UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Dipartimento
di Fisica
e Astronomia
Galileo Galilei

Temporal and spatial analysis of earthquakes in Italy in the last century

Jamilov Javlon, Pirazzo Tommaso, Secco Benedetto

14 luglio 2025

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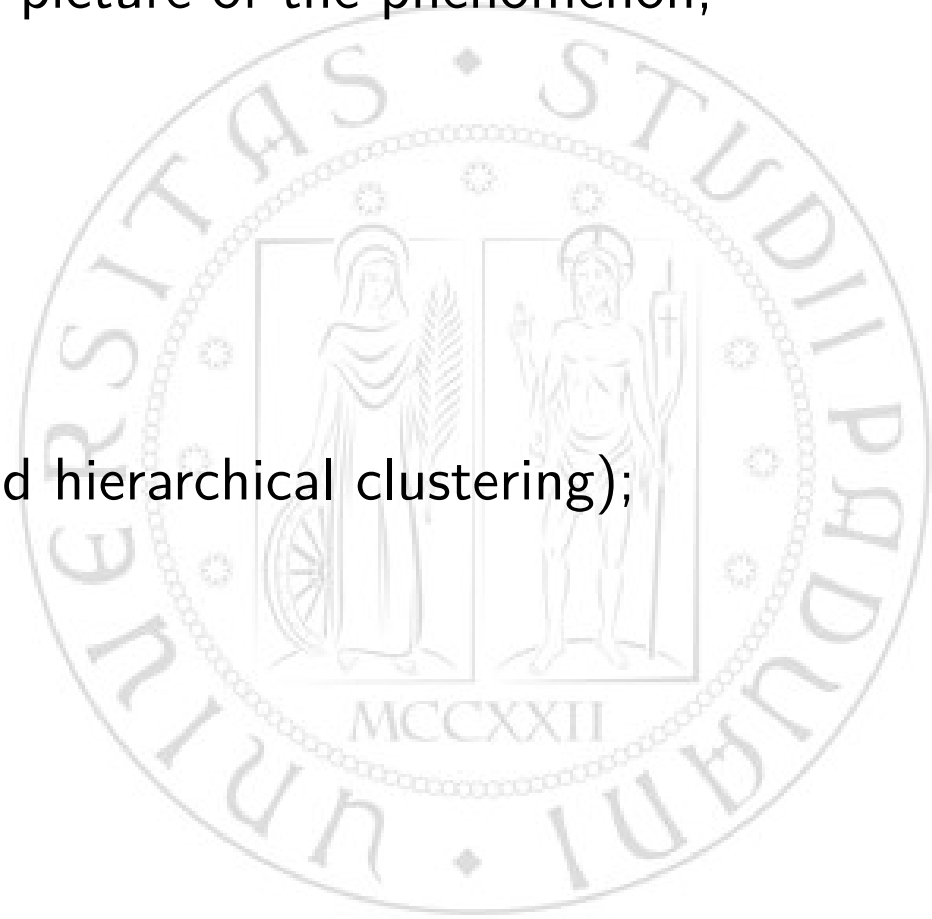

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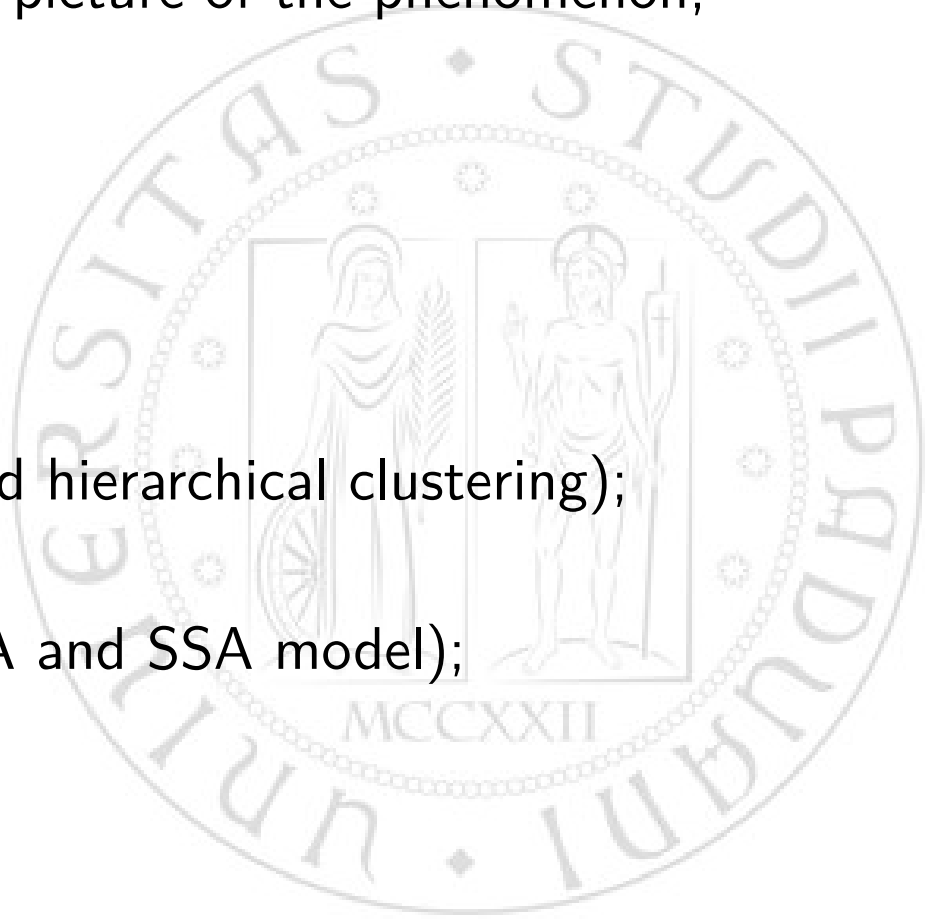

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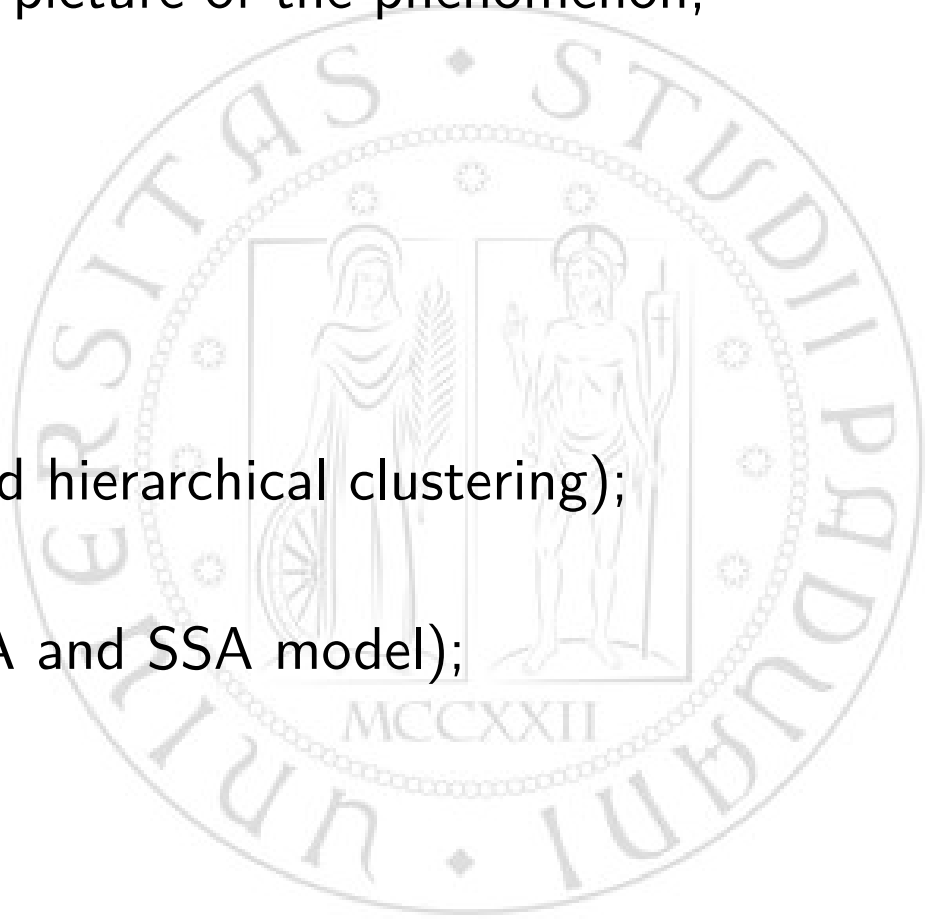

