



# Time Series Project on Earthquakes



# Outline

**3** Project Overview

**4** Business Understanding

**5** Problem Statement

**6** Data Understanding

**7** Visualizations

**8** Modeling

**9** Evaluation

**10** Conclusion & Recommendations

**11** Next Steps

**13** Thank You





# Project Overview

The project focuses on enhancing earthquake prediction and analysis through advanced time series forecasting techniques to mitigate the impact of these natural disasters.



# Business Understanding

- ▶ Earthquakes are devastatingly destructive.
- ▶ Recent earthquake in Turkey left millions homeless, hundreds of thousands injured, thousands dead, and billions in property destroyed.
- ▶ Such losses call for the need to improve earthquake forecasting.

# Problem Statement

The problem at hand is the need for timely and accurate earthquake prediction to minimize the devastating impact on human lives, infrastructure, and the environment, despite the inherent complexity and limited knowledge surrounding seismic events.



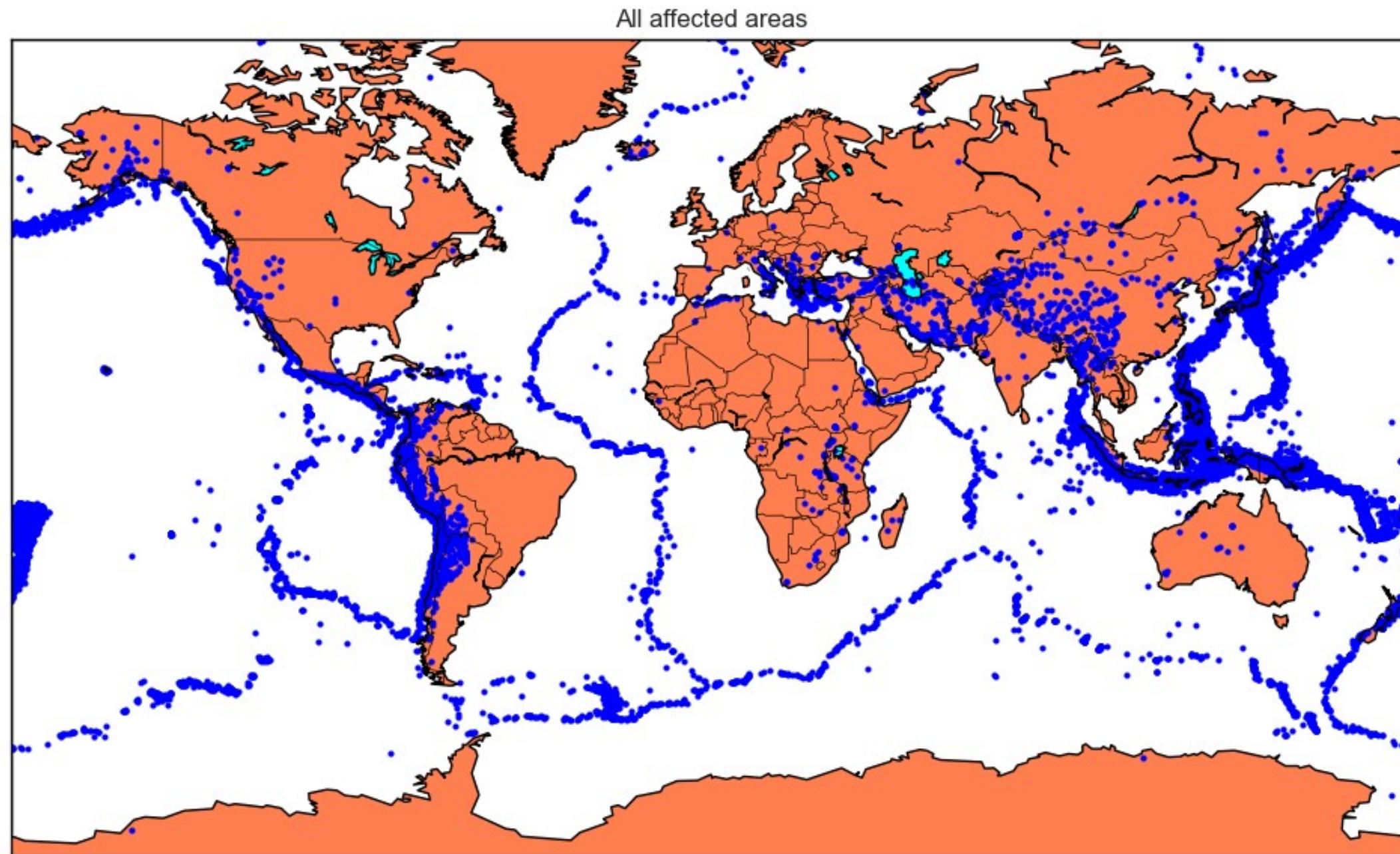
# Data Understanding



Dataset source:

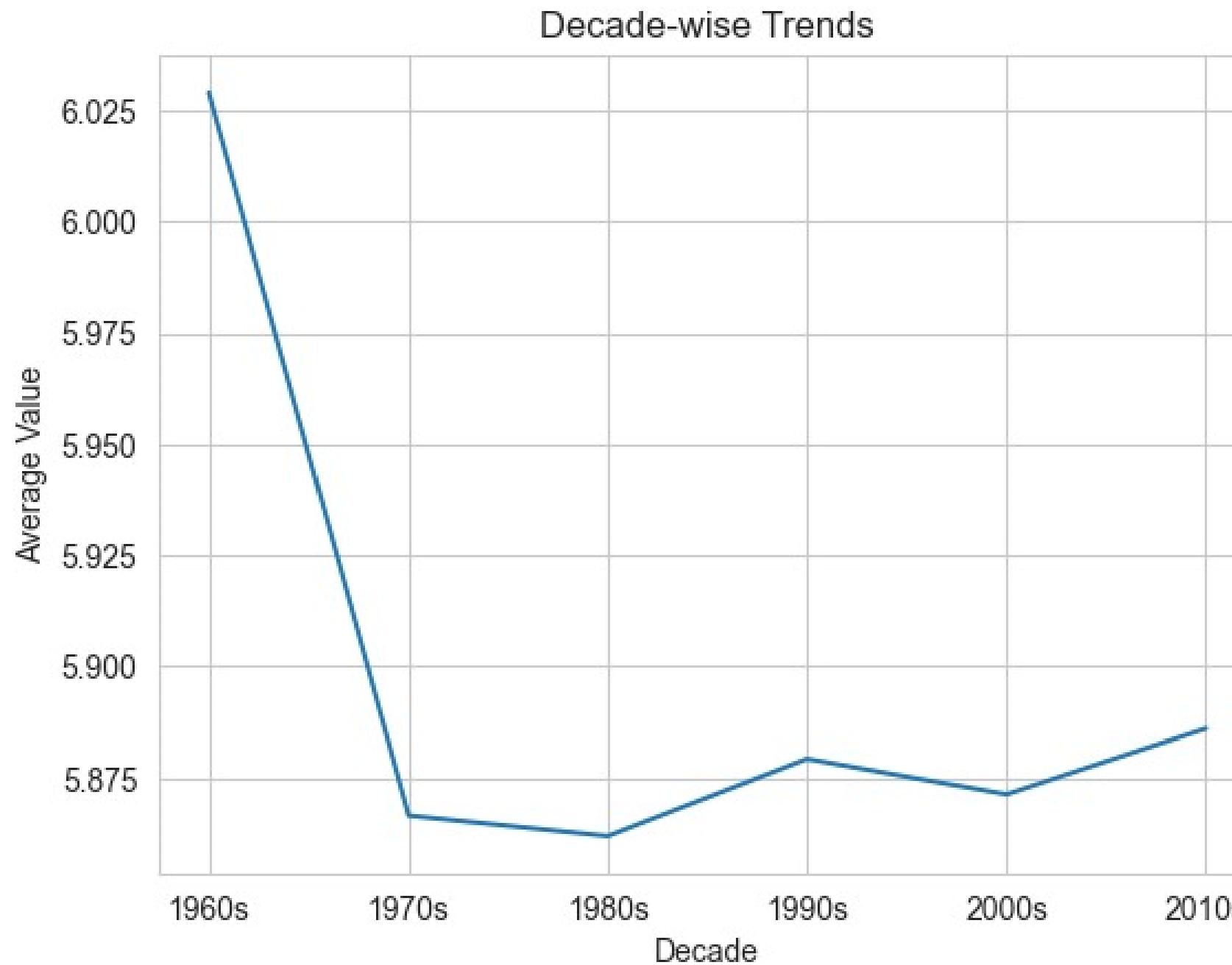
- ▶ <https://www.kaggle.com/datasets/usgs/earthquake-database>
  
- ▶ Dataset includes a record of the date, time, location, depth, magnitude, and source of every earthquake with a reported magnitude 5.5 or higher since 1965.

