

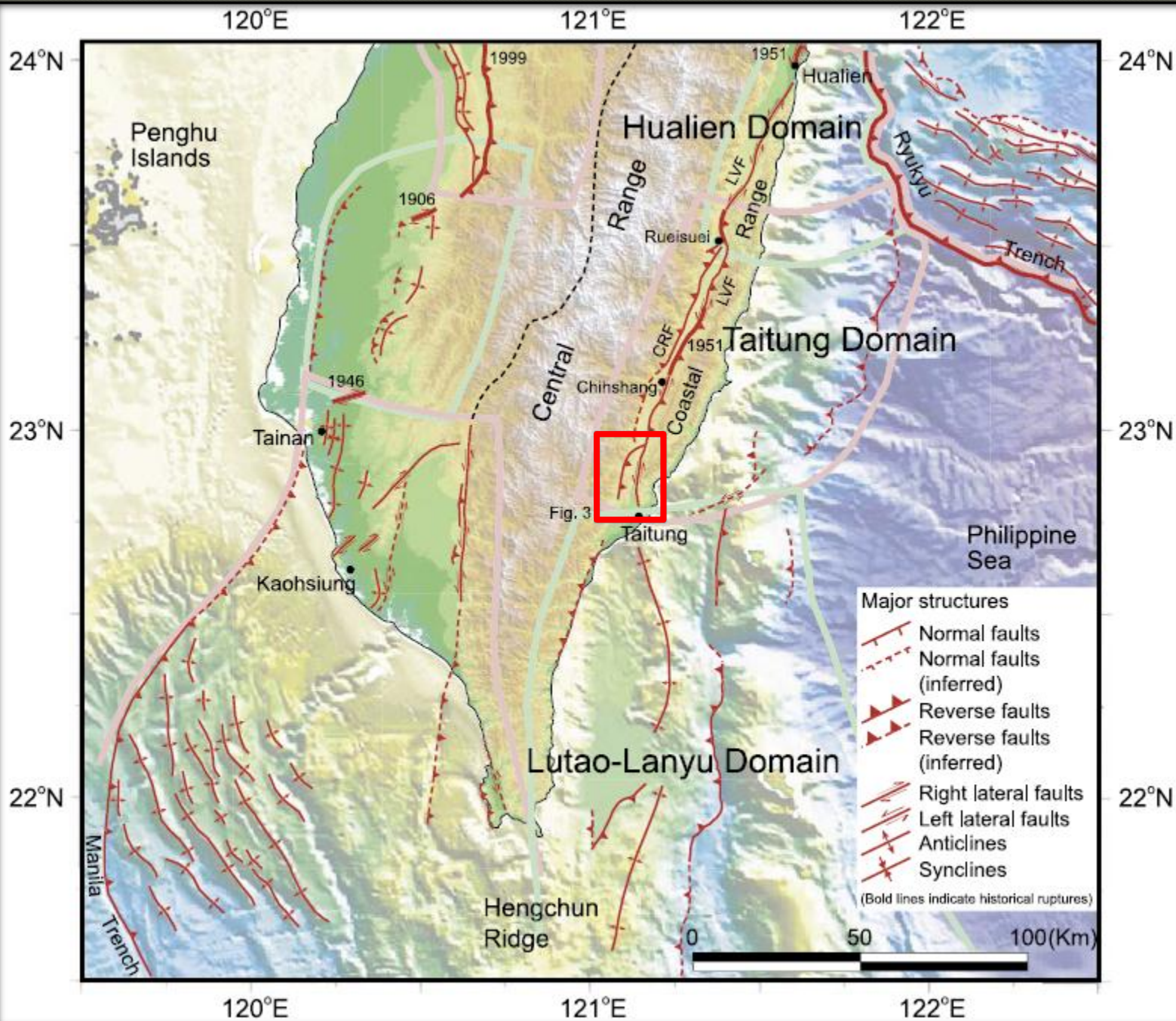
**Insights into the pattern of the  
southernmost Longitudinal Valley Fault:  
Implications from geodetic data analysis and  
geomorphic evidences**

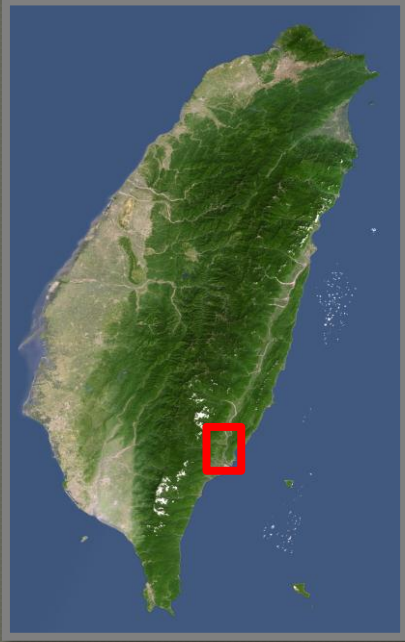
**Szu-Hua Wang**

# References

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- Lee, J.-C., J. Angelier, H.-T. Chu, S.-B. Yu, and J.-C. Hu, **1998**. Plate-boundary strain partitioning along the sinistral collision suture of the Philippine and Eurasian plates: Analysis of geodetic data and geological observation in southeastern Taiwan, *Tectonics*, **17**, 859 – 871.
- Shyu, J. B. H., K. Sieh, Y.-G. Chen, R. Y. Chuang, Y. Wang, and L.-H. Chung, **2008**. Geomorphology of the southernmost Longitudinal Valley fault: Implications for evolution of the active suture of eastern Taiwan, *Tectonics*, **27**, TC1019, doi:10.1029/2006TC002060.





# Outline

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- Geodetic data analysis
  - strain tensor analysis
  - discontinuous model analysis
- Geomorphic analysis
- Discussion and Conclusions

# Geodetic data analysis

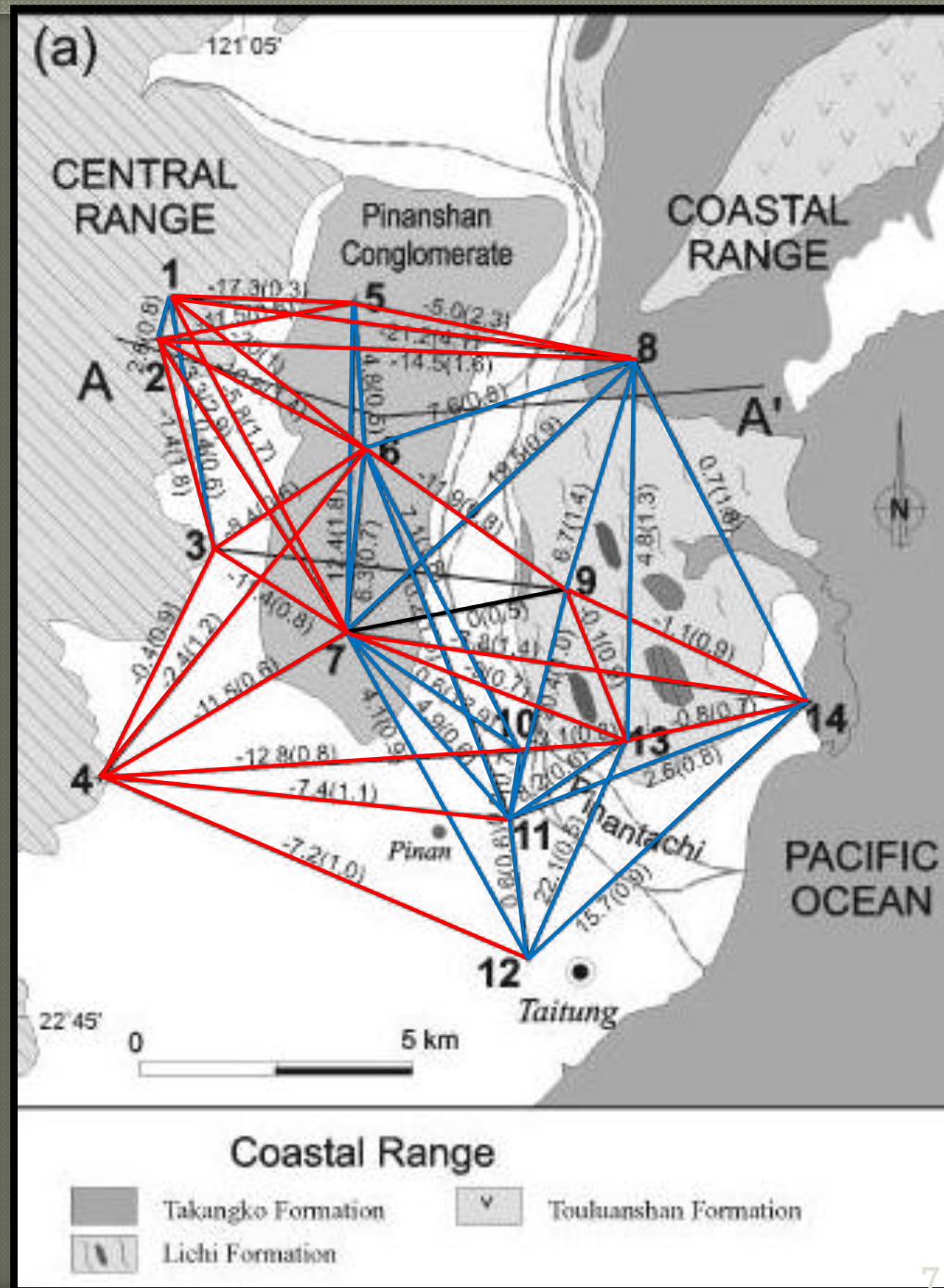
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- Geodetic data were collected by Yu *et al.* (1992), using the **Taitung trilateration network**. Each line of the network has been measured 9 times between 1983 and 1990.
  