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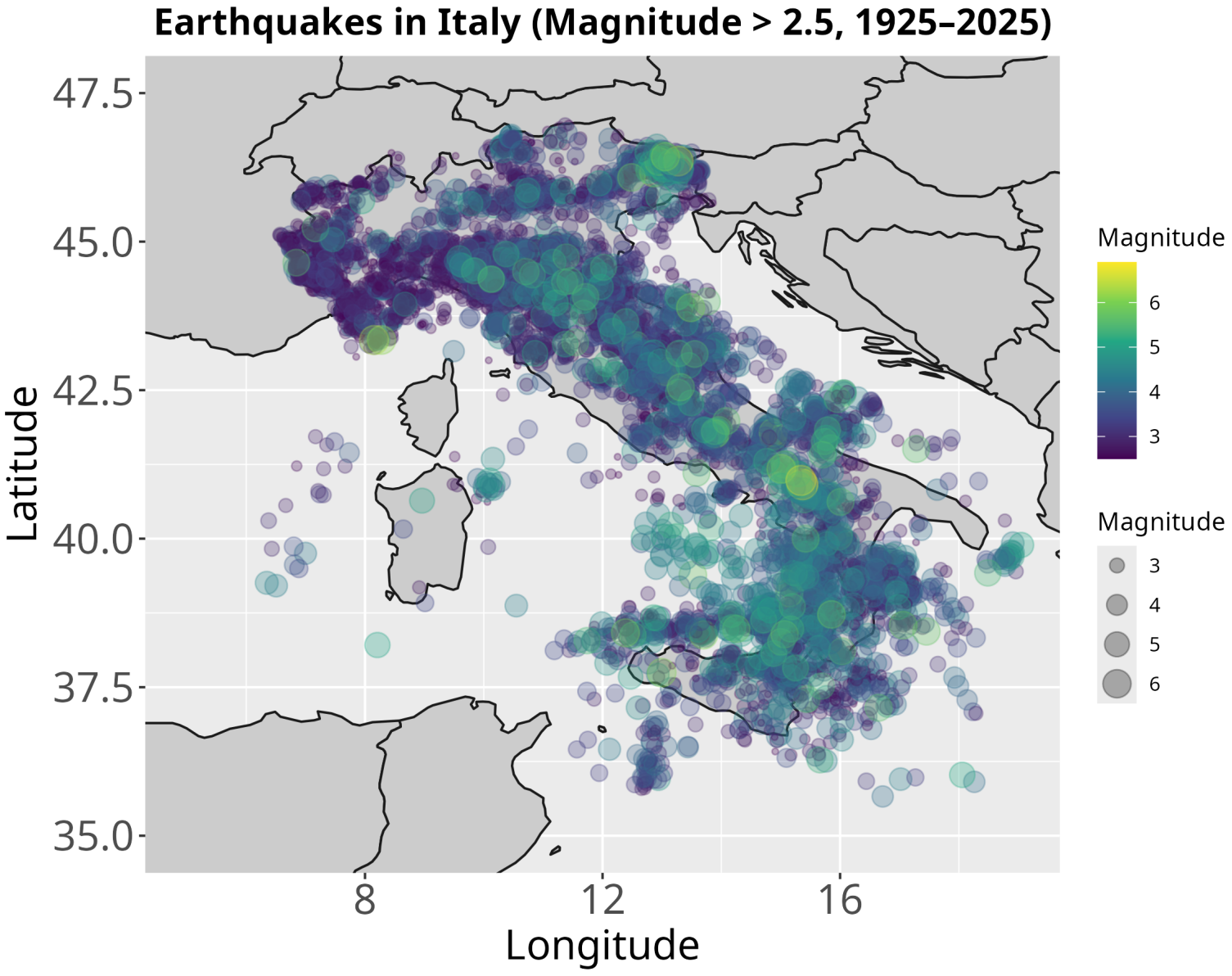
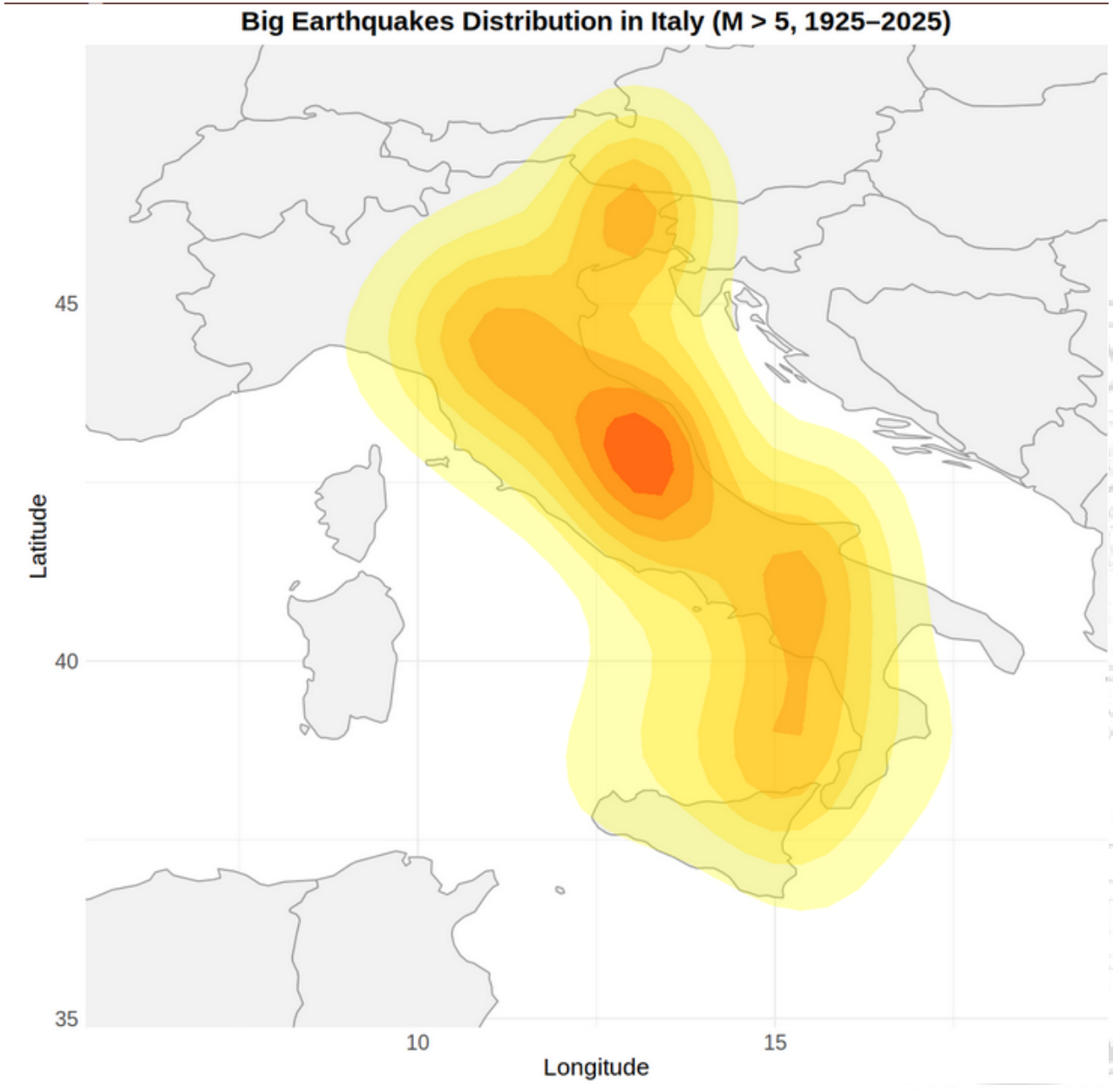


Focus on high magnitude events



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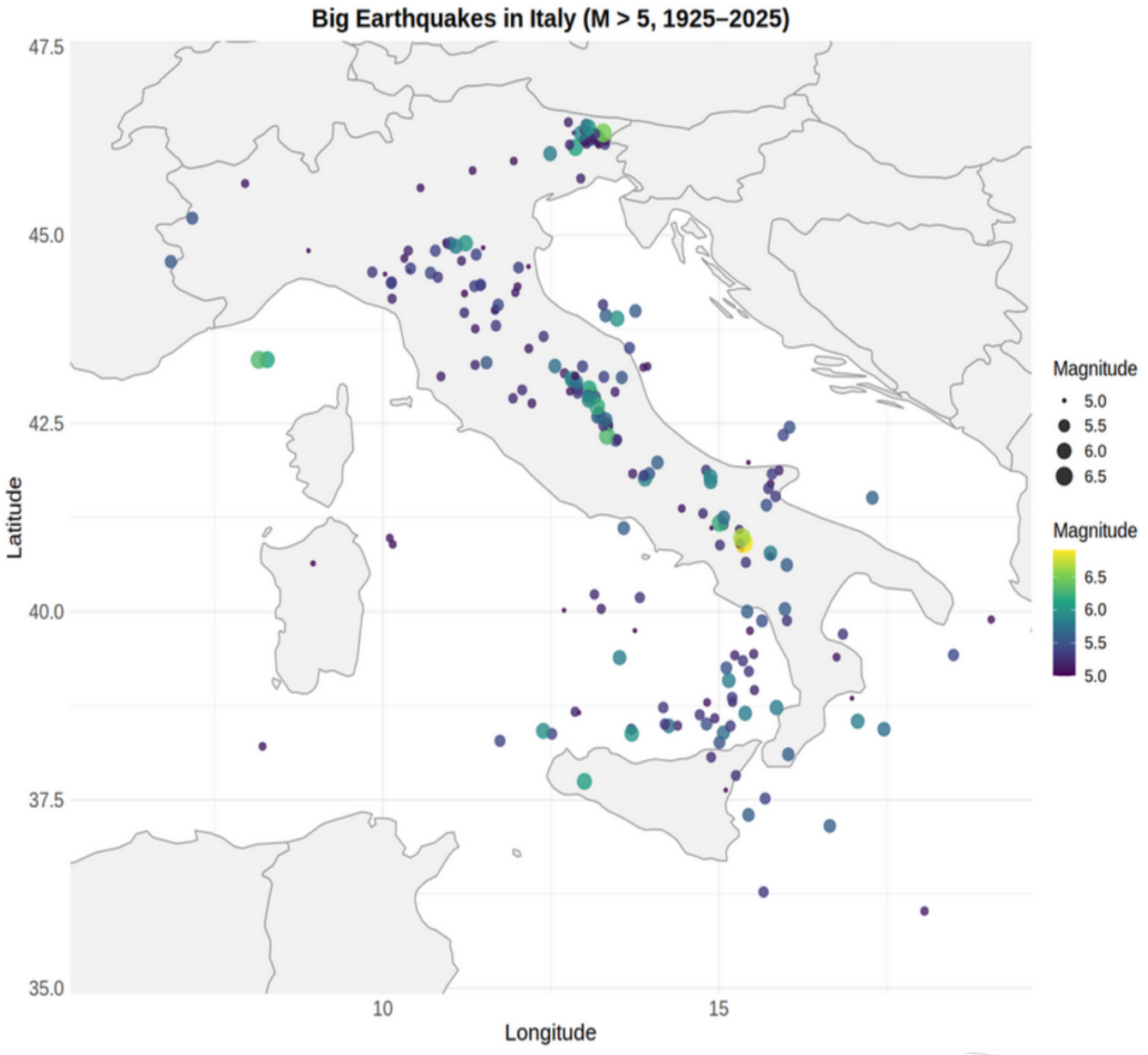

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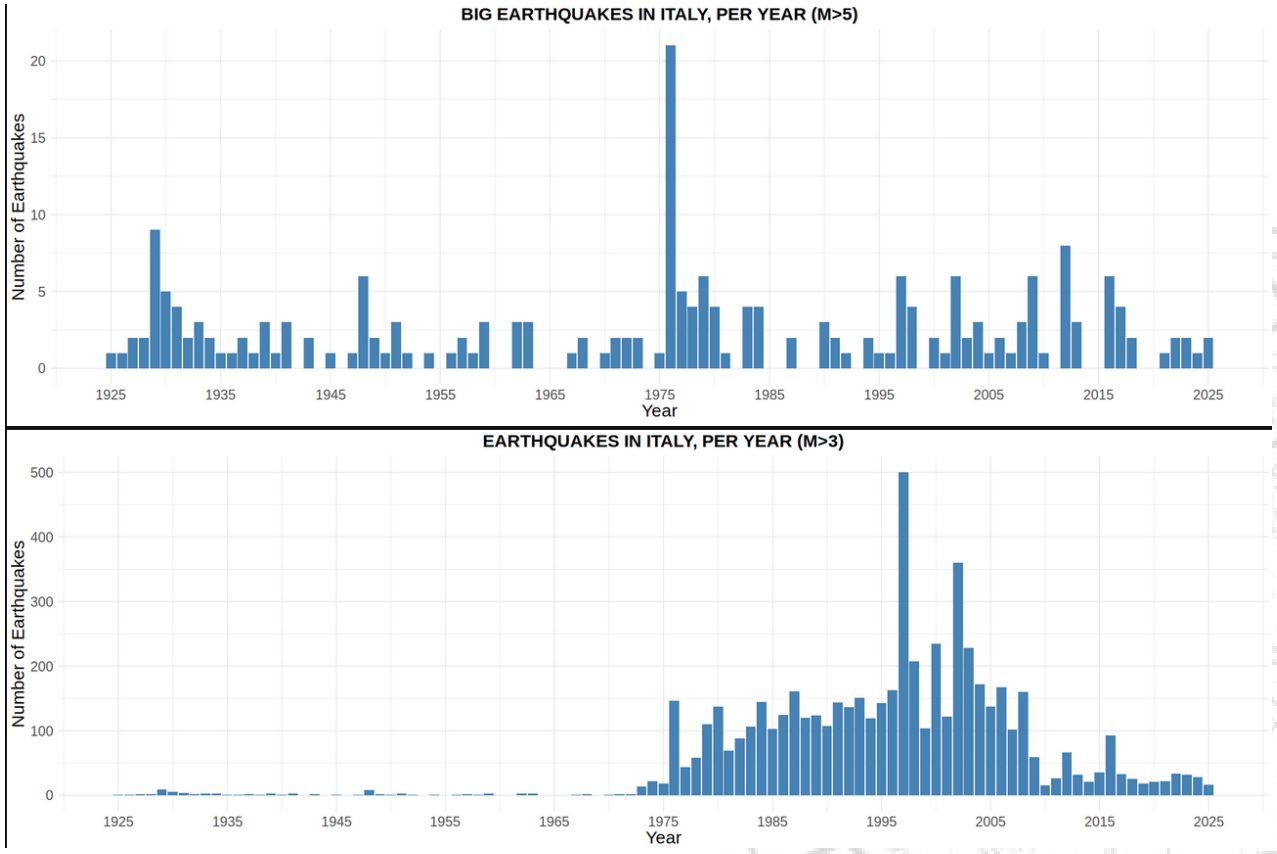

