



Exploring geothermal structures in the Ilan Plain, Taiwan

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The Ilan Plain in northeast Taiwan is located at the southwestern tip of the Okinawa Trough, which extends westward into the Taiwan orogeny. The Ilan Plain covered by thick sediments is clipped by the Hsuehshan Range in the northwest side and the Central Range in the south side. High geothermal gradients with plenteous hot springs of this area may result from magmatism associated with the back-arc spreading of the Okinawa Trough. In this study, we use geophysical methods to explore underground structures in the whole Ilan Plain, especially around the LangYang river and the SanShin area. We aim to find high geothermal potential spots in the plain area. The research is divided into three parts. First, we use the explosion source refraction with 119 Texan instruments, covering most of the Ilan Plain. Second, we use two mini-vibrators to investigate the area along the LangYang river by reflection seismics. Third, we explore a significant fault by refraction seismics and semi-reflection seismics with the impactor source.

Combining large-scale and local scale seismic data, we find that in the Ilan Plain the shallow part is filled with Quaternary alluvial deposits. The basement is gradual thicker from the east to the center and then thin out to the west. In the deep part, there is a significant difference between the northern and southern sides of LangYang river. The northern is deposited with the Szeleng sandstone, dipping obliquely to the south. But, the southern side is separated into the Szeleng sandstone and the Kanko formation, dipping smooth to the north. This suggests that the fault which known as Zailian fault has an offset about 1 km just along the LangYang river and extends to the east along the river. The heat sources from magmatism under the offshore volcanic island (Kueishantao) migrate into the Ilan Plain which may provide heat to the Szeleng sandstone. The hydrothermal solutions migrate in the Szeleng sandstone and move up to the shallow along the Zailian fault. This cause the high geothermal gradient potential in the Sansing area of the Ilan Plain.