

Present-day kinematics of Neogene extensional structures in the foreland of southwestern Taiwan from GPS observations during 2002-2012

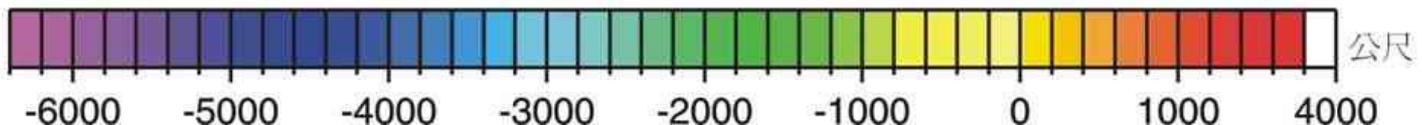
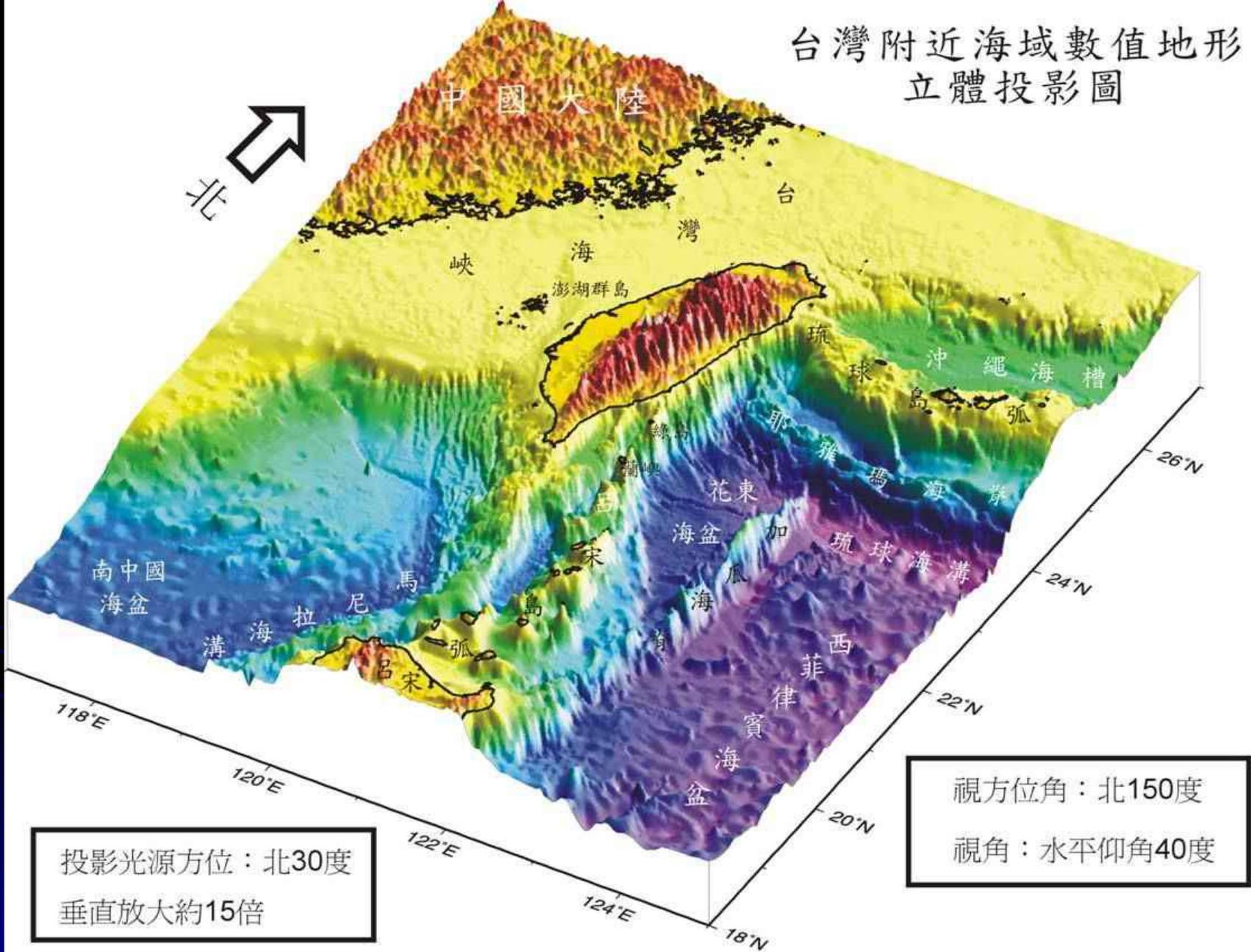
^a Ruey-Juin Rau, ^a Chia-Hsun Yang, ^a Sz-Man Ko,
^b Kuo-En Ching and ^c Chien-Liang Chen

^a *Department of Earth Sciences, National Cheng Kung University, Taiwan*

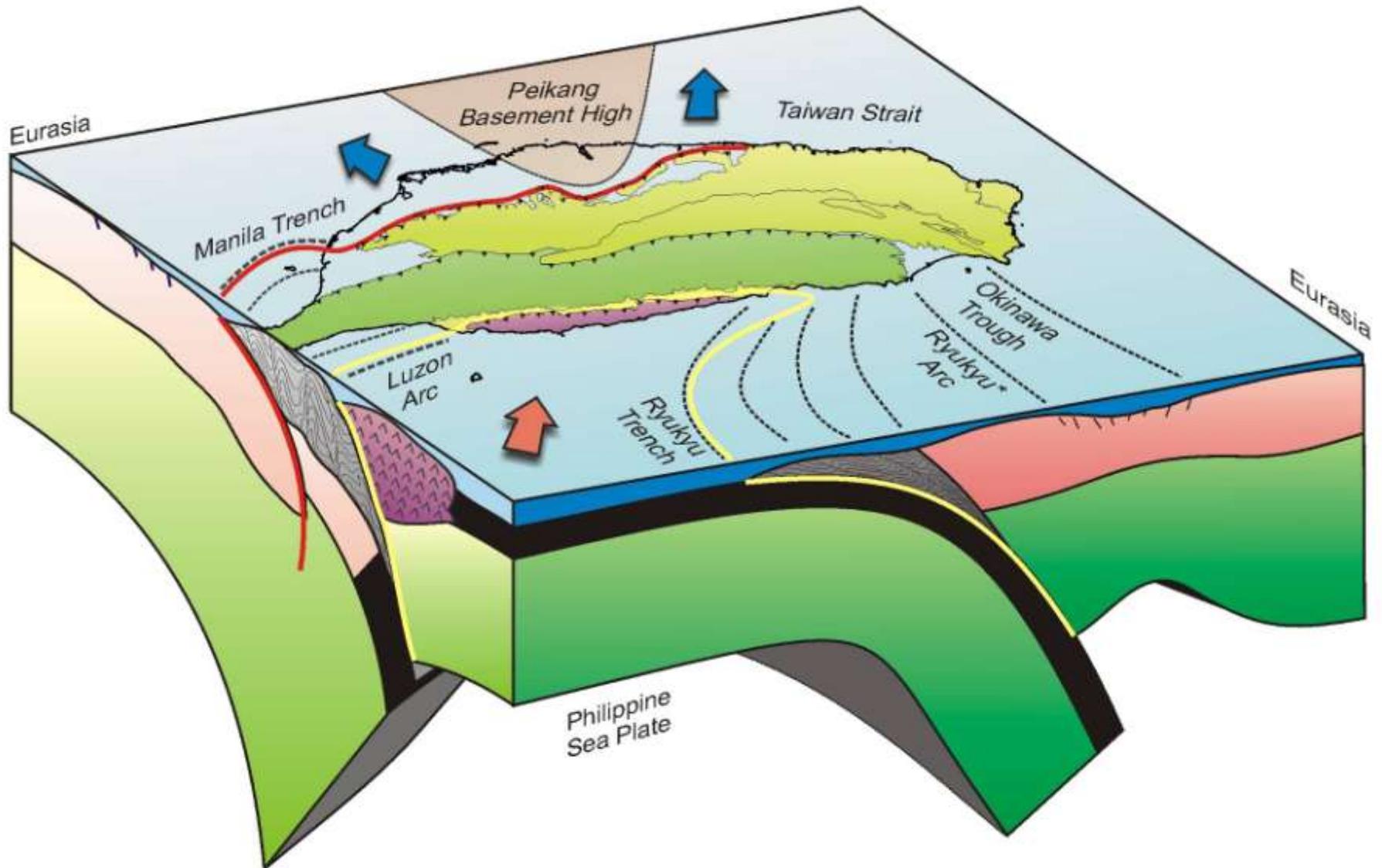
^b *Department of Geomatics, National Cheng Kung University, Taiwan*

^c *Central Geological Survey, MOEA, Taiwan*

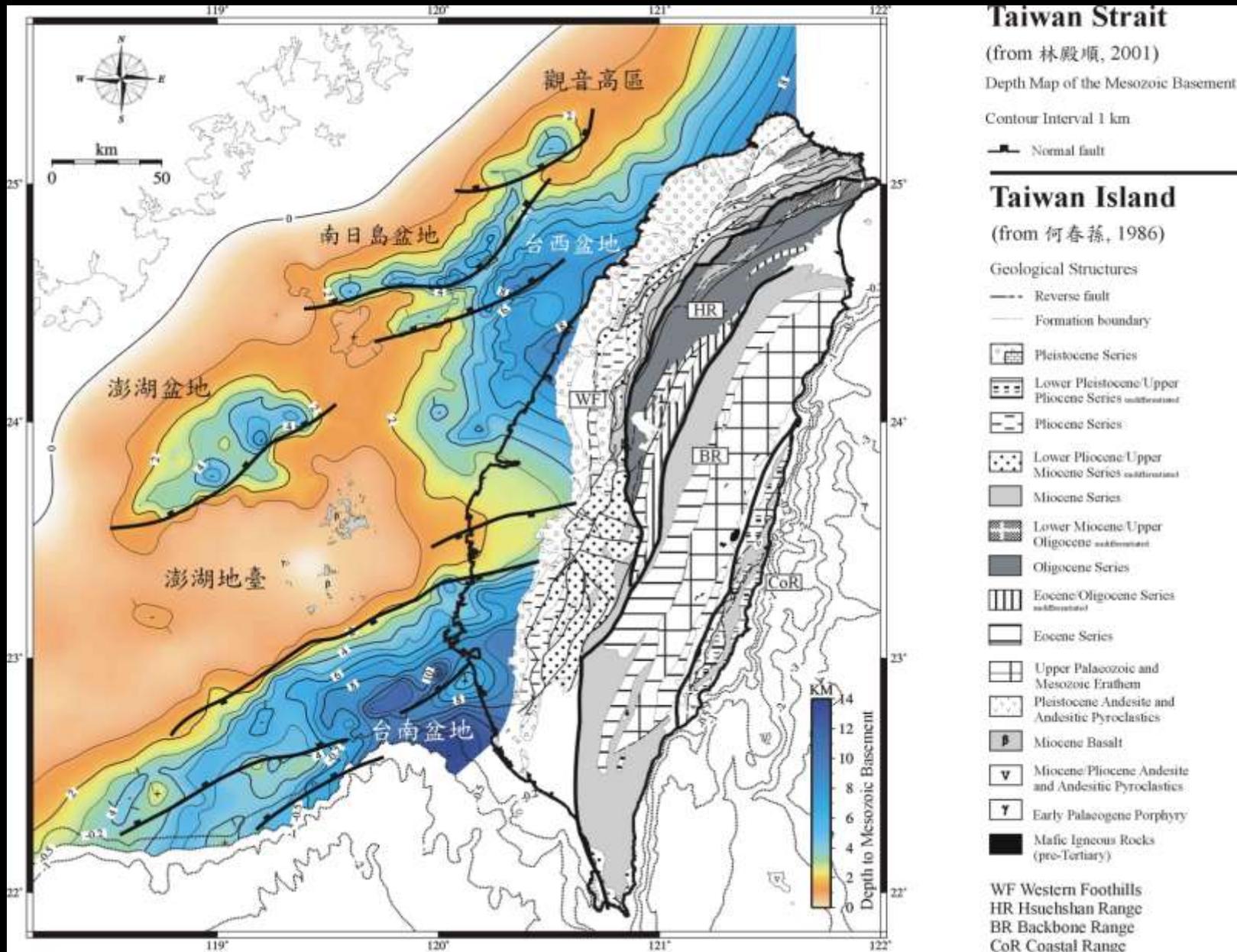
台灣附近海域數值地形 立體投影圖



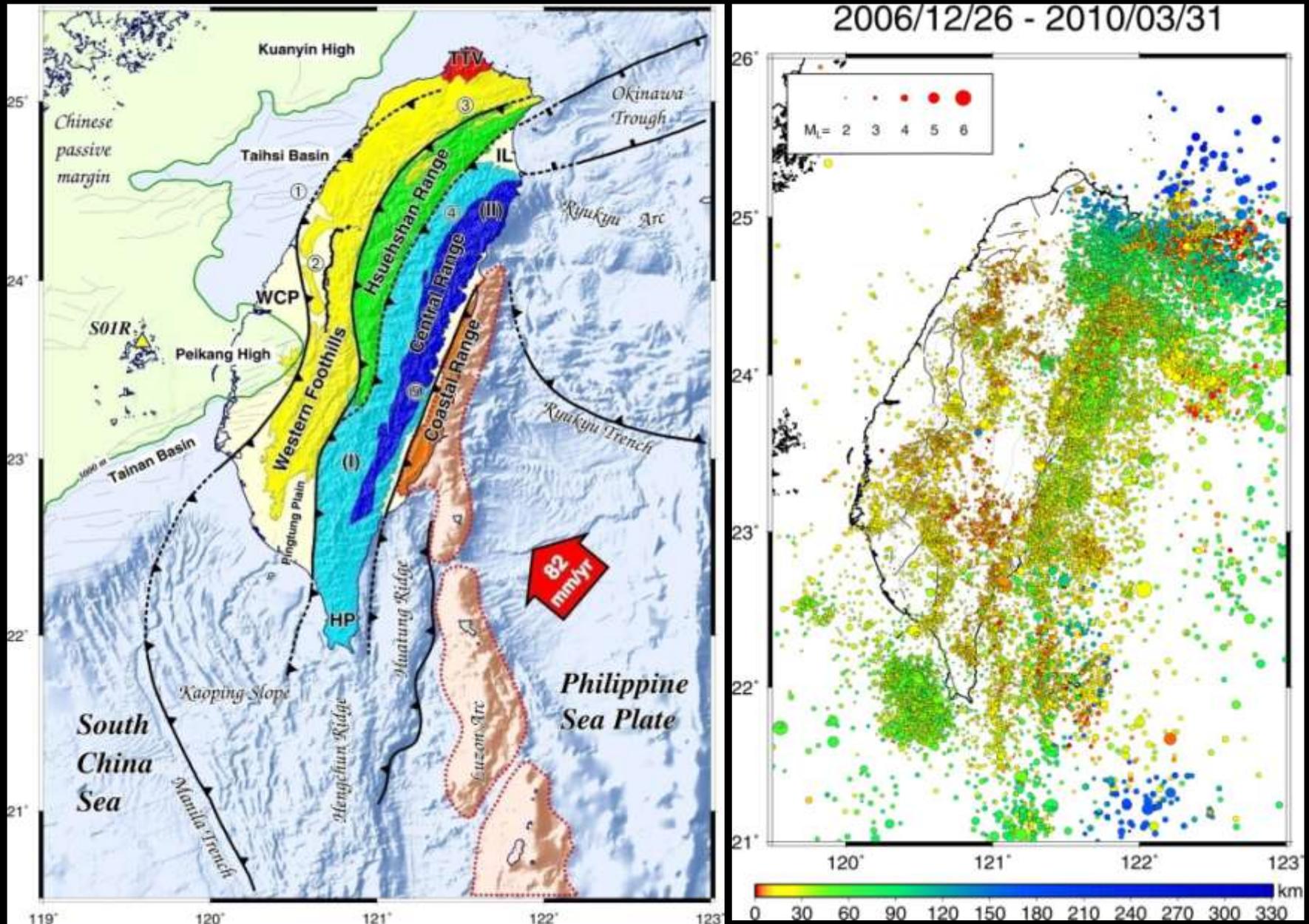
Tectonic Setting of Taiwan



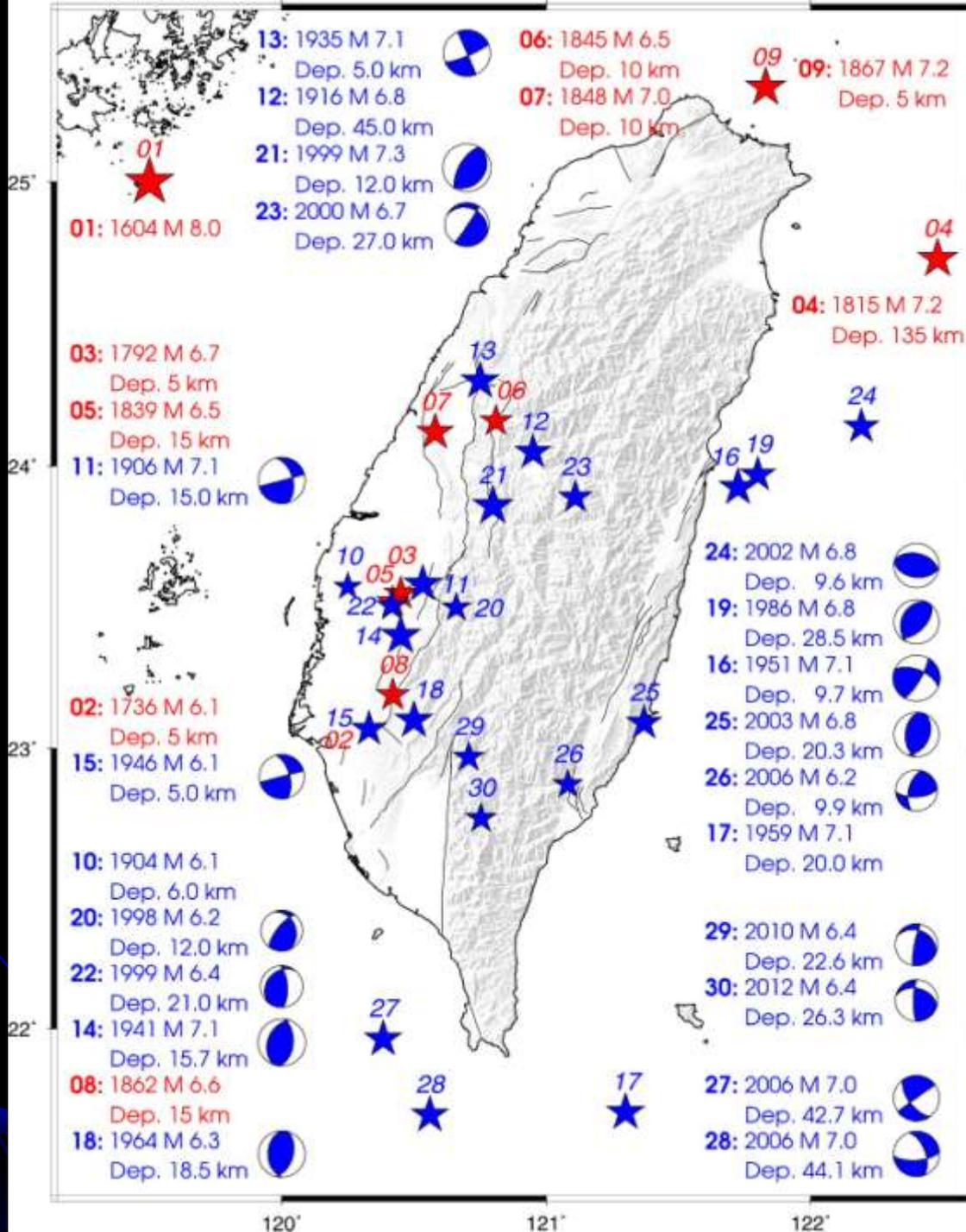
Geology of Taiwan and Mesozoic basement depth map



