

Prosjektrapport¹

Prosjektnummer: 480514
Prosjekttittel: Earthquake Potential in Western Anatolia and the Associated Seismic Hazard in Izmir, Turkey (EPiWA)
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Institutt: Institutt for geovitenskap
Bevilgning fra Meltzerfondet: kr 300 000,-

Rapport: Western Anatolia is actively deforming due to the plate convergence between the African and Eurasian plates. This deformation results in reactivating various fault systems in the region, as were demonstrated by destructive earthquakes in geological and historical times. During the recent history there have been three catastrophic earthquakes in the region which caused severe destruction in the largest city in the region, Izmir with almost a 3.5 million population, which is also the third largest city in Turkey. These earthquakes were separated in time by approximately 50 years, with the latest one occurring in 1788. Since then, there have not been any catastrophic earthquakes and hence understanding the future earthquake potential and the seismic hazard in the region is becoming increasingly important. The main objective of the present project was therefore to assess the seismic hazard in western Anatolia with a focus in the city of Izmir. Keeping in mind the previous work in the area, assessing the seismic hazard realistically requires the following investigations:

- Study the regional geology and tectonics to identify significant faults.
- Investigate the reactivation potential of faults by studying the earthquake focal mechanisms and their inversion for regional crustal stress. Develop a model for fault interaction using stress transfer analysis.
- Understand the block rotations by studying the GPS velocity vectors and paleomagnetic signatures.
- Develop a kinematic model and segmentation for a selected fault to understand fault behavior. Determine trench sites along selected fault segments for future studies.
- Integrate these results to build earthquake rupture scenarios.
- Compute ground motions using hybrid kinematic methods and produce seismic hazard maps for Izmir.

Given the limited resources within the present project we have focused on some of these issues listed above. Our main focus has been to:

- Conduct a preliminary geological and geomorphological field-work on selected active faults with the aim of identifying the areas that are favorable for initiating a detailed paleoseismological field-work.
- Conduct a field-campaign for data collection for further investigation of possible block rotations by paleomagnetic analyses.
- Conduct preliminary ground motion simulations based on deterministic scenarios on the active faults in the area with the aim of identifying the most critical faults that have been responsible of destroying the city of Izmir in documented historical earthquakes.
- Investigate the character and extent of the local site effects in selected parts of the city for further detailed analyses.

The earthquake potential of the selected active faults is investigated through field work and seismic hazard maps are prepared using a hybrid broad-band ground motion simulation technique. The results clearly show that despite the significant number of active faults that are identified in the area, the destruction of the city of Izmir during the last three historical earthquakes, can only be associated with two faults, the east-west oriented normal-oblique Izmir and the northeast-southwest oriented strike-slip Tuzla faults. Future studies should therefore be focused on these. The final report including the details of the above mentioned individual studies can be provided upon request.

Underskrifter²:

Dato:

Prosjektleder

Instituttleder

¹ Fylles ut av mottaker av bevilgning til forskningsprosjekt, undertegnes av prosjektleder og instituttstyrer og sendes til Meltzerfondet c/o Forskningsavdelingen, Universitetet i Bergen så snart prosjektet er avsluttet og senest innen 31. juni året etter at tildelingen ble gitt. Kort rapport om det faglige resultatet av prosjektet. Det skal ikke leveres økonomiregnskap her. Vennligst ikke send vedlegg. Merk at hele eller deler av rapporten kan bli offentliggjort.

² Prosjektleder og instituttstyrer bekrefter med dette at prosjektet er gjennomført og at prosjektkonto er oppgjort.