The Lesser Antilles Island Arc is a chain of islands, approximately 850 km long, in the Eastern Caribbean from Sombrero in the north to Grenada in the south. They have been formed at the junction of two tectonic plates. The North American Plate is being subducted beneath the less-dense Caribbean Plate at a speed of approximately two centimetres every year.

The islands are formed from magma derived from the melting of the North American Plate as it goes deeper into the Earth.

The Lesser Antilles Island Arc can be divided into two categories of islands based on geology and because of tectonic adjustments which changed the orientation of the northern section of the subduction zone about 25 million years ago, causing the volcanic front to move west (from the now inactive Limestone Caribbees), creating a new active arc (Volcanic Caribbees).

The Limestone Caribbees refer to islands that had active volcanism between 56 and 28 million years ago. The volcanic products are now partially or totally covered by carbonate deposits (limestone) created from coral reefs. The Limestone Caribbees are therefore the islands located north of Martinique and are - Marie Galante, Grande Terre (of Guadeloupe), La Desirade, Antigua, Barbuda, St Bartholomew, St Martin, Anguilla, Dog and Sombrero.

The Volcanic Caribbees continued to be active after the change and so are made up of volcanic deposits and have higher relief than the Limestone Caribbees and include Grenada, the Grenadines, St Vincent, St Lucia, Martinique, Dominica, Les Saintes, Basse Terre (of Guadeloupe), Montserrat, Redonda, Nevis, St Kitts, St Eustatius and Saba.

Barbados is located approximately 165km east of St Vincent and has no volcanic history. Its basement is composed of sedimentary rocks, on which lie Tertiary aged strata (65-2 million years ago). It lies over the Caribbean-American subduction zone and is one of the few places in the world where an active accretionary prism is subaerially exposed. The rocks are entirely sedimentary (85% of which are reef limestones) in origin except a few volcanic ash bands, demonstrating its geological independence from the volcanic arc.
The Lesser Antilles Island Arc has 11 volcanically active islands that have 21 active volcanoes between them. As a result of this, volcanic eruptions are one of the main hazards that threaten the eastern Caribbean. During the past 200 years over 30,000 people have been killed by volcanic activity in the region, and currently about one million people are threatened by the direct effects of volcanic eruptions and about two and a half million more by related phenomena. Most of the islands of the Lesser Antilles have a single active volcano that may erupt in the future (e.g. Saba, Statia, Nevis, Guadeloupe, St Vincent). The other islands are more complicated, of which Dominica is the most extreme with no less than nine active volcanoes. The 21 most recent eruptions in the Eastern Caribbean have shown a wide variety in both eruptive style and impact on the local population. For example, a minor phreatic eruption in Dominica in 2007 went largely unnoticed and two much more serious eruptions in Guadeloupe in 1956 and 1976-1977 resulted in a 3.5 month evacuation of over 70,000 people. The 1902 eruption from the Soufrière in St. Vincent was an explosive magmatic eruption that resulted in the deaths of at least 1,500 people; in contrast, the 1971-1972 eruption at the same volcano was wholly effusive, and resulted in the formation of a lava dome confined within the summit crater. The 1902-1907 eruption of Montagne Pelée on Martinique is ranked among the world’s most devastating in terms of destruction of lives and property. This eruption was characterised by both effusive dome formation and explosive dome collapse, and led to the total destruction of the town of St Pierre and the deaths of approximately 30,000 people. A similar eruption occurred from Montagne Pelée several years later, between 1929 and 1932, this time with no reported casualties. The Soufrière Hills Volcano on Montserrat has been in active eruption since 1995, and has had a major impact on the island’s population. The eruption is characterised by periods of dome-growth interspersed with dome collapse and minor explosions. The Soufrière Hills Volcano is the only volcano currently erupting in the eastern Caribbean.

One other main hazard and by-product of the active subduction zone that threatens the eastern Caribbean are earthquakes. More than 75% of the world’s earthquakes occur at subduction zones, making the eastern Caribbean highly susceptible to earthquakes. The region experiences on average 1500 earthquakes a year, with more frequent smaller earthquake magnitudes (1, 2, 3, 4) than larger magnitudes (5, 6, 7, 8).