick deposits of chert and carbonate (Thiede et al., 1981). Several smaller oceanic features including ridges, cones, and seamounts are found proximal to the rise. Here we present new information on a volcanic elongated ridge that potentially formed between the northern guyots on the MPM and a paleo-spreading center. The causal mechanisms and temporal relationship between these features and the plateau are unknown. Using $^{40}Ar/^{39}Ar$ geochronology, we present a suite of age determinations for igneous samples dredged from four locations during expedition TN435 in 2024 (Fig. 1). It is hypothesized that the largest volume of the plateau formed during the early Cretaceous from mantle plume (Thiede et al., 1981). This research tests the hypothesis, that the ridges were formed by channelization of plume melts (e.g. Mittal and Richards, 2017) toward the proximal eastern Pacific-Farallon spreading center in the early Cretaceous. This model can then be extended to explain the presence of similar volcanic ridges throughout the MPM and eastern Hess Rise regions.

References

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