SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

P1.2-101

Empirical relationship among seismic and fault parameters on the Talysh dynamic earthquake zone (southern Azerbaijan)

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CTBTO PREPARATORY COMMISSION

INTRODUCTION AND MAIN RESULTS

This presentation examines the empirical relationships linking seismic parameters—such as magnitude, displacement, and recurrence intervals—with fault characteristics in the Talysh dynamic earthquake zone of southern Azerbaijan. It discusses the methodological framework, illustrates scaling trends with representative analyses, and highlights how these findings can enhance seismic hazard assessment, scenario modeling, and risk mitigation strategies in the region.

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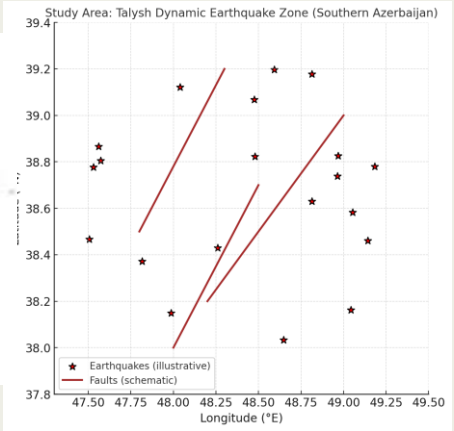
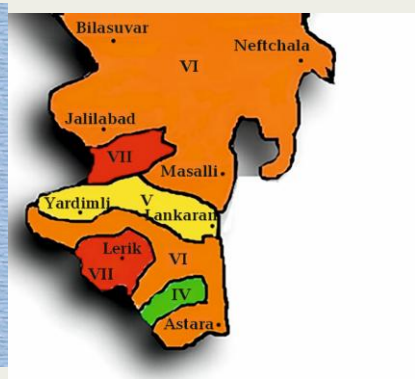
Introduction

The Talysh dynamic earthquake zone, located in southern Azerbaijan along the Talysh Mountains near the Azerbaijan–Iran border, is a region of significant seismotectonic activity. Understanding the relationships between seismic parameters—such as moment magnitude, ground motion, and recurrence intervals—and fault characteristics like length, displacement, and slip rate is crucial for seismic hazard assessment. This study aims to develop empirical scaling relationships specific to this region, providing a foundation for scenario earthquake modeling, risk evaluation, and infrastructure planning. By comparing regional trends with established global models, the study also seeks to identify unique characteristics of the Talysh fault systems.

Methods/Data

A comprehensive dataset was compiled, including historical and instrumental earthquake catalogs, fault geometry data (length, surface displacement and segmentation), and geologic and geodetic information. Statistical analyses were conducted to explore log–linear and multivariate relationships between seismic and fault parameters. Regression techniques, including least-squares methods, were applied to identify scaling trends, while bootstrapping was used to estimate uncertainties. Spatial association of earthquakes to mapped fault segments was verified, and data quality control measures, such as magnitude homogenization, declustering were implemented to ensure reliability.





Results

The study identified clear correlations between m and fault length and displacement, indicating that faults tend to produce larger earthquakes. Recurr inversely related to slip rates, consistent with gen though local variations reflect structural complexit Talysh zone. These empirical relationships, while global trends, reveal distinct regional patterns like compressional and transpressional tectonics, fau contrasts. Illustrative figures show log–linear scal length and displacement, and recurrence interval highlighting both the trends and scatter inherent t

Conclusions

Empirical relationships derived for the Talysh dynamic earthquake zone provide a practical basis for regional seismic hazard assessment ar scenario earthquake modeling. These findings facilitate more accurate estimation of potential earthquake magnitudes, recurrence times, and fault behavior. Future work should incorporate refined paleoseismic and geodetic data, improve slip-rate constraints, and expand the earthquake catalog to enhance predictive capability. Integration of these relationships into probabilist and deterministic hazard models will improve regional earthquake preparedness, risk mitigatio and infrastructure resilience.

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