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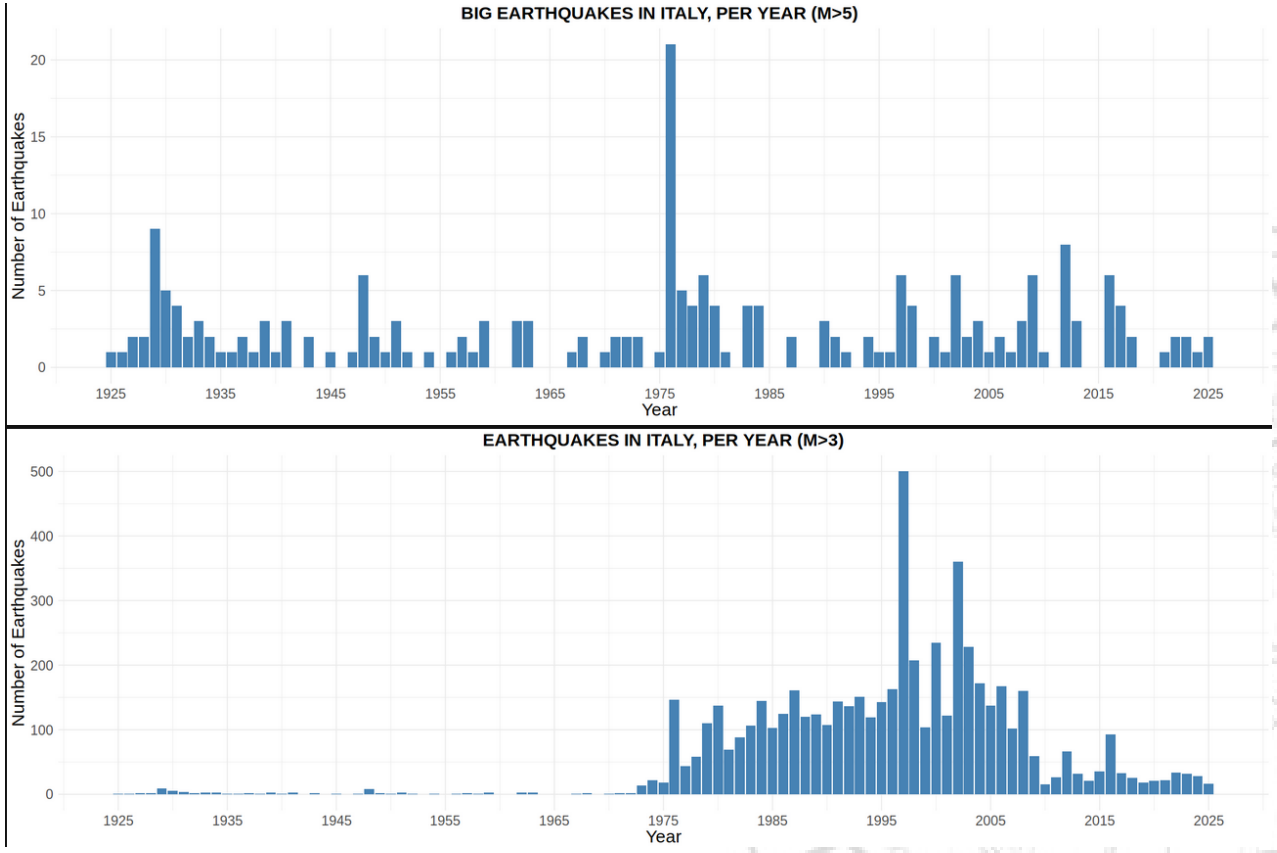
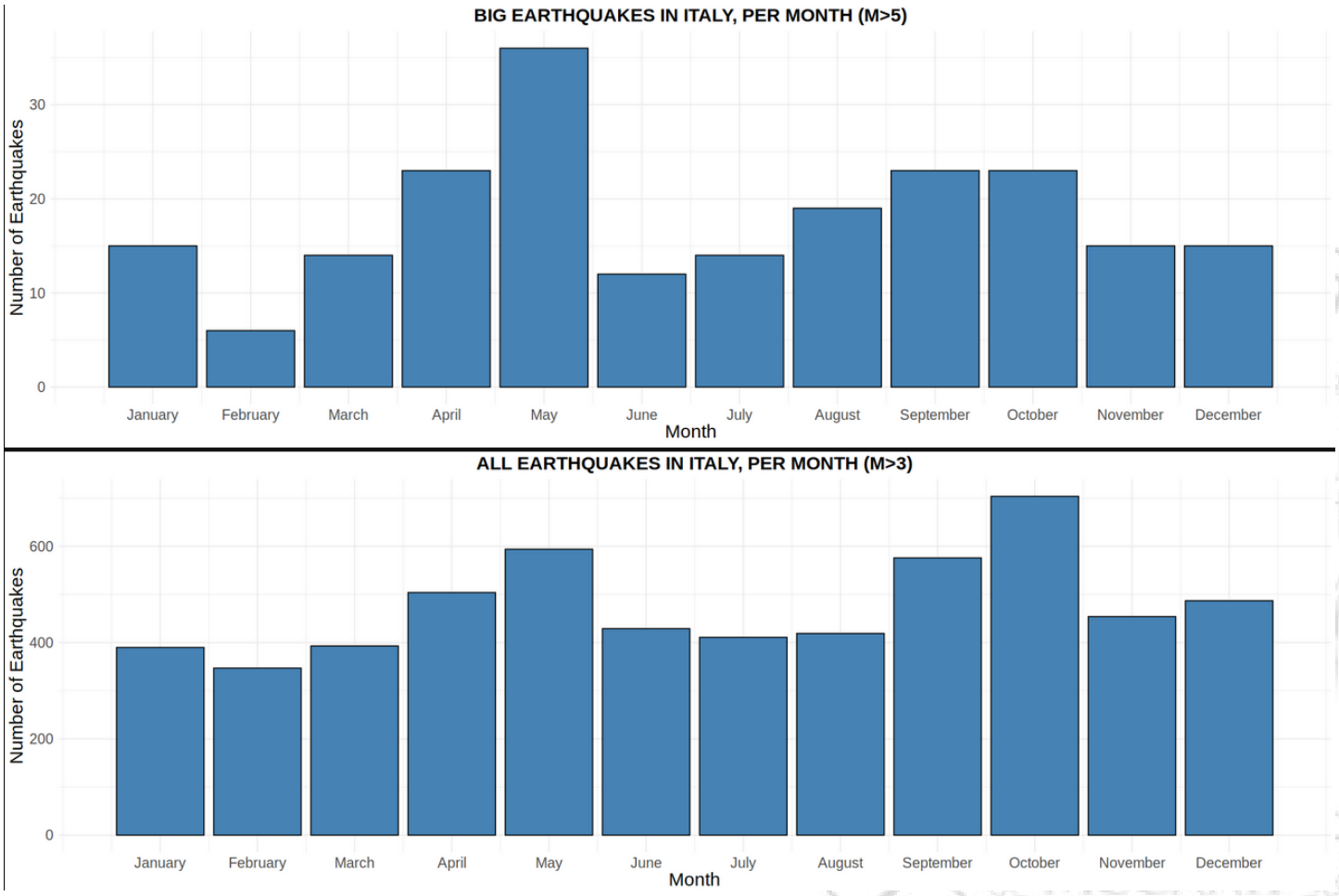
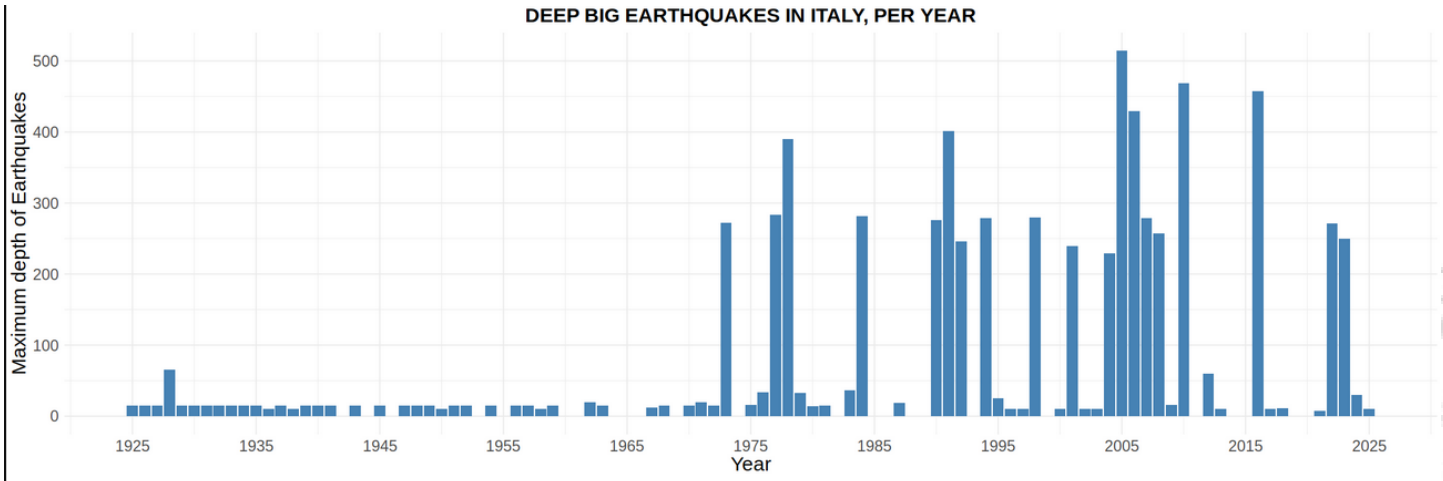


