



Revisiting the subaerial AD 1580 and AD 1808 volcanic eruptions at São Jorge Island (Azores archipelago, Portugal)

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At least 28 volcanic eruptions were reported at the Azores archipelago since the settlement of the islands in the 15th Century. Two of them occurred on the emerged portion of São Jorge Island (AD 1580 and AD 1808) and a third event occurred offshore the south-western side of the island in AD 1964. São Jorge Island is a 55 km long and 6.5 km wide basaltic volcanic ridge with main WNW-ESE direction. The two subaerial eruptions occurred along fissures that opened for several kilometres and produced multiple lava flows from numerous vents active at the same time, which descended the steep southern slopes of the island. The total number of casualties (about 45, from historical reports) ranked these eruptions as the second (1808) and third (1580) deadliest volcanic events in the Azores after the 200 deaths caused from the AD 1630 subplinian eruption from Furnas Volcano (São Miguel Island).

The temperate and humid weather of the archipelago largely favours the rapid growth of lush vegetation, which hinders outcrops and hampers the access to eruption sites. In addition, a substantial landforms reshaping by local inhabitants aiming at recuperating croplands and the diffuse quarrying on the island masked the geological features generated during these recent volcanic events. In this study, through an integrated methodological approach, we understood the chronological sequence of the volcanic events and we traced back and mapped the location of the vents and the extension of the lava flows. We also clarified the mechanisms that determined the high number of casualties associated to these events. The objectives have been accomplished through the re-interpretation of the historical accounts and reports of local inhabitants, integrated by field surveys, aerial photographs interpretation, petrography and geochemistry of the erupted products. Our results highlight the importance of a multi-hazard evaluation for these volcanic events, which due to the particular morphology of the island represent the “type-eruption” expected at São Jorge Island. Furthermore, these geo-volcanological maps should constitute the basis for the conservation of the geological heritage of the island.