

Volcanic island evolution and the environmental impact of volcanic activity: examples from a Cenozoic island arc in the Caribbean

T.A. Jackson

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Trevor A. Jackson, Seismic Research Centre, The University of the West Indies, St Augustine, Trinidad (t_jackson41@hotmail.com).

The different stages of volcanic island evolution are evident in the Cenozoic Lesser Antilles arc. An initial stage of seamount evolution is represented by the Kick-'em-Jenny submarine volcano, located north of Grenada, at the southern end of the arc, and which remains one of the most active volcanoes in the region. The volcanically active islands of the Lesser Antilles are known as the Volcanic Caribbees and extend from Saba in the north to Grenada in the south. They are composed of a series of stratovolcanoes and are examples of an emergent volcanic island stage. Each island contains several extinct volcanic centres, in addition to that which is still active. From the isotopic ages of the ancient volcanic centres, it is apparent that they migrate over time along the volcanic front, thus contributing to the enlargement of the islands and their generally oval shape. Those islands that were formerly active, and now known as the Limestone Caribbees, provide evidence that a drowning island or erosional stage occurred in the northern part of the island arc during the Oligocene and Miocene epochs when volcanism ceased in that region.

Subaerial volcanism in the Lesser Antilles arc is typically explosive with the ejection of large amounts of pyroclastic deposits accompanied with minor periods of effusive dome lava eruptions. The ejecta from these volcanoes have contributed to the destruction of island infrastructure and property, and loss of life. Direct hazards such as pyroclastic flows and surges are the most dangerous of the hazardous phenomena, and are responsible for the annihilation of St Pierre (Martinique) and Plymouth (Montserrat). Indirect hazards such as volcano-tectonic earthquakes and tsunamis have also been responsible for minor damage in the region.