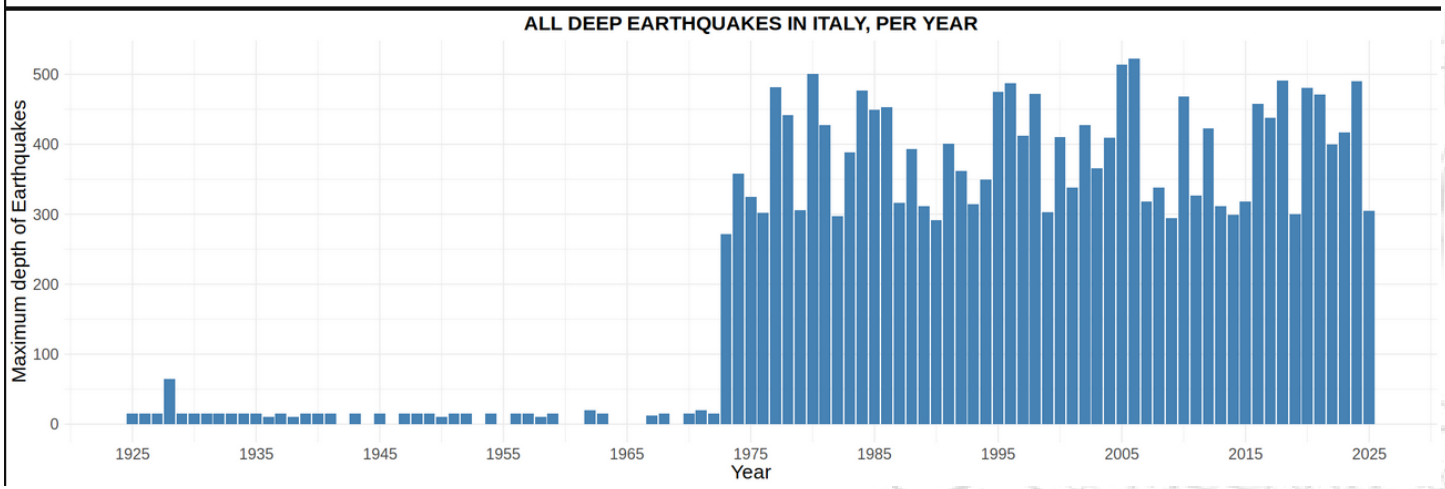
Bad technology....

Seasonality?



Depth histograms





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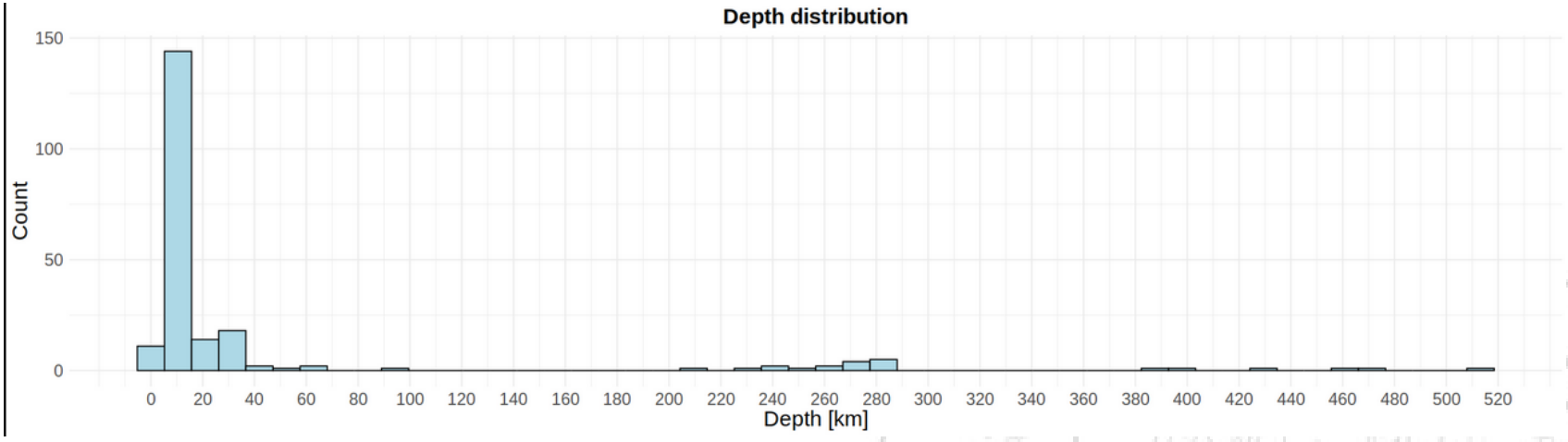

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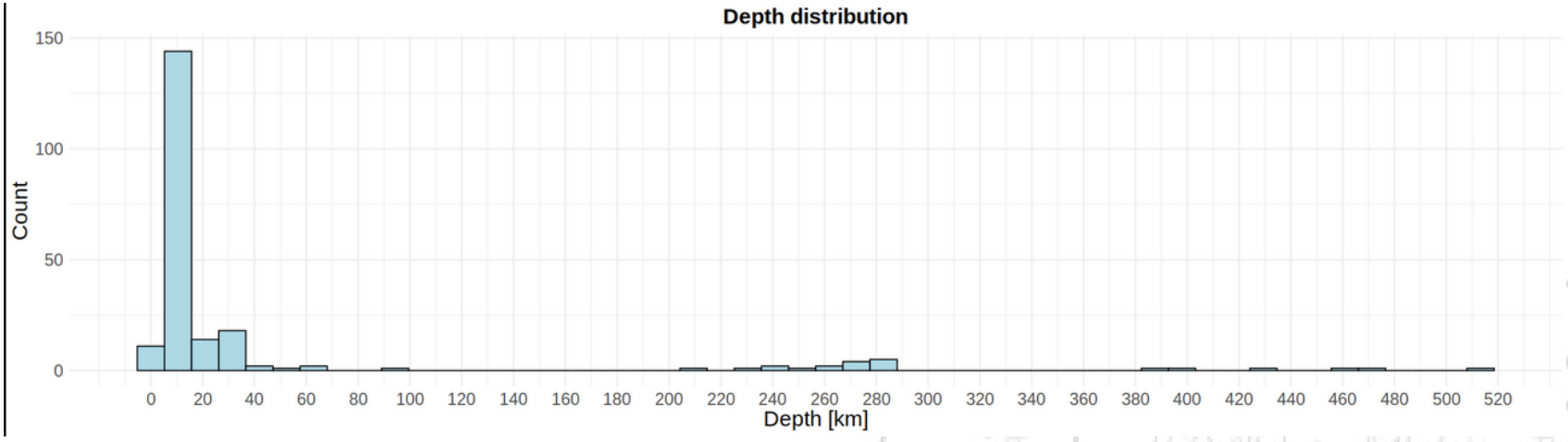

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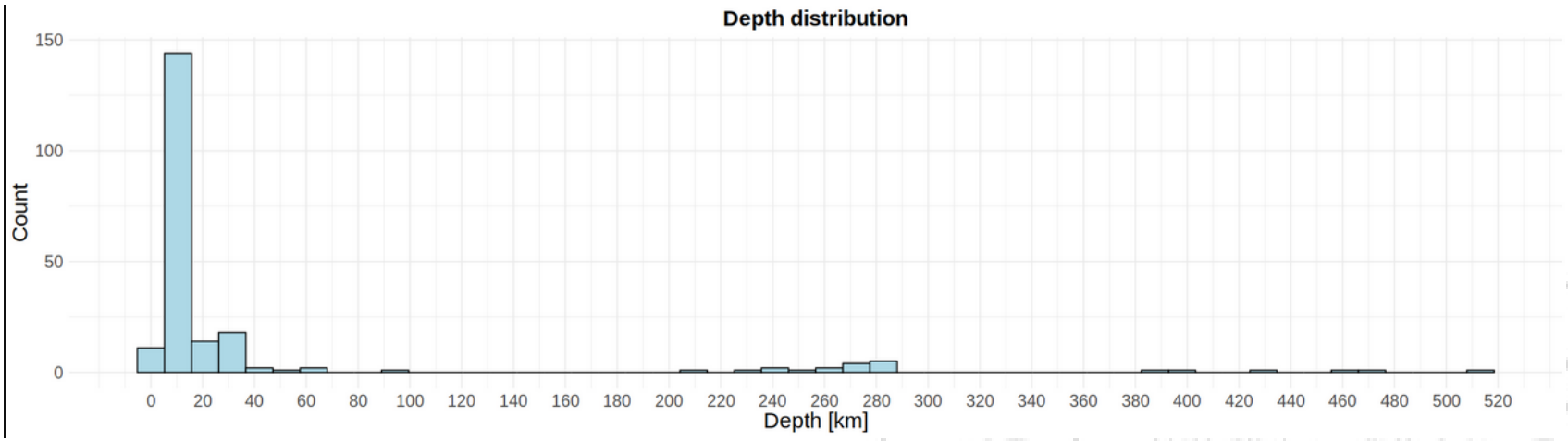

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- $230 - 290\ km$

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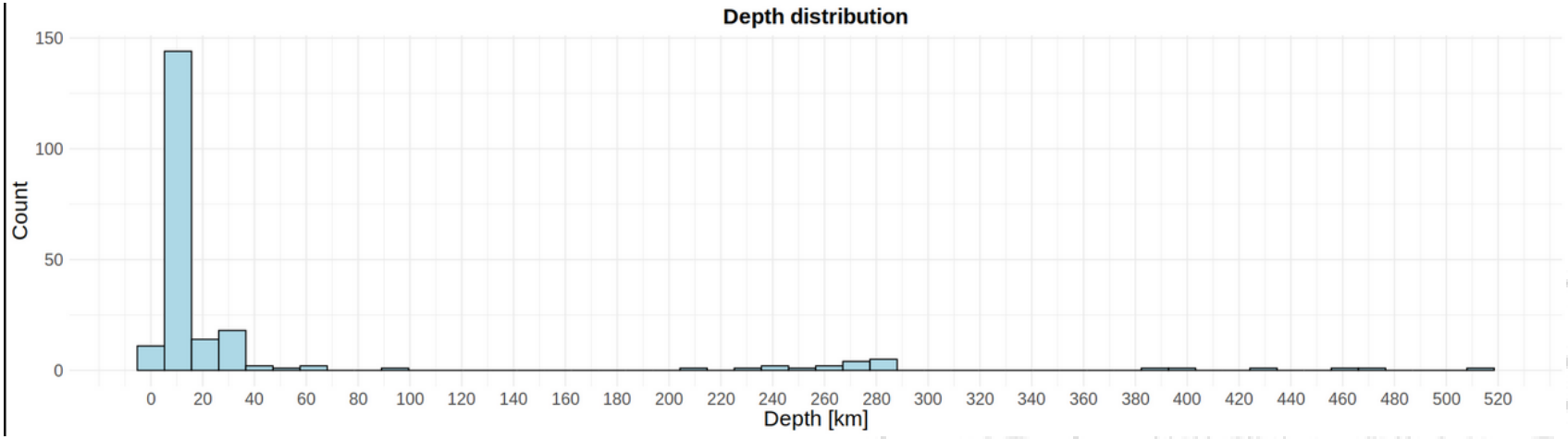