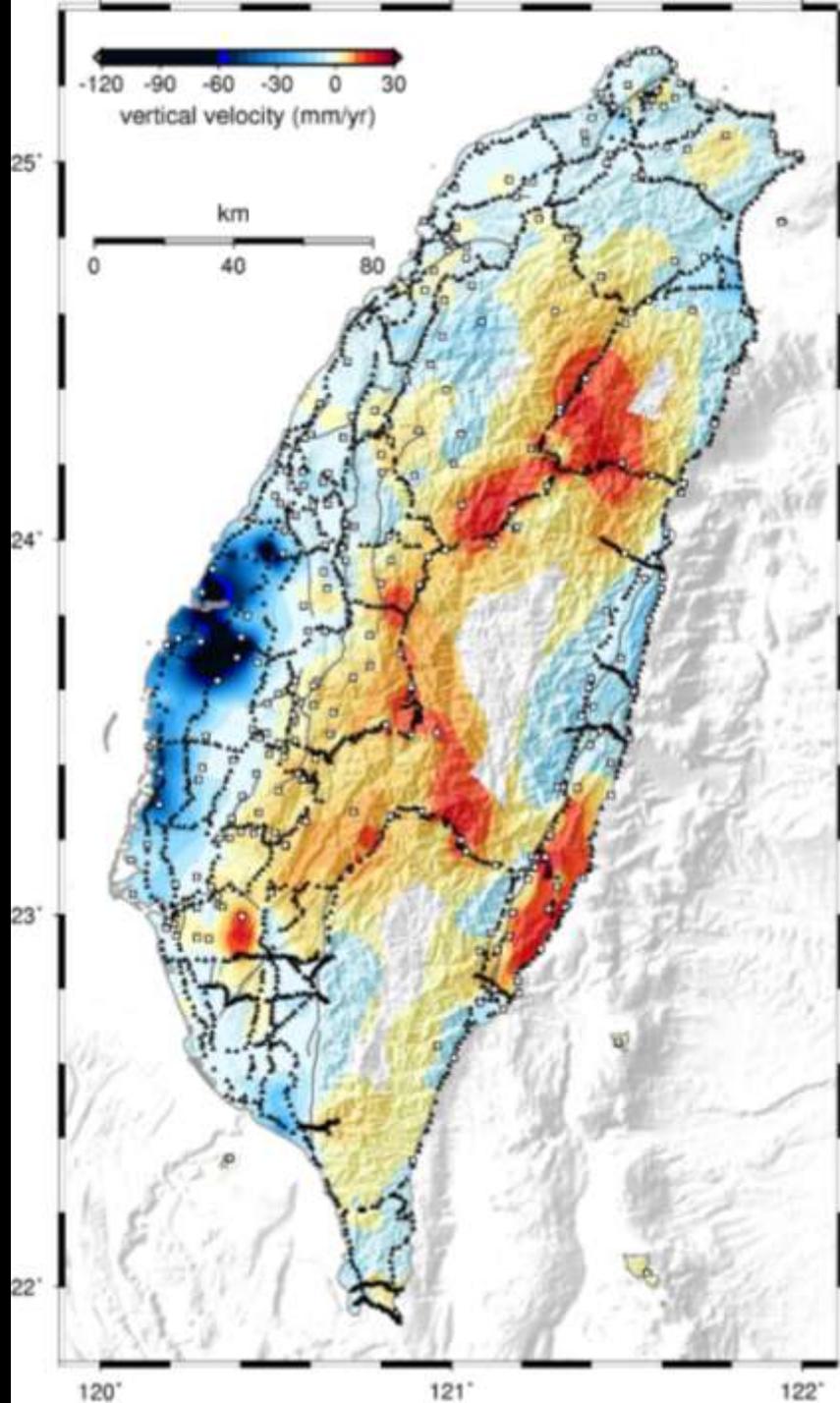
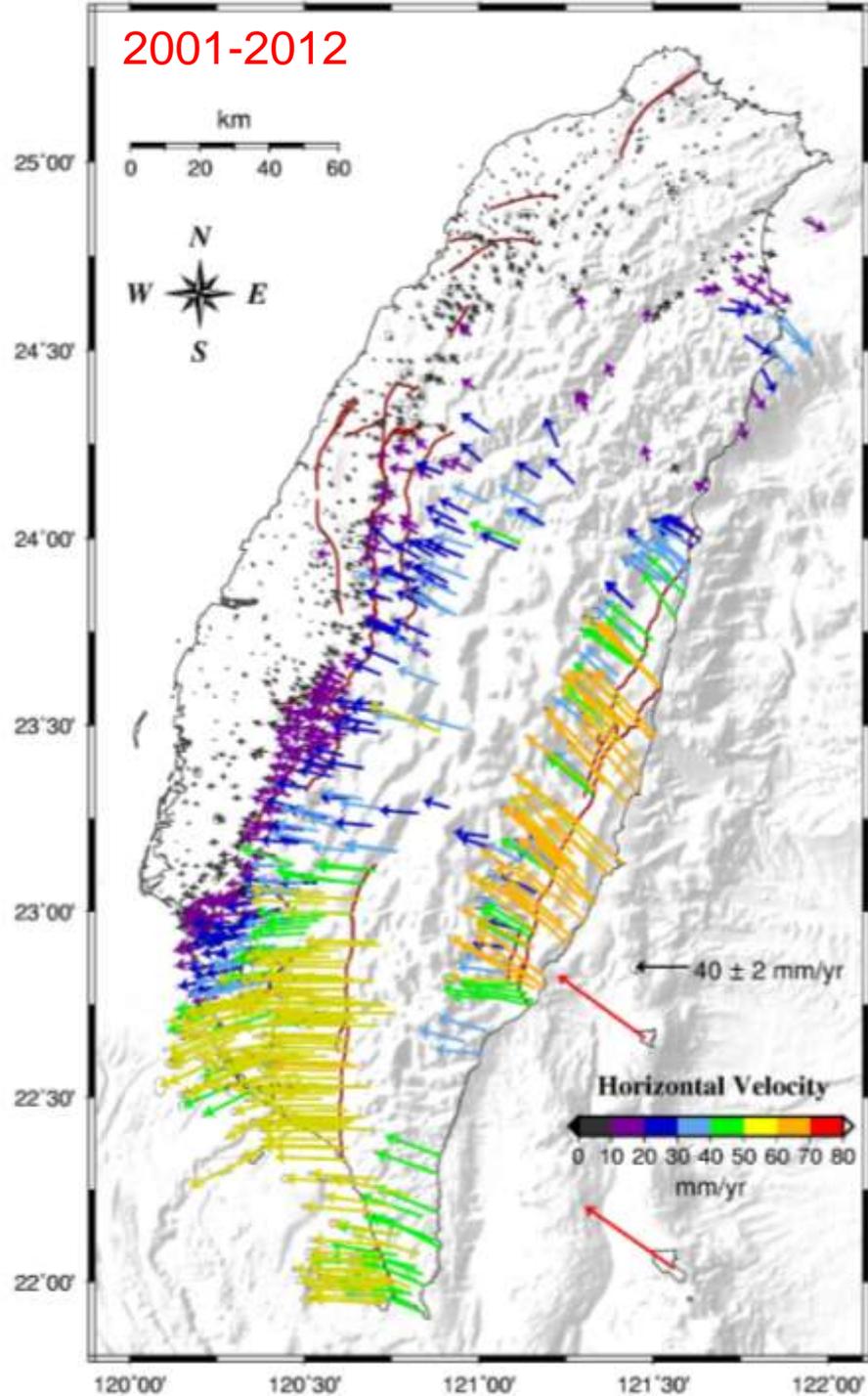
Tectonics and Seismicity of Taiwan



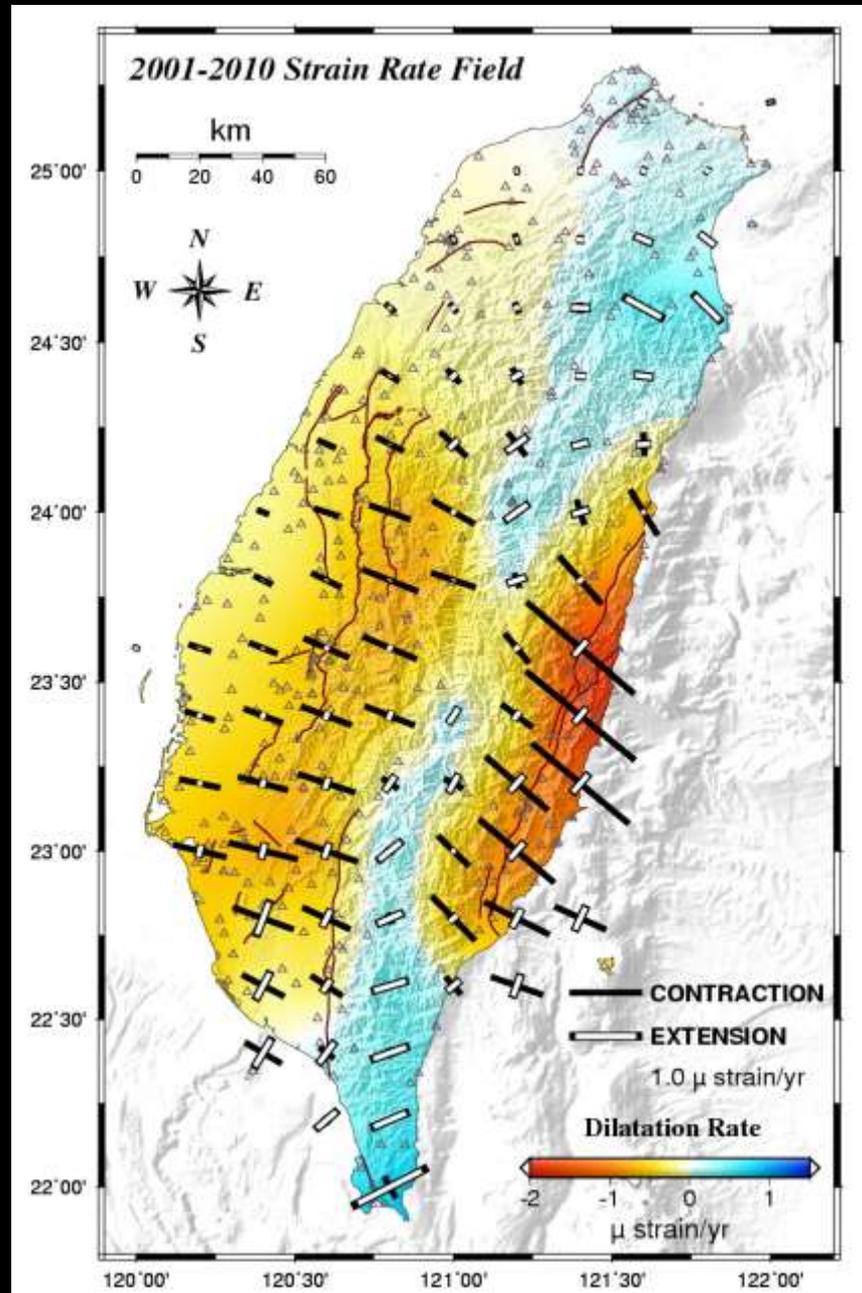
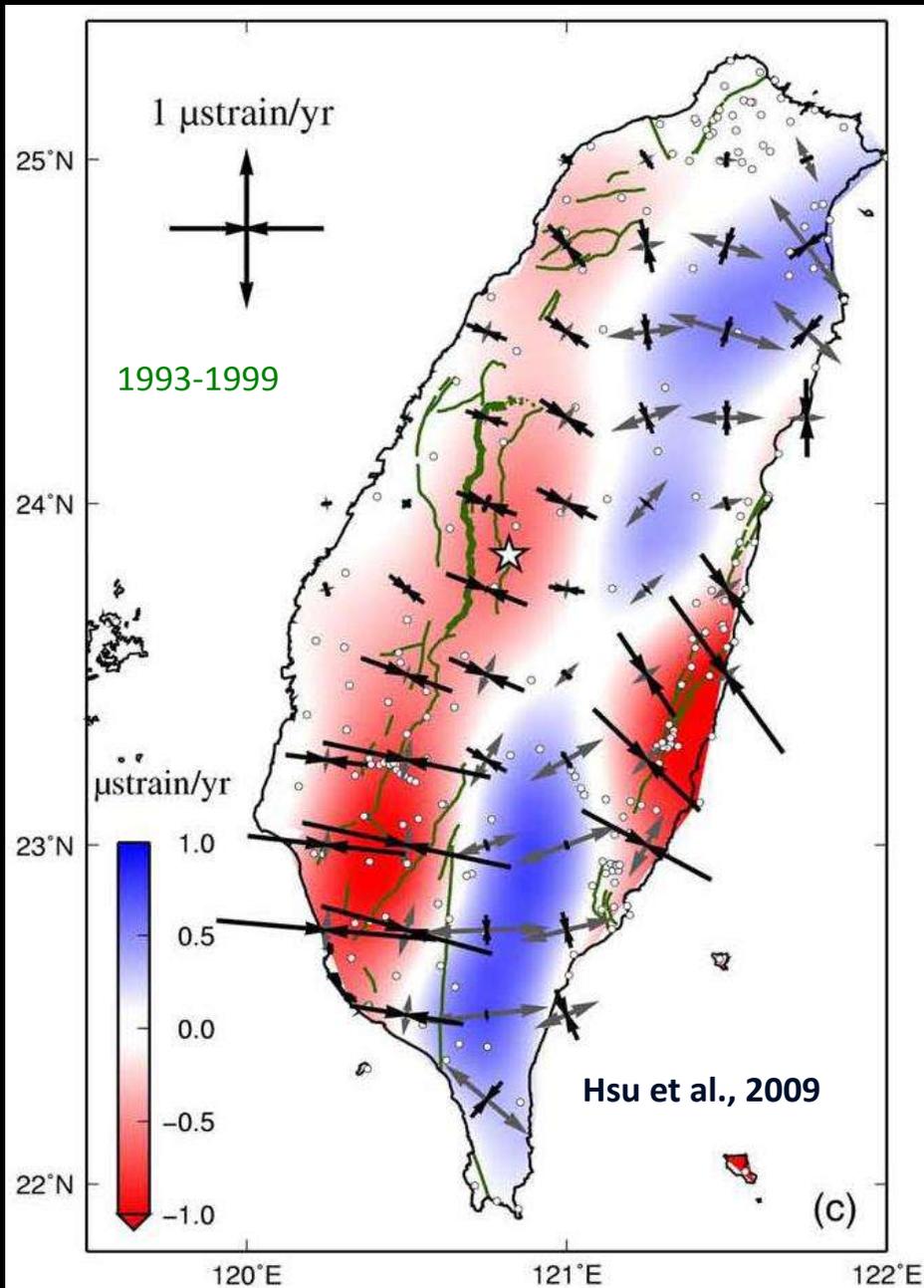
1600-2012 Significant earthquakes in Taiwan