# Visualizations



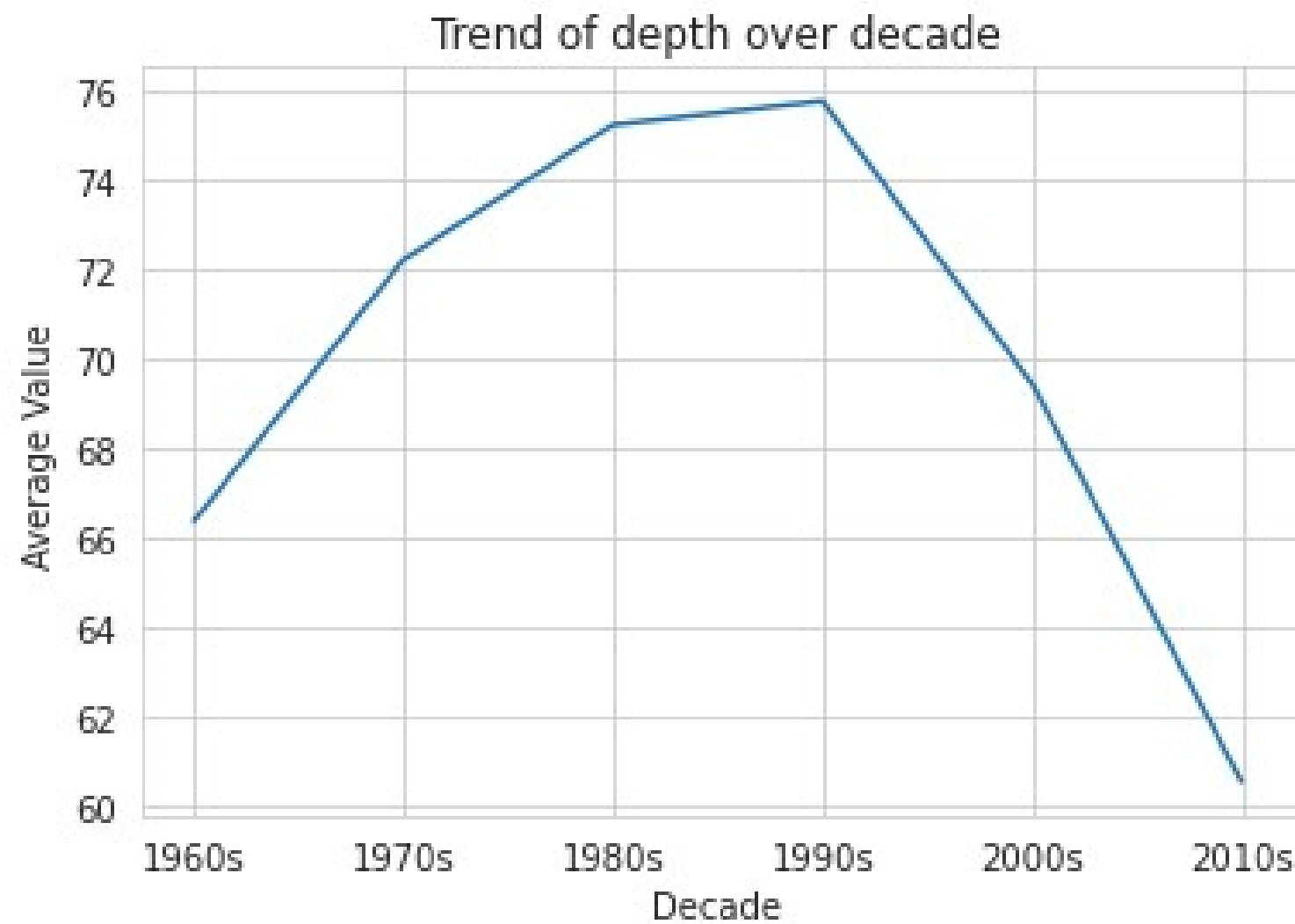
- Map showing all the affected areas.

# Magnitude Decade-Wise



- Decade-wise trends comparing the magnitude of earthquakes since the 1960s.

