Seismogenic structures of the 2006 M_L4.0 Dangan Islands Earthquake offshore Hong Kong

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As a typical extensional continental margin, the intraplate seismicity in the coastal region of the northern South China Sea (SCS) is very active. Compared with the seismically active zones of NanAo Islands, Yangjiang, and Heyuan, the seismicity is relatively low in the Pearl River Mouth area. But, a M_L4.0 earthquake in 2006 has occurred near the Dangan Islands offshore Hong Kong, adjacent to the source of historical Dangan Islands earthquake in 1874 with about M5.8. In this study, we ascertained the locations of NW- and NE-trending faults in the Dangan Islands sea, and found that the NE-trending Littoral Fault Zone (LFZ) mainly dipped southeast at a high angle and cut through whole crust with an obvious low-velocity anomaly. The NW-trending fault dips northeast with similar high angle. The 2006 Dangan Islands earthquake is adjacent to the intersection of the NE- and NW-trending faults, which suggests the intersection of two faults in different directions could provide a favorable condition for the generation and triggering of intraplate earthquakes. Crustal velocity model showed that the high-velocity anomaly was imaged in the west of Dangan Islands, but a distinct entity with low-velocity anomaly at depth smaller than 10 km but high-velocity anomaly below depth of 10 km was found in the south of Dangan Island. Both 1874 (about M5.8) and 2006 (M_L4.0) Dangan Islands earthquakes occurred along the edge of above mentioned distinct entity, and the vertical cross-sections parallel and perpendicular to the LFZ revealed that there were good spatial correlations between the 2006 Dangan Islands earthquake and the prominent high-velocity body below 10 km depth in the distinct entity, which indicated that the high-velocity body might be rigid and capable to store strain energy and release it as a brittle failure, being considered as earthquake-prone area.