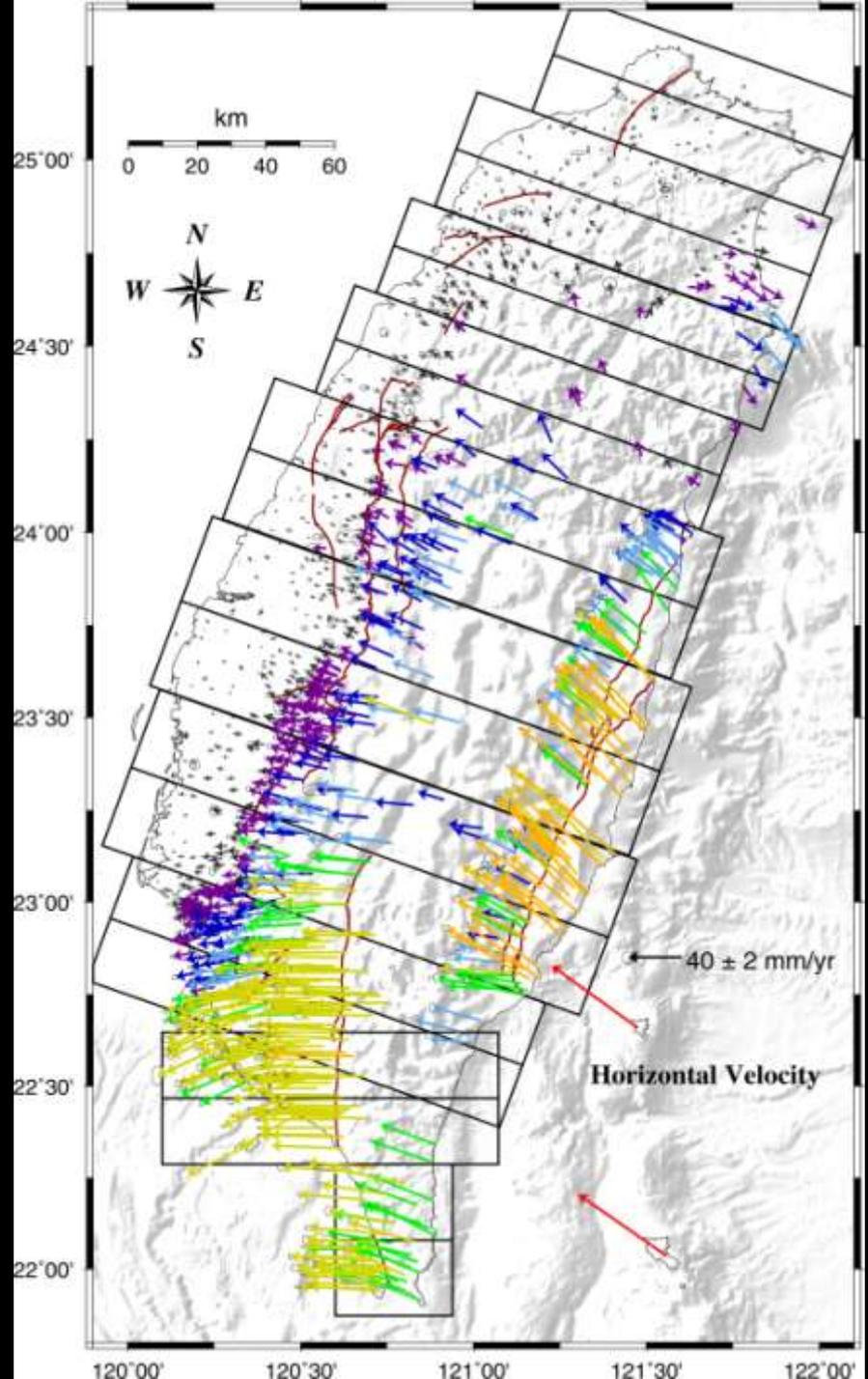
2001-2012

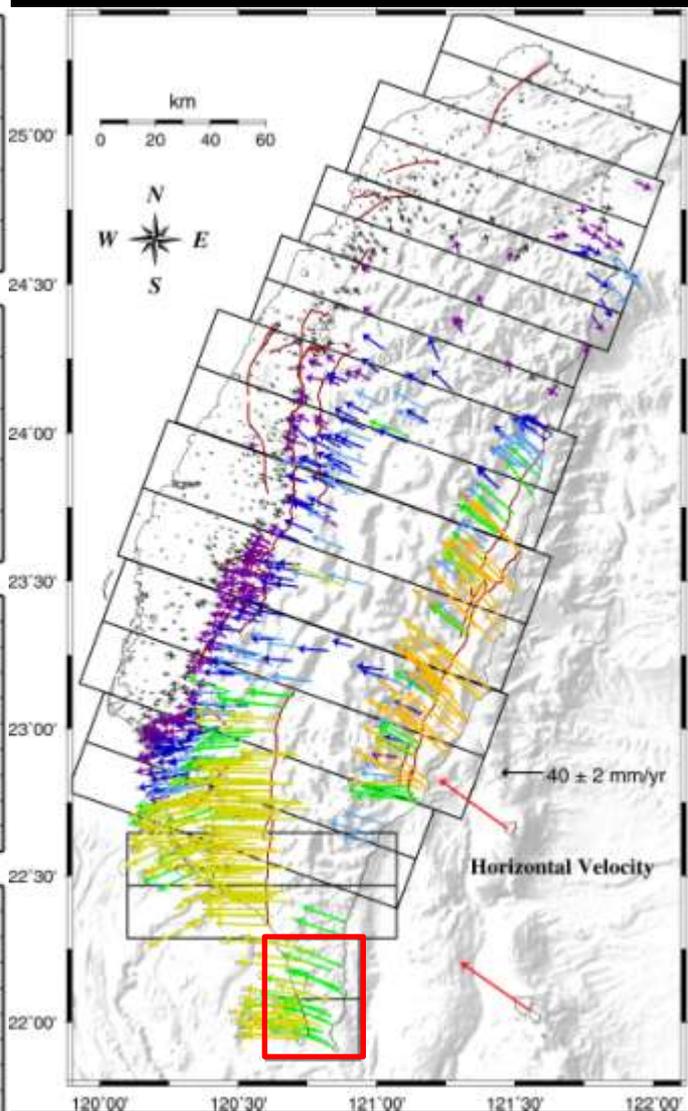
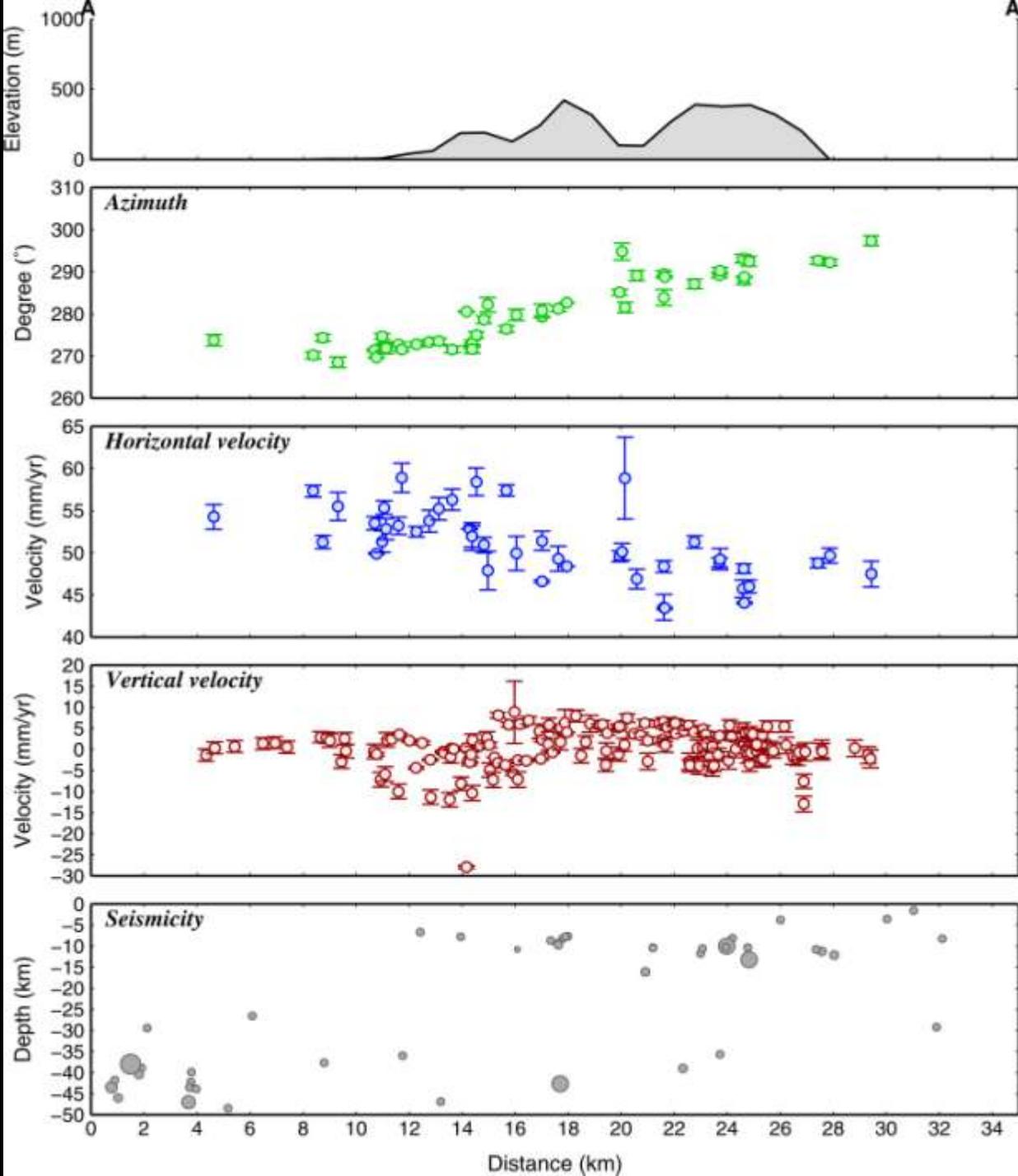


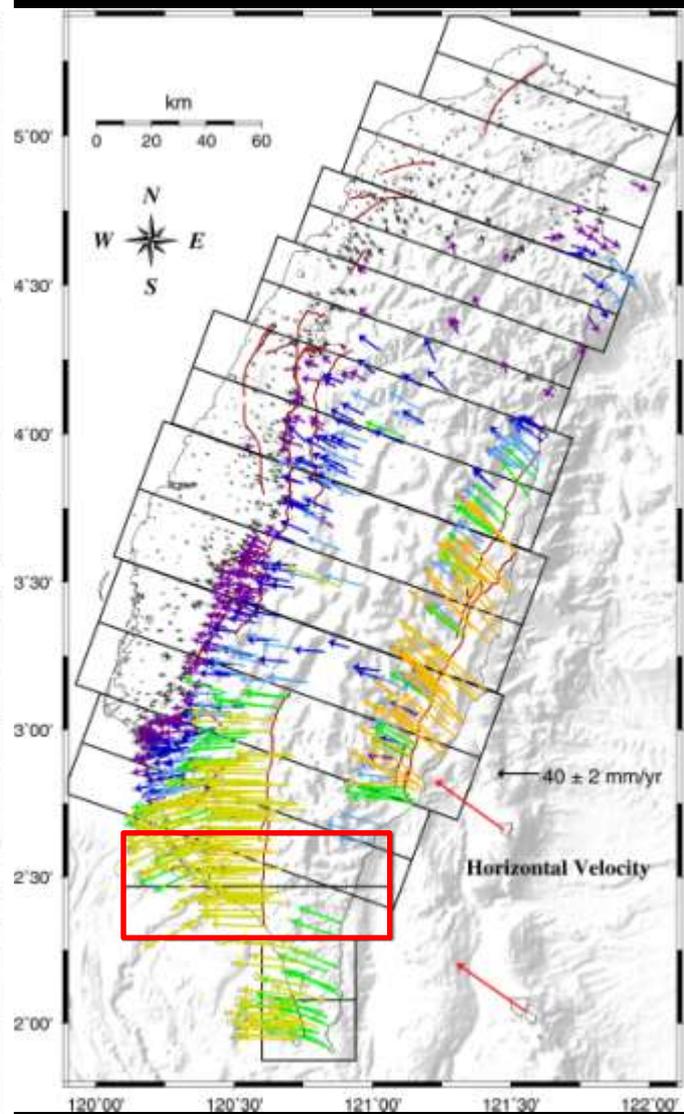
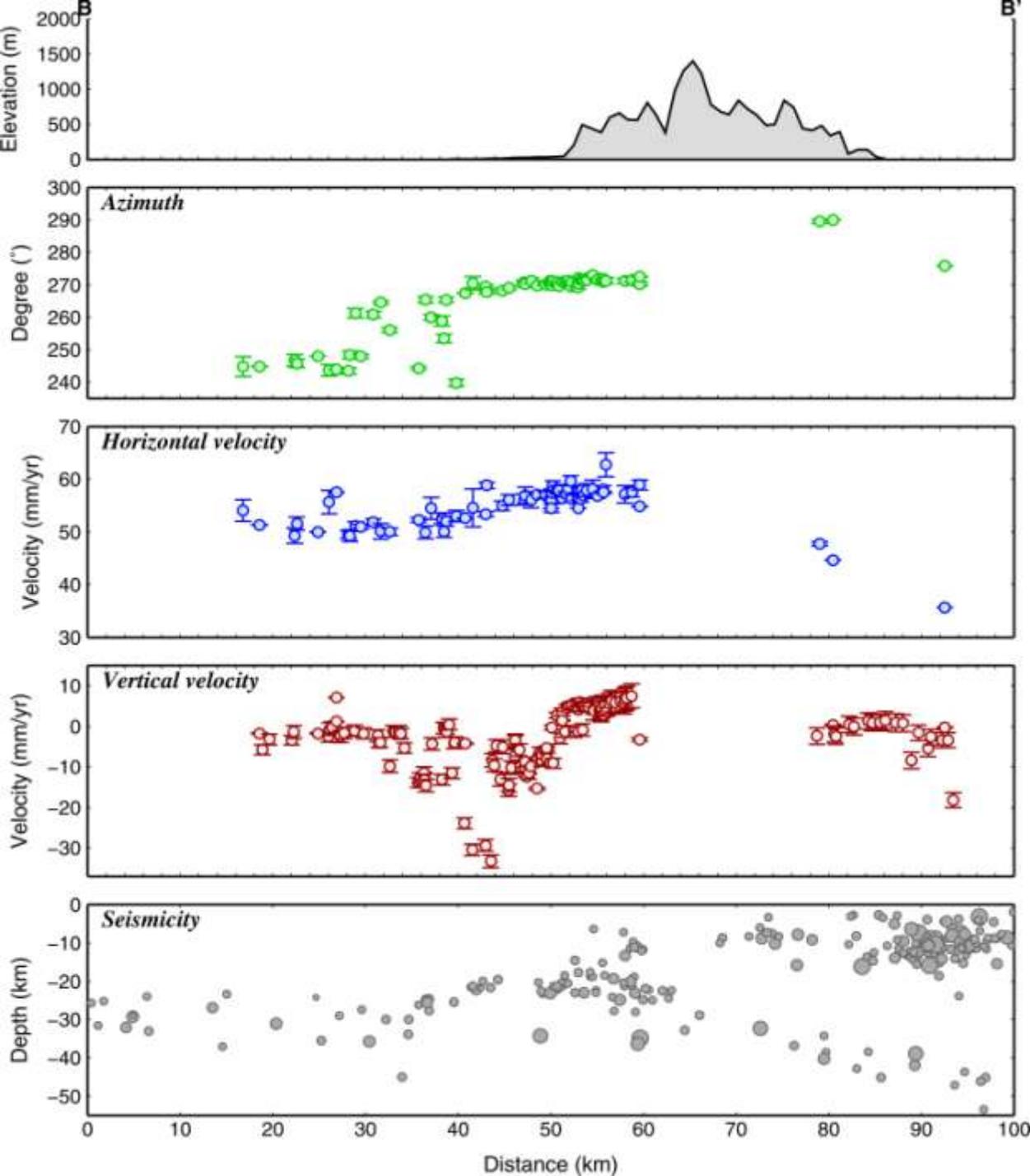
GPS strain rate in Taiwan

