



## **A high resolution aftershock seismicity image of the 2002 Sultandag-Çay earthquake ( $m_w=6.5$ ), Turkey**

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A medium-size earthquake ( $M_w=6.5$ ) occurred on 3 February 2002 (07:11:28 GMT) in Sultandağ-Çay region of southwestern Turkey. The mainshock was followed by  $M_w=6.0$  event occurred just two hours after the main shock at 09:26 GMT. The main shock was a normal-faulting and ruptured east-west trending Çay segments. A 27 vertical component temporary seismic network was installed to monitor aftershock seismicity and studied in detail space-time evaluation of the aftershocks and related fault segments during this earthquake. About 1100 aftershocks ( $0.2 < M_L < 3.3$ ) were recorded during a period from 5 to 10 February 2002.

We analyzed the P and S arrival times and P wave first motion data to obtain high-quality hypocenters and focal mechanisms. We infer that the main shock has ruptured a segment of the Sultandağ Fault that is approximately 37 km long and 7 km wide at depth. The average slip over the rupture plane is estimated to be 32 cm. The linear distribution of the aftershocks and the location of the main shock epicenter suggest that rupture has initiated in the eastern sharp-bend region and propagated unilaterally to the West. The majority of fault plane solutions indicate E-W to ESE-WNW striking

oblique-normal faulting mechanisms with an average dip angle of  $62^{\circ} \text{ N} \pm 10^{\circ}$ . The high resolution aftershock seismicity image also shows that faulting involved both synthetic and antithetic structures during the evolution of the aftershock sequence. The steady increase of the b-value towards the west implies that the highest moment release of the mainshock occurred at the west of the epicenter, and the most western end of the aftershock belt corresponds to a structurally complex zone distinct from the main rupture. The main rupture is located along the southern margin of the Akşehir-Afyon Graben system between the towns of Sultandağ and Çay with an E-W trend. The westernmost extent of the aftershock zone is characterized by both E-W and N-S trending oblique-slip normal faulting mechanisms, the latter being associated with the N-S trending Karamlık and Şuhut grabens. The intersection of these two grabens provides abundant fault planes available for failure in this region. The pattern of seismicity of large events in the region indicates a probable migration of earthquakes from east to west. Thus, we conclude that this has an important implication for earthquake hazard for the city of Afyon, which lies 20 km west of the Sultandağ Fault Zone.