Island Arcs Encyclopedia Article

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An island arc is a curving series of volcanic islands that are created through the collision of tectonic plates in an ocean setting. The particular type plate boundary that yields island arcs is called a **subduction zone**. In a subduction zone, one lithospheric (crustal) plate is forced downward under an upper plate. Continual tectonic movement pushes the lower plate deeper until it reaches a depth where temperatures are sufficient to begin to melt the subducted plate and form magmas. These magmas then rise through fractures and melt their way through the overlying **crust** to be extruded in the form of volcanoes. The volcanoes are generally andesitic in composition. If the overriding plate is oceanic, then volcanoes are extruded underwater and may eventually rise high enough to become islands. The volcanoes form in a line because the angle and rate of subduction, and hence the distance to the depth where **melting** occurs is consistent. Because the surface of Earth is curved, the line of volcanoes forms in an arcuate pattern in much the same manner as an arc is produced when a planar surface intersects a sphere.

Island arcs are usually accompanied by rapid **erosion** and **sedimentation** into accompanying basins. A back-arc basin occurs on the side of the overriding plate and a fore-arc basin forms toward the subducted plate side. Typically, a deep oceanic trench, such as the Marianas Trench, bounds an island arc on the oceanic side beyond the fore-arc basin.

The Aleutian Islands, the islands of Japan, and the Lesser Antilles are all examples of island arcs. The term volcanic arc is often interchanged with island arc, although volcanic arc can also refer to land-based volcanoes produced by subduction. The Andes Mountains are the result of a continental volcanic arc.

See Also

Andesite; Benioff Zone; Subduction Zone