- Geodetic data analysis
  - strain tensor analysis
  - discontinuous model analysis

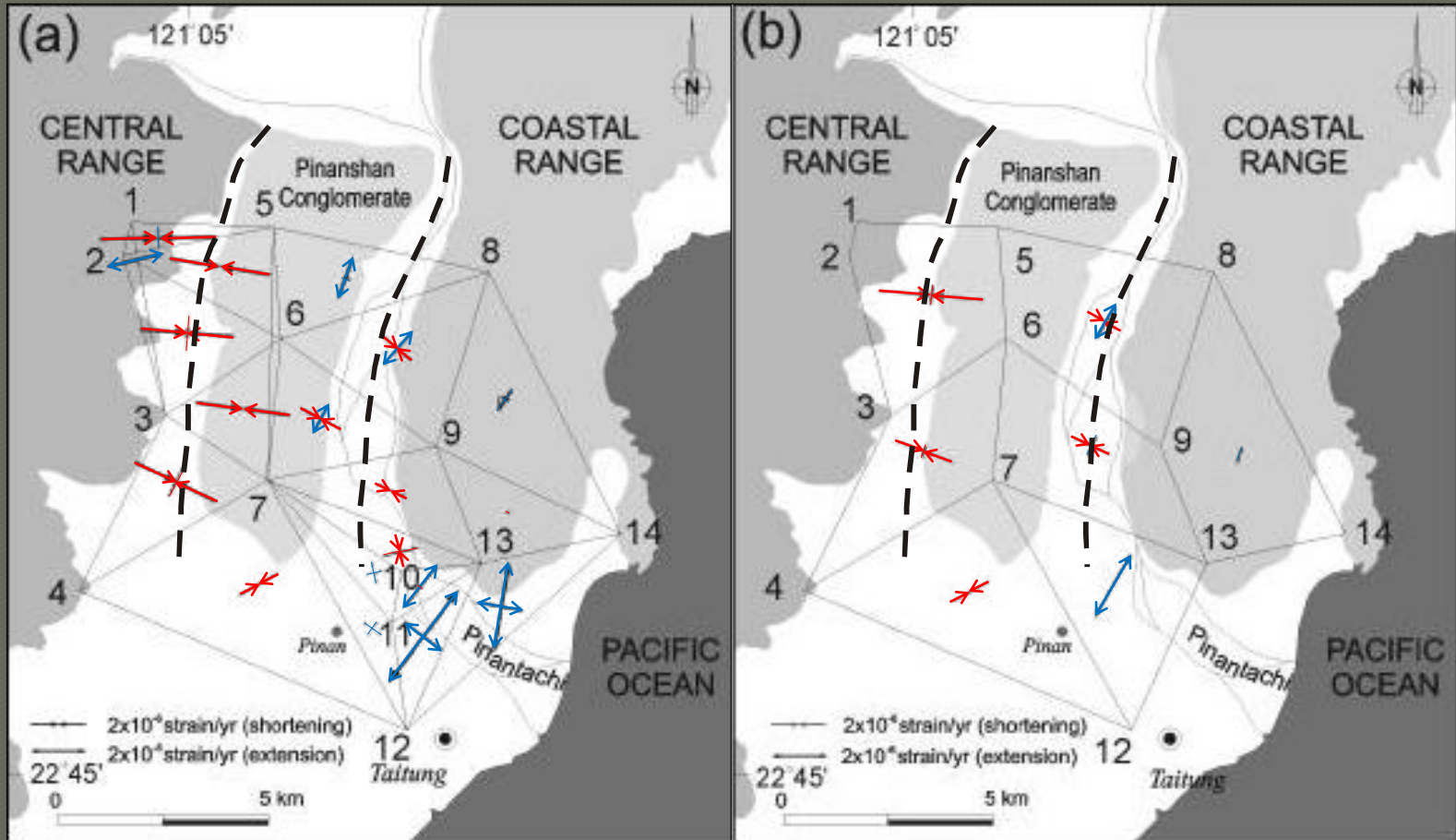
Trilateration network with all 48 lines measured 9 times from 1983-1990.

Values show annual average length changes (mm/yr) with '-' for **shortening**, '+' for lengthening. Standard errors (mm) are shown in parentheses.

