



Late Cenozoic stress states along the North Anatolian Fault, Bolu basin, NW Anatolia

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The Alpine-Himalayan mountain chain system has much interesting structural lineament with its plate boundaries, particularly border of the Anatolian block where three major plates, i.e., Eurasian, African and Arabian meet one another in the eastern Mediterranean. This study defines the Late Cenozoic stress regime states acting at the northwestern Turkey in the Bolu basin along the North Anatolian Fault. The inversion of slip vectors measured on fault planes and chronologies between striations indicate that the stress regime changed from transpressional to transtensional, having a consistent NW- and NE-trending $\sigma_{Hmax}(\sigma_1)$ and $\sigma_{Hmin}(\sigma_3)$ axes, respectively, but have significantly different mean stress-ratio (Rm) values. The older stress state is characterized by N $136 \pm 8^\circ$ E-trending σ_1 and N $226 \pm 13^\circ$ E-trending σ_3 axes, and by a mean arithmetic Rm value of 0.64, indicating that the previous regional stress regime is transpressional. The younger stress regime is characterized by N $130 \pm 10^\circ$ E-trending σ_1 and N $220 \pm 7^\circ$ E-trending σ_3 axes, and by a mean arithmetic Rm value of 0.27, indicating a transtensional character for this regional stress regime. Local consistent NE-trending extension directed normal faulting regime also shown in the Bolu basin. The earthquake focal mechanism inversions confirm that the younger (transtensional) stress regime continues into recent time. The inversion of earthquakes identifies transtensional stress regime representing a strike-slip stress state with a consistent NW- and NE-trending $\sigma_{Hmax}(\sigma_1)$ and $\sigma_{Hmin}(\sigma_3)$ axes. These stress states are characterized by N $136^\circ \pm 2^\circ$ E and N $226^\circ \pm 1^\circ$ E-trending σ_1 and σ_3 axes, respectively. Both significant regional stress regimes induce right-lateral displacement along the North Anatolian Fault around Bolu basin. This temporal change, probably in Qua-

ternary time, within the regional stress regime, from transpressional to transtensional, resulted from the coeval influences of slab-pull in the W-SW (i.e., along the Hellenic arc), continental collision in the east, and westward escape of the Anatolian block.