

In this paper we reassess the geochronology and geochemistry of three dredge hauls from the SE corner of the Aves Ridge (Caribbean Sea) originally sampled in 1968 by Duke University's R. V. Eastward. Two hauls consist of light rare earth element-enriched granitoids with a U-Pb zircon emplacement age of 75.9 ± 0.7 Ma. A further haul contains mostly calc-alkaline island arc basaltic andesites of uncertain age. Petrological, trace element and isotopic constraints indicate that the granitoids have an oceanic crustal source and were formed by melting of the lower arc, oceanic or oceanic plateau crust. The mafic rocks formed by partial melting of an incompatible trace element-enriched mantle wedge, which was probably composed of mantle plume material. Both the dredged rocks and data from the Dutch-Venezuelan Antilles indicate a period of west-dipping underthrusting and subduction beneath, or close to, the Caribbean-Colombian Oceanic Plateau between c. 88 and c. 59 Ma, concurrent with collision of part of the plateau with northwestern South America. Constraints from the geochemistry and geochronology of offshore southern Caribbean arc and plateau rocks suggest that in the southern Caribbean there was no pre-existing west-dipping subduction system during formation of the Caribbean-Colombian Oceanic Plateau, whereas long-lived SW-dipping subduction in the northern Greater Antilles is more probable.