



Geological and structural evolution of Easter Island (Chile).

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Easter Island (Rapa Nui, 27°S, 110°W) is an oceanic intraplate volcanic island, located ~350 km east of the superfast spreading Eastern Pacific Rise. Easter Island is, with Sala y Gomez, the only emerged part of the Easter Seamount Chain (ESC), an E-W trending zone of islands, seamounts and high topography on the Nazca Plate. Recent geophysical and geochemical evidences suggest that ESC is the Easter hotspot track.

Here we consider the structural and volcanological features of Easter Island, and their possible relationships to the regional tectonic setting. In particular, on the basis of original geological field survey and critical re-evaluation of published geochemical and geochronological data, we reconstruct the evolution of Easter Island. This has three main volcanic centers: Poike, Rano Kau and Terevaka. Between 0.75 and 0.30 Ma ago the Poike and Rano Kau volcanoes experienced the same volcanic and structural evolution in three phases: a) the initial emersion of a shield volcano; b) the emission of more viscous and highly porphyritic lava flows and the summit caldera collapse; c) lava dome emplacement, hydro-magmatic explosions and subvolcanic intrusions of silica-rich magma. In the first two phases, volcanic activity occurs from central vents; during the last phase, magma extrusion is strictly controlled by NNE to NE striking fractures. Terevaka is a shield volcano with an explosive summit caldera. In the time span 0.15 – 0.11 Ma BP, several eruptive fractures, N30°-45° and N130° trending, appear on the Terevaka flanks. These feed large lava flows and aligned cinder cones.

Final fissural volcanism of the Poike, Rano Kau and Terevaka volcanoes appears therefore strongly controlled by regional tectonics. NNE to NE striking fracture zones con-

trol the extrusion of the residual magma from shallow magma chambers in the mature phase of Poike and Rano Kau central volcanoes. N30°-45° and N130° fracture zones control the rise of magma of the later Terevaka. Similar structural features are found in the submerged part of Easter Island and the western part of ESC. Indeed, the submarine Rano Kau Ridge extends from the south-western corner of the island for about 50 km in the NE-SW direction. The NE-SW and ESE-WNW tectonic directions are also consistent with the structural framework of the Ahu and Umu Volcanic Fields, two young (estimated age <0.4 Ma BP) submarine volcanic areas west of Easter Island, considered part of the active zone of the Easter hotspot.