Study of Mountain Building Processes of the Northern Hsuehshan Range, Taiwan 臺灣北部雪山山脈造山機制之研究

Advising Professor: 葉恩肇 (En-Chao Yeh) Student : 劉傑笙 (Chieh-Shen Liu)

Introduction & Study area

Taiwan is located on the collision boundary between Eurasian Plate and Philippine Sea Plate. In the northeast, Philippine Sea plate subducts beneath Eurasian Plate; however, in the south, Eurasian Sea Plate subducts beneath Philippine Sea Plate. So between two subduction zone, there's a reversal subduction boundary.

We are curious about the current position of reversal subduction boundary nowadays and where the boundary start to subducted before. In Teng's(1996) model, the reversal subduction is occured outside north Taiwan. From East Sea slowly moved to central Taiwan. Also, Lu(1992) supposed the reversal subduction is occured just on the land and crossed north Taiwan, slowly moving

southly recently.





fig1 Simple Taiwan geological map (鄧屬子, 2007)

Peng(2014) collected data across Northern Cross-Island Highway. The research used the Anisotropic of Magnetic Susceptibility(AMS) as a index of deformation degree.

So we set a profile more north to Peng's study, trying to check the reversal subduction boundary. The porfile is along Highway No.9(PeiYi Highway).





Method

Objects would get magnetization(M) by giving an applied magnetic field(H). The coefficient between them is called magnetic susceptibility(K).

M = KH

Magnetic susceptibility can be taken as an ellipsoid with three principle axes (from longest to shortest axis : K1, K2, and K3). Because minerals in the rocks are deformed by external force, mineral grains may be stretched. The compression direction is usually perpendicular to K1. Flinn-diagram indicates deformation conditions of ellipsoid. The y-axis is lineation and the x-axis is foliation. The intensity is the distance to origin by the diagram.



In the field work, we get oriented samples along the outcrops of highway. Back to laboratory, cut these samples into cubics and put them into the measuring mechine to get the data. We would eliminate the weathered samples to avoid affecting the experimental results.

fig.6



Result

The anisotropic of magnetic susceptibility pattern is similar to the intensity pattern. They both increase from west to east. The flinn diagram shows that rocks here are alomost disc-shaped deformation.

Intensity





The P value in PeiYi Highway is average **1.02~1.04**. It is obvious lower than Northern Cross-Island Highway (average **1.02~1.14**). This stands for that deformation degree is lower in PeiYi Highway. In other words, we could suppose that the reversal subduction was occured southern than our study profile and northern than Peng's study profile. That is, the reversal subduction started in North Taiwan, not in the area of East sea.



Conclusion

- 1. Anisotropy(P) and deformation intensity(Int) increase from the west to east.
- 2. From Flinn diagram, rocks in our study area are mostly disc-shape.
- 3. The anisotropy across Peiyi Highway is lower than Northern Cross-Island Highway.

Reference

1. Lu C.Y., Hsu K. J.(1992), Tectonic evolution of the Taiwan mountain belt. Petroleum Geology of Taiwan, 27, 21-46.

2. Peng Xiao-Jun, Yeh En-Chao, Chou Yu-Min, Lee Teh-Quei, Charles Aubourg, Chen Chuh-Chih, Lin Shih-Ting (2014), Study of Magnetic Susceptibility Anisotropy along the Northern Transect of Taiwan. 2014 TGA (臺灣地球科學聯合學術研討會)。

3. Teng L.S., Lee C. T.(1996), Geomechanical appraisal of seismogenic faults in northeast Taiwan. J. Geol. Soc. China, 35, 1-18.

4. 鄧屬予(2007),台灣第四紀大地構造。經濟部中央地質調查所特刊,第八號,1-24頁。