



MAGM-1: Arcos magmáticos fanerozoicos

Volcanism and tectonism in the southern Central Andes: Tempo, styles, and relationships

José Antonio Naranjo¹, Víctor Villa¹, Cristian Ramirez¹, Carlos Perez De Arce¹.
(1) Geología Regional, Servicio Nacional de Geología y Minería

An important objective of volcanic research is to establish a cause-and-effect relationship between the age of fault kinematics and volcanic arc evolution based on structural and stratigraphic evidence. The southern part of the Central Andes records the complete development of the late Cenozoic Andean volcanic arc. This study focuses on the interpretation of volcanism and dated tectonic structures between 24.5° and 27°S. This segment consists of hundreds of volcanoes, including constructional and caldera volcanoes. We are able to better constrain the temporal evolution of the central Chilean volcanic arc, including timing and kinematics of regional faults. Recognition of 15 Oligocene to Pleistocene ignimbrites and their sources has allowed us to define 11 caldera systems contemporaneous with effusive constructional volcanoes. Two main NE-SW- and N-S-oriented thrust systems dominate the structural architecture of this segment of the arc. The first, located in the Precordillera, was active between 25 and 14 Ma and extends over 200 km to the northeast through the Pedernales-Arizaro thrust fault. Parallel to this thrust, the east-vergent Antofalla thrust fault system developed during Oligocene-Miocene times. The second system, located within the volcanic arc, includes sinuous N-S contractional structures that developed in pulses between the middle and late Miocene. There appears to be a cause and-effect relationship between tectonic pulses and the development of volcanism, whereby changes in the upper crustal stress field lead to the generation of extensional domains. These conditions favor magma storage at upper crustal levels, thus promoting a suction-pump effect. The coexistence of both dominantly effusive constructional volcanism and explosive caldera volcanism results from the same tectonic conditions that produced shortening, as a consequence of the maximum compressive stress and conjugated extensions. In this work, we suggest a new model that integrates the coexistence and contemporaneity of compressive structures and the widespread development of effusive constructional volcanism and explosive caldera volcanism along the Andean Oligo-Miocene volcanic arc. Este trabajo es parte del programa regular de cartografía del SERNAGEOMIN y contó con el financiamiento del Plan Nacional de Geología-PNG. This work is part of the SERNAGEOMIN's regular mapping program and was supported by the National Plan of Geology-PNG.