



Late Holocene phases of dome growth and Plinian activity at Guagua Pichincha volcano (Ecuador)

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Abstract

Since the eruption which affected Quito in AD 1660, Guagua Pichincha has been considered a hazardous volcano. Based on field studies and twenty ¹⁴C dates, this paper discusses the eruptive activity of this volcano, especially that of the last 2000 years. Three major Plinian eruptions with substantial pumice discharge occurred in the 1st century, the 10th century, and in AD 1660. The ages of organic paleosols and charcoal from block-and-ash flow and fallout deposits indicate that these eruptions occurred near the end of 100 to 200 year-long cycles of discontinuous activity which was comprised of dome growth episodes and minor pumice fallouts. The first cycle took place from ~ AD 1 to 140. The second one developed during the 9th and 10th centuries, lasted 150–180 yr, and included the largest Plinian event, with a VEI of 5. The third, historic cycle, about 200 yr in duration, includes pyroclastic episodes around AD 1450 and AD 1500, explosive activity between AD 1566 and AD 1582, possible precursors of the 1660 eruption in the early decades of the 17th century, and finally the 1660 eruption (VEI 4). A fourth event probably occurred around AD 500, but its authenticity requires confirmation. The Plinian events occurred at the end of these cycles which were separated by repose periods of at least 300 yr. Older volcanic activity of similar type occurred between ~ 4000 and ~ 3000 yr BP.

Because ash fallout and related mudflows represent a serious hazard for Quito's metropolitan area, the significance of the increasing phreatic activity observed from 1981 to 1998, and the 1999–2001 magmatic episode of dome growth and collapse are discussed. These probably represent a short step in a longer evolution which may result in a major Plinian event in the future decades or in the next century, comparable to that which occurred during the 1st, 10th, and 17th centuries.

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