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Stress transfer around Algiers (Algeria) region following El-Asnam (1980, Mw=7.3), Tipaza (1980, Mw=6.0) and Zemmouri (2003, Mw=6.8) earthquakes

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We study the redistribution of the co-seismic stress in the Algiers (Algeria) region [0°E-5°E, 34°N-38°N] following the El-Asnam (1980, Mw=7.3), Tipaza (1989, Mw=6.0) and Zemmouri (2003, Mw=6.8) earthquakes. The formulation is based on the concept of fault interaction which is a major topic in earthquake process, underlying the idea that the occurrence of an earthquake caused by a fault (master or source fault) could modify the state of stress on the neighboring faults (target faults). The sources are required their sizes (length L, width W, dislocation U) and their fault mechanisms (strike, dip, rake); the targets are required their focal mechanisms. The theory predicts that the inductive earthquake shapes the space in lobes attributed positive and negative static stress variations noted CFF (Coulomb Failure Function): the first ones would be the sites of future seismicity; the latter would be devoid. CFF is a combination of the normal and tangential stresses resolved on the target fault. Using Okada's subroutine, empirical relations (converting magnitude into L, W, U) and Hooke's law, the stress field is computed relatively to Okada's frame attached to the causative fault. For practical use, this stress is expressed into geographic co-ordinates where three cumulative CFF maps are produced. In the first case, El-Asnam fault is used as source and target, and Tipaza and Zemmouri faults as targets: the mapping reveals positive CFF values around the focus of the future Tipaza earthquake. In the second one, El-Asnam and Tipaza faults are considered as sources and targets, and Zemmouri fault as target: CFF is enhanced around the focus of the future Zemmouri earthquake. In the third case, all three earthquakes act as sources and targets: the resulting stress field exhibits three lobes with positive CFF west of El-Asnam, east of Zemmouri, and in the surrounding between Tipaza and Algiers.

Key words: Algiers, co-seismic stress, Coulomb Failure Function (CFF), El-Asnam earhquake, Tipaza earthquake, Zemmouri earthquake.