Geophysical Research Abstracts
Vol. 21, EGU2019-6462-1, 2019
EGU General Assembly 2019

The tectonic structure of the northernmost Longitudinal Valley in eastern Taiwan by using gravity data.

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The Longitudinal Valley in eastern Taiwan is characterized by frequent earthquakes and complex geologic structures. It is generally considered as the suture of the collision between the Philippine Sea plate and the Eurasian plate. When the M7.3 earthquake in October 1951 and the M6.4 earthquake in February 2018 happened, the rupture of the Milun fault was observed in the northernmost Longitudinal Valley (NLV). To understand the fault strike and geological formation in the NLV, we use gravity anomalies to model the density structures and then explored the tectonic structure mechanism.

In this study, we collected the gravity data including onshore and offshore in NLV. After the gravity corrections, we obtained the gravity anomaly map of the NLV and proceeded to the 2-D density profiles modeling. Then using the Talwani technique to calculate the effect of the 2D density model. To reduce the non-unique problem in gravity modeling, we use the tomography, the reflection seismic data, the surface geological mapping and the previous results in this area to constrain the density model. After using tried and error method to modify the model, we finally get a reliable density structure that conforms with observed gravity data. We present four 2D density profiles perpendicular to the strike of the NLV.

After the gravity modeling, we get the locations of strata and faults in the NLV. Because of the collision between the Philippine Sea plate and the Eurasian plates, the sediment in the NLV becomes thick and dipping to east. The lingding fault might be a sediment boundary made by the Coastal Range uplifted. Structural observations also show that the Luzon arc start to subduct in the NLV, caused the Milun tableland uplifted. This density model provides more details to understand the tectonic structure beneath the NLV.