

The Louisiade Plateau Large Igneous Province in the Coral Sea, northeast of Australia.

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One of the fundamental predictions of mantle plume theory is that the start of the plume should cause a massive outpouring of magma, to form a Large Igneous Province (LIP). Nevertheless, few plume-derived hotspot chains have been conclusively linked with a corresponding LIP. One of the world's most spatially extensive intraplate volcanic regions is located around eastern Australia, including the longest continental hotspot trail and two parallel trails offshore, the Tasmanid and Lord Howe Seamount chains. No LIP has yet been linked to this age-progressive hotspot volcanism, but at the northern (older) end of this region lies the submerged Louisiade Plateau, located in the northern Coral Sea, northeast of Australia. At 100,000 km², this feature is comparable to the Columbia River LIP. In 2019, the rocks of the Louisiade Plateau were sampled for the first time by the Australian research vessel *Investigator*. In this study, we combine bathymetry, geochronology, trace element and isotopic geochemistry, and geophysics to investigate if the Louisiade Plateau could be a LIP linked to the widespread age-progressive volcanism of eastern Australia. Most of the samples recovered are basalts formed via high degrees of mantle melting, consistent with origin as a LIP. ⁴⁰Ar/³⁹Ar analyses of groundmass and plagioclase yielded disturbed spectra due to alteration, constraining the age to between 70 to 50 Ma; additional geochronologic work is being undertaken to further refine the age of mafic eruptions at the plateau. On the north-western end of the plateau, rhyolites are also present, with geochemical signatures characteristic of a substantial input of continental material (e.g., high Pb/Nd and Th/Nb), indicating that at least part of the plateau is underlain by rifted and submerged continental crust, likely in a similar manner to the Kerguelen LIP.