— shortening  
— lengthening



# Strain tensor analysis



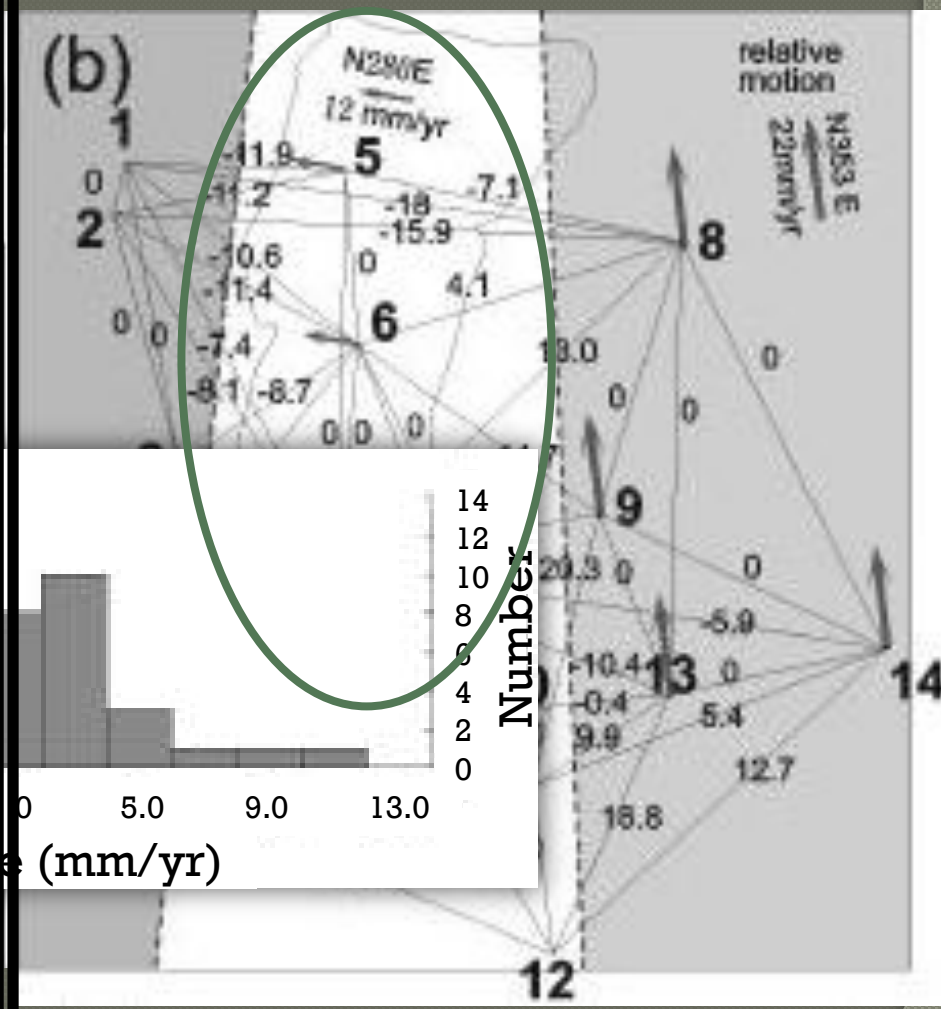
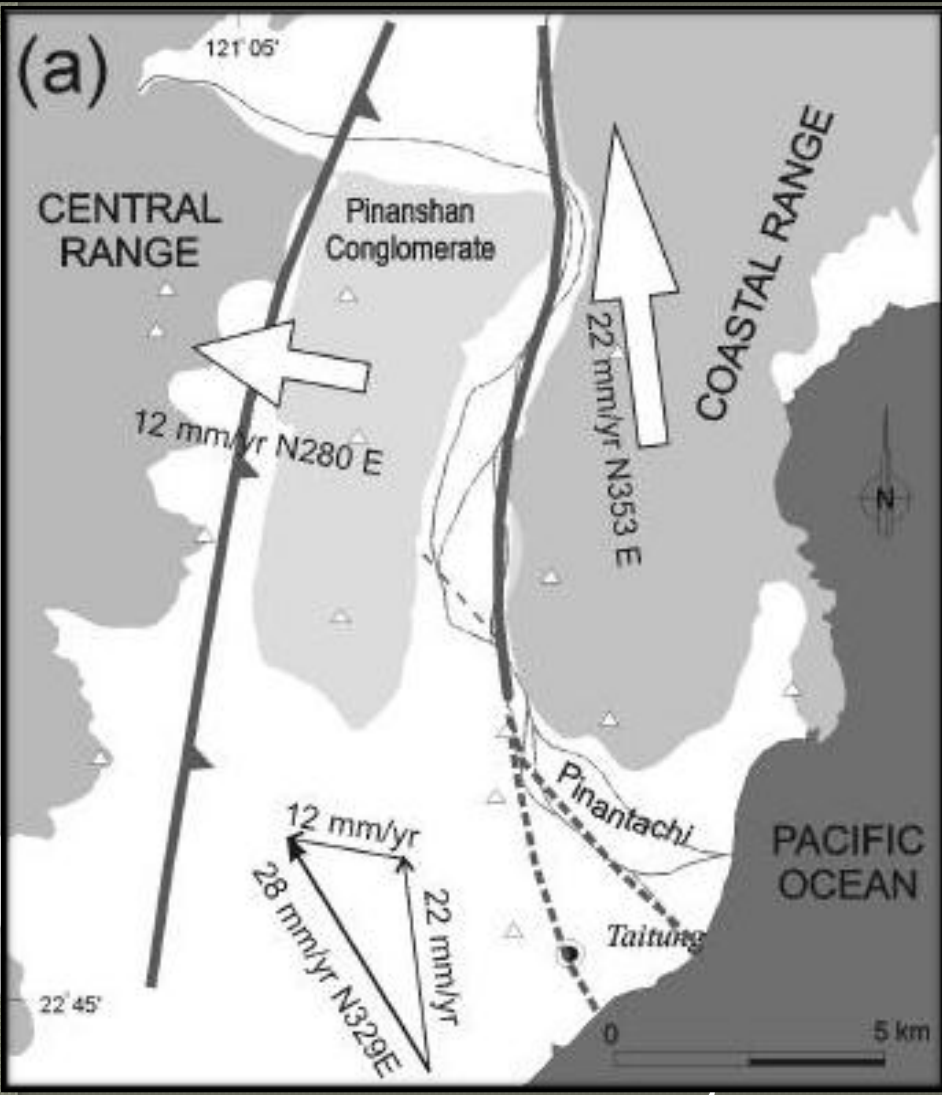
↔ extension  
↔ compression

# Discontinuous model analysis

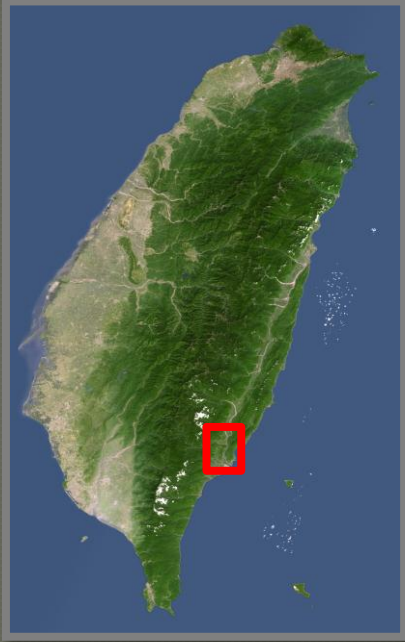
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- Discontinuous model analysis was used (1) to interpret the results of the trilateration network and (2) to illustrate quantitatively the characteristics of the surface crustal deformation along highly localized active faulting.
- The deformation is simply represented by the **relative movement** of rigid blocks separated by linear fault.

# Discontinuous model analysis

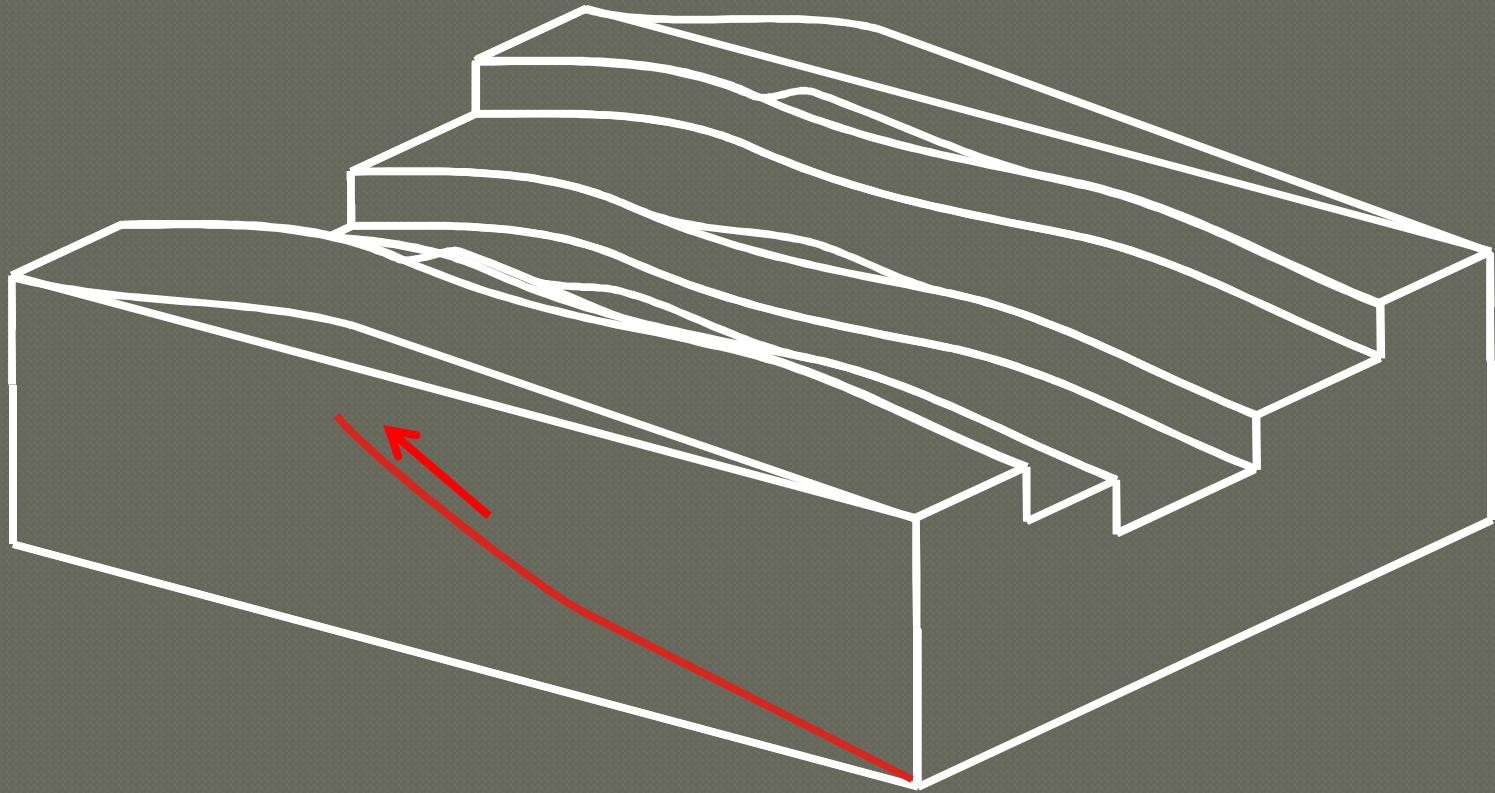


(differences  $< \pm 5$  mm/yr)



