La Palma Earthquakes Mechanism

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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). …

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()
```

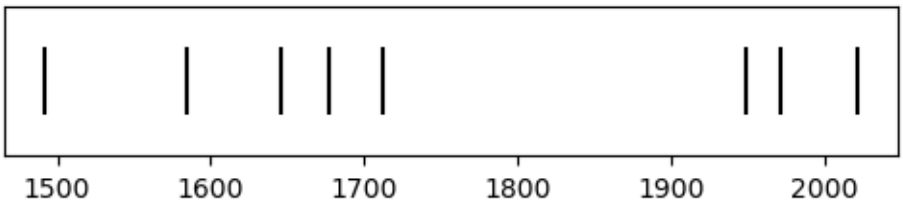

Figure 1: Timeline of recent earthquakes on La Palma

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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.[1], 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[1] .

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Eight eruptions have been recorded since the late 1400s (Figure 1).

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Data and methods are discussed in Section .

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

$$p(x) = \frac{e^{-\lambda}\lambda^x}{x!} \tag{1}$$

where λ is the rate of eruptions per year. Using Equation 1, the probability of an eruption in the next t 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 summarises the eruptions recorded since the colonization of the islands by Europeans in the late 1400s.

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La Palma is one of the west most islands in the Volcanic Archipelago of the Canary Islands (Figure 2).

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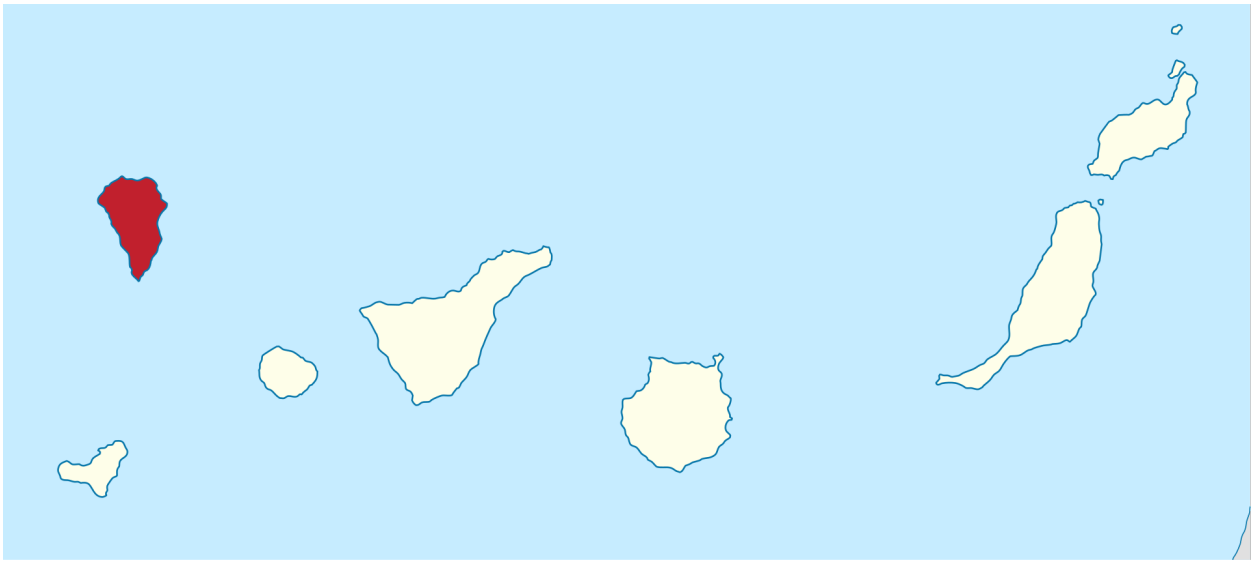

Figure 2: Map of La Palma

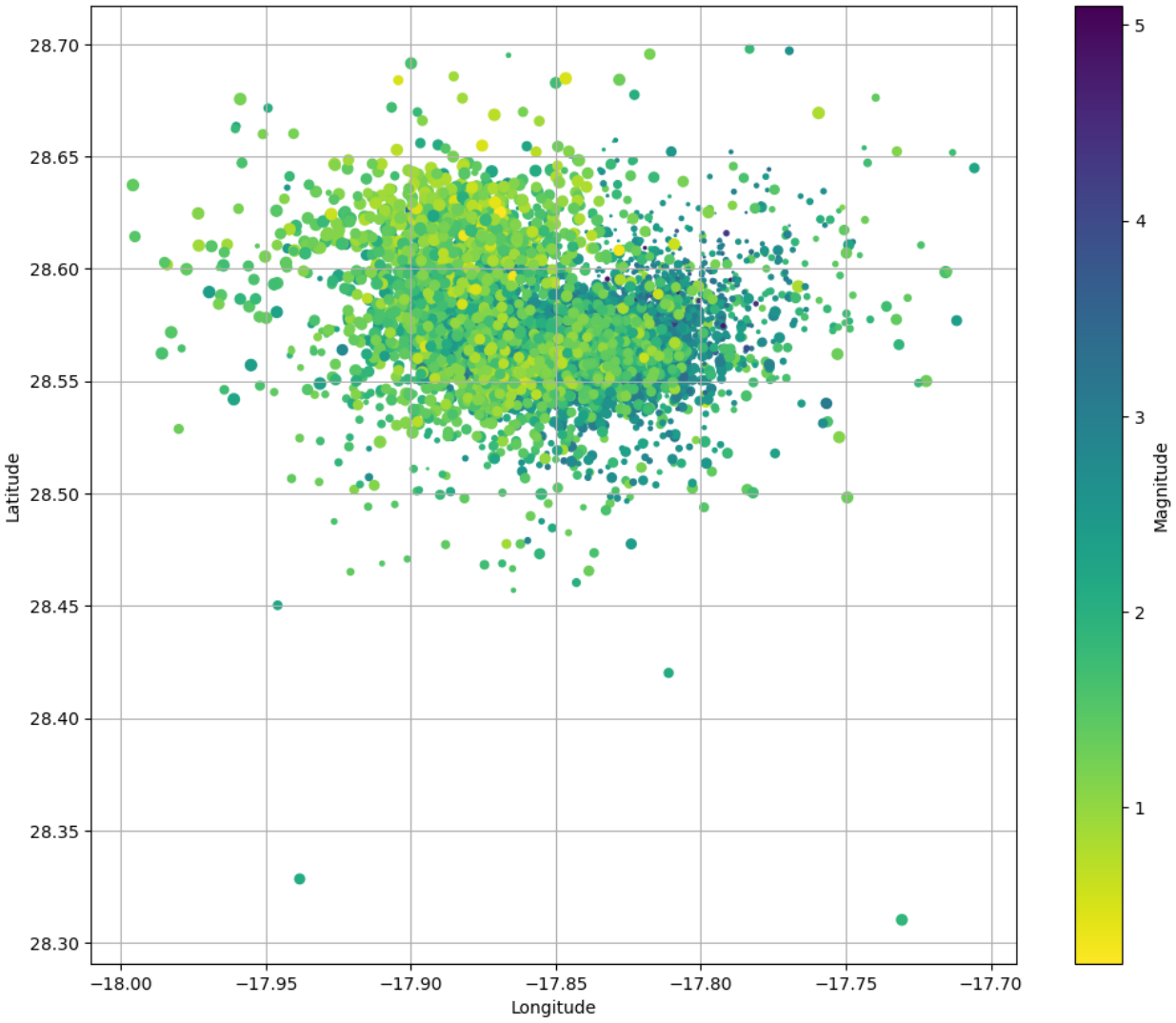

Figure 3: Locations of earthquakes on La Palma since 2017.

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Figure 3 shows the location of recent Earthquakes on La Palma.

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Data & Methods

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Data and methods are discussed in Section

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Conclusion

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References

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References

(1) Marrero, J.; García, A.; Berrocoso, M.; Llinares, Á.; Rodríguez-Losada, A.; Ortiz, R. Strategies for the development of volcanic hazard maps in monogenetic volcanic fields: the example of La Palma (Canary Islands). *Journal of Applied Volcanology* **2019**, *8*.