# Depth Decade-Wise



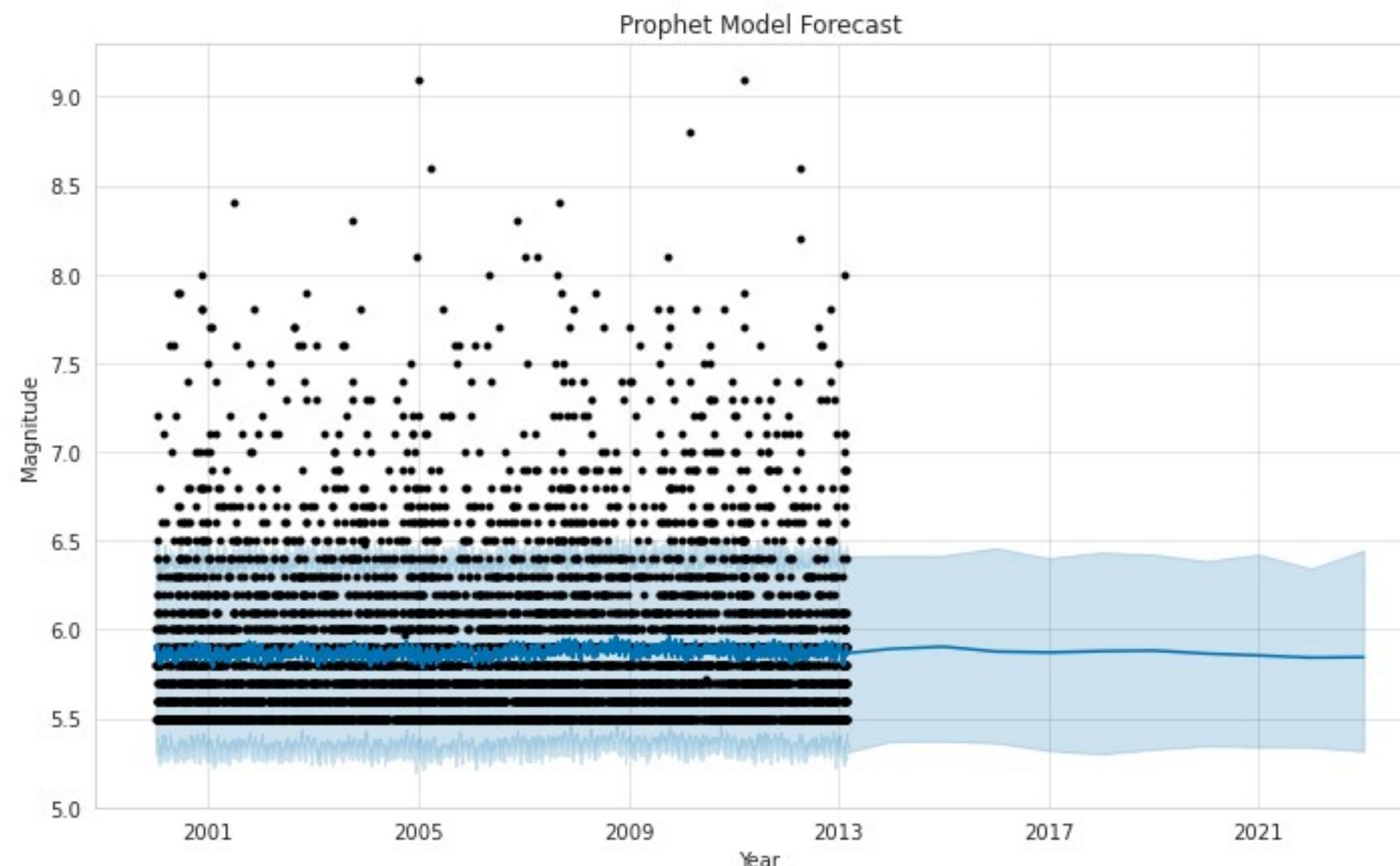
- Decade-wise trends comparing the depth of earthquakes since the 1960s.