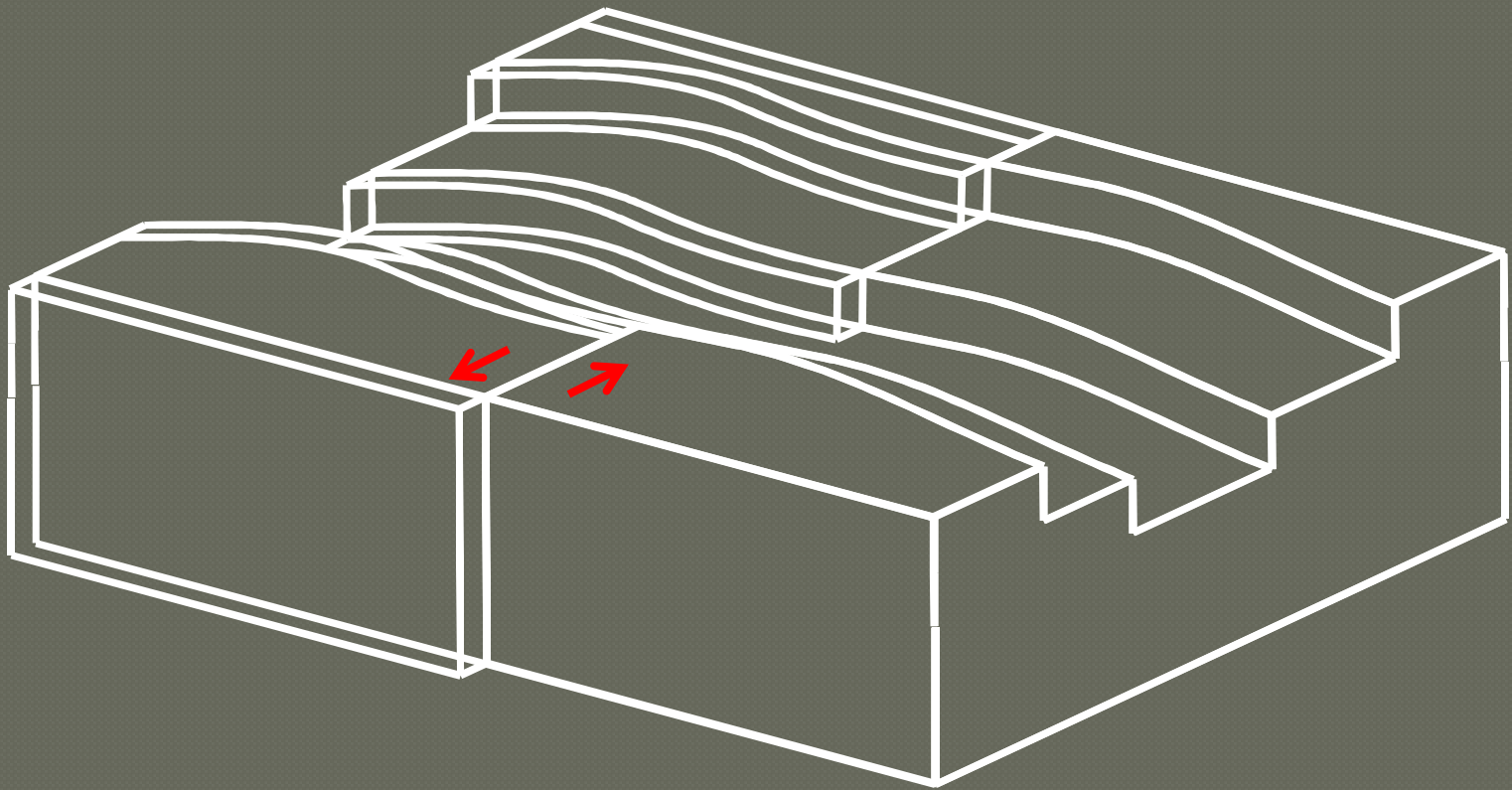
# Geomorphic analysis

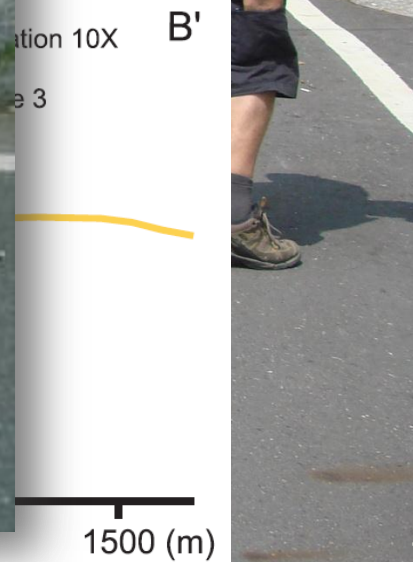
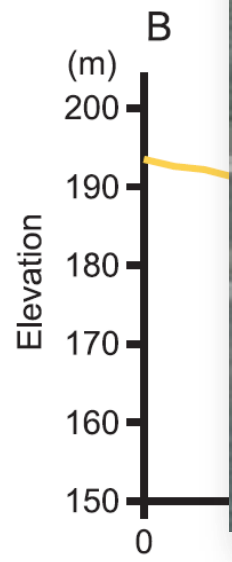
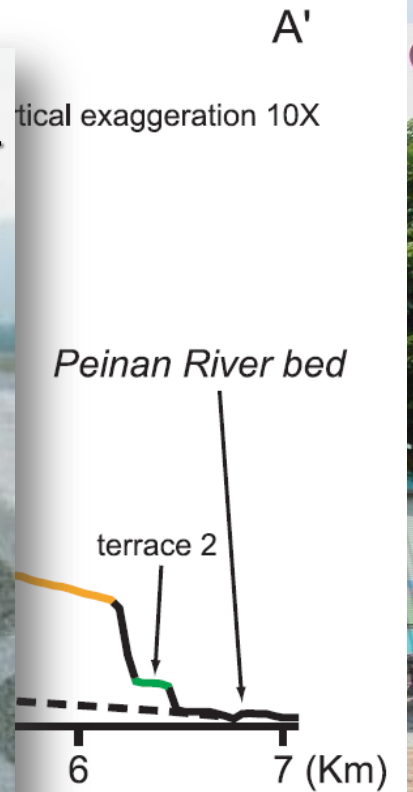
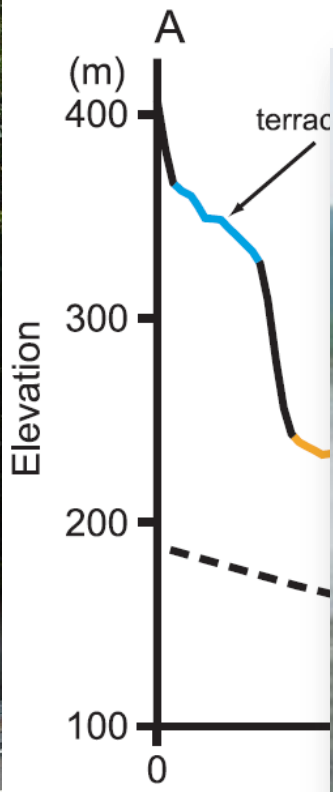
