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Complex Pacific Plate Motion Prior to 80 Ma: New Seamount Ages Constrain the Ontong Java Plateau-Louisville Hotspot Relationship

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Though the canonical model for hotspot volcanism suggests a rising plume head forming large igneous provinces (LIP) followed by an age-progressive volcanic track, the Ontong Java Plateau (OJP)—the most voluminous LIP in the geologic record—lacks an obvious volcanic track. Resolving this using absolute plate motion (APM) models is challenging because Louisville and Hawaiian seamounts older than ~80 Ma have been subducted, though OJP erupted ~116 Ma. However, the West Pacific Seamount Province (WPSP) hosts Cretaceous-aged seamounts, and a recently updated APM model (K01M[1]) indicates a connection between OJP and Louisville. Prior to 100 Ma, this model is based on sparse data due to sampling difficulties. Around 100 Myr, Pacific plate motion changes from predominantly N-S to E-W[2], but the nature of this transition is critical for updating Pacific APM models to better test the OJP-Louisville relationship. Furthermore, age-chemistry relationships in the WPSP region are complicated by overprinting of several ancient hotspot tracks. Here, we present 38 new $^{40}Ar/^{39}Ar$ ages (determined on hornblende, plagioclase, clinopyroxene and groundmass) from 20 seamounts in the WPSP sampled during Expedition KM2201. Samples were processed, acid-leached and hand-picked, and analyzed on the ARGUS-VI noble gas multi-collector mass spectrometer in the $^{40}Ar/^{39}Ar$ Geochronology Laboratory at Oregon State University. While attaining ages in this region has been historically difficult due to pervasive alteration, incremental heating of individual mineral separates produced high-resolution (stacked) ages. These ages suggest the WPSP hosts Cretaceous-age progressive seamounts from the Rurutu-Arago and Samoa hotspot tracks, and an additional group of seamounts associated with heretofore unknown hotspots, and reveal true age progressions which increase robustness and resolve data gaps in the Pacific APM during the 80-120 Ma time interval.

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