# Models Used

- Facebook Prophet
- Arima Model



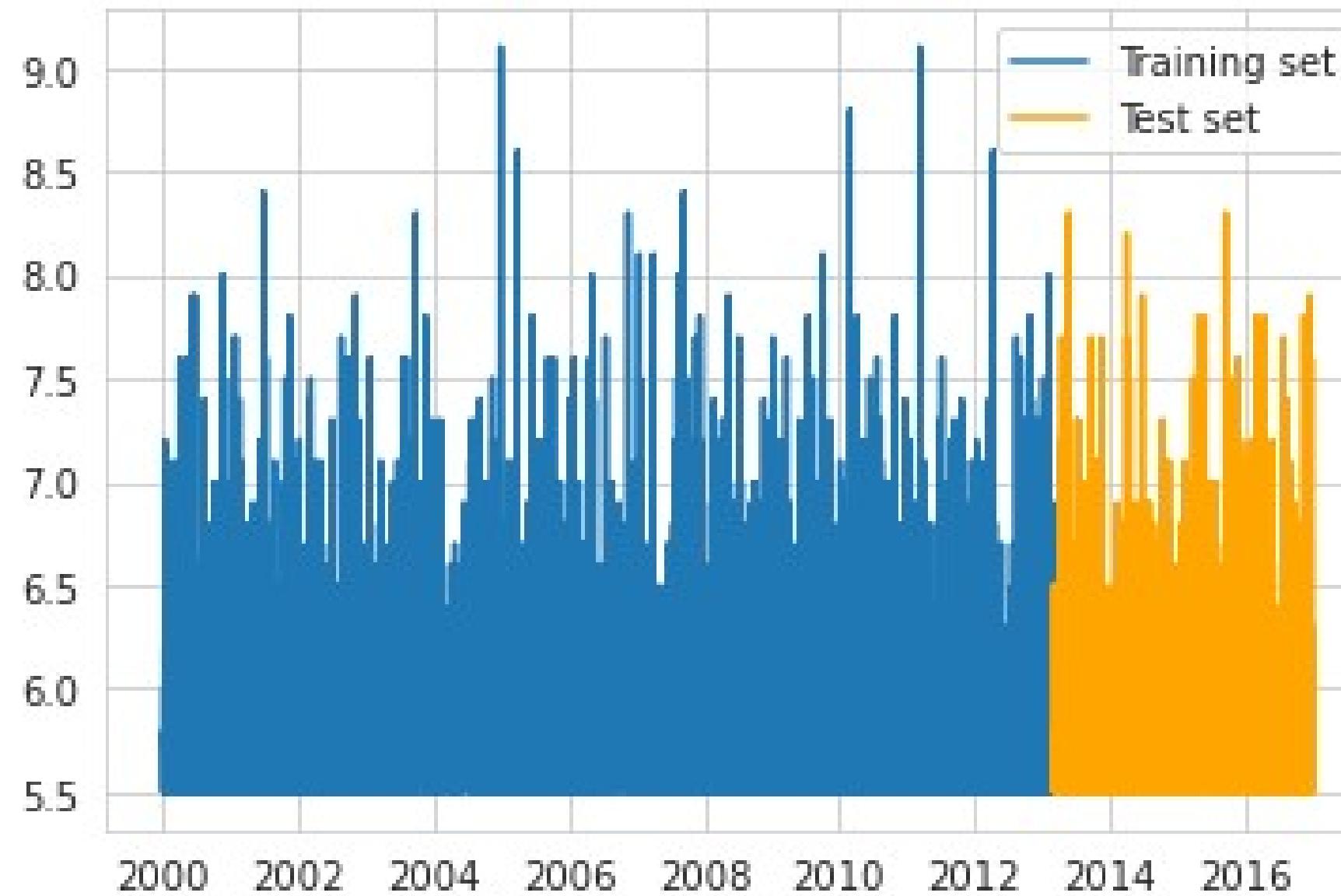
# Modeling: Facebook Prophet



- The predicted line suggests that the magnitude of future earthquakes will likely remain constant with subtle deviations from the mean.

# Arima Model

## train and test sets



- The distribution of the test set follows a similar pattern of the train set.

# Evaluation

## Facebook Prophet

- Posted an RMSE of 0.45 - means that the predictions post, on average, a difference of 0.45 units from the actual values in the test set

## Arima Model

- Posted an RMSE of 0.44 - suggests that the model's predictions are quite close to the actual values, with relatively low error.

# Conclusion & Recommendations

## Conclusion

- Earthquake data analysis provides valuable insights for risk assessment.
- Quality and availability of earthquake data are crucial for research.
- Collaboration is essential for advancing earthquake research and preparedness.

## Recommendations

- Improve data collection and monitoring systems.
- Invest in advanced prediction models.
- Enhance collaboration and information sharing.
- Strengthen infrastructure resilience.
- Increase public awareness and education.

# Next Steps

- Refine and optimize prediction models for better accuracy.
- Conduct in-depth statistical analysis to identify trends and factors.
- Develop an integrated early warning system using real-time data.
- Educate and engage the public in earthquake awareness and preparedness.

