Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.12613

Geochronology of Western Pacific Seamounts: Implications for Absolute Pacific Plate Motion Beyond 80 Ma

SARAH BEETHE[1], ANTHONY KOPPERS[1], EMILY CAHOON[1], JASPER GERARD KONTER[2] AND MATTHEW JACKSON[3]

[1]Oregon State University
[2]University of Hawai'i at Manoa
[3]Department of Earth Science, University of California Santa Barbara

Presenting Author: beethes@oregonstate.edu

Models for hotspot volcanism suggest a rising plume head forming large igneous provinces (LIP) followed by a time-transgressive volcanic track. However, the Ontong Java Plateau (OJP)—the most voluminous LIP in the geologic record—lacks such a volcanic track and most current absolute plate motion (APM) models do not extend 'robustly' prior to 80 Ma as these APM models are confined by the age of subduction of Louisville and Hawaii hotspots. Movement of the Hawaiian hotspot independent from Louisville and Rurutu-Arago during the Emperor Stage between 50-80 Ma further restricts APM modelling beyond 80 Ma. Early paleomagnetic data suggests Louisville as a candidate for OJP's associated hotspot track, though current APM models would require significant plume motion for this to be accurate and rely on atypical structures with unclear relationships to typical hotspot chains. During the KM2201 expedition in the West Pacific Seamount Province dredges were recovered from 42 seamounts along the hypothesized extensions of the Rurutu-Arago and Samoa hotspots to update existing APM models for the Pacific Plate extending up to 120 Ma. By combining Sr-Nd-Pb-Hf isotope fingerprinting and $^{40}Ar/^{39}Ar$ dating of the oldest portion of Rurutu-Arago and Samoa, these hotspot tracks can be adequately defined as long-lived, intraplate anchor points for APM modelling beyond 80 Ma and up to possibly 120 Ma. Rurutu and neighboring Macdonald Hotspot have overlapping unique HIMU composition endmember with a ~10 Myr offset in age progressions. Similarly, late-stage Samoa and Rarotonga and the Cook-Austral Islands have overlapping EM1 isotopic signatures but a ~15 Myr difference in age progressions. $^{40}Ar/^{39}Ar$ dating of recovered basalt phases of hornblende, biotite, plagioclase, clinopyroxene and/or groundmass will be conducted to develop a high-resolution age analysis of these time-transgressive features. We hypothesize that newly defined Rurutu will have a westward age progression from ~80-120 Ma approaching the Mariana's trench. Similarly, Samoa-Magellan will likely continue a northward age progression from ~80-100 Ma. Utilizing $^{40}Ar/^{39}Ar$ dating and Sr-Nd-Pb-Hf isotope geochemistry to develop a high-resolution age vs. composition dataset, we will extend understanding of Pacific plate motion into the Cretaceous and assess the association between OJP and the Louisville Hotspot Trail.