

Crustal stress field in the Ilan Plain and its offshore area, NE Taiwan from seismic stress inversion

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The Ilan plain (IP) at the northeastern corner of Taiwan is considered as the consequence of crust thinning by the Okinawa trough (OT) opening. Morphologically the westernmost Okinawa trough, however, is stopped at east of 123°E. Though the shallow seismicity in this region between is active with extensional stress dominantly, it shows not a simple series of back-arc basin opening events. To further examine whether the stress perturbed by the tectonic structure, the improved stress inversion method is adopted to depict the crustal stress distribution between the IP and westernmost OT. We adopt the seismicity collection during the period 1996-2016 to invert the stress field in the crust with grid of 0.1° by 0.1°. The data catalog in this study is collected by the CWBSN (the Central Weather Bureau Seismic Network) and the TSMIP (Taiwan Strong Motion Instrumentation Program), and relocated by Wu et al. (2008). Most of the crustal seismicity occurred in the shallow 15-km depth and can be divided into two major groups. The stress inversion result shows that the dominant stress in this region is of extension (σ_3) in the NW-SE direction and with a clockwise rotation in the southeast part. On the contrary, σ_1 is relative complex in the same region and can essentially be divided into three parts: (i) offshore the IP, mostly east of 121.95°E, σ_1 is quite stable in the about N-S direction; (ii) it behaves unstable and large uncertainty in the NW-SE direction in the northern flank of IP; and (iii) σ_1 remains stable in the southern wing of the IP and is oriented in the NE-SW direction, except for two W- and E-end. It is clear and implying that there must be a structure existing in the central E-W axis of IP leading to a nearly orthogonal stress direction distribution between the north and south IP, respectively. The left-lateral strike-slip Choshui fault crosscutting through the middle IP is the corresponding structure in line with the preceding stress barrier.