**GEOMORPHOLOGICAL EVIDENCE OF DROWNED MARINE SHELLES: A REVIEW OF THE OFFSHORE DATA FOR LA GOMERA ISLAND (CANARY ISLANDS)**

**TATIANA IZQUIERDO**, **MANUEL ABAD**, **JOAQUÍN RODRÍGUEZ-VIDAL**

(1) **GROUPO PALEONTOLOGÍA Y ECOLOGÍA AP LICADAS (Q.NM-238), CAMPUS EL CARMEN, 21007 HUELVA, ESPAÑA**
(2) **OPT. GEODÍNAMICA Y PALEONTOLOGÍA, UNIVERSIDAD DE HUELVA, CAMPUS EL CARMEN, 21007 HUELVA, ESPAÑA**

**Abstract**

Bathymetric investigations of the Canary archipelago offshore areas have shown that several of the islands present an insular shelf sculptured in the submarine volcano flanks. This geomorphological feature has also been identified in other oceanic islands around the world, such as the Hawaiian archipelago, and related with subsidence. The non-active and highly eroded island of La Gomera (>20 – 4 Ma) is semi-circular in outline with an east-west diameter of 24 km, a north-south length of 20 km and an area of 378 km². The island’s maximum elevation of 1487 m above sea level (asl) is reached in its centre at Alto de Garajonay whereas the base of the volcanic apron is located at an average depth of 3000 m below sea level (bsl) (Figure 1).

The non-active and highly eroded island of La Gomera (>20 – 4 Ma) does not present a unique shelf but various wide subhorizontal surfaces (slope < 0.5%) that define a staircase morphology observed in the submarine DEM between 30 and 200 m below the present sea-level (Figure 2a). All of them constitute a regional smooth surface that previous authors have interpreted as only one surface related with turbidity current deposition and erosion as well as hemipelagic processes or the result of marine abrasion (Acosta et al. 2003; Llanes et al. 2009). That closer to the island (“I” in Figures 2b and 2c) forms an almost continuous ring along the current coast at 30 m bsl with an average width of 150 m. It is better developed on the northwestern area where it presents more than 1.5 km width. Seawards, a shelf break with slopes ranging from 1-2º in the north and east, and 2-5º in the south and west reaches 100 m bsl (“II” in Figures 2b and 2c). At that depth, a wider shelf is observed from the west to the northeast of the island. This second morphology width varies from 3 to 4 km and although in its northwestern area is not completely continuous it is 37 km long. Its shelf break leads to the volcanic apron except in the southwest, northwest and eastern areas where another two shelves (ca. 1 km wide each, “III” and “IV” in Figures 2b and 2c) can be described at 170 and 200 m bsl. The upper one appears isolated in the northwest and northeast areas whereas the deepest one is located in the north, northeast and southwest. Once the insular slope appears it presents gradients of 5-20º (Figure 2c).

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The depth and morphological features of these submarine terraces suggest the present insular shelf is the result of both the active marine erosion during the Quaternary glacio-eustatic oscillations and the continum subsidence of the oceanic lithosphere due to the volcanic load. Seismic profiles have proved that this flexure is a function not only of the island’s loading history but also of that of the non-active volcanic load. Seismic profiles have proved that this flexure is a function not only of the island’s loading history but also of that of the non-active volcanic load. Seismic profiles have proved that this flexure is a function not only of the island’s loading history but also of that of the non-active volcanic load. Seismic profiles have proved that this flexure is a function not only of the island’s loading history but also of that of the non-active volcanic load.

**Figure 1.** (a) Location of the Canarian Archipelago [I, Lanzarote; FT, Fuerteventura; GC, Gran Canaria; TF, Tenerife; LG, La Gomera; LP, La Palma; EH, El Hierro]; (b) Bathymetry of the Western Canaries (Tenerife, La Gomera, La Palma and El Hierro; 50 m grid); and (c) Bathymetric map of the proximal area to La Gomera Island (50 m grid; contour interval is 50m).

**Figure 2.** (a) Slope map La Gomera derived from the 50 m elevation grid (see Figure 1); (b) Morphological interpretation of La Gomera insular shelf. Dashed line is the limit of the previously identified abrasion platform. Platform I located at -30 m bsl; platform II located at -100 m bsl; platform III at -170 m bsl; and platform IV at -200 m bsl; and (c) Profiles perpendicular to the insular coast where arrows point out the identified shelf (see Figure 2a for location).

**Figure 3.** Correlation between Late Quaternary sea-level fluctuation and main identified drowned shelves for La Gomera Island and simplified evolution model for the vertical movements of these morphologies. Both platforms were probably subaerially exposed during the last 50 ka.

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