臺灣中央山脈變形與剝蝕機制關係之研究

Study of the Relation between Deformation and Exhumation in the Central Range, Taiwan

Supervisor:
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Project description:

Taiwan is a classical example of arc-continent collision mountain belt located at the conjunction of on-going oblique convergence between the Eurasian and Philippine Sea Plates. Various tectonic models of mountain building processes for Taiwan orogen have been proposed and are still under investigation. Recently, relative timing between the deformation and maximum metamorphism in the Central Range has become an essential issue regarding to the feedback between tectonic accretion and erosion. New findings of thermopaleomagnetic tool, such as pyrrhotite with the relative lower unblocking (~320℃) and blocking (~240℃) temperatures, can provide insights into evaluating the relation between deformation and maximum metamorphic temperature.

In the study, oriented samples will be collected at several locations of the limbs of major folds, where metamorphic temperature is larger than 320℃, along the Hsuehshan Range and Backbone Range. In the lab, cubed/cylindrical samples are needed to be prepared. The principal directions and magnitudes of magnetic susceptibility ellipsoid will be measured first to evaluate the influence of deformation on natural remanence magnetization. Also, the anisotropy of magnetic susceptibility (AMS) as fabric indicator and finite strain marker will be used to elucidate the tectonic deformation and finite strain pattern and the relationship between magnetic foliation/lineation inferred from AMS and petrofabric foliation/lineation of mesostructures will be inspected. To retrieve detailed paleomagnetic directions of successive partial thermoremanent magnetization of pyrrhotite remanences, the thermal demagnetization with small temperature intervals (2-5 ℃) between unblocking and blocking temperatures will be performed. Based on the validation result of fold test, the relation between the deformation and maximum metamorphic temperature can be deciphered. Furthermore, integrating the thermopaleomagnetic results and thermochronologic data, the timing of post-folding exhumation can be investigated. With appropriated paleomagnetic framework, the post-folding movement of regional blocks can be also inspected.

Project Schedule:

1 week: paper readings and field trip; 1 week: sample preparation; 2 weeks: conducting AMS & thermal demagnetization measurements; 2 week: magnetic mineral determination; 2 week: synthetic interpretation and complete the presentation / report.

Preferred background:

Students with field work experience are highly welcomed.
Paleomagnetic knowledge and ArcGIS skills are not necessary.
Knowledge of Excel and stereonet plotting is required.