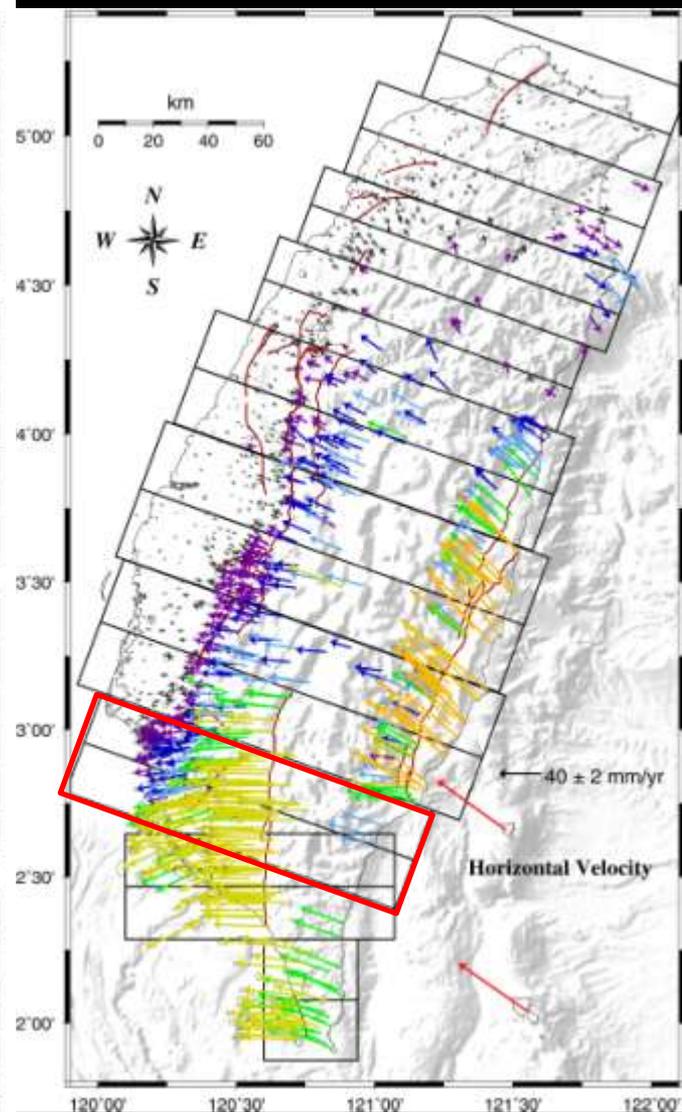
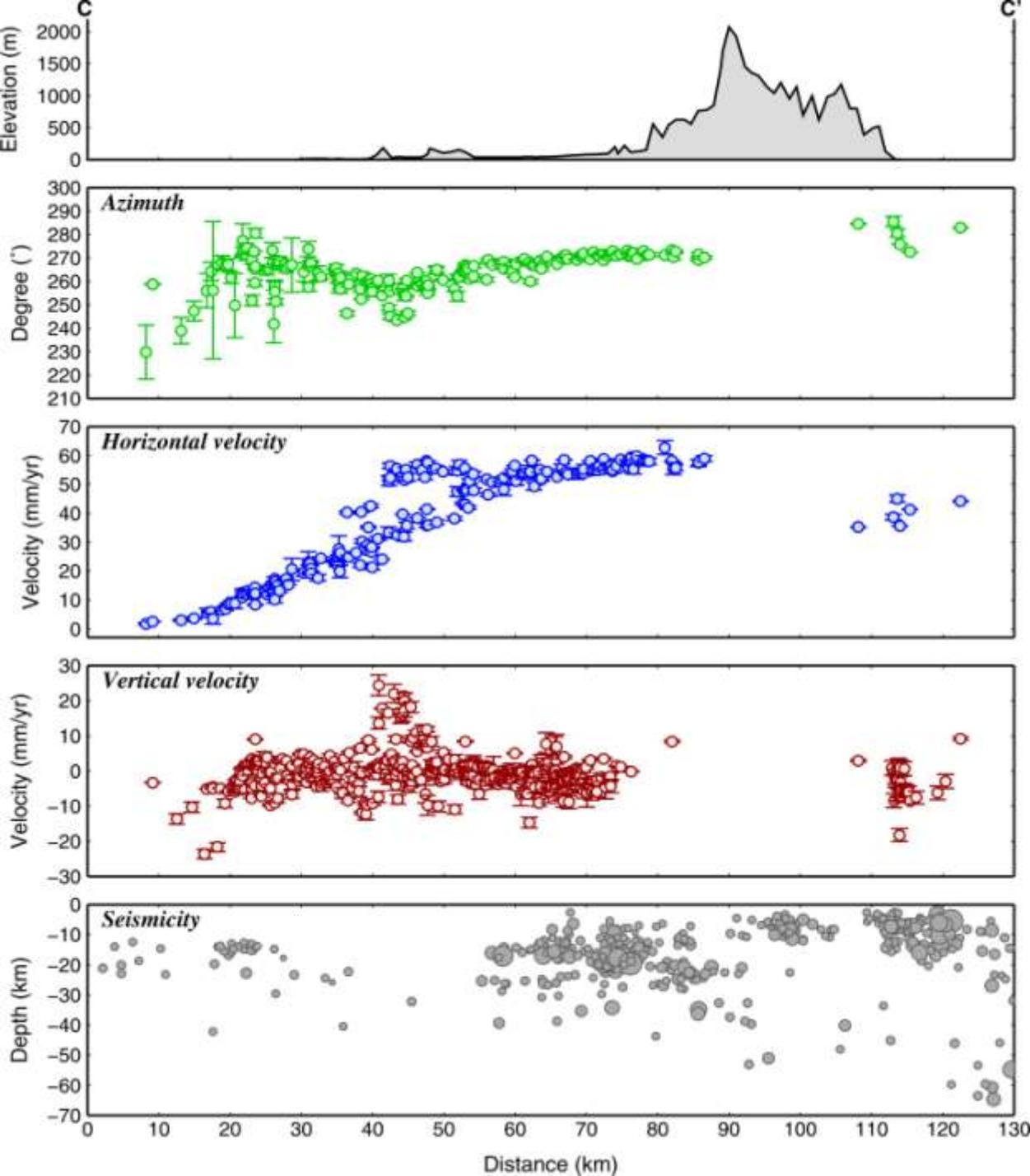


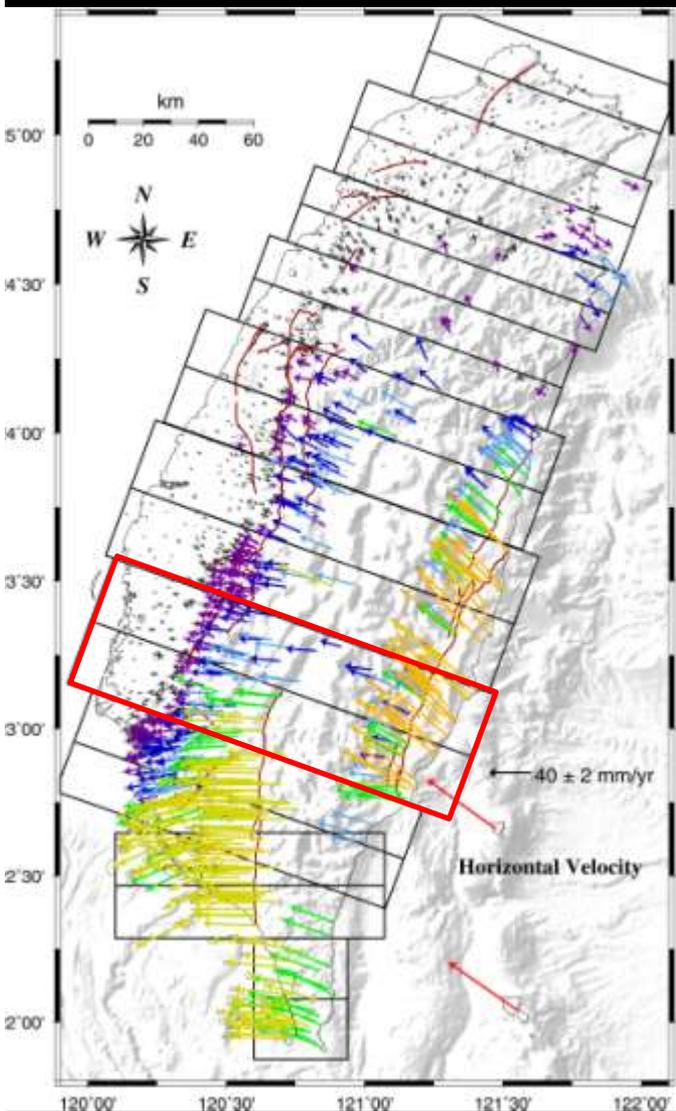
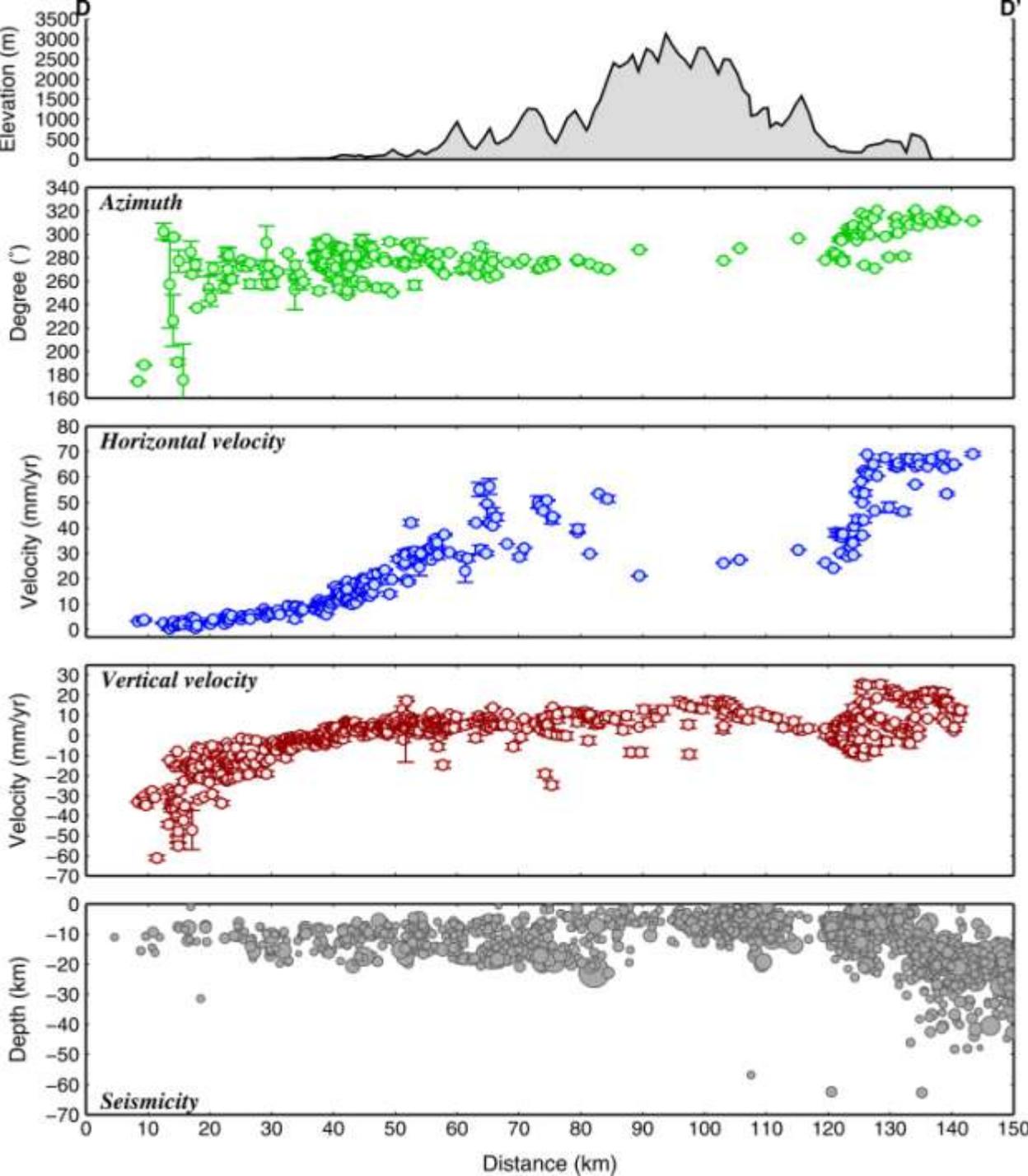
Profiles across Taiwan

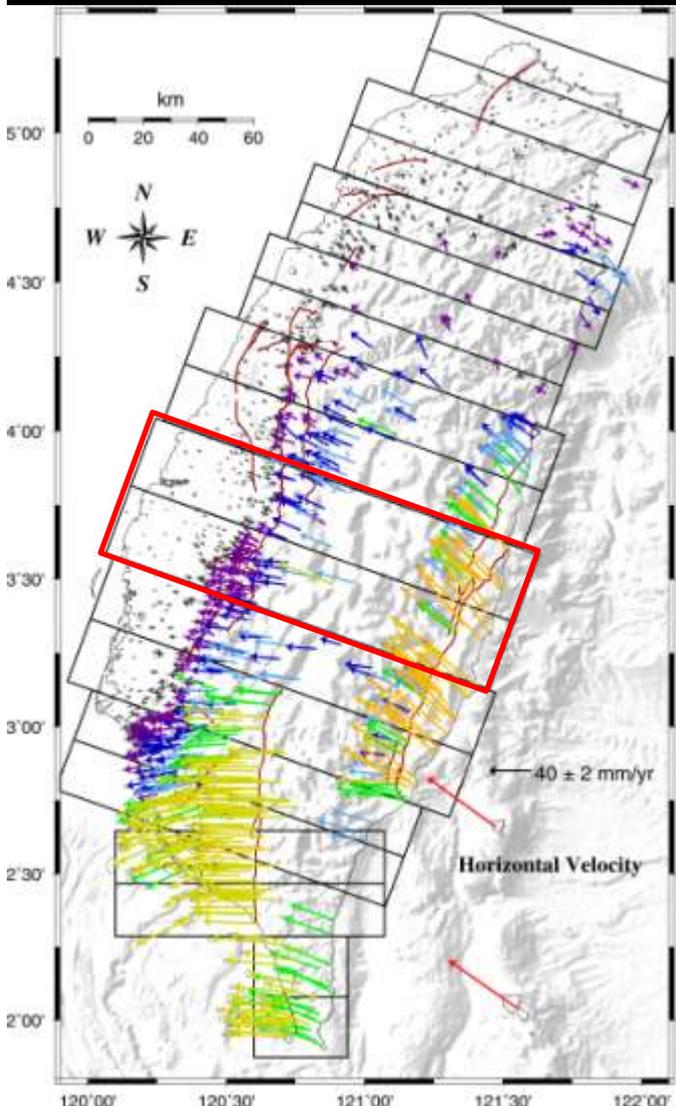
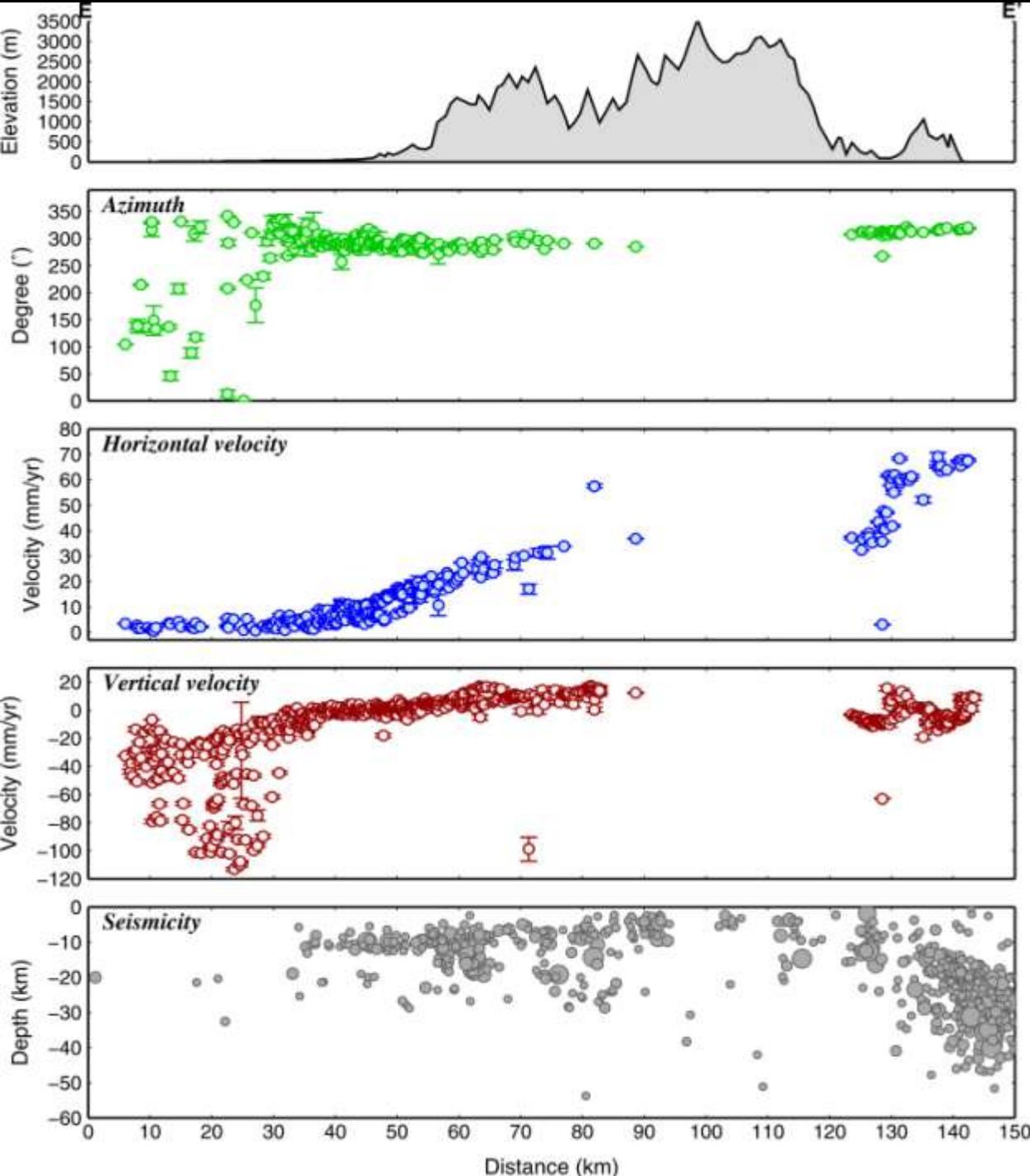


