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Thematic Set: Active Tectonics and Earthquake Hazard of Western Anatolia -- PREFACE

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PREFACE

Thematic Set: Active Tectonics and Earthquake Hazard of Western Anatolia

This thematic set of papers has been selected from contributions to the 10th Annual Meeeting of the Active Tectonics Research Group (ATAG). This meeting was organised by the Department of Geological Engineering, Dokuz Eylül University (DEU) with financial support of the Scientific and Technological Research Council of Turkey (TÜBİTAK). ATAG annual meeting was first established by Professor Aykut Barka in 1997 to provide opportunity for scientists to meet and exchange ideas on the state of the art in active tectonics of Turkey. The first and second ATAG meetings were held at İstanbul Technical University in 1997 and 1998. Following meetings were organised by different universities and institutions. The 10th meeting was held in the Seferihisar Student Training Camp of Dokuz Eylül University, İzmir, Turkey, during the period of November 2–4, 2006.

The scientific sessions were introduced by invited lectures by A.M. Celal Şengör and Tuncay Taymaz from İstanbul Technical University. Then, sixty-four presentations were given by participants in a variety of topics on active tectonics including: (i) mapping of active faults, (ii) surface rupture studies, (iii) Quaternary geology/geomorphology, (iv) palaeoseismology, (v) archeoseismology, (vi) seismology/seismotectonics, (vii) recent stress analysis, and (viii) earthquake hazard studies. More than 250 Earth Scientists attended the meeting.

Eight papers, presented in different theme sessions of ATAG-10 have submitted for publication in the special issue of *Turkish Journal of Earth Sciences*, four of which are accepted. In addition, five papers will be published in the Geological Bulletin of Turkey.

Isostatic Compensation in Western Anatolia with estimate of the effective elastic thickness is the subject of **Pamukçu and Yurdakul** paper. In this study, the compensation mechanism of the Western Anatolia which has dynamic loads was investigated by isostatic response functions. The authors estimated, based on admittance and coherence between gravity and topography data, the effective elastic thickness in the region. They correlated the seismogenic thickness and thermal structure of Western Anatolia with the effective elastic thickness. Results of this study showed that the strength of the lithosphere resided in average 6 km in Western Anatolia.

Uzel and Sözbilir present the structural features of the NE–SW-trending Cumaovası basin which is located within an intermittently active zone of weakness, the İzmir-Balıkesir Transfer Zone. This study presents structural data collected from the strike-slip faults that bound the western margin of the basin and the transverse, dip-slip faults to the south and north of the basin. The authors describe the Cumaovası basin as a transtensional strike-slip basin; the evolution of the basin is characterized by episodic tectonic activity, where superposed transpressional and transtensional deformation occurred. Their results show that the earliest period of evolution is represented by left-lateral strike-slip faulting along the Orhanlı Fault Zone. This transpressional regime is inferred to be responsible for the NW–SE shortening associated with NE–SW extension. The younger structural data obtained from the Cumaovası basin is consistent with a mixture of normal- and strike-slip movement in a transtensional tectonic regime that formed under an approximately N–S extensional associated with an approximately E–W compression. According to the authors, this transtensional phase is still ongoing in the region, as indicated by active fault planes and focal mechanisms of shallow earthquakes.

Polat *et al.* study the earthquake hazard of Aegean extension region (AER), west Turkey by using fractal behaviour, seismic quiescence z- and Guteberg-Richter b-parameters. According to the results obtained from the Frequency-Magnitude Distribution (FMD), seismic activity rates (b- and z-values) and fractal correlation dimension, they detected three anomalous zones throughout the AER of Turkey. These are: (1) Çandarlı Bay and Bergama-Zeytindağ Fault Zone, (2) İzmir fault and Orhanlı Fault Zone, and (3) Buldan and surrounding areas. Great earthquakes are relatively infrequent in the AER. This observation and present hazard parameters obtained by the present study indicate that a possible magnitude of a damaged earthquake could reach up to Ms= 6.5. Since great earthquakes occur relatively infrequently, it is difficult to statistically test the effectiveness of models concerning the results. Added to this, they consider that their conclusions and speculations are reasonable, but they should not be taken as hard evidence of what to expect in the future certainly. Therefore, the authors advocate, both testing by algorithm as well as evaluating by common sense based on the earthquake catalogues, that these results should be exercised to advance our knowledge of the physics of earthquake failure processes.

Özkaymak and Sözbilir aim to present detailed stratigraphic and structural evidence for reactivation and evolution of the western part of the Manisa fault zone, a major range-bounding fault that is geomorphologically expressed as a trace of north-facing scarps forming the southern margin of the Manisa Basin which is subsidiary to the Gediz Graben. The authors propose that the Manisa fault zone, at its western end, consists of three fault segments which are en échelon arranged in left step. Fault segments become linkaged and show breaching of the relay ramps between them. The result is a through-going fault trace with zigzag patterns. They suggest that such type of fault patterns have formed in a region where extension has reactivated pre-existing structures in an oblique sense. Studies of kinematic indicators on fault zones have also revealed that the slip direction varies systematically along the Manisa fault zone. At the centre of the Manisa fault zone oriented perpendicular to the regional extension direction almost pure dip-slip motion occurs, whereas near the fault tips substantial oblique slip motion is documented. An episodic fault evolution is proposed: (i) the fault zone commenced as a sinistral strike-slip structure during the Miocene–Early Pliocene E–W-trending contractional phase, (ii) then, it was reactivated as a dextral oblique-slip fault zone during Plio–Quaternary time, suggesting a NE–SW-trending extension; and (iii) finally, during the Quaternary, the Manisa fault zone was reactivated as an approximately pure dip-slip normal fault under the control of current NE–SW-trending extensional tectonic regime.

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