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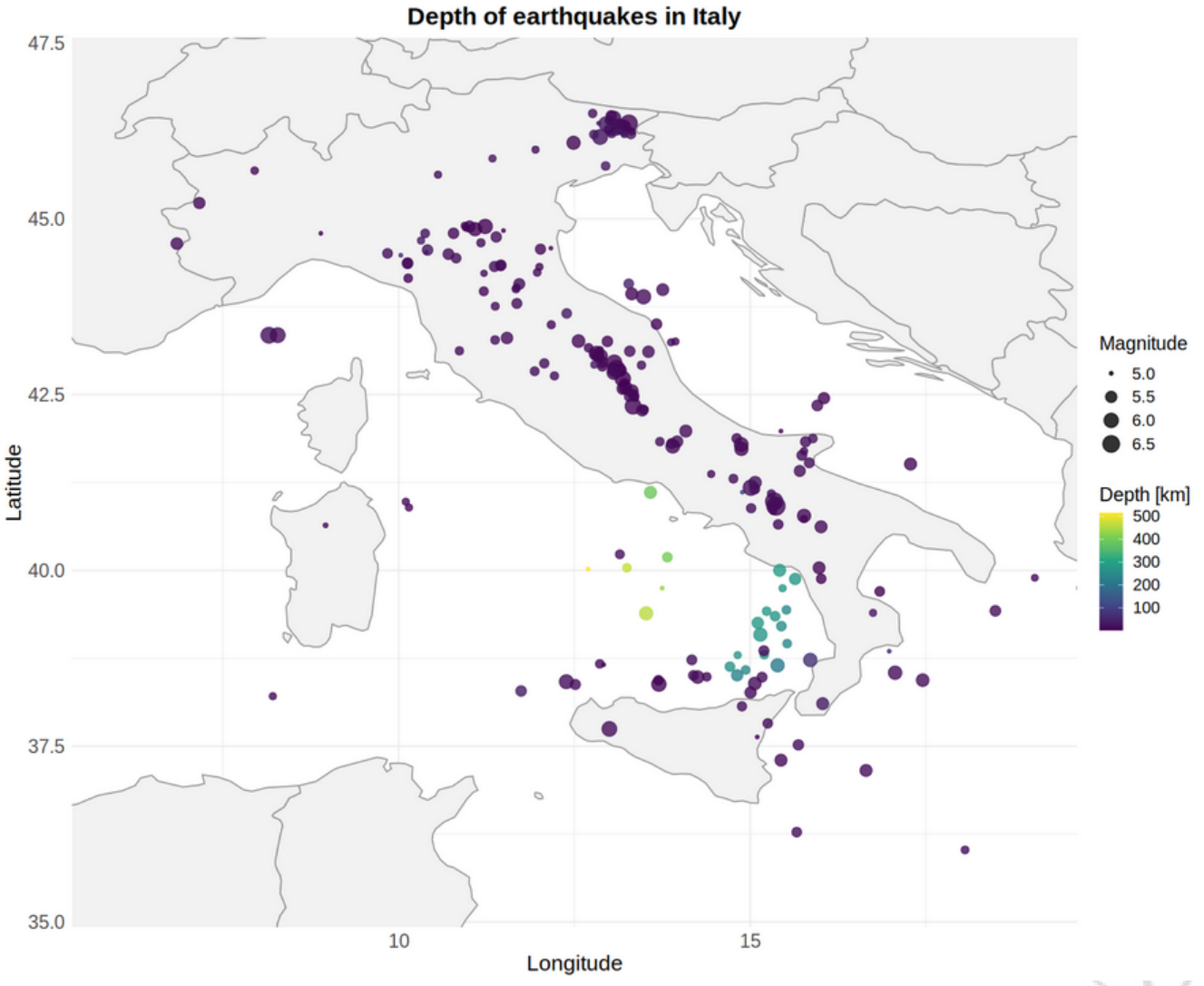
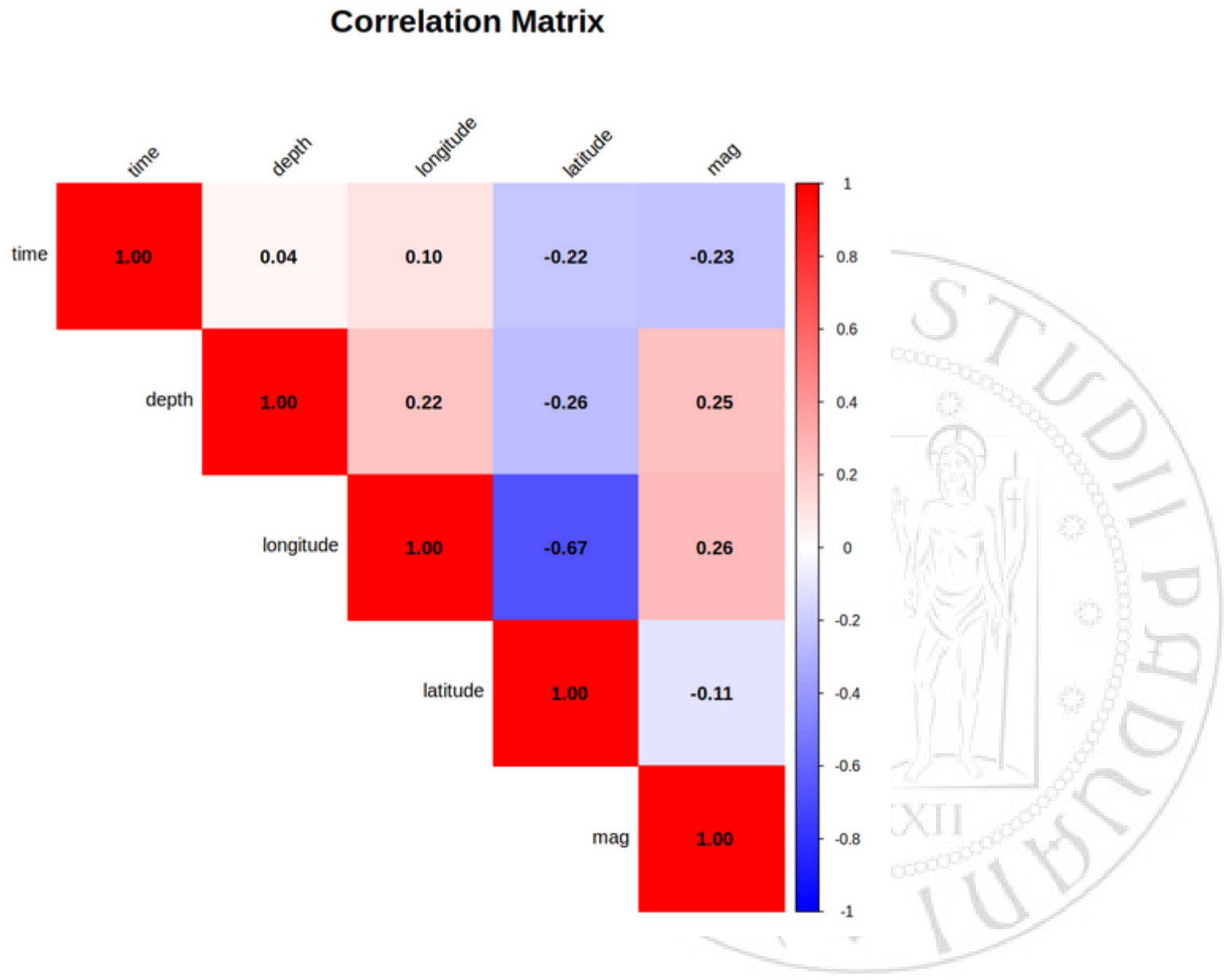
Depth map



