



The Tempo of Recent Volcanism on Terceira, Azores

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Terceira is an active volcanic island with offshore eruptions recorded in the 19th and 20th centuries. It is constructed by three main volcanic centres aligned along a NW-SE-trending fissure zone. Eruptions from vents along this main fissure zone are a persistent feature in the island's history, including the two recent offshore eruptions in 1867 and 1995-2002, and the 1761 basaltic eruption, the only recorded historic event on the island that has been inhabited since about 1485 AD. Early work [1] on the volcanic succession of the island established a stratigraphic sequence for the Upper Terceira Group (UTG), the on-land products of the past ~ 20,000 years of volcanism, with very little chronological control. Since then, two more studies have added detail on the timing of eruptions in the UTG and the older history of the island, including ignimbrite-forming eruptions and volcano-building lavas, using both ^{14}C and $^{40}\text{Ar}/^{39}\text{Ar}$ dating [2, 3]. Further age determinations have been made and are reported here together with a reassessment of the stratigraphic significance of some of the ages obtained in the past.

We present here an estimate of the number and type of eruptions in the UTG, concentrating on the last 3,000 years. Ignimbrite-forming eruptions have not occurred since one or two events took place 20-23,000 years ago [3] from the northern caldera of the Pico Alto-Guilherme Moniz volcanic centre, the middle of the three main central volcanoes. The Santa Barbara composite volcano has a record of 12-14 eruptions over the past three millennia; all but one formed comendite-pantellerite lava domes and coulées, of which three were preceded by explosive sub-plinian phases forming tephra-fall deposits. One flank eruption formed a basaltic scoria cone and lava flow. In approximately the same time period, Pico Alto-Guilherme Moniz produced 11-14 eruptions from the northern caldera (Pico Alto), all of which formed comendite-pantellerite lava domes and coulées, with one or two preceded by explosive sub-plinian phases. Uncertainty in the number of eruptions is due to lack of knowledge about the number of events contributing to some of the complex clusters of lava domes. The fissure zone hosted 6-7 basaltic-intermediate scoria/spatter cone and lava-forming eruptions during the past 3,000 years, and one event that formed comenditic trachyte lava domes. Thus, Terceira's volcanoes contribute to a rapid tempo of volcanism, having recently produced an eruption approximately every century, but clustering is evident in the chronological record. Interestingly, there is no reported historic on-land eruption in the ~ 300 years between colonization and 1761. We hope to improve our understanding of the tempo of volcanism on Terceira as more age determinations are performed. Furthermore, it is known that there are more eruptive units than accounted for in the UTG stratigraphy, thus the numbers of events must be considered a minimum.

References: [1] Self, S. (1976). The Recent volcanology of Terceira, Azores. *J. Geol. Soc. Lond.* 132, 645-666. [2] Calvert, A.T., Moore, R.B., McGeehin, J.P., Rodrigues da Silva, A.M. (2006). Volcanic history and $^{40}\text{Ar}/^{39}\text{Ar}$ and ^{14}C geochronology of Terceira Island, Azores, Portugal. *J. Volcanol. Geotherm. Res.* 156, 103-115. [3] Gertisser, R., Self, S., Gaspar, J.L., Kelley, S.P., Pimentel, A., Eikenberg, J., Barry, T.F., Pacheco, J.M., Queiroz, G., Vespa, M. (2010). Ignimbrite stratigraphy and chronology on Terceira Island, Azores. *Geol. Soc. Amer. Spec. Paper* 464, 133-154.