

Post-emplacement alkalic volcanism on the Ontong Java Plateau revisited: Insights from Lyra Basin basalts

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Post-emplacement volcanism on the Ontong Java Plateau (OJP) is evident both on the islands of Malaita and Santa Isabel in the Solomon Islands, forming its southern margin, and on the plateau itself based on geophysical imaging and occurrence of several atolls, seamounts, and other features of igneous origin. In addition, similar late-stage alkalic seamounts are also identified on Manihiki and Hikurangi plateaus that presumably formed between 70-100 Ma, suggesting similarity with the OJP. The cause for such widespread alkalic volcanism across all three plateaus is poorly understood. Some insights into a possible origin in the case of the OJP may be derived from the alkalic basalts in the Lyra Basin, forming the western margin of the plateau. These lavas also post-date the main emplacement of the OJP by about 60 Ma. Based on our Pb-Nd-Sr-Hf-Os isotope investigation of the alkalic lavas recovered by dredging on the Lyra Basin, we confirm the existence of post-OJP extrusives that may have covered the older plateau lavas in the area. The Lyra Basin alkalic basalts possess Sr-Nd-Pb isotopic compositions that are distinct from those of the OJP tholeiites. They also have Os isotopic compositions that are similar to the range of values determined for the Kwaimbaita-Kroenke-type OJP lavas but their Hf isotopic values are lower. These isotopic compositions do not match any of the Polynesian hot spots well either. Instead, the Lyra Basin lavas have geochemical affinity and isotopic compositions that overlap with those of some alkalic suite and alnoites in the island of Malaita. Although not directly related to the main plateau volcanism at 120 Ma, our geochemical modeling suggests that the origin of the Lyra Basin alkalic rocks may be genetically linked to the mantle preserved in the thick lithospheric mantle root of the OJP.