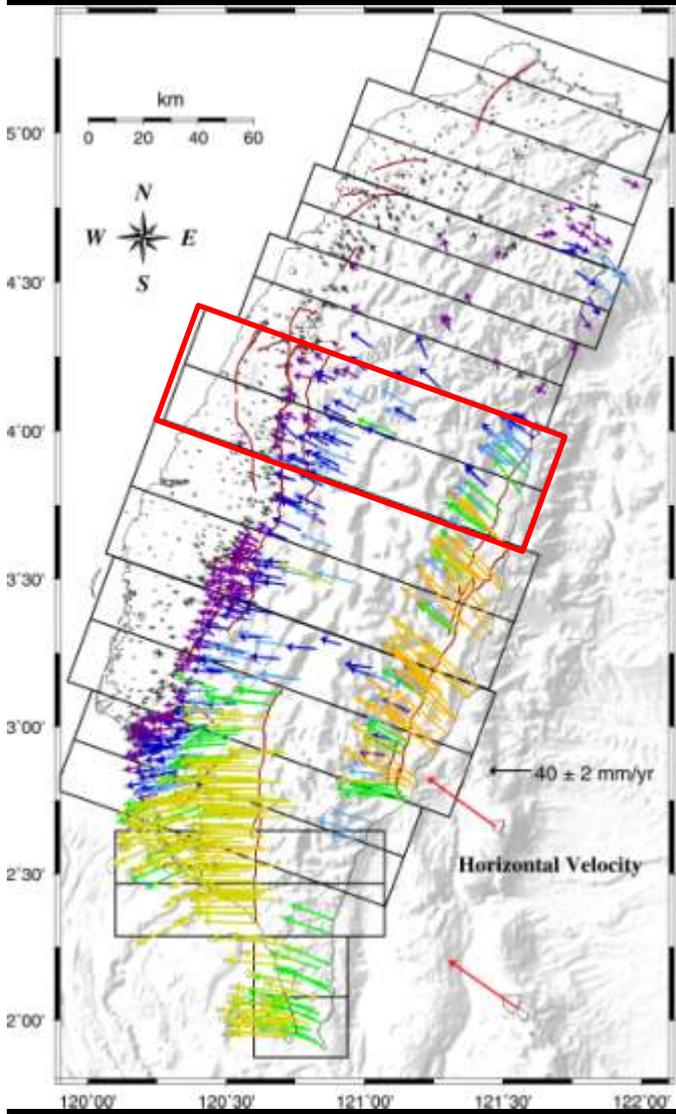
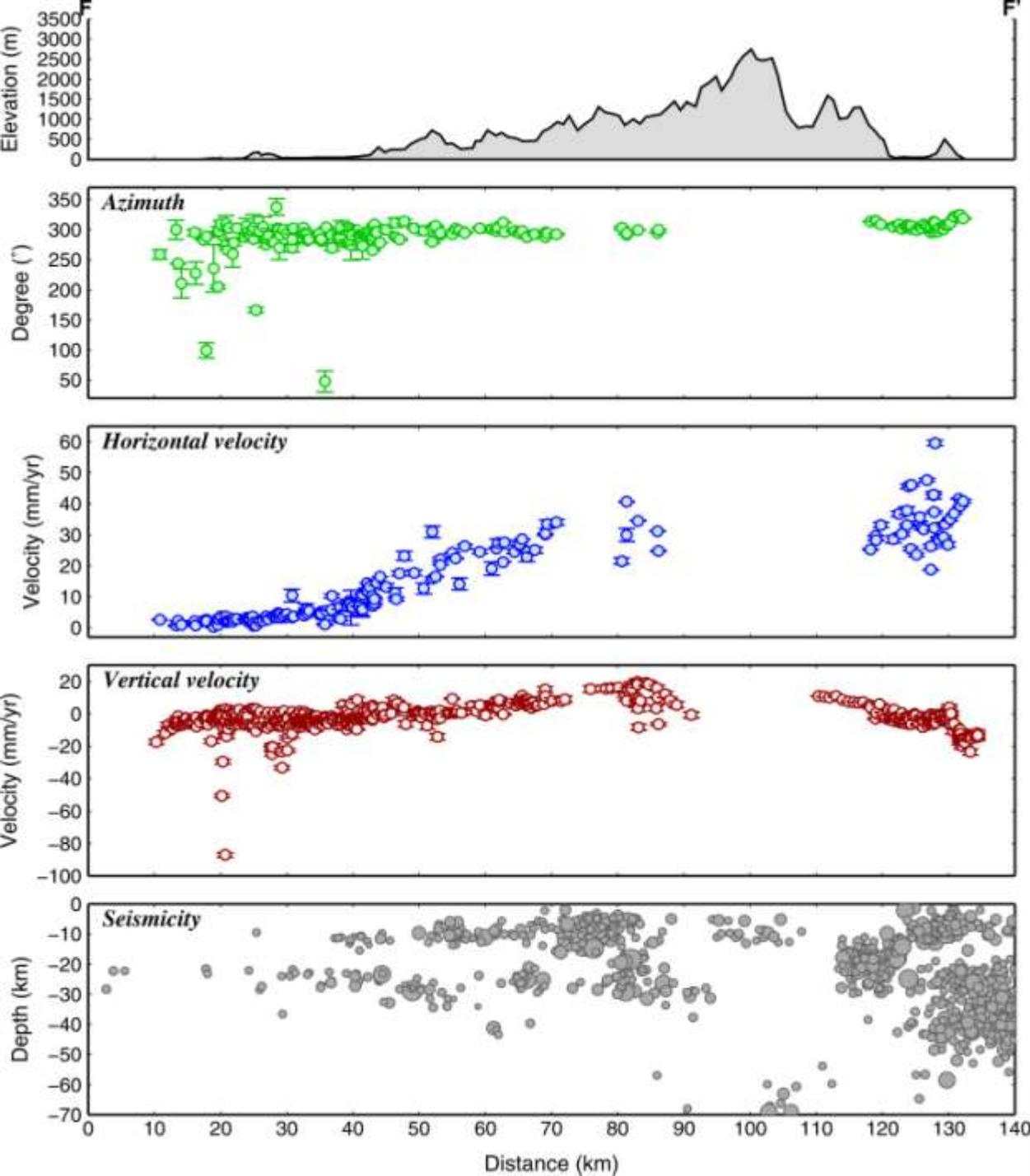


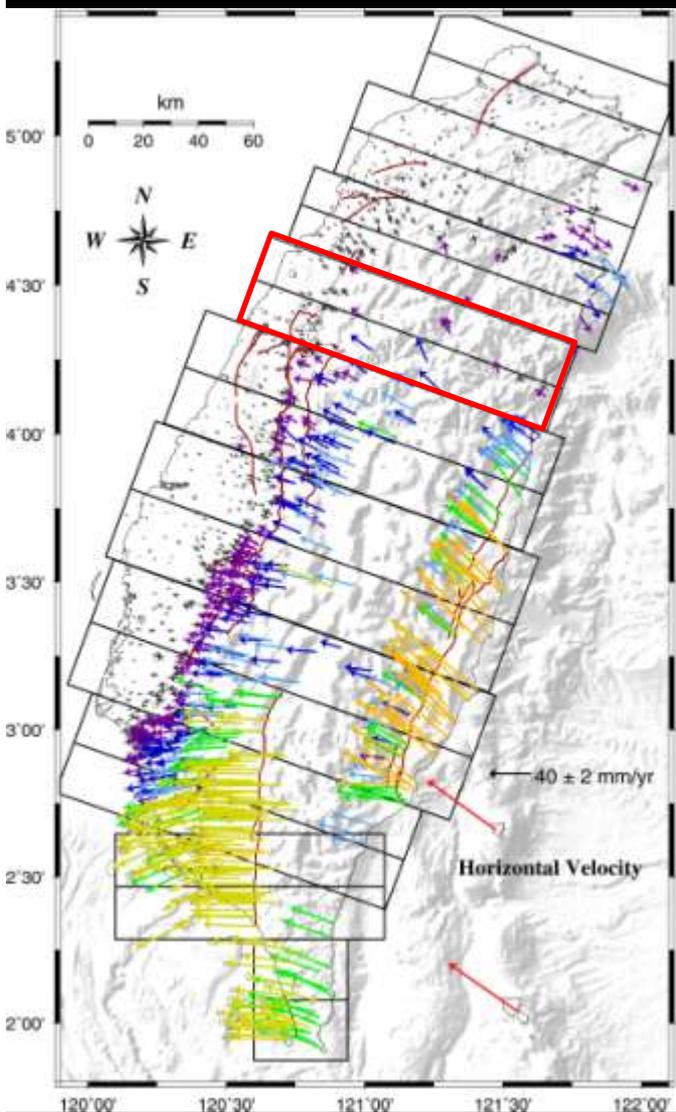
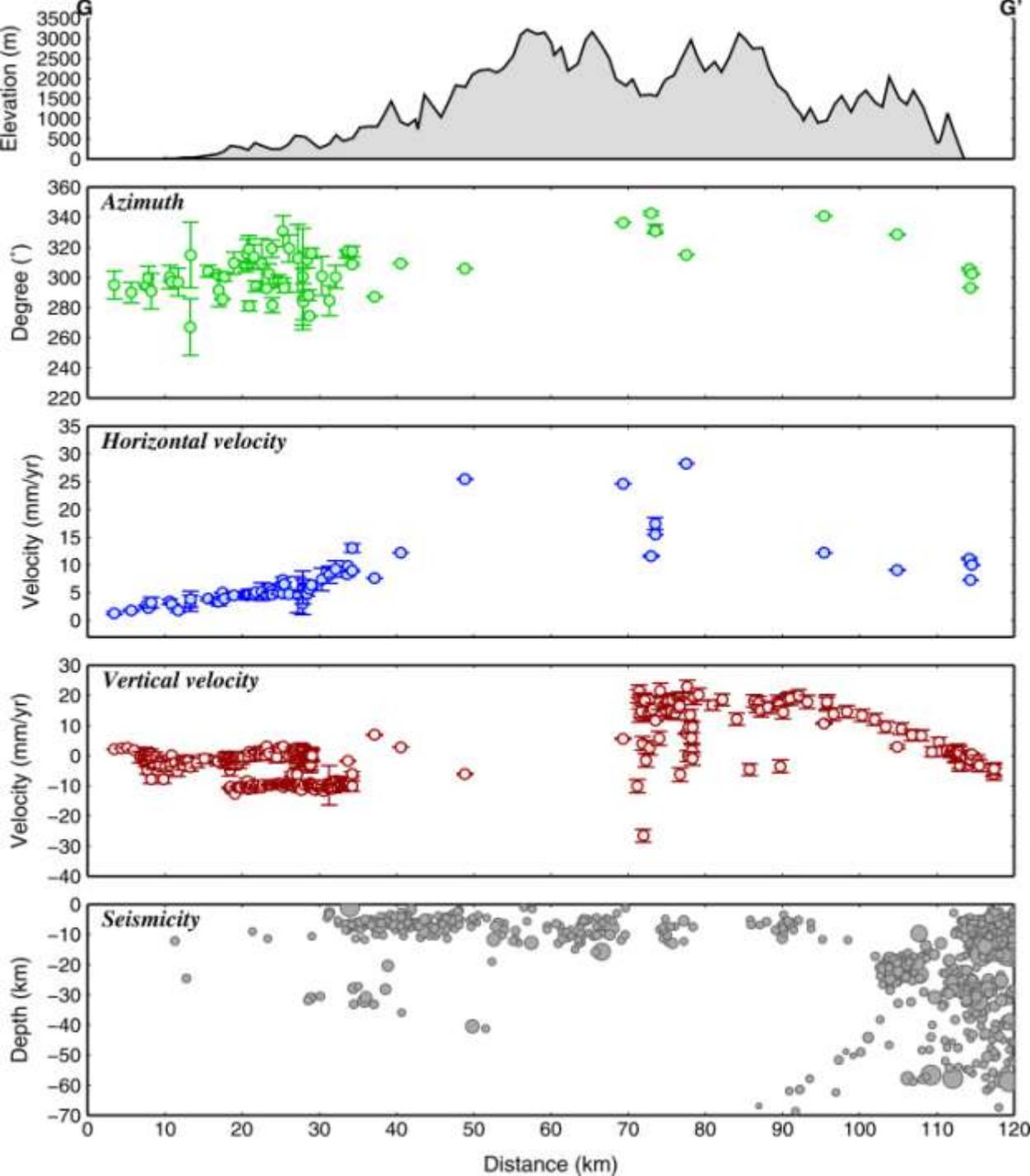


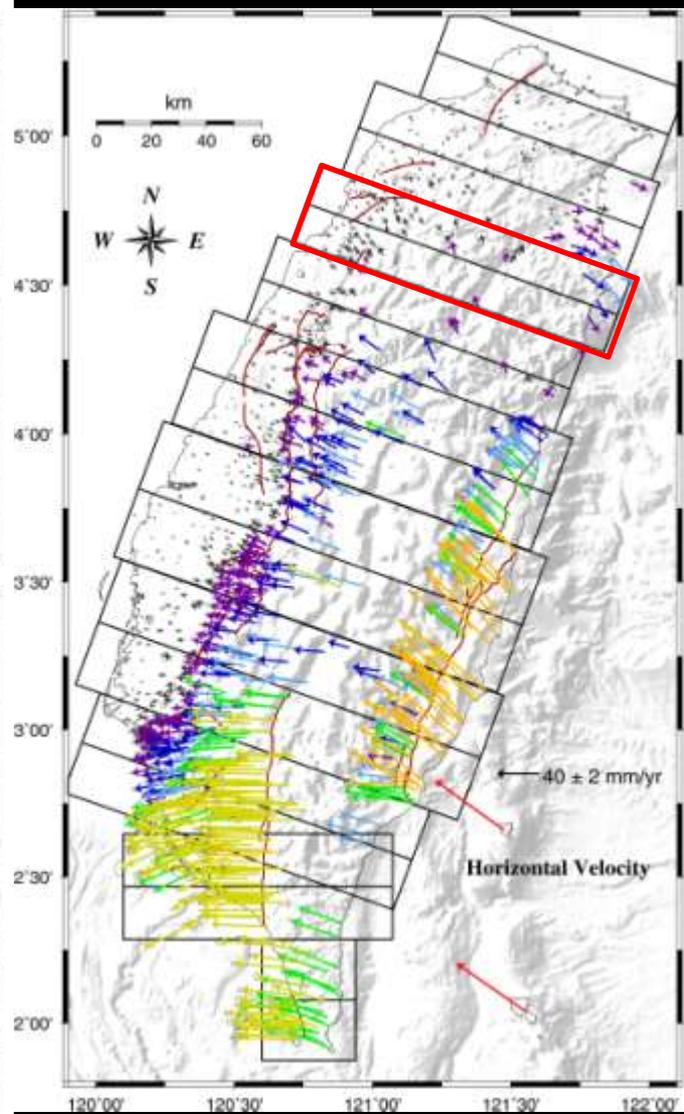
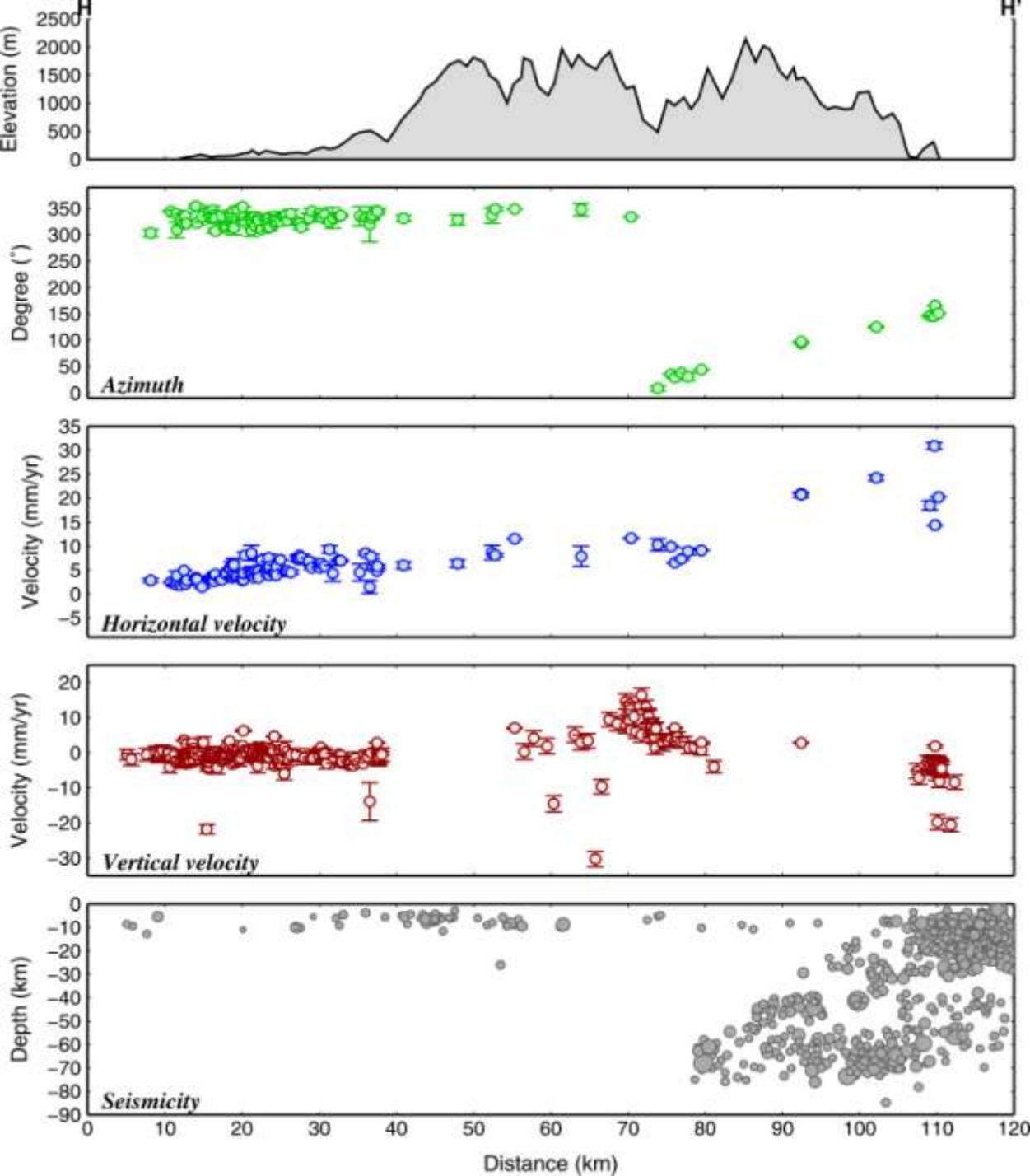


