



Regional tectonics and resurgence in Pleistocene La Reforma caldera complex, Baja California Sur, Mexico

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La Reforma is a 10 km wide nested caldera complex close to the Santa Rosalía town (Baja California Sur, Mexico). Pleistocene calc-alkaline volcanic activity moved from La Reforma to Sierra Aguajito and finally to Las Tres Vírgenes complex (currently hosting the fourth largest producing geothermal field). The entire region is affected by an active transtensive tectonic regime (NW-SE trending right-lateral faults and NE-SW or N-S conjugate systems). Structures were partly inherited from the Gulf of California proto-gulf orthogonal extension and following oblique rifting phases. Detailed field mapping and structural analysis performed across La Reforma caldera complex during 2015-17 allowed the reconstruction of its geological and structural evolution, highlighting the key role of regional faults in influencing magma trapping and rise, geometry of the caldera collapse and resurgence processes. With regards to recognised evolution phases, a volcanic edifice was built in a shallow marine setting during the pre-caldera phase. The eruption of Los Balcones ignimbrite (1.35 Ma) triggered the formation of a caldera depression, that was then filled by lava flows alternated with scoriae and enlarged by La Reforma ignimbrite eruption (1.29 Ma). The Punta Arena caldera-filling ignimbrite (0.96 Ma) closes the syn-caldera sequence. The post-caldera phase is characterized by effusive activity mainly along ring faults. The trap-door geometry of the caldera collapse is due to the control of the prominent NW-SE regional Santa Ana fault that dissects the complex. The same structure is responsible for the focusing of resurgence in the western sector of the caldera depression, as testified by reverse faults and folds, strong uplift and erosion resulting in the exposure of pre-caldera and Cretaceous basement rocks and in the development of alluvial deposit fans produced by the dismantling of the uplifting resurgent-block. Predominant control of regional structures on resurgence also results in an asymmetrical shape of the resurgent block, bounded by volcanic structures (ring faults) only in the SE sector. On a wider scale, magma trapping and rise to feed La Reforma caldera complex was permitted by the intersection of the regional gulf-inherited Santa Ana fault system with the N-S fault trend developed after the onset of transtensive deformation in the studied region and commonly dissecting multiple scale pull-apart basins.