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Eruptive chronology of Tungurahua volcano (Ecuador) revisited based on new K-Ar ages and geomorphological reconstructions

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ABSTRACT

This study focuses on the evolution through time of Tungurahua volcano (Ecuador), and provides new information regarding its history. Eighteen new K-Ar ages constrain its construction and the activity of its three successive edifices. We show that the volcano is much younger than expected. Indeed, the older edifice activity only began around 293 ± 10 ka, and ended at 79 ± 3 ka. After ~ 50 ka of quiescence, the second edifice started growing at 29 ± 2 ka after a major sector collapse, and itself collapsed at ~ 3 ka. Since then, the third edifice filled the amphitheatre and is still active. Together with numerical reconstructions of the morphology of the three edifices flanks before erosion, these new ages allow us to quantify the magmatic productivity rates during their construction, from 0.6 ± 0.3 and 0.9 ± 0.2 km³/ka for the two older edifices to 2.5 ± 1.0 km³/ka for the youngest, as well as an erosion rate of

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