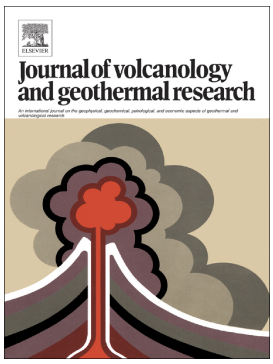

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Persistent growth of a young andesite lava cone: Bagana volcano, Papua New Guinea

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Abstract

Bagana, an andesite lava cone on Bougainville Island, Papua New Guinea, is thought to be a very young central volcano. We have tested this idea by estimating the volumes of lava extruded over different time intervals (1-, 2-, 3-, 9-, 15-, 70-years) using digital elevation models (DEMs), mainly created from satellite data. Our results show that the long-term extrusion rate at Bagana, measured over years to decades, has remained at about 1.0 m^3s^{-1}. We present models of the total edifice volume, and show that, if our measured extrusion rates are representative, the volcano could have been built in only ~300 years. It could also possibly have been built at a slower rate during a longer, earlier period of growth. Six kilometres NNW of Bagana, an andesite-dacite volcano, Billy Mitchell, had a large, caldera-forming plinian eruption 437 years ago. We consider the possibility that, as a result of this eruption, the magma supply was diverted from Billy Mitchell to Bagana. It seems that Bagana is a rare example of a very youthful, polygenetic, andesite volcano. The characteristics of such a volcano, based on the example of Bagana, are: a preponderance of lava products over pyroclastic products, a high rate of lava extrusion maintained for decades, a very high rate of SO_2 emission, evidence of magma batch fractionation and location in a trans-tensional setting at the end of an arc segment above a very steeply dipping and rapidly converging subduction zone