- Primo punto
- Secondo punto
- Terzo punto

Variables correlation



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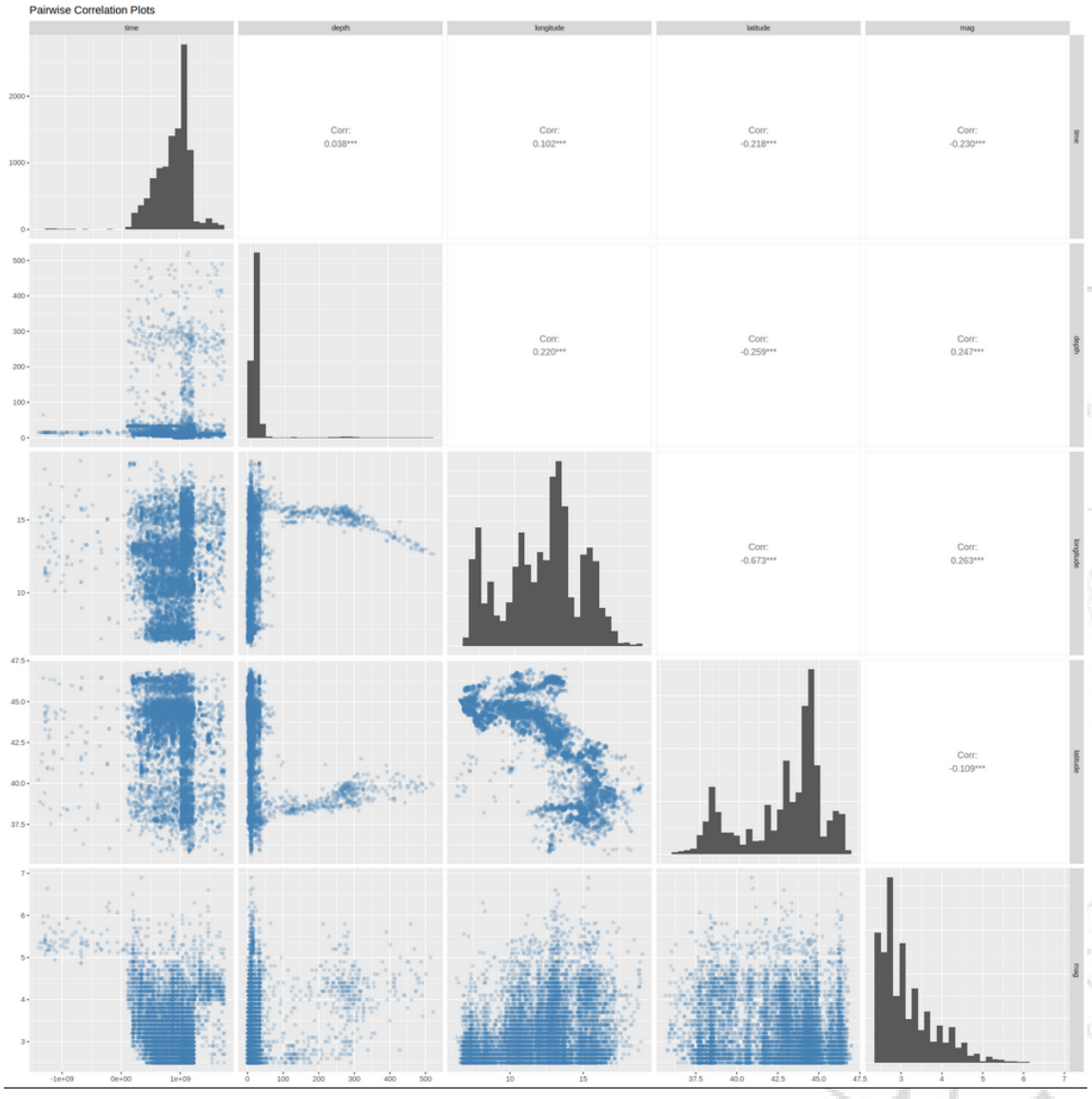
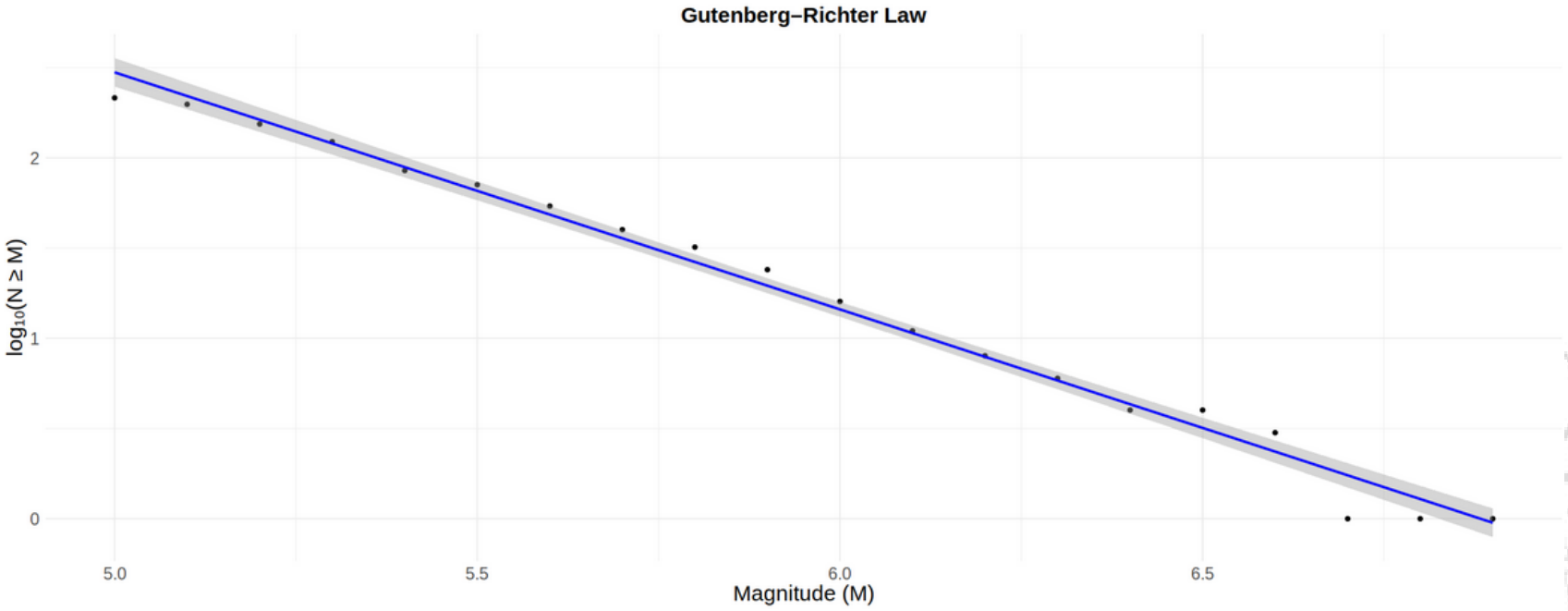


The Gutenbergh-Richter Law



	Value units	Error units	χ^2
a	...	...	
b	...	...	

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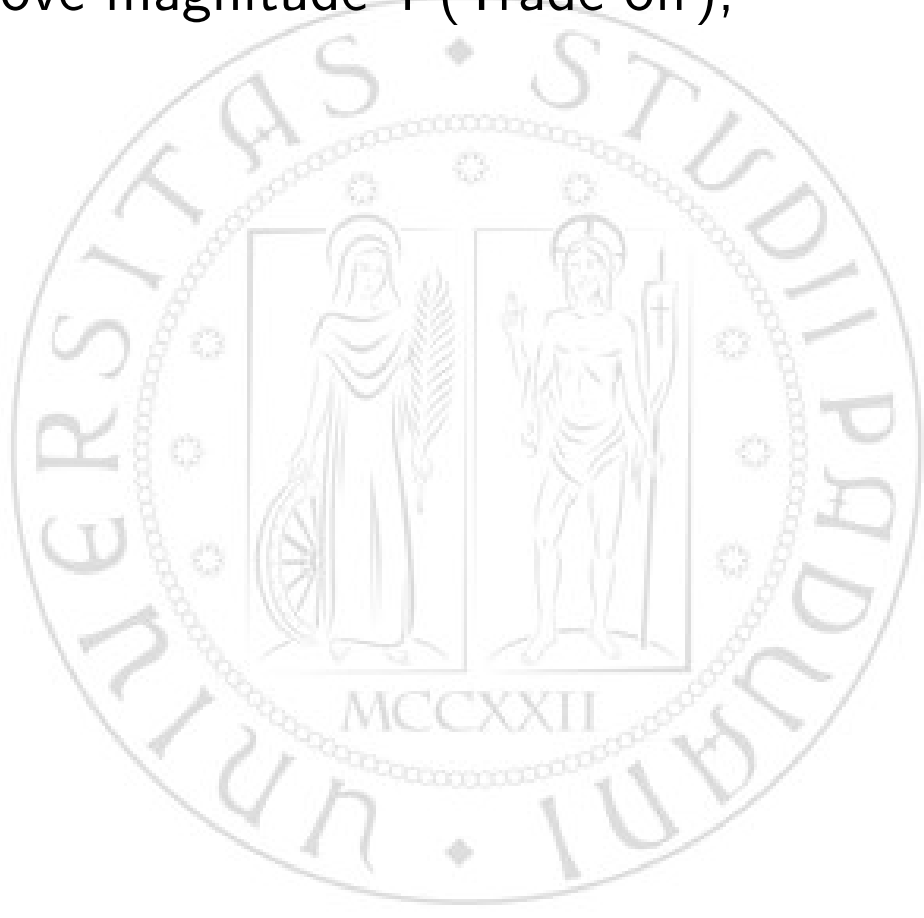

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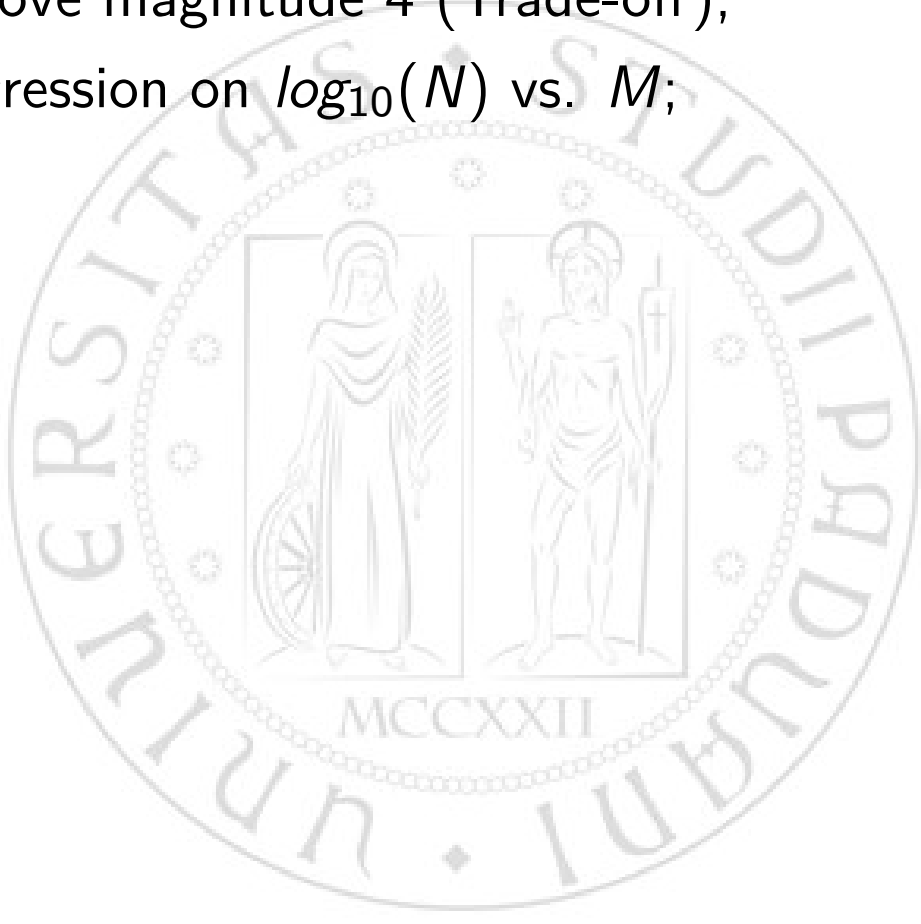