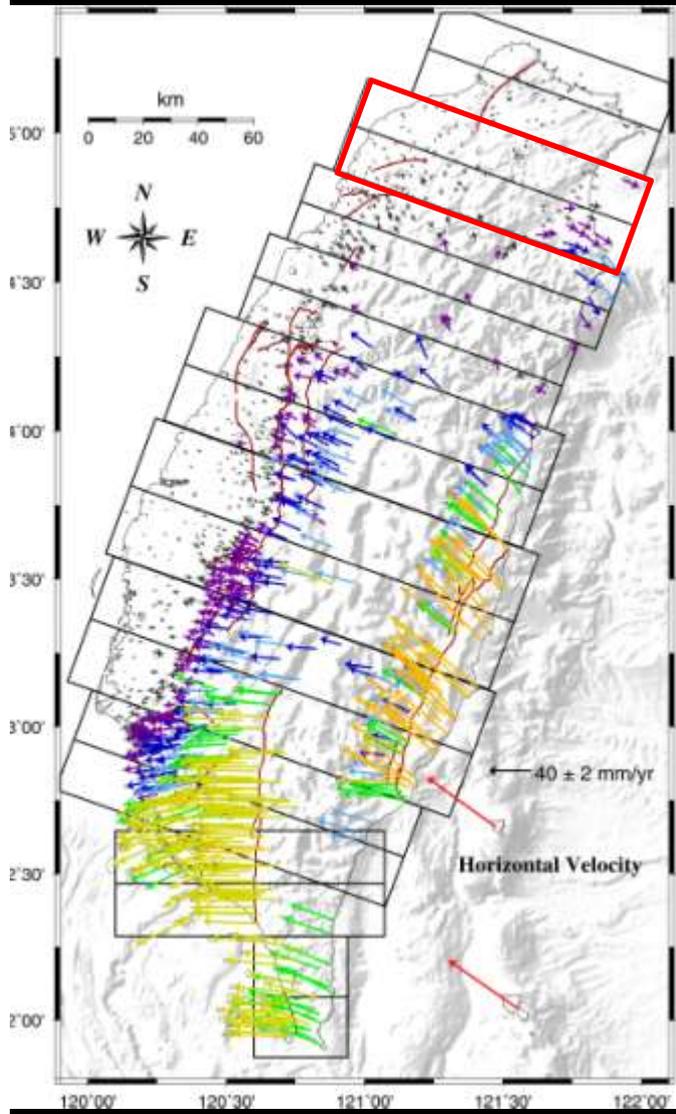
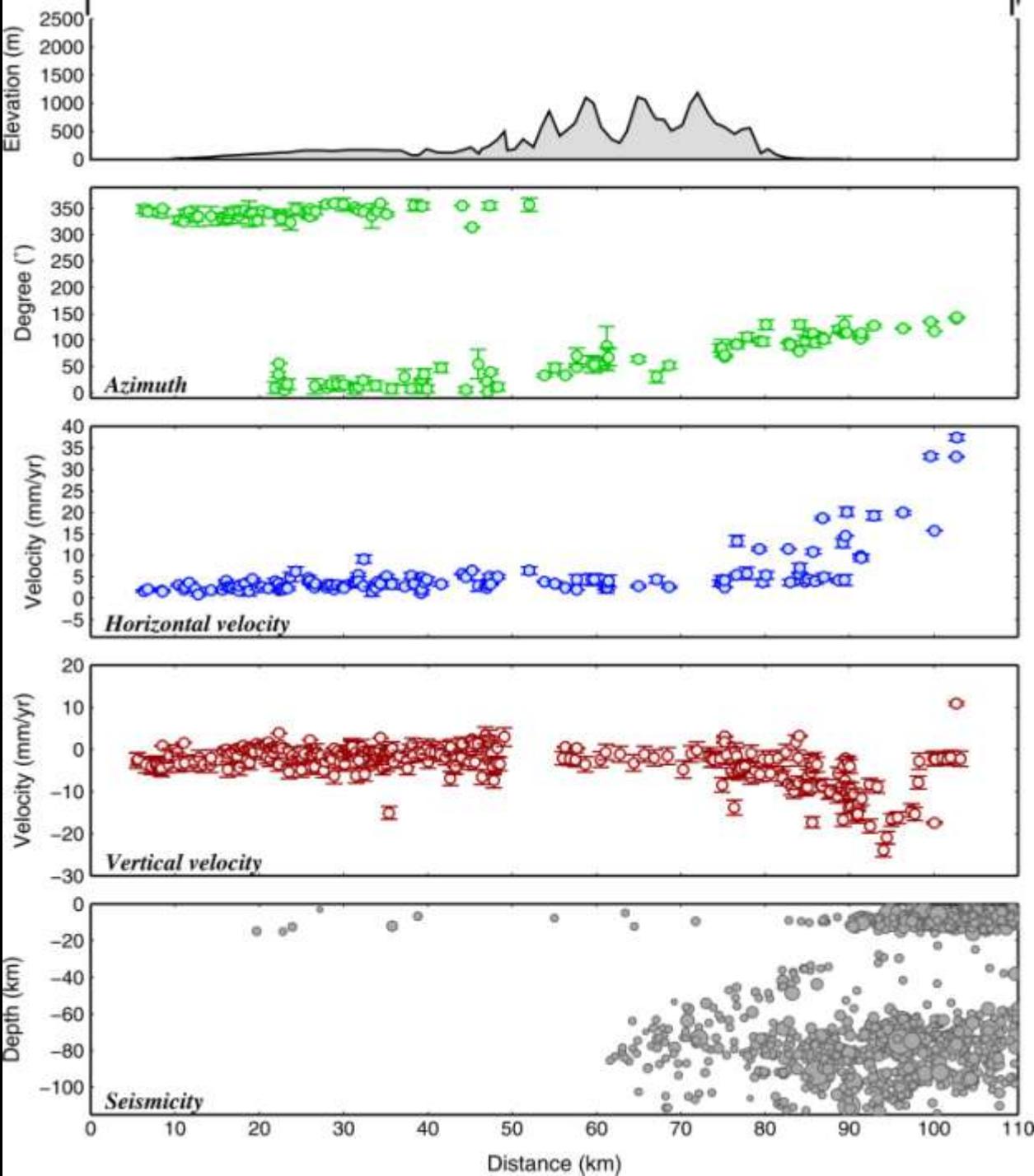


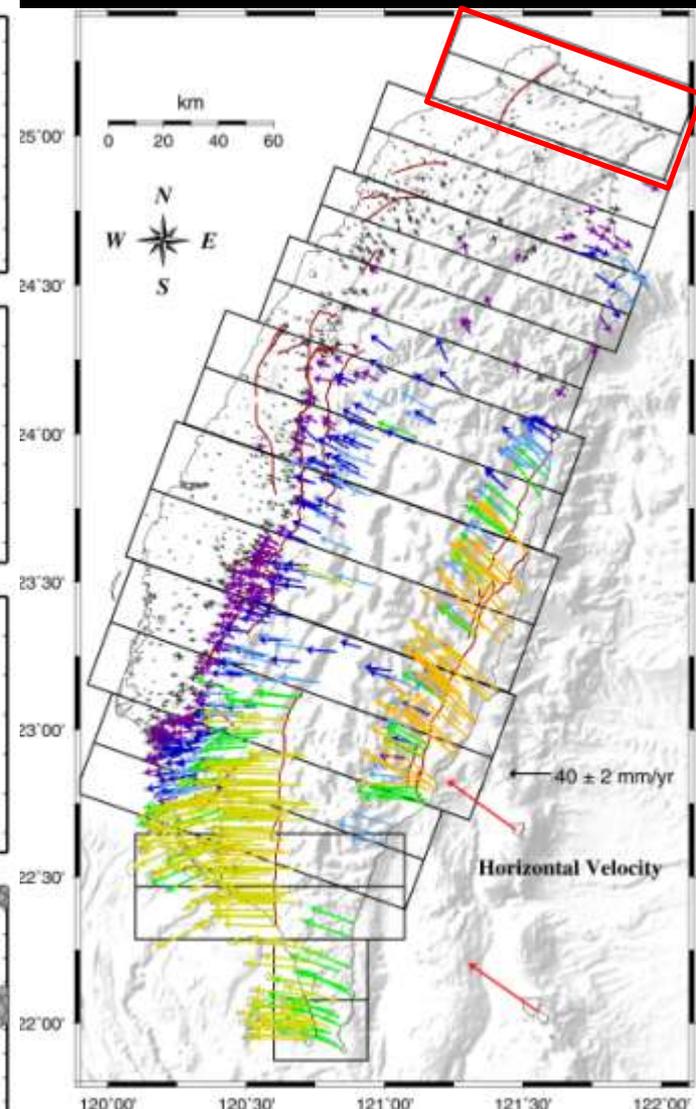
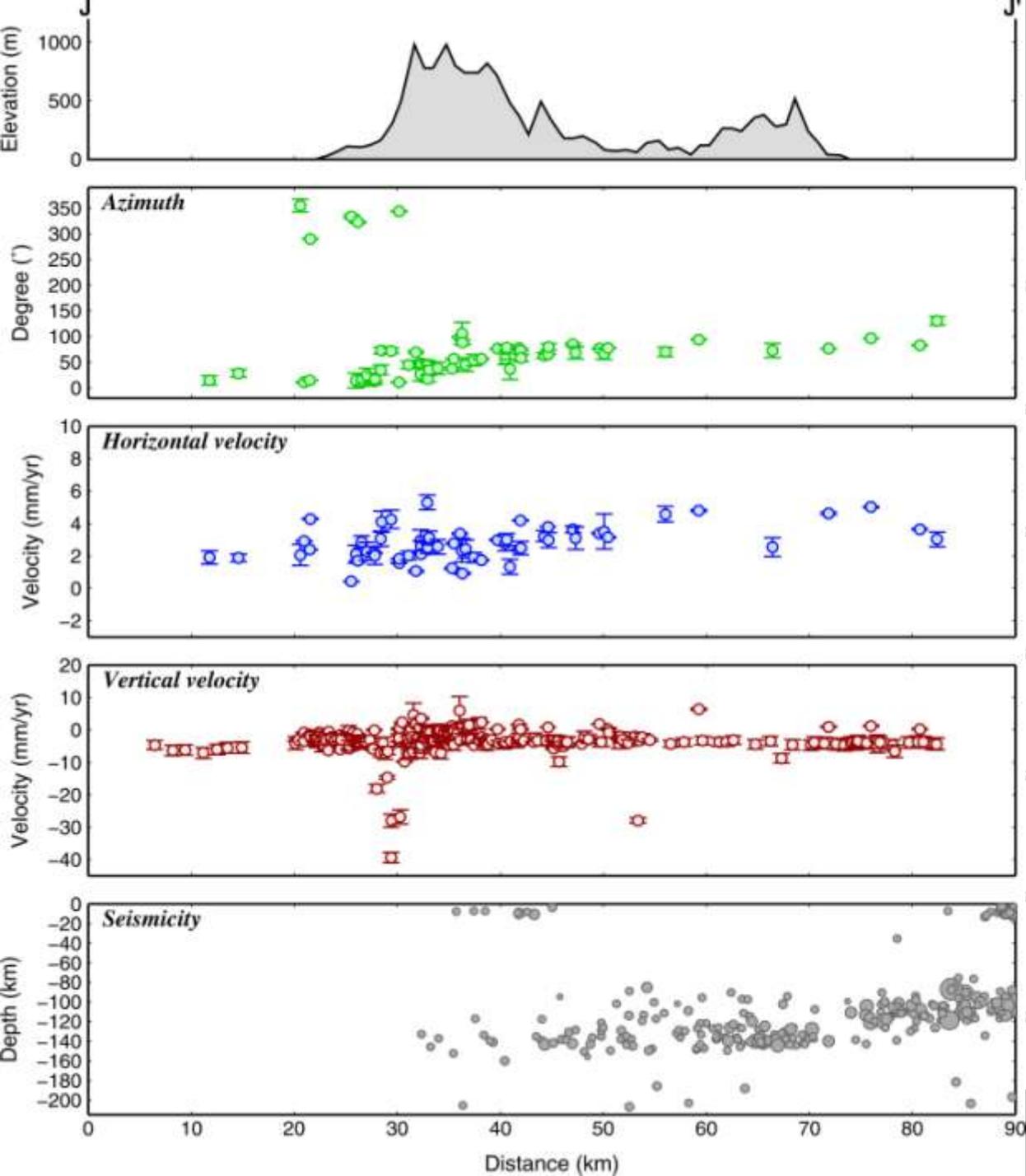




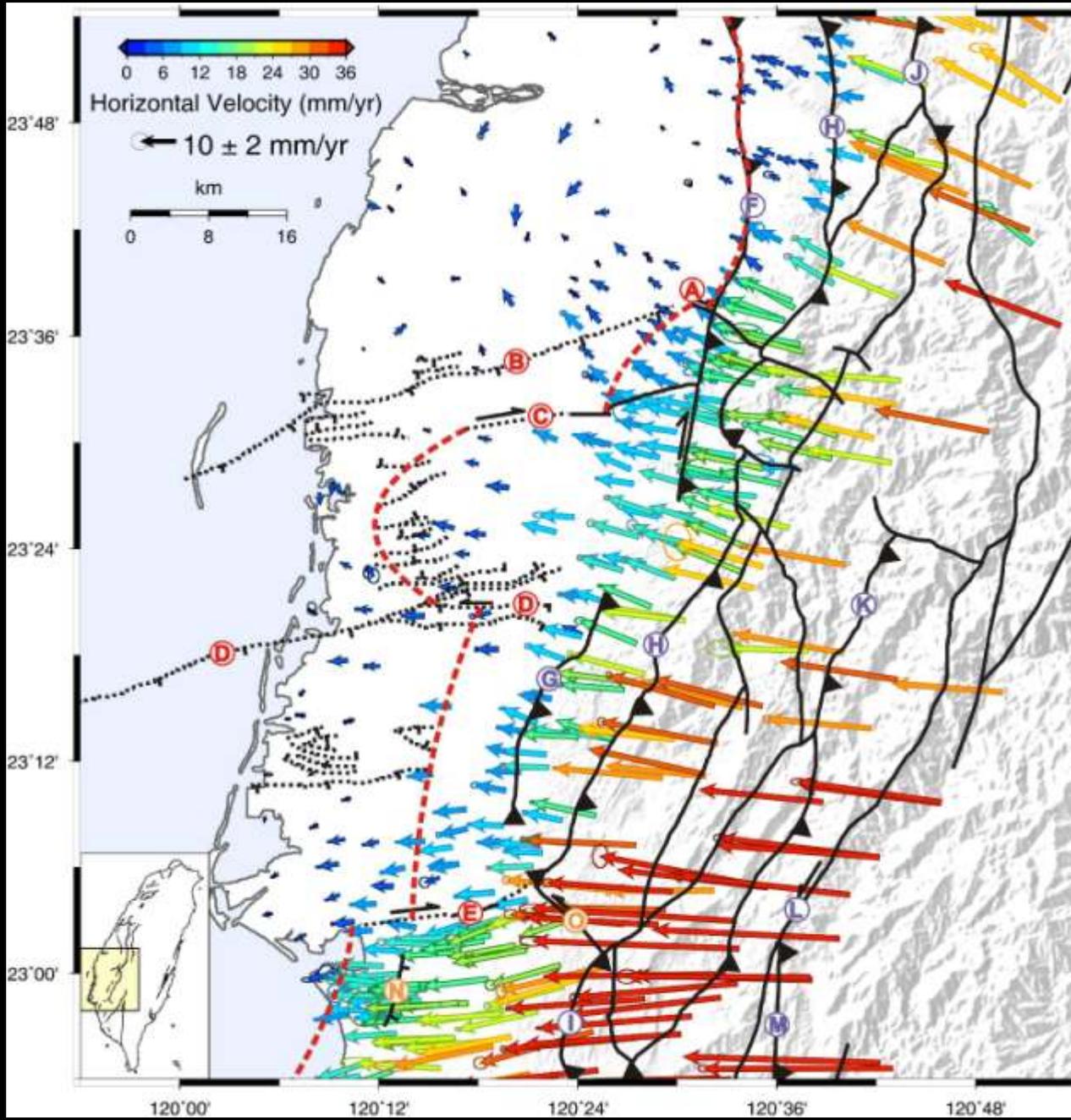








SW Taiwan Horizontal Velocity Field



Strike-Slip Fault:

- A Kukeng fault
- B B-Structure
- C Meishan fault
- D Yichu fault
- E Hsinhua fault

Fold-and-Thrust System:

- F Changhua-Chiuchiungkeng fault
- G Liuchia-Muchiliao fault
- H Tachianshan-Chukou fault
- I Longchuan fault
- J Tamaopu-Shuangtung fault
- K Chishan fault
- L Liukuei fault
- M Chaochou fault

Others:

- N Houchiali fault
- O Tsochen fault

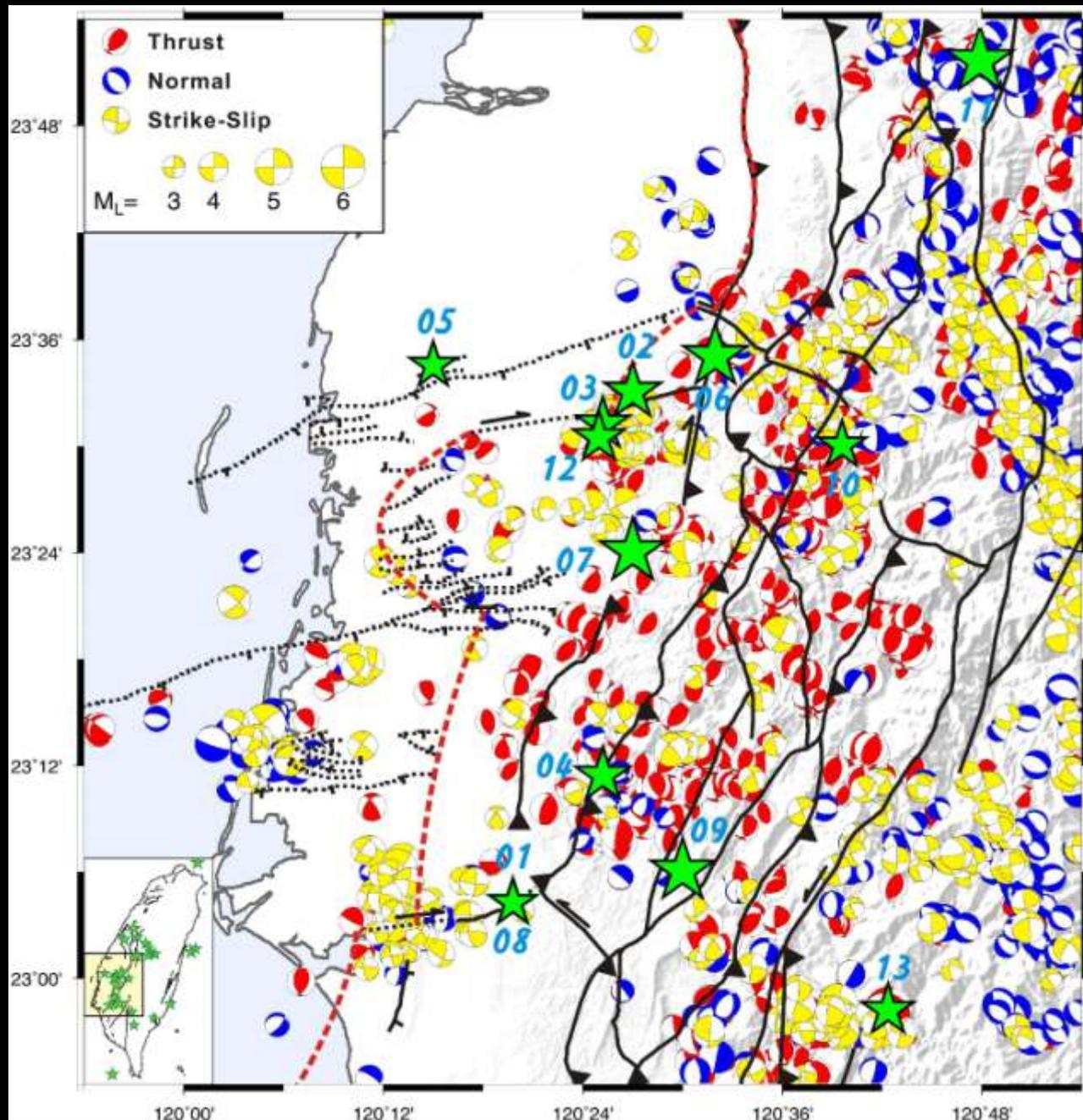
337 campaign GPS stations
117 continuous GPS stations