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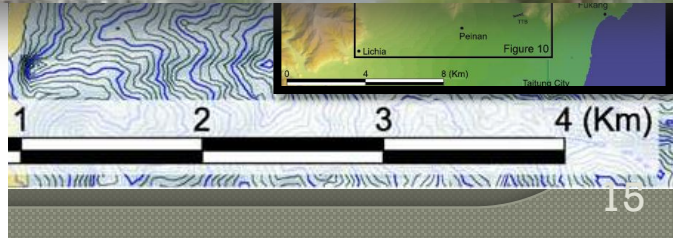
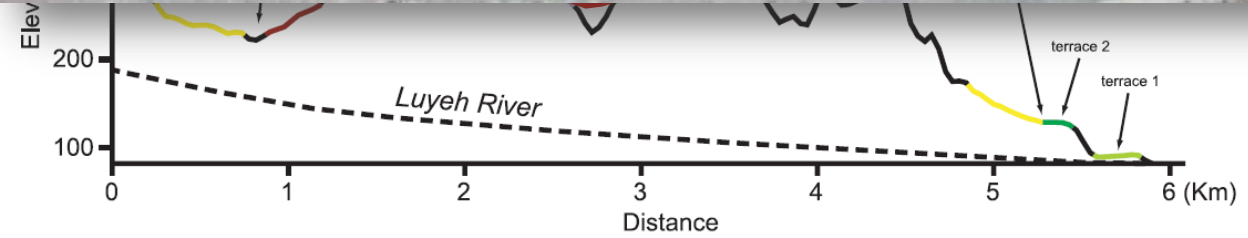
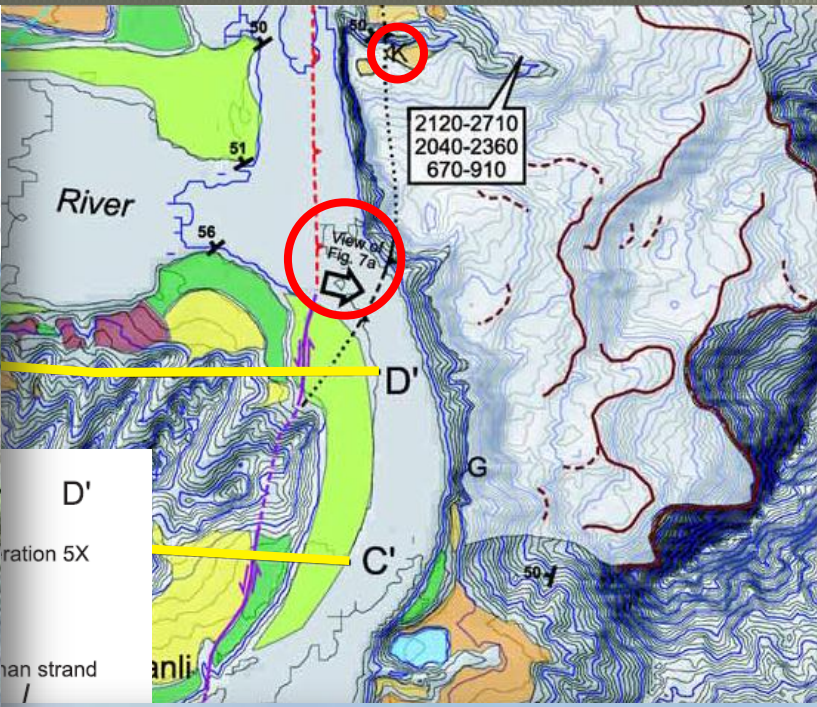
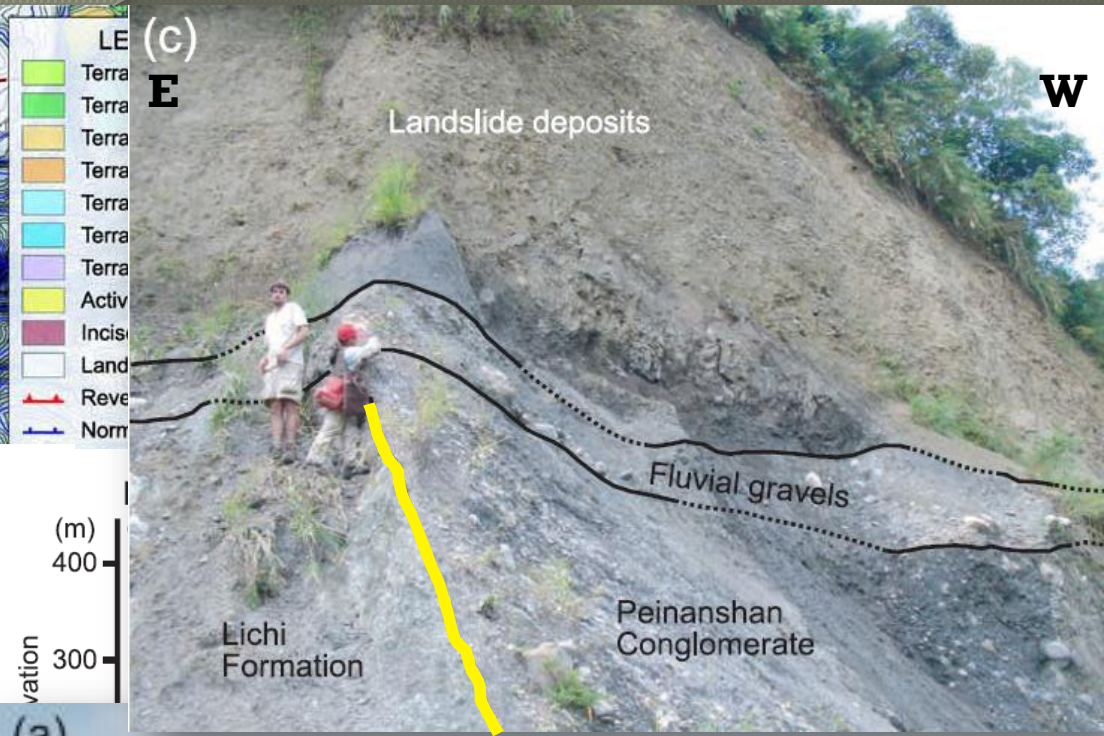