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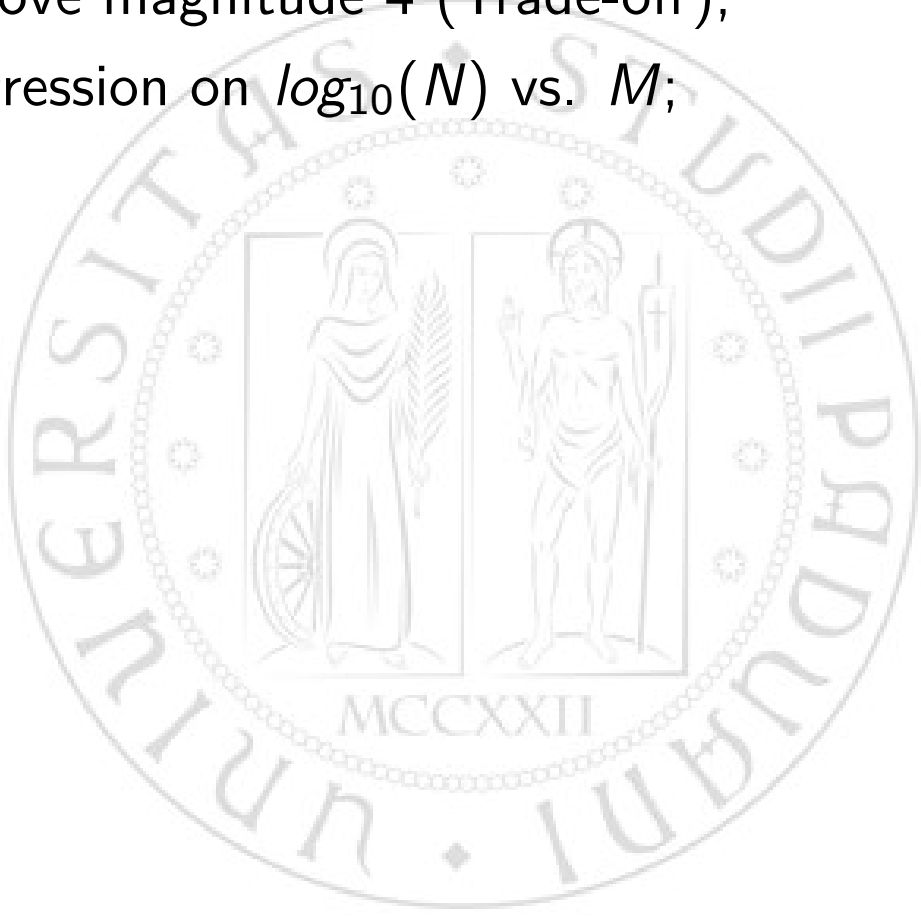

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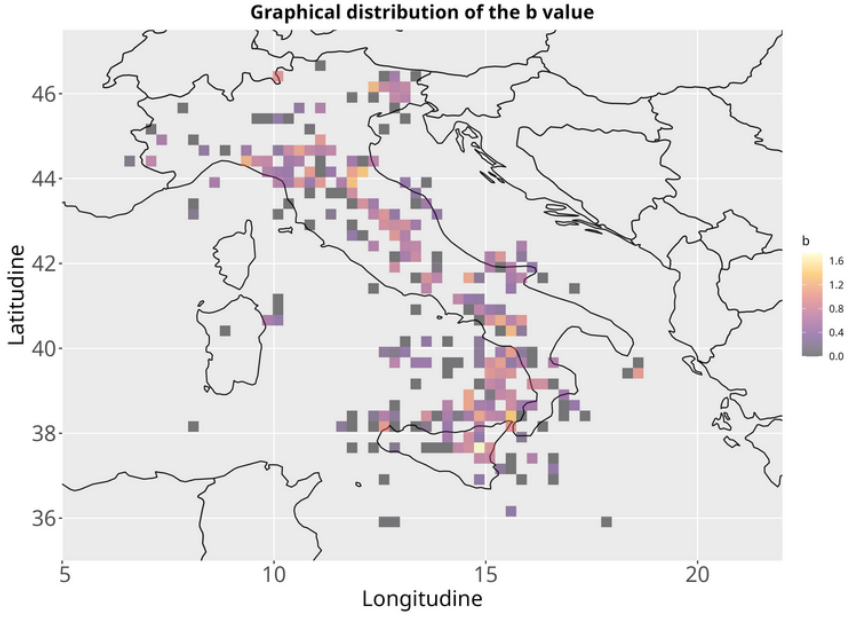
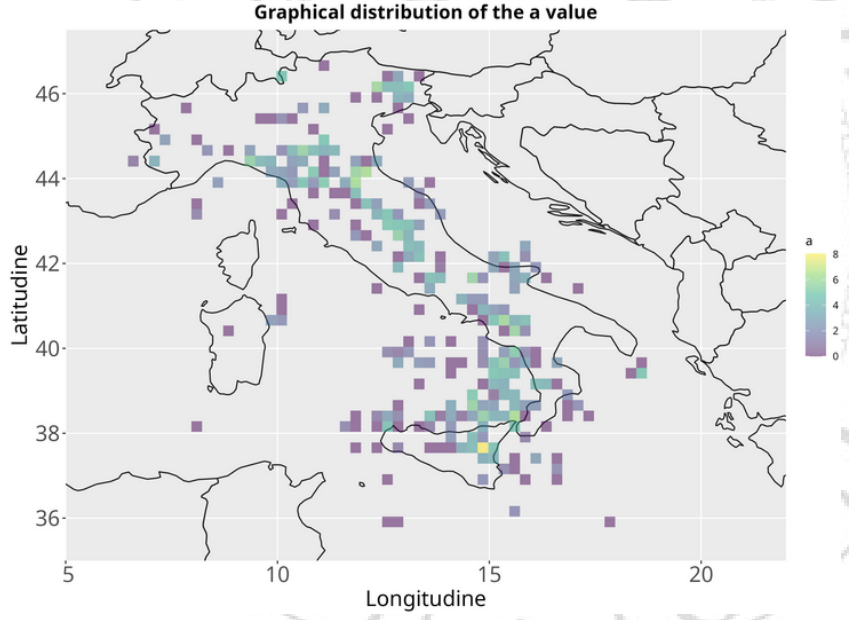
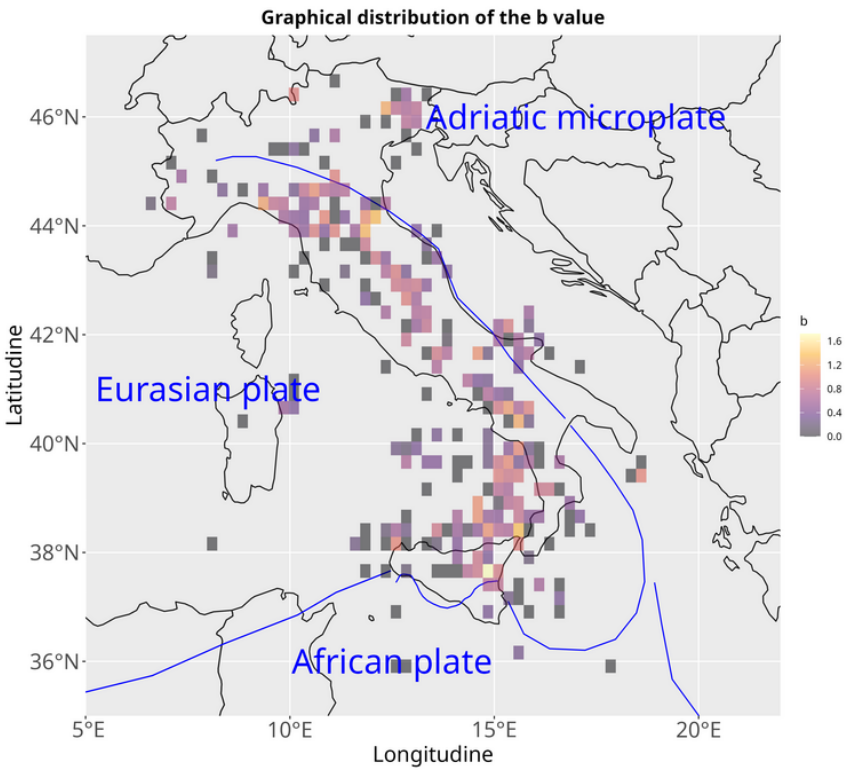


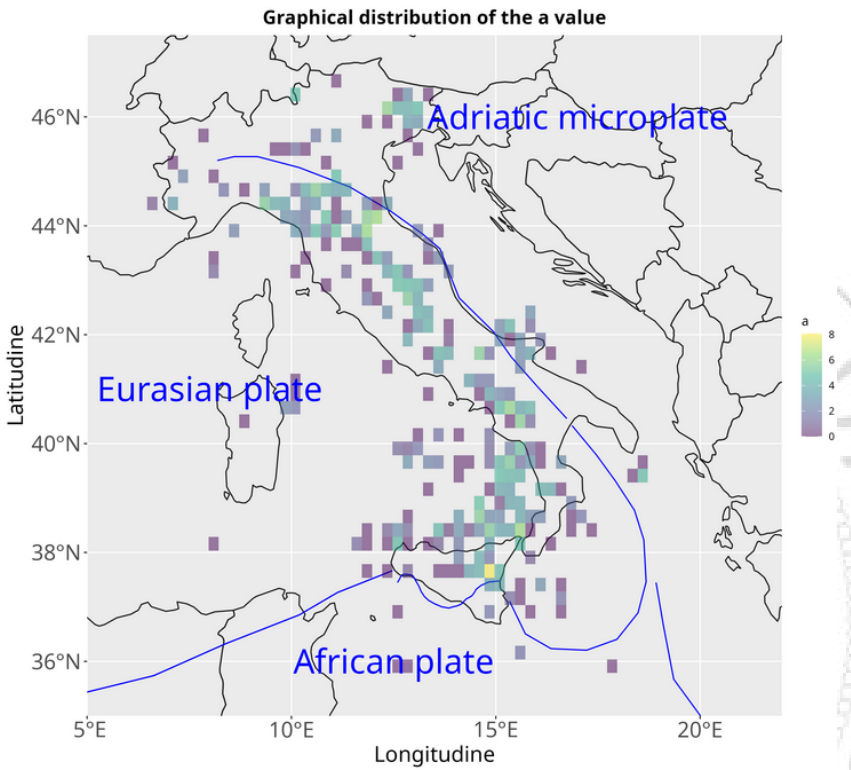


Adding tectonic plates boundaries

```
# https://www.usgs.gov/programs/earthquake-hazards/google-
    earthtmkml-files -> page where you can find the file for
     the edge of the plates

plates <- st_read("doc.kml", layer = "Plate Interface")
                  ...

# add tectonic plates boundaries
a_plot_plates <- ggplot() +

        # borders
        borders("world",
        regions = c(reg),
        fill = "gray80", colour = "gray10", alpha = 0) +

        # tectonic plates boundaries layer
        geom_sf(data = plates, color = "blue", size = 2) +
                  ...
```

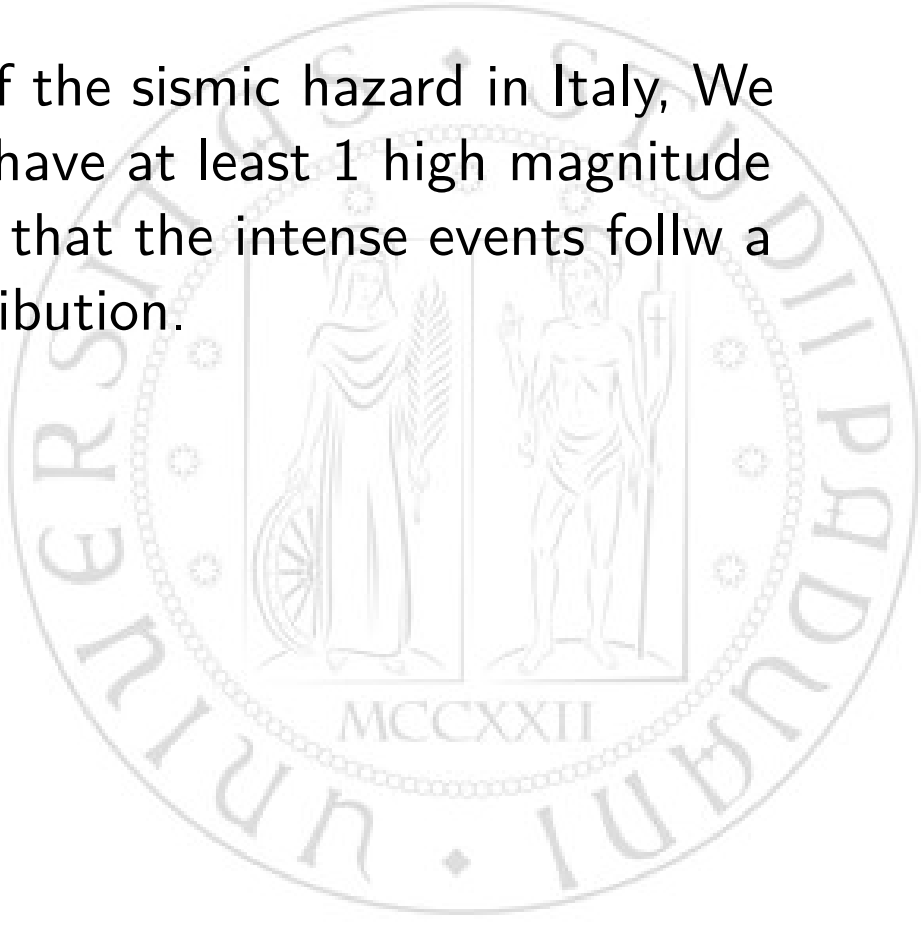
Adding tectonic plates boundaries





Naive model for sismic hazard

In order to provide an exstimation of the sismic hazard in Italy, We tried to calculate the probability to have at least 1 high magnitude event in the next 10 years assuming that the intense events follw a Poisson distribution.



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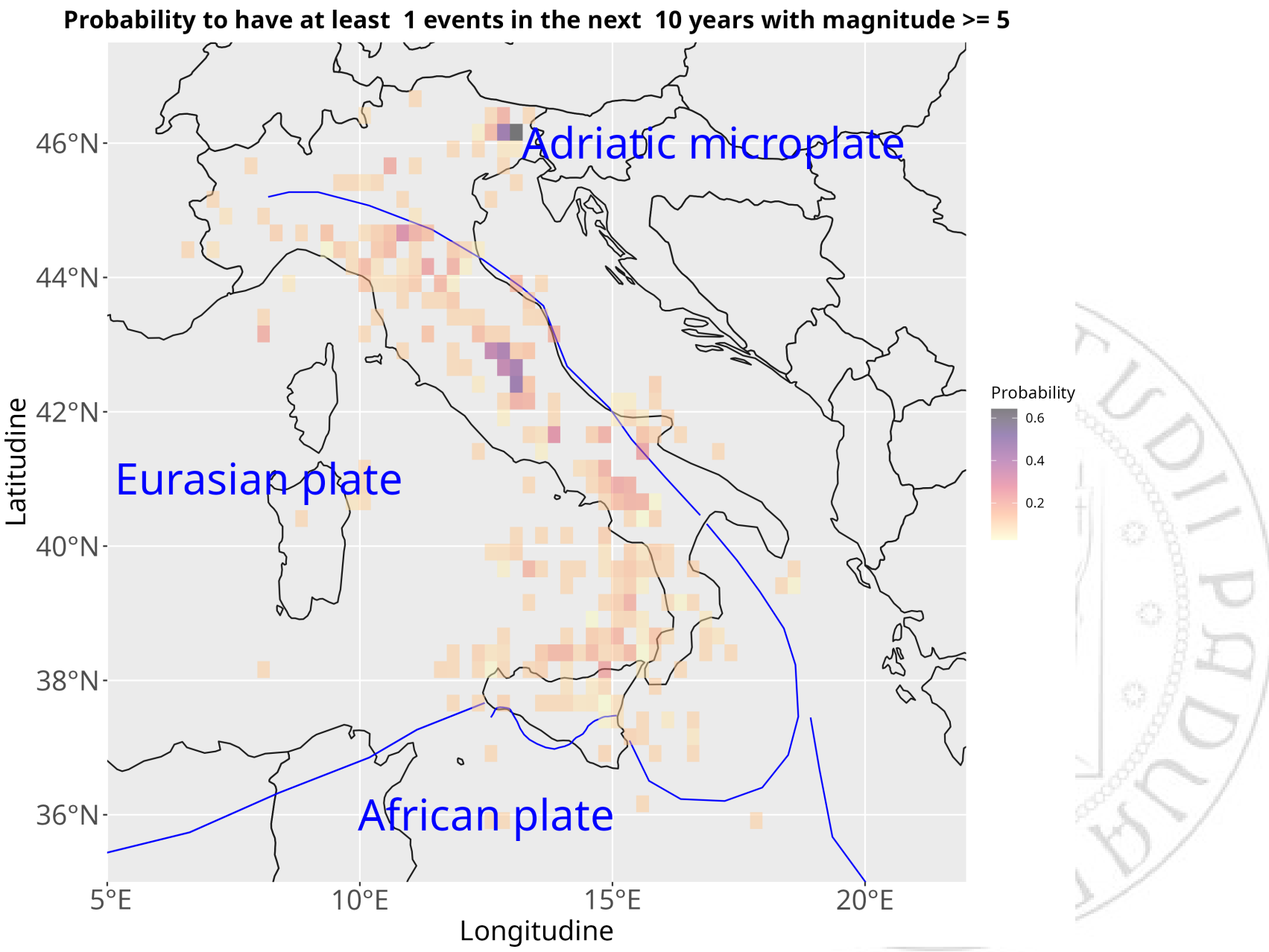
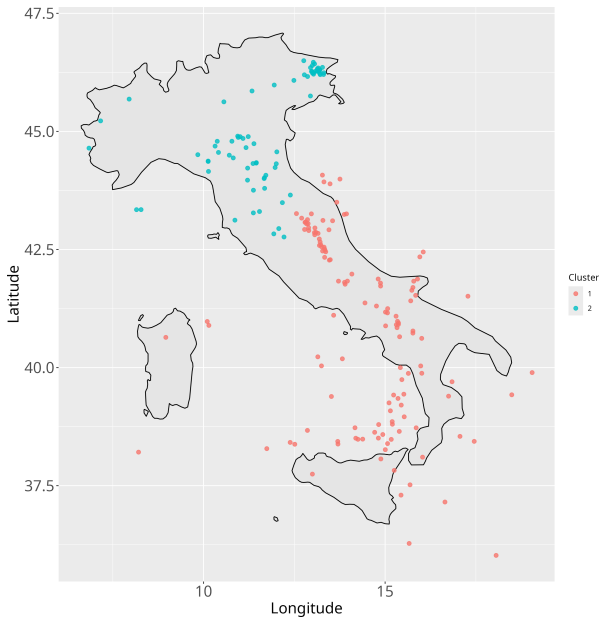
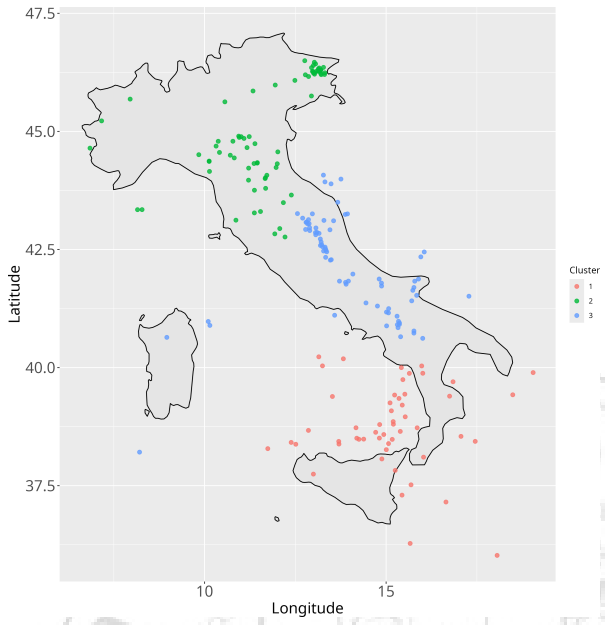
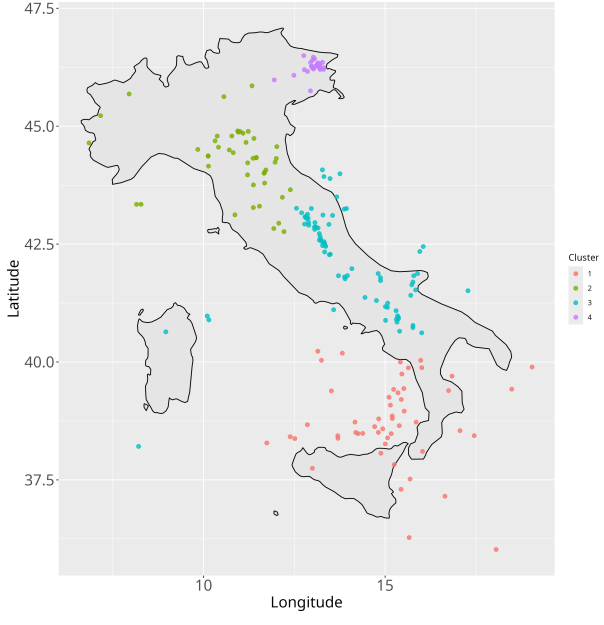
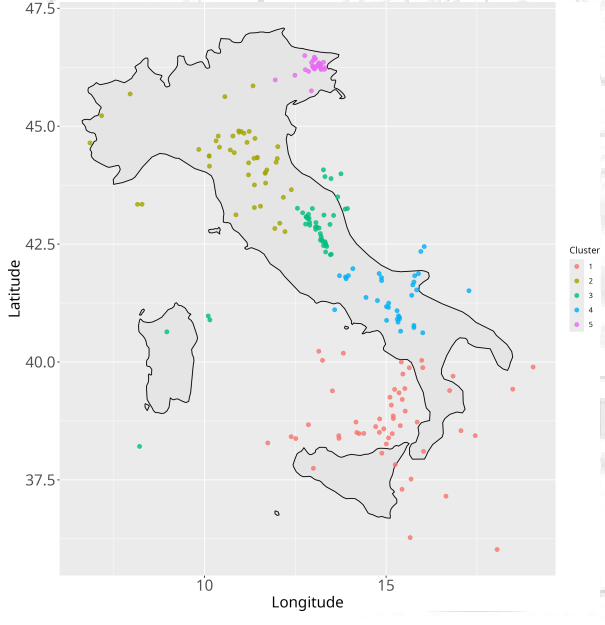


Hierarchical clustering









Thanks for your attention!