Geologic map is refined from
CPC geologic map (Chow *et al.*,
1988 and Yang *et al.*, 1991),

CGS geologic map (Chen *et al.*,
2000) and

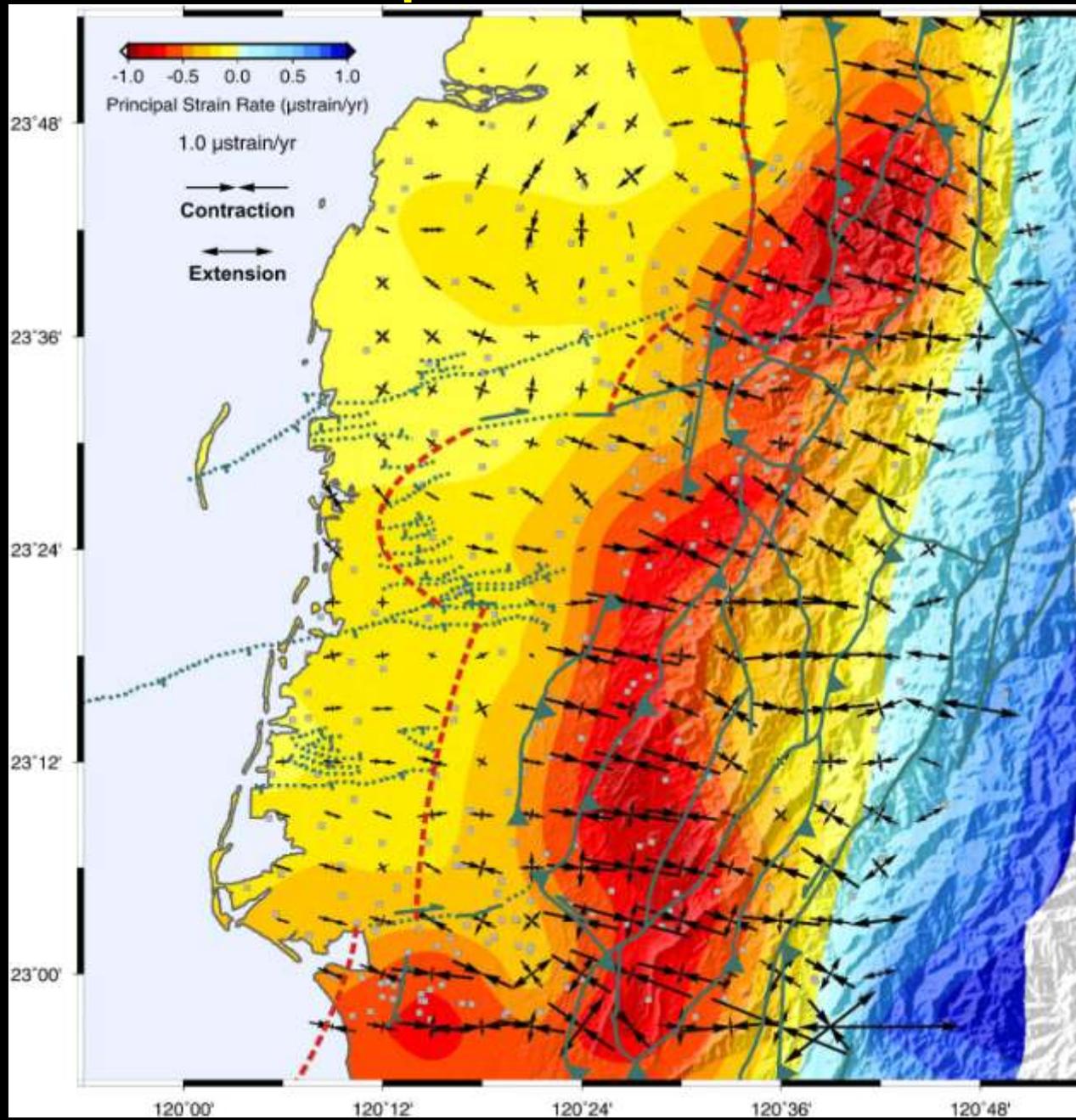
Yang *et al.*, 2007

SW Taiwan Focal Mechanism 1991-2012

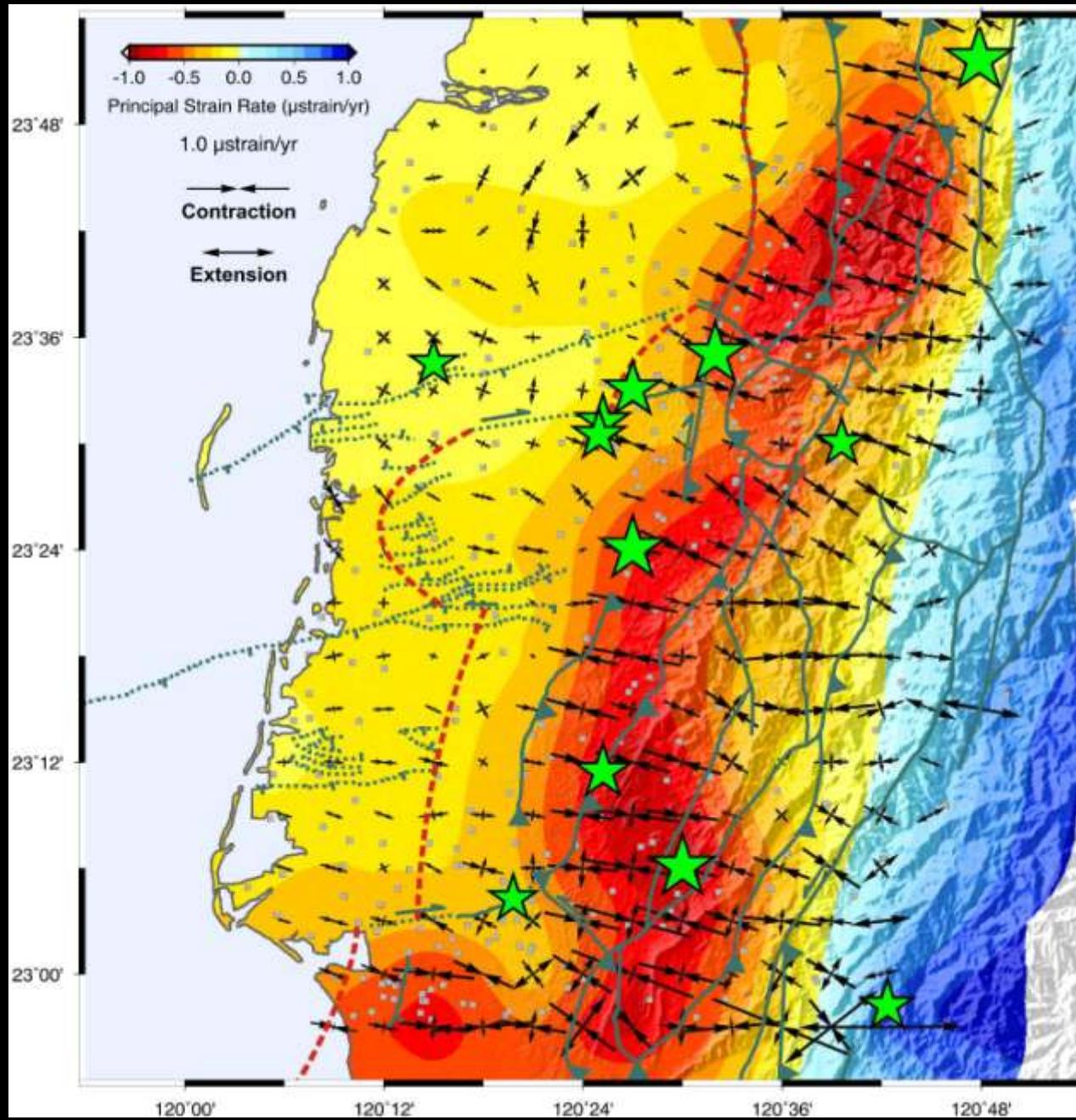


- 01: 1736 M 6.1
Dep. 5 km
- 02: 1792 M 6.7
Dep. 5 km
- 03: 1839 M 6.5
Dep. 15 km
- 04: 1862 M 6.6
Dep. 15 km
- 05: 1904 M 6.1
Dep. 6.0 km
- 06: 1906 M 7.1
Dep. 15.0 km
- 07: 1941 M 7.1
Dep. 15.7 km
- 08: 1946 M .61
Dep. 5.0 km
- 09: 1964 M 6.3
Dep. 18.5 km
- 10: 1998 M 6.2
Dep. 12.0 km
- 11: 1999 M 7.3
Dep. 12.0 km
- 12: 1999 M 6.4
Dep. 21.0 km
- 13: 2010 M 6.4
Dep. 22.6 km

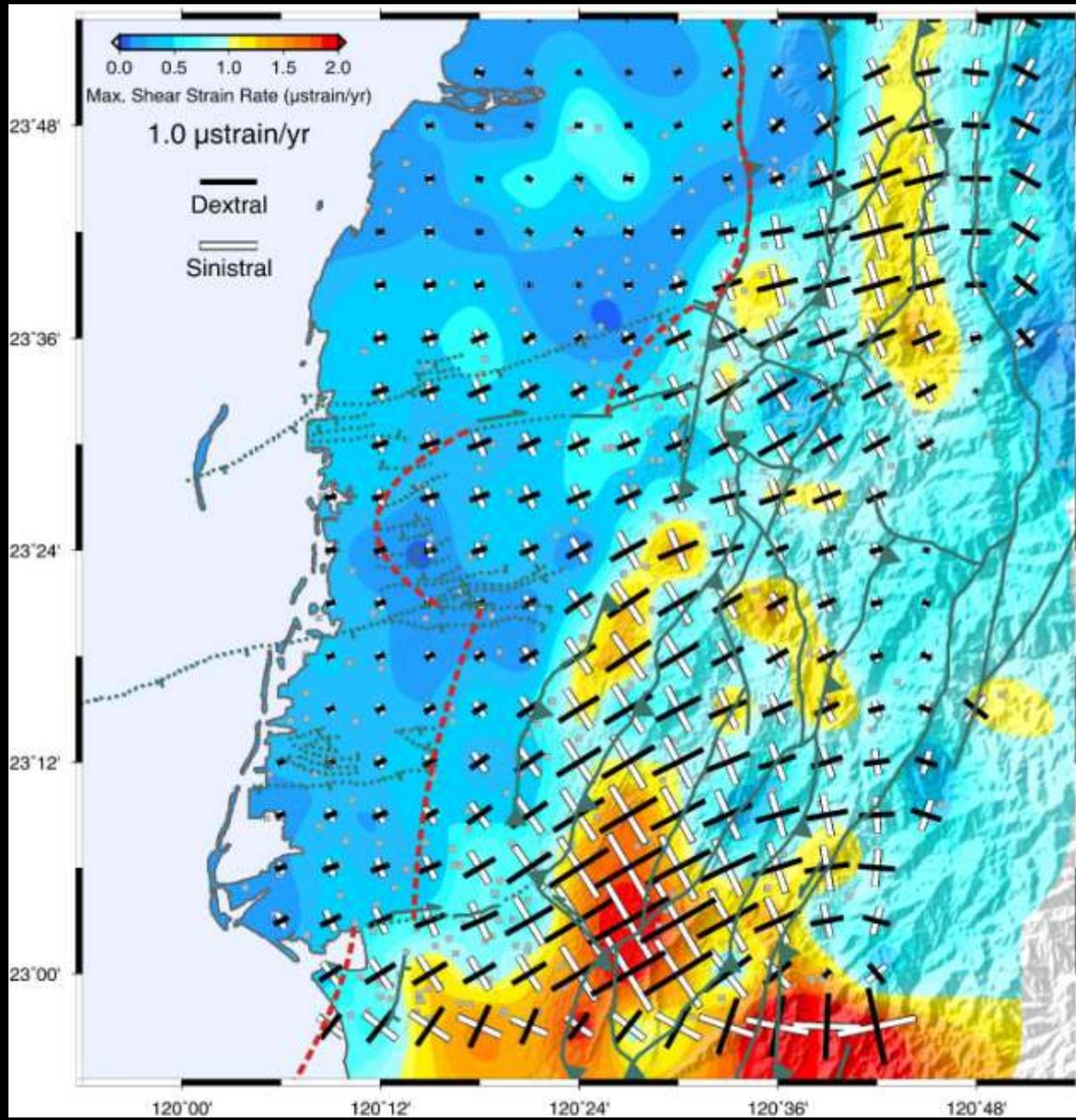
Principal Strain Rate



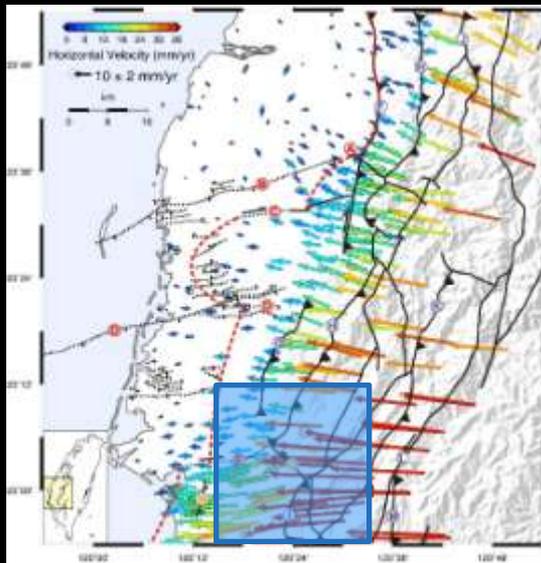
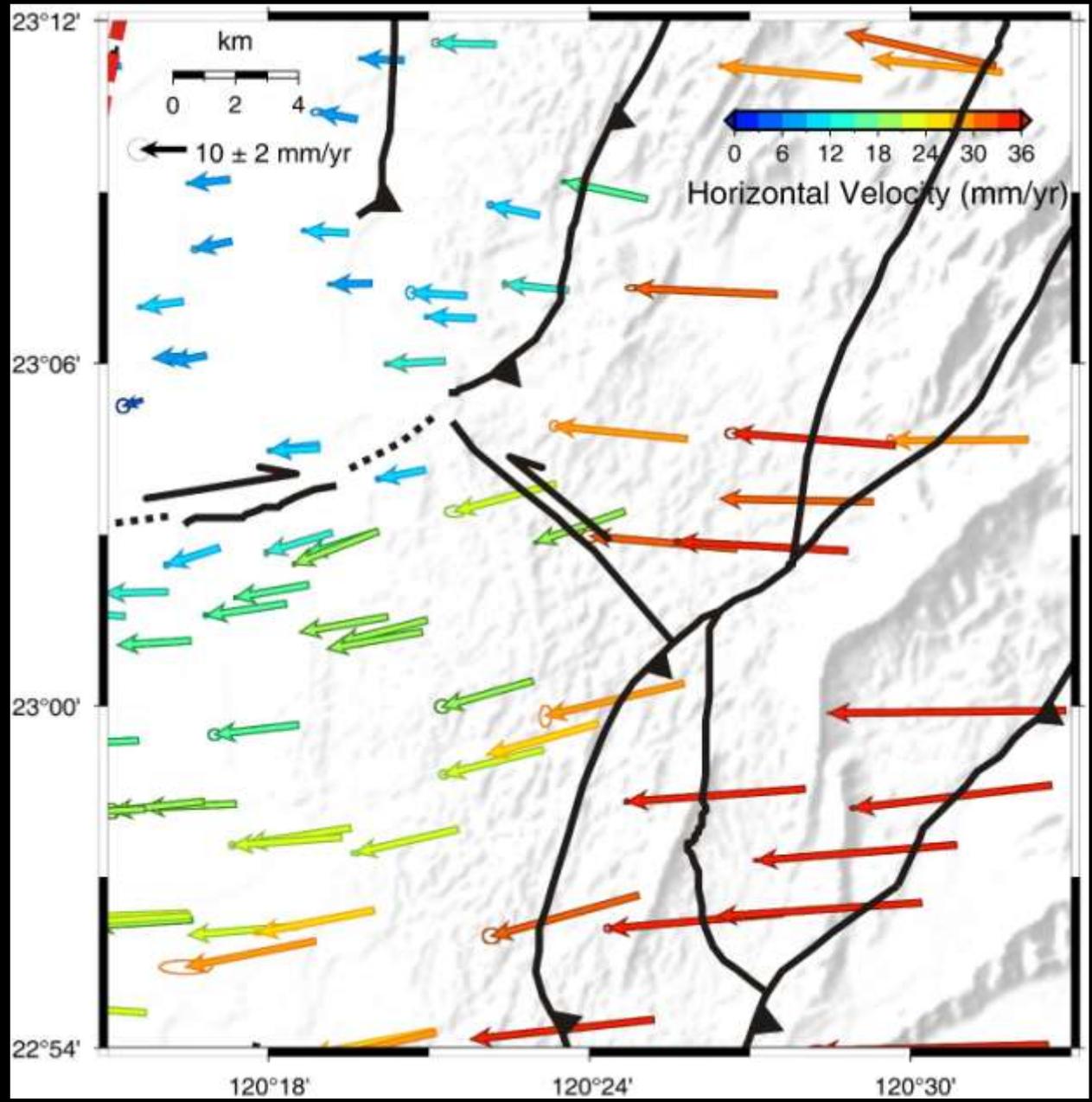
Principal Strain Rate and Damaging Earthquakes



