SECRETARIA TÉCNICA DE LA CNDM
SUBCOMISIÓN TÉCNICA
Guayaquil
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CARNEGIE RIDGE: A NATURAL PROLONGATION OF THE GALÁPAGOS PLATFORM

(Artículo aceptado y presentado durante la asamblea de la Asociación Geofísica Americana en el año 2005)

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Located between mainland Ecuador and the Galapagos Islands, the Carnegie Ridge is a prominent aseismic ridge, ~1350 km long and up to ~300 km wide, rising ~2000 m above the surrounding seafloor. It is believed to represent the surface expression of the interaction between the Galápagos Hot Spot (GHS) and the Cocos-Nazca Spreading Center (CNSC) during the last ~23 m.y. Within the context of Article 76 of UNCLOS, it could prove problematic to qualify Carnegie Ridge as a natural prolongation of the landmass of mainland Ecuador, in view of the morphological break imposed by the Ecuador Trench. However, it is feasible to consider this ridge as a natural prolongation of the Galapagos Platform, which underlies the Galapagos Islands. Seismic, gravimetric, and radiometric evidence presented by various scientist as part of a variety of studies seems to support the view that Carnegie Ridge is indeed a

natural prolongation of the Galapagos Platform, and that it extends in an easterly direction as a result of the motion of the Nazca Plate over the GHS. Our present knowledge regarding the crustal thickness and particularly the crustal-seismic structure across the Galapagos Archipelago and Carnegie Ridge has been inferred from wide-angle refraction seismic data, employing tomography inversion techniques. The results of these studies show a remarkable similarity of the estimated seismic velocity structures in both features. This supports a common origin and suggests in turn the easterly migration of the hotspot track. The latter notion is further supported by the absence of along-axis structural discontinuities between the Galapagos Platform and the western end of Carnegie Ridge. The separation of Carnegie Ridge into two elongated triangular-shaped parts, with a central bathymetric low (saddle), has been attributed to temporal variations in the relative locations of, and interactions between, the GHS and the CNSC. Rock sample dating, in conjunction with ages determined from paleogeographic reconstruction along the hotspot track, including the saddle area, support an easterly along-axis increase in age. This further corroborates the perception of Carnegie Ridge as an eastward-migrating prolongation of the Galapagos Platform. In a recent study, we determined the long-wavelength crustal structure of Carnegie Ridge between ~81° W and 89° W, employing 2-D forward gravity modeling as the primary analytical technique. Model structures were built by assuming Airy isostasy and crustal layers of constant density. The geometry and density structure of the thickened oceanic crust beneath the ridge were constrained by available seismic velocity models. Except for regions near the Ecuador Trench, the gravity modeling solution along successive transects examined in our study accounted adequately for the observed gravity anomaly field over the ridge. Moreover, the estimated crustal structure along these transects showed remarkable similarities, being mainly characterized by crustal overthickening accommodated in oceanic layer 3.