

The plumbing system of a DECADE volcano: field and petrologic studies of the Galeras volcano, Colombia

L. J. GOMEZ GOMEZ

Colombian Geological Survey and Department of Earth Sciences, University of New Brunswick, Fredericton, New Brunswick E3C 1G1, Canada <Johana.Gomez@unb.ca>

Galeras volcano, one of the most hazardous volcanoes in the world, is located in the southern section of the Colombian Andes mountain range, near the border with Ecuador. It is an andesitic stratovolcano that represents the last stage of the Galeras Volcanic Complex (GVC). The volcano's zone of influence encompasses the city of Pasto, which has approximately 460 000 inhabitants, as well as seven towns and some villages. The proximity of such a large population and its high level of activity makes Galeras one of the best monitored volcanoes in the country.

The GVC reaches an elevation of 4276 m above sea level; the active cone has a height of 150 m and a diameter of about 300 m. It is located inside the youngest amphitheater, which is horseshoe shaped and approximately 3–4 km diameter. This amphitheatre was created by partial collapses on the west flank of the volcano. The active cone is considered to be less than 4500 years old and the age of the complex is at least 1 Ma.

Galeras volcano has a high explosive potential. The most recent activity has been characterized by vulcanian eruptions, the emplacement and destruction of crater domes, eruptions of lava flows, pyroclastic density currents, and pyroclastic falls, as well as lahars and debris avalanches. Gravitational column collapse is the most common origin of the pyroclastic flow deposits. The historic eruptions at Galeras have been small to modest in size, generating an ash column as high as 10 km. Commonly, a large part of the material ejected with each explosion is not juvenile but includes country rock as accessory lithics. The most recent eruption phase started in 1988 after ten years of dormancy. It includes episodes of unrest ranging from weak fumarolic activity and ash emissions, to larger explosive eruptions and high seismic activity before the present-day reactivation. The well-recorded historic activity indicates numerous eruptions since 1580.

Despite the hazard presented by Galeras, there are very few petrologic data on the volcano and no information is available on the magmatic plumbing system. The purpose of my research is: (1) to determine the pressure and temperature conditions of magma storage using mineral – melt thermobarometry; and (2) to decipher, by using zonation in phenocrysts, the transport history of magma from three distinct eruptions that occurred early in the history of the currently active cone.