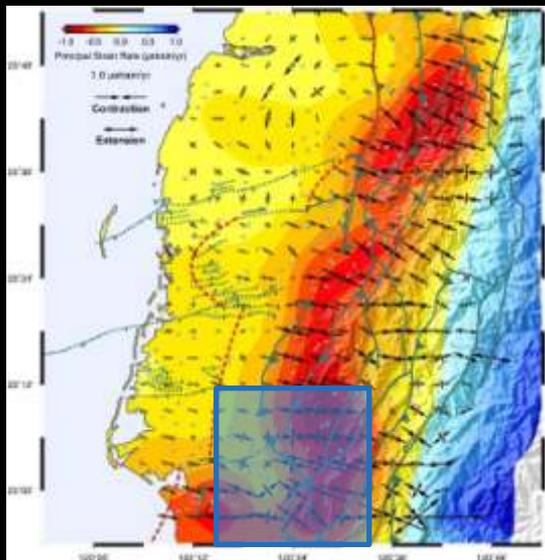
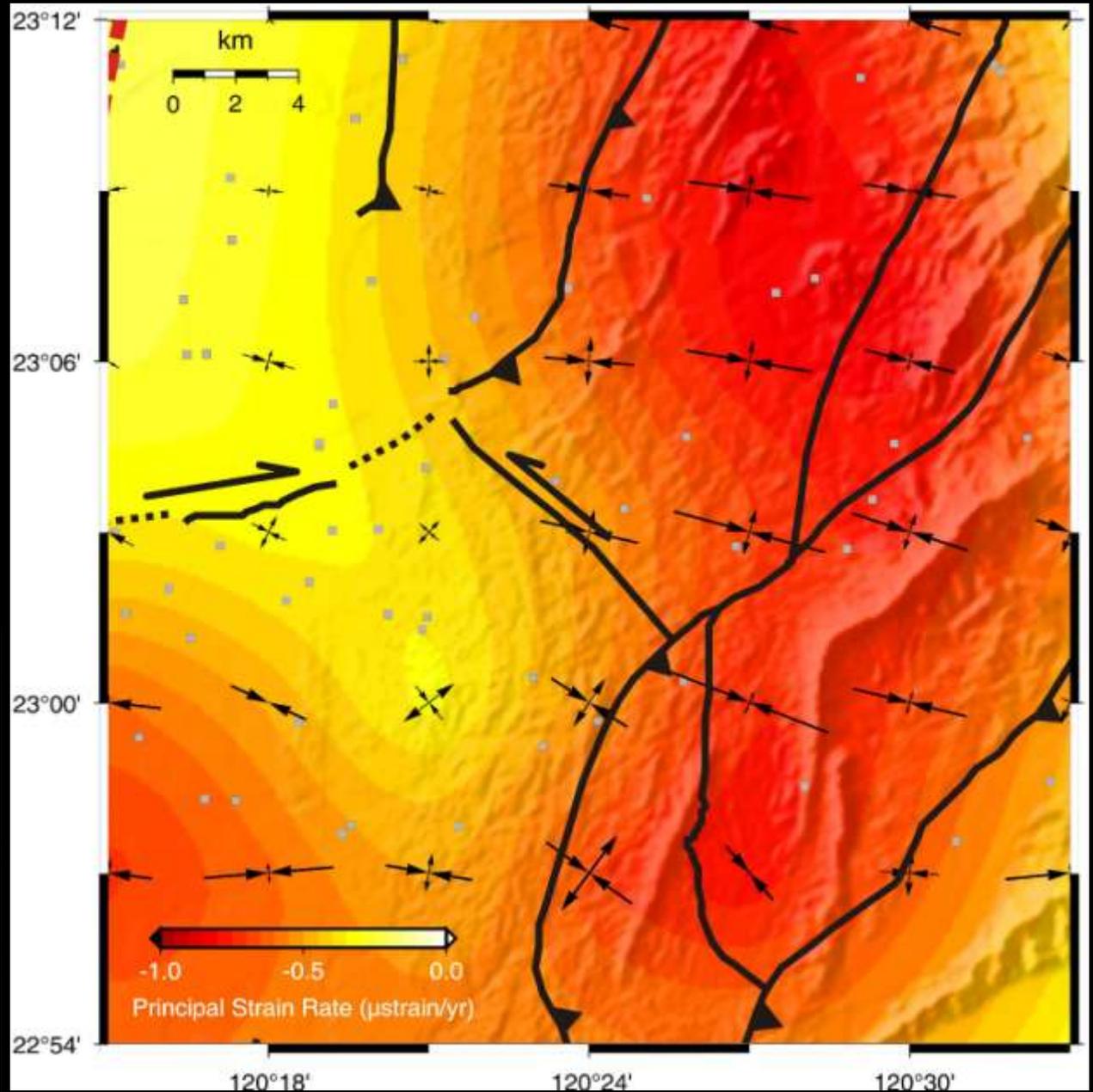
Shear Strain Rate



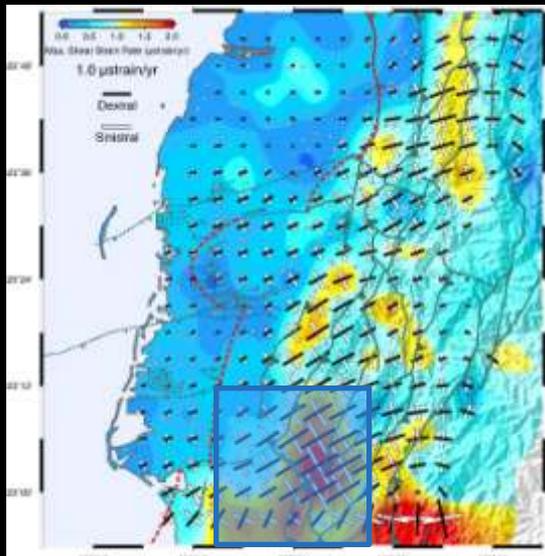
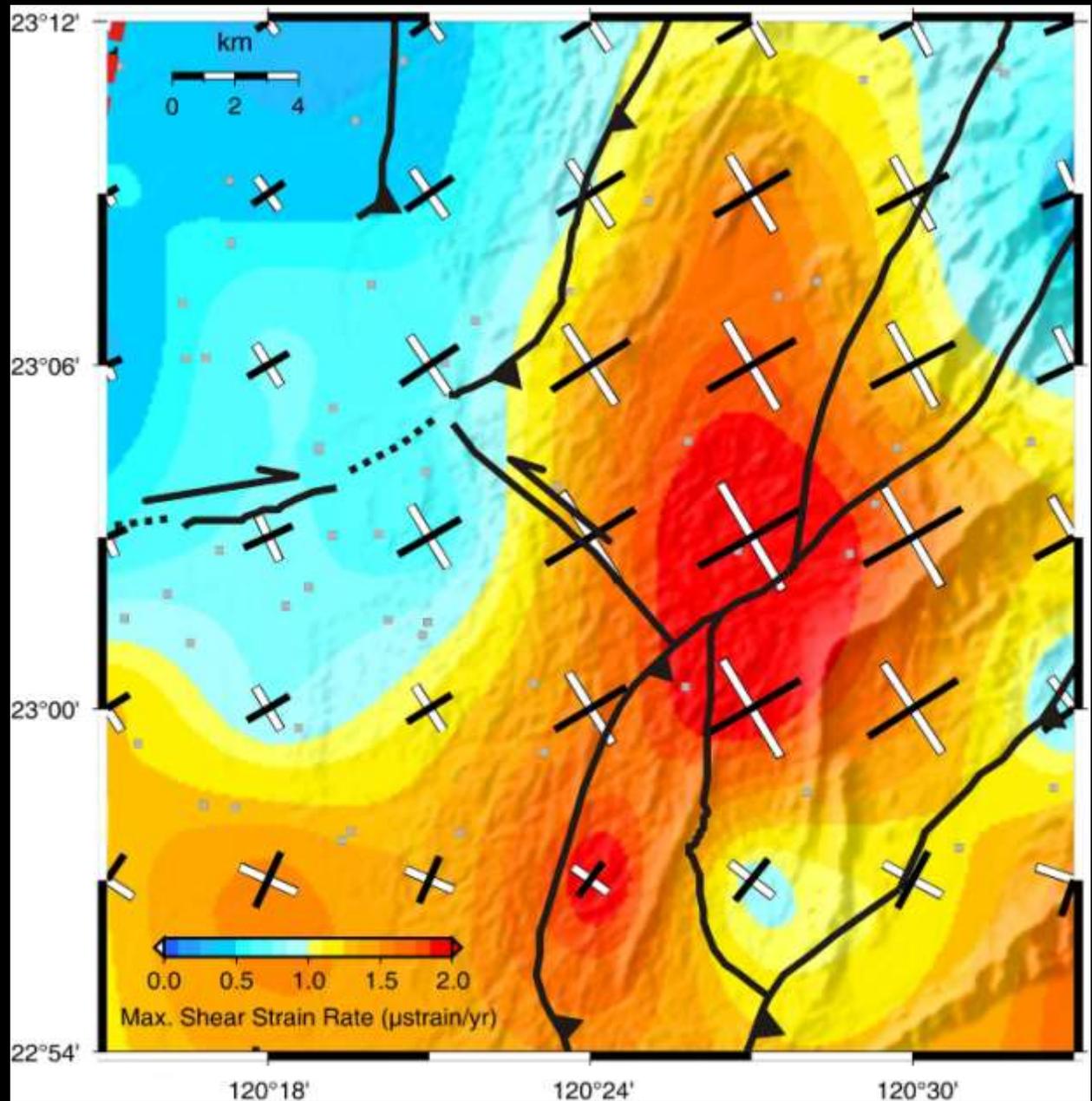
Horizontal Velocity Field of Tsochen fault



Principal Strain Rate of Tsochen fault

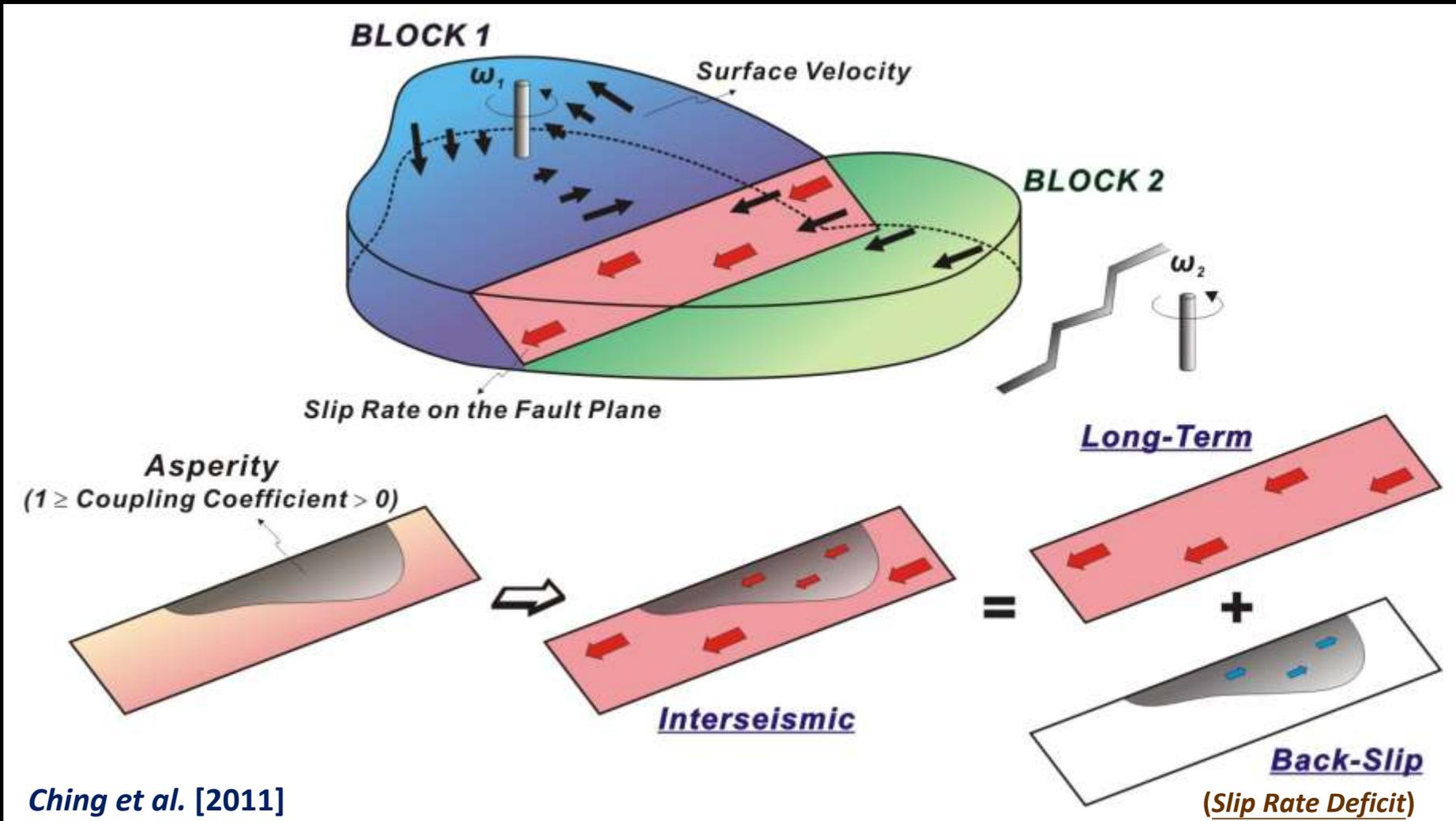


Shear Strain Rate of Tsochen fault



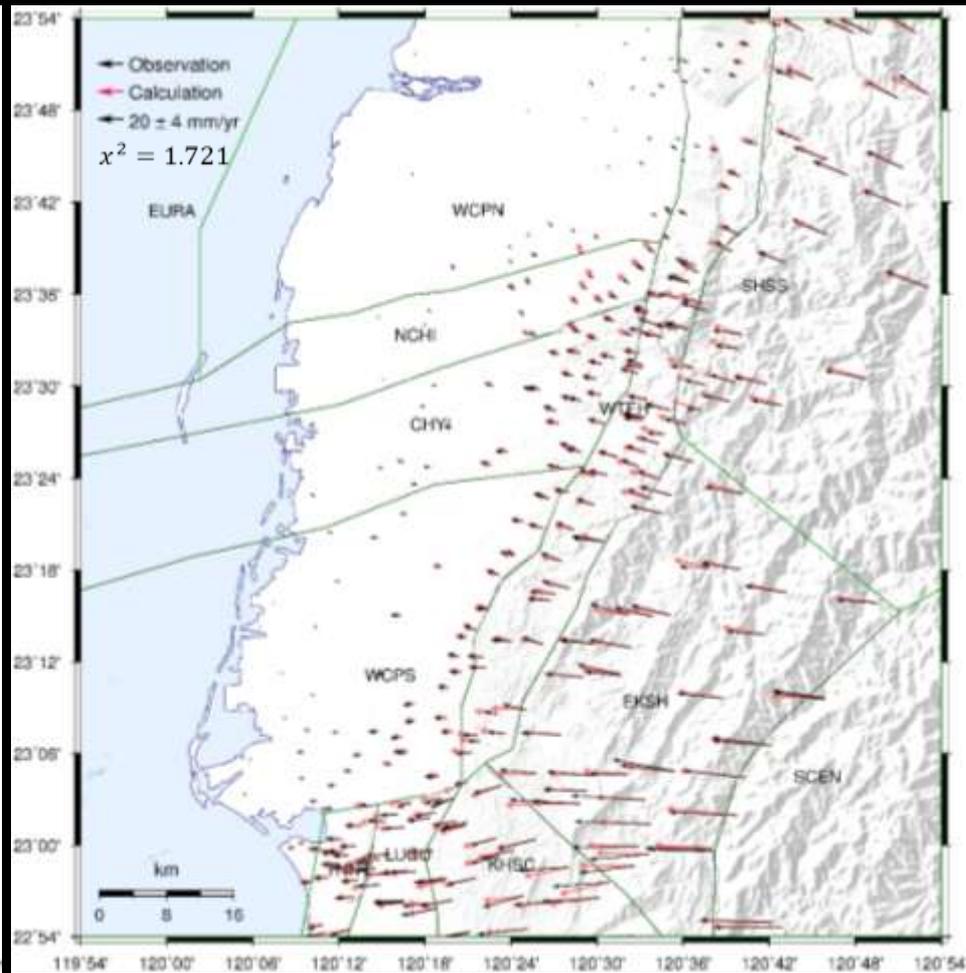
