



Cities on Volcanoes 9
November 20-25, 2016
Puerto Varas, Chile

'Understanding volcanoes and society: the key for risk mitigation'



Eruptive activity in long-lived systems: the Chachani volcanic complex, south Perú

Rigoberto Aguilar^{1, 2}, Jean-Claude Thouret¹, Pablo Samaniego¹, Brian Jicha³, Jean-Louis Paquette¹

¹Laboratoire Magmas et Volcans, Université Blaise Pascal et CNRS, 63038 Clermont-Ferrand, France

²Observatorio Vulcanológico del INGEMMET, Arequipa, Perú.

³Department of Geoscience, University of Wisconsin-Madison, Madison, WI 53706, USA.

Keywords: Chachani volcano, eruptive history, chronology, stratigraphy, petrology

Located in the Frontal Arc of Peruvian Andes c. 20 km north of the city of Arequipa, the Chachani Volcanic Complex (CVC) is one of the most voluminous (c. 154 – 248 km³), fast-growing (c. 1 Myr) complexes in the Central Andean Volcanic Zone. The CVC eruptive history and magmatic growth has been described using detailed mapping, stratigraphy, and ⁴⁰Ar/³⁹Ar and U/Pb ages of twelve edifices. The chronology, location of vents and geochemistry have allowed us to distinguish two groups above the oldest Pre-Chachani (>1.28 Ma) andesitic lava flows and the c. 1.27 Ma-old Yura tuffs. (1) The group of old edifices (<1000 – 640 ka) includes composite cones and the El Colorado dome coulee, all aligned along N130° and N160° tectonic lineaments on the northeast side of the CVC. This group exhibits a wide range of basaltic andesitic to dacitic compositions (53–67 wt.% SiO₂). Plagioclase compositions range from An₈₂?29 and pyroxene is abundant. (2) The young group of edifices (>460 – 56 ka), which has been emplaced along to N70° trend in the central part of the complex, is characterized by a more restricted range of whole-rock (59–64 wt.% SiO₂) and plagioclase (An₆₈?24) compositions and has abundant amphiboles. The young group encompasses three additional composite cones but contains many dome clusters together with the Nevado Chachani stratocone. The temporal-compositional evolution of the CVC lavas suggests that magmas have been homogenized through time. Despite the apparent lack of tephra younger than c. 56 ka, instability of the snow-clad CVC threatens many suburbs that have encroached on the south Chachani slopes up to 10 km away from the summit over the past 20 years. The snowfield and scars of rock avalanches have cut the hydrothermally altered slopes of the Estribo volcano, which may lead to future mass flows.