La Palma Earthquakes Mechanism

Steve Purves

Rowan Cockett

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Abstract

In September 2021, a significant jump in seismic activity on the island of La Palma (Canary Islands, Spain) signaled the start of a volcanic crisis that still continues at the time of writing. Earthquake data is continually collected and published by the Instituto Geográphico Nacional (IGN). …

## 1 Introduction

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plt.figure(figsize=(6, 1))  
plt.eventplot(eruptions, lineoffsets=0, linelengths=0.1, color='black')  
plt.gca().axes.get\_yaxis().set\_visible(False)  
plt.ylabel('')  
plt.show()

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| Figure 1: Timeline of recent earthquakes on La Palma |

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Based on data up to and including 1971, eruptions on La Palma happen every 79.8 years on average.

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Studies of the magma systems feeding the volcano, such as Marrero et al. (2019), have proposed that there are two main magma reservoirs feeding the Cumbre Vieja volcano; one in the mantle (30-40km depth) which charges and in turn feeds a shallower crustal reservoir (10-20km depth).

A prior study of the magma systems feeding the volcano proposed that there are two main magma reservoirs feeding the Cumbre Vieja volcano (Marrero et al. 2019) .

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Eight eruptions have been recorded since the late 1400s ([Figure 1](#fig-timeline)).

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Data and methods are discussed in [Section 2](#sec-data-methods).

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Let denote the number of eruptions in a year. Then, can be modeled by a Poisson distribution

where is the rate of eruptions per year. Using [Equation 1](#eq-poisson), the probability of an eruption in the next years can be calculated.

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| Table 1: Recent historic eruptions on La Palma   | Name | Year | | --- | --- | | Current | 2021 | | Teneguía | 1971 | | Nambroque | 1949 | | El Charco | 1712 | | Volcán San Antonio | 1677 | | Volcán San Martin | 1646 | | Tajuya near El Paso | 1585 | | Montaña Quemada | 1492 | |

[Table 1](#tbl-history) summarises the eruptions recorded since the colonization of the islands by Europeans in the late 1400s.

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| Figure 2: Map of La Palma |

La Palma is one of the west most islands in the Volcanic Archipelago of the Canary Islands ([Figure 2](#fig-map)).

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| Figure 3: Locations of earthquakes on La Palma since 2017. |

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[Figure 3](#fig-spatial-plot) shows the location of recent Earthquakes on La Palma.

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## 2 Data & Methods

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## 3 Conclusion

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## References

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Marrero, José, Alicia García, Manuel Berrocoso, Ángeles Llinares, Antonio Rodríguez-Losada, and R. Ortiz. 2019. “Strategies for the Development of Volcanic Hazard Maps in Monogenetic Volcanic Fields: The Example of La Palma (Canary Islands).” *Journal of Applied Volcanology* 8 (July). <https://doi.org/10.1186/s13617-019-0085-5>.