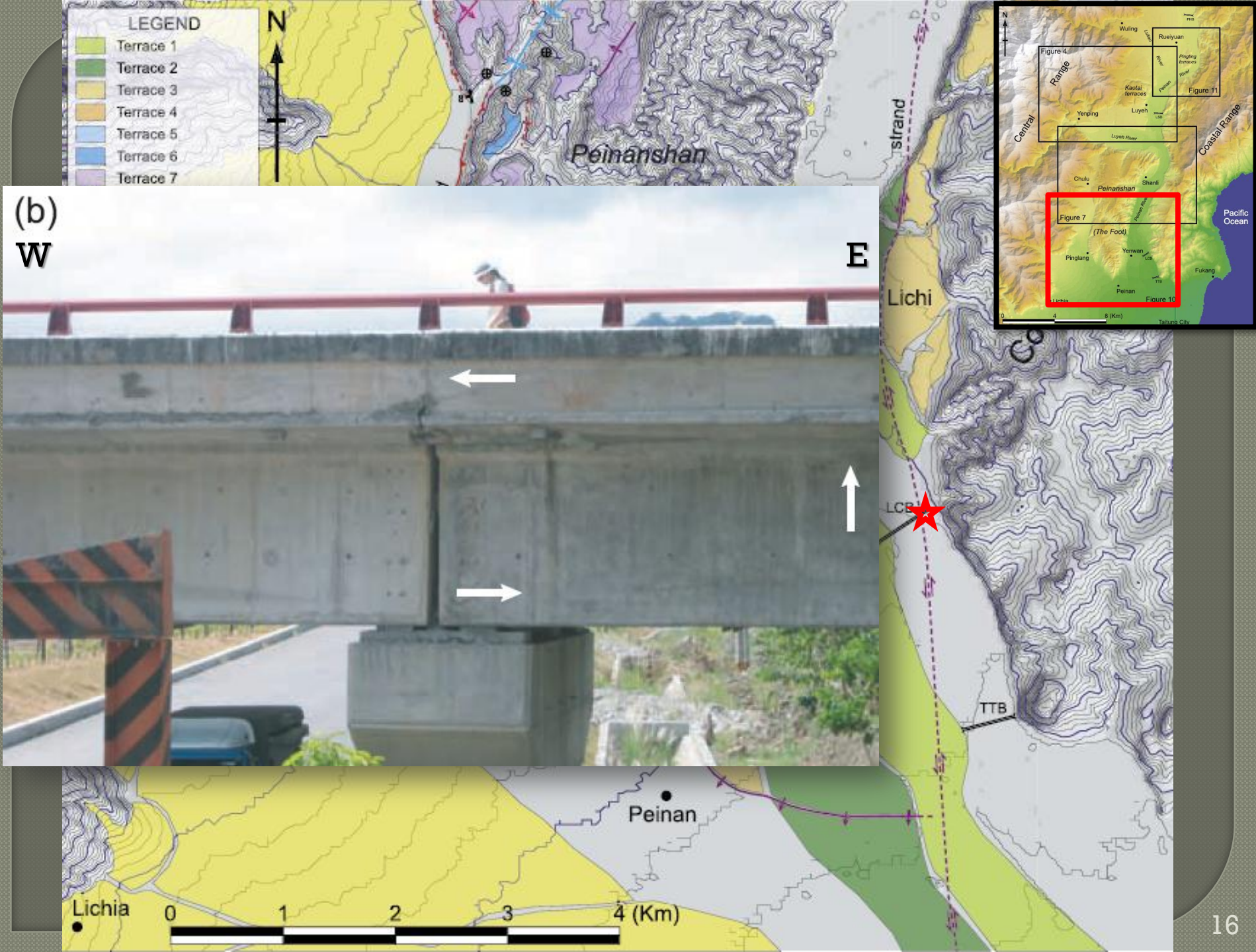
# Geomorphic analysis

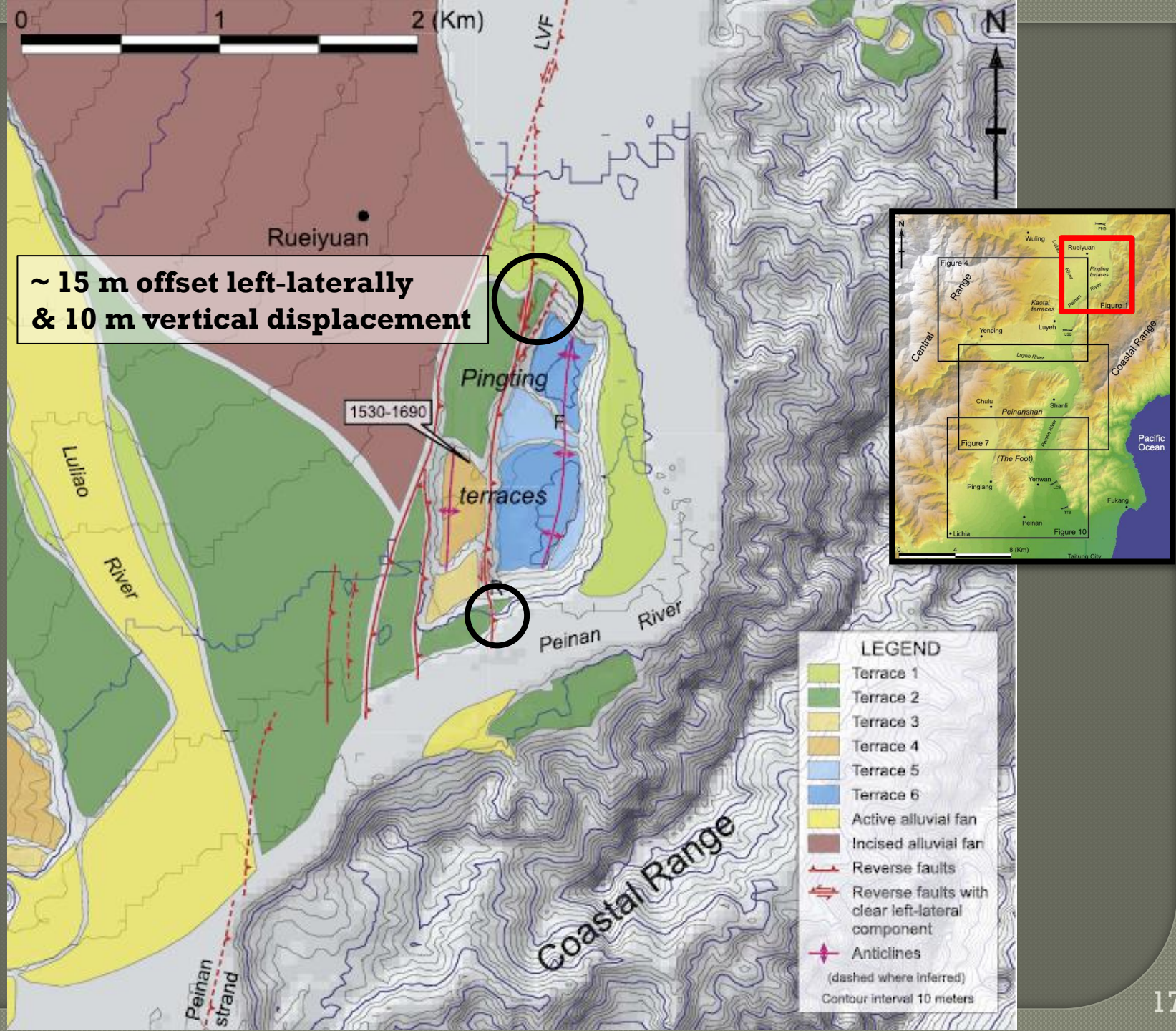
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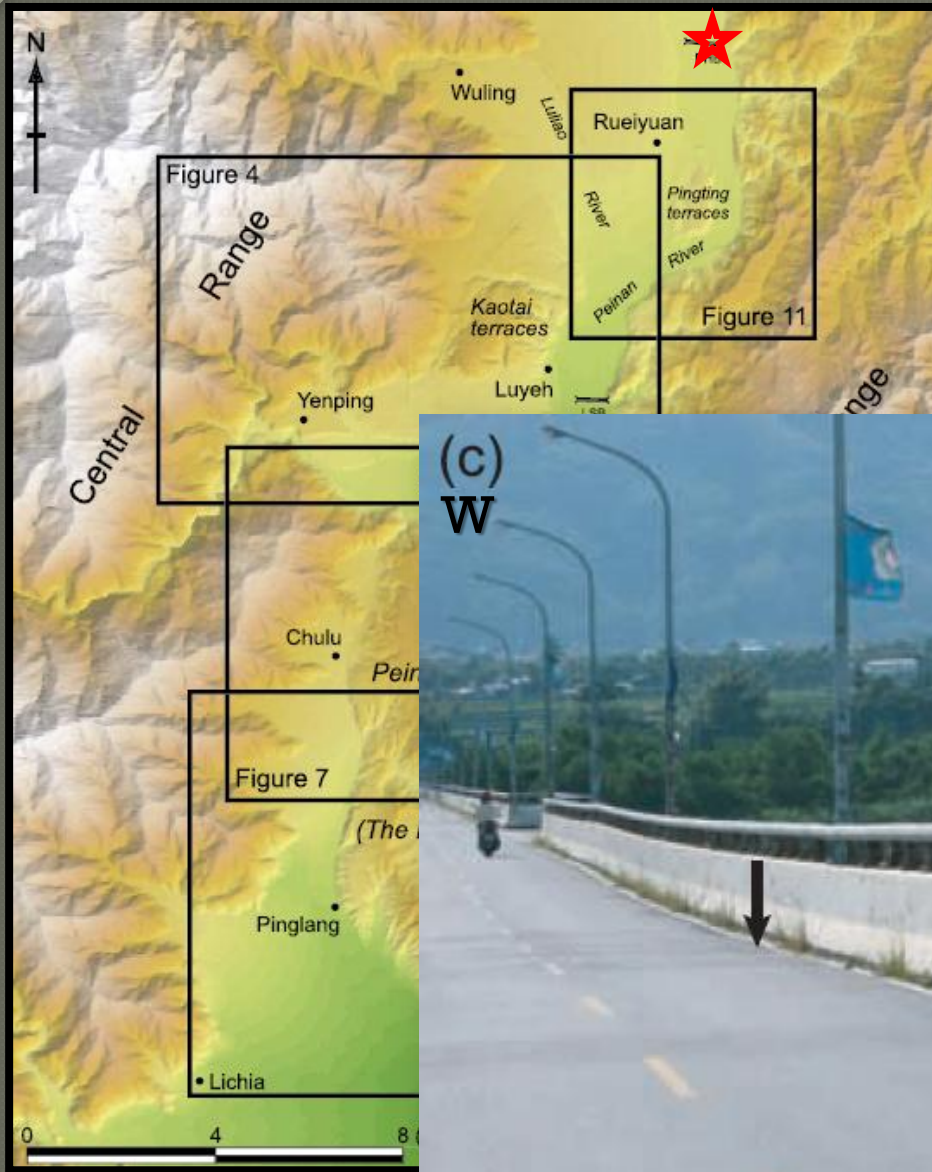


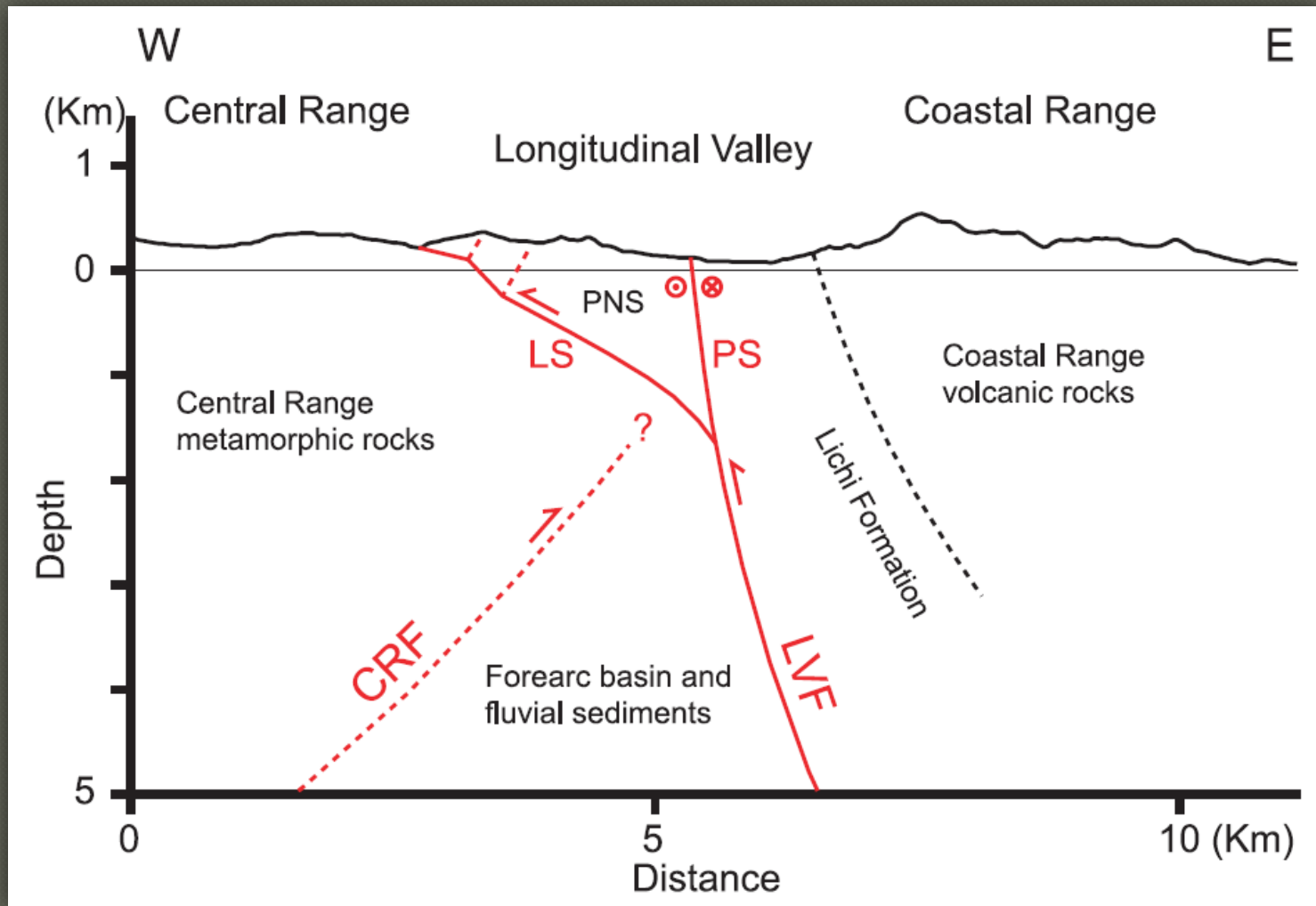










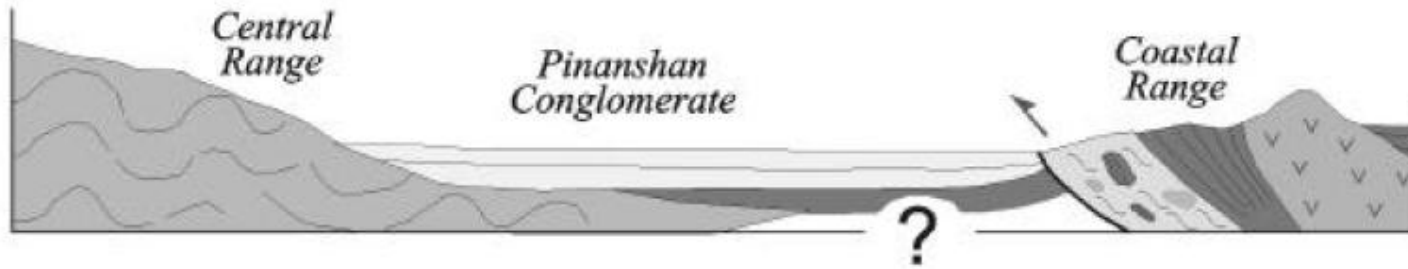


LVF: Longitudinal Valley fault  
 CRF: Central Range fault

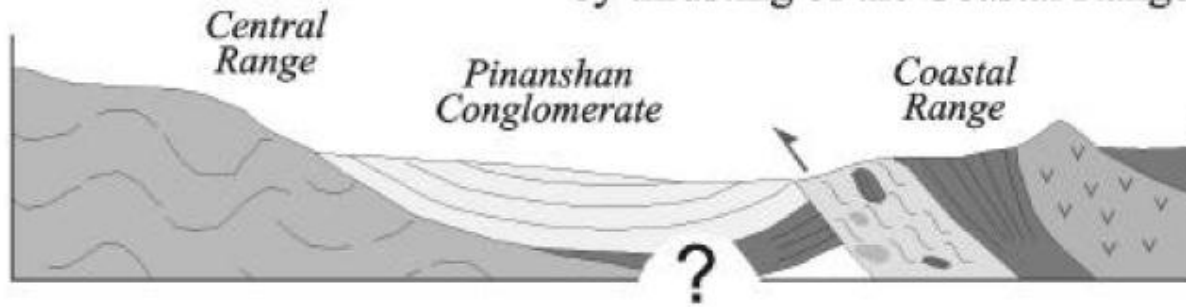
PNS: Peinanshan Conglomerate  
 LS: Luyeh strand  
 PS: Peinan strand

## Tectonic model of the Peinanshan Conglomerate

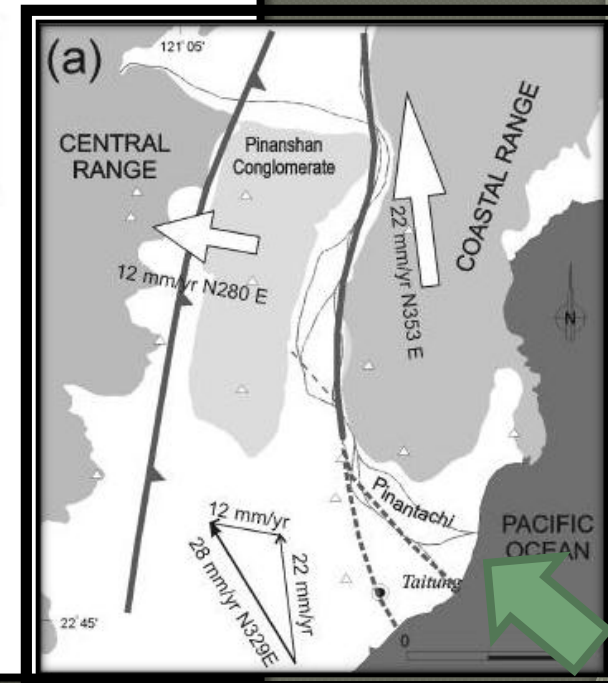
(a) middle Pleistocene: Sedimentation of Pinanshan Conglomerate



(b) late Pleistocene: Folding of Pinanshan Conglomerate by thrusting of the Coastal Range



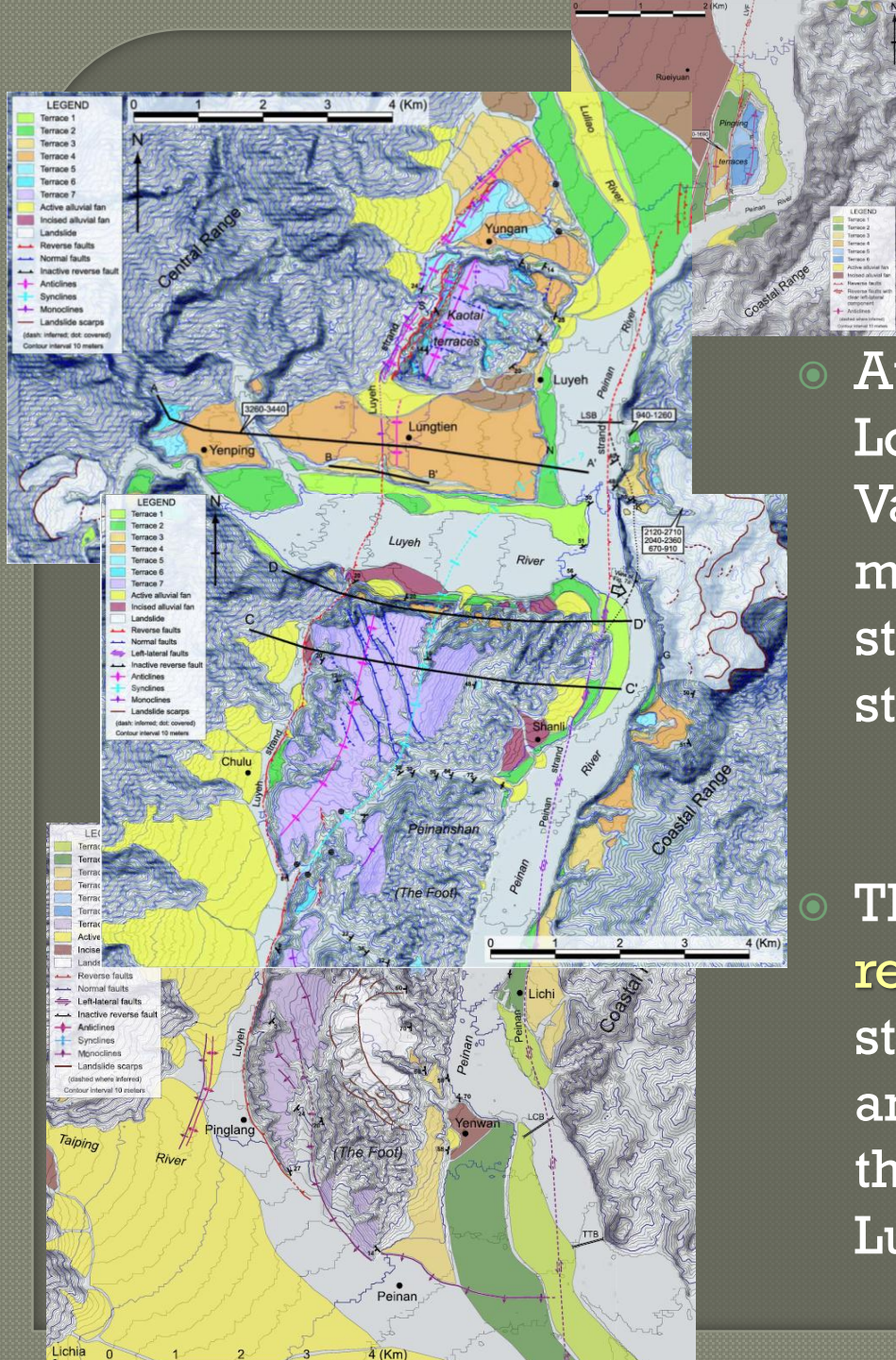
(c) Present Strain partitioning



Tectonic evolution of the Peinanshan Conglomerate

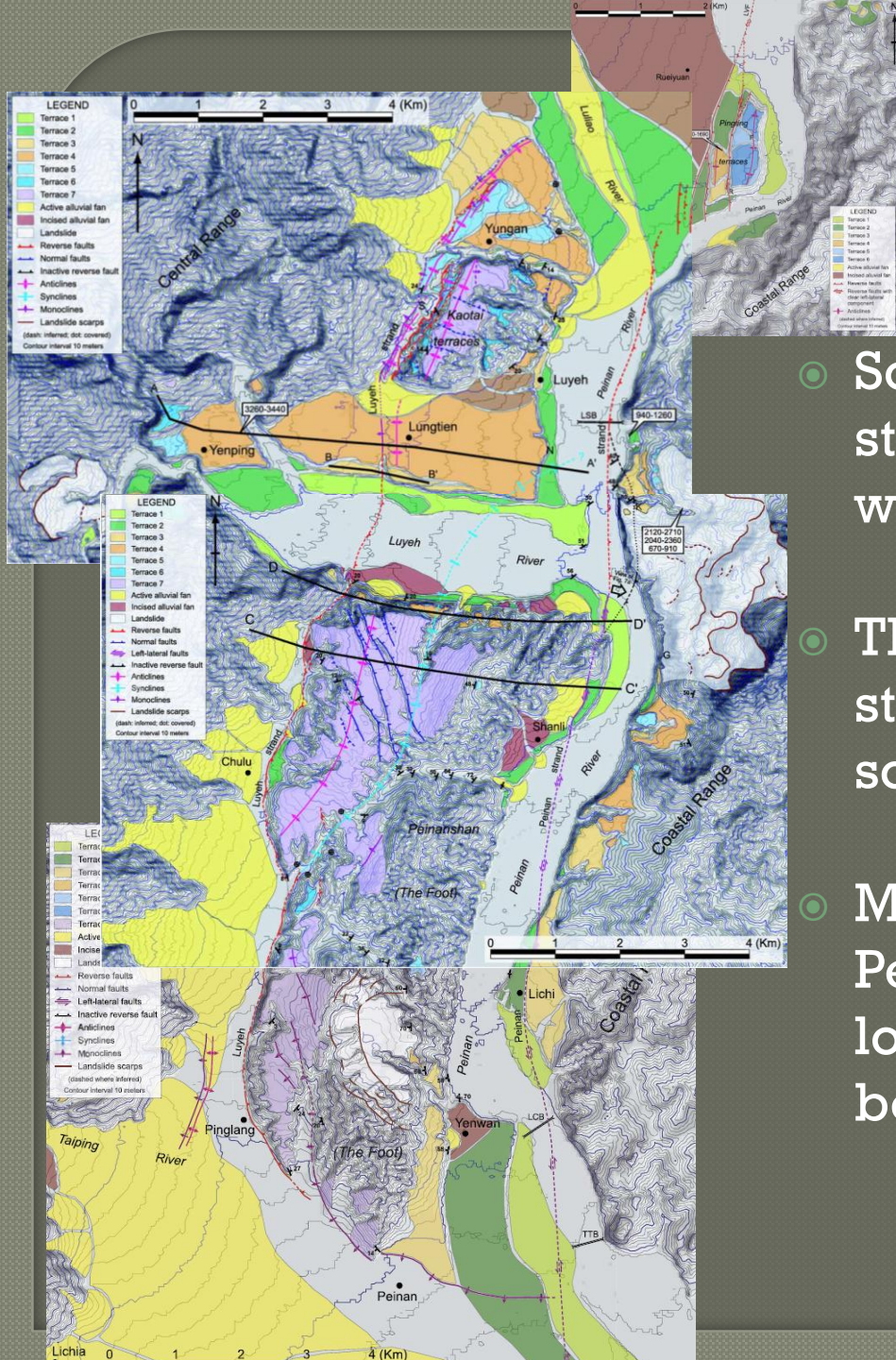
# Conclusions

- At the southern end of the Longitudinal Valley, the Longitudinal Valley Fault system splits into two major active branches: the Luyeh strand in the west and the Peinan strand in the east.
- The **Luyeh** strand has predominately **reverse** motion, whereas the **Peinan** strand has a significant **left-lateral** and a large **reverse** component, to the south and to the north of the Luyeh River, respectively.



# Conclusions

- South of the Luliao River, the Luyeh strand steps to the east and joins with the Peinan strand.
- The southern end of the Luyeh strand is coincident with the southern end of the Coastal Range.
- Most of the active strands in the Peinanshan area have very shallow locking depths, but do not seem to be creeping at the surface.



**Thank you for your listening!**

