Imaging the subsurface fault systems with the magnetotelluric surveys in the western Ilan plain of NE Taiwan

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ABSTRACT

The Ilan Plain is located at the northeastern Taiwan at the extension tip of the Okinawa Trough. According to the drilling core records, the unconsolidated alluvial deposits from the Lanyang and Luodung rivers were laid over the rock basement that exhibiting the normal faults (Chiang et al., 1979; Hsu et al., 1996) from seismic reflection and refraction profiles in the plain. To delineate the subsurface structures beneath the thick sediments, we used the magnetotelluric (MT) surveys to show the basement topography as well as the resistivity structures of the rock basement of the eastern Ilan plain. More than 50 MT stations were deployed at the eastern tip of the plain for collecting the MT responses. Due to the interferences from the EM noisy environments, we can only select 21 MT stations from the surveys for the one-dimension and two-dimension inversions. Combined with the seismic and drillingdata, we have identified the normal fault system of the eastern Ilan plain, which is the extension of the rifting Okinawa Trough, with the magnetotelluric (MT) surveys. Preliminary explanations were made for the geological structures in the western Ilan plain. We delineated the boundary between the Hsueshan Group and the Lushan slates, which may represent an old fault contact before the development of the rifting normal fault system. Fom the MT and seismic reflection results, we had concluded that the NE-trending Chiaochi fault which dips toward the South and forms the northern boundary between the Ilan plain and the Hueshan Range. Also we have delineated the fault trace of the Southern-boundary (SB) fault which forms the northern boundary between the Ilan plain and the Central Range. The Choushui fault lies at the area between the Chiaochi and SB fault. The fault planes of Zailian, Choushui and SB faults are dipping to the North. These faults are the east-west/northeast-southwest trending faults. On the other hand, there are N-S trending faults that cut across the aforementioned faults. These faults modified the basement of the unconsolidated sediments and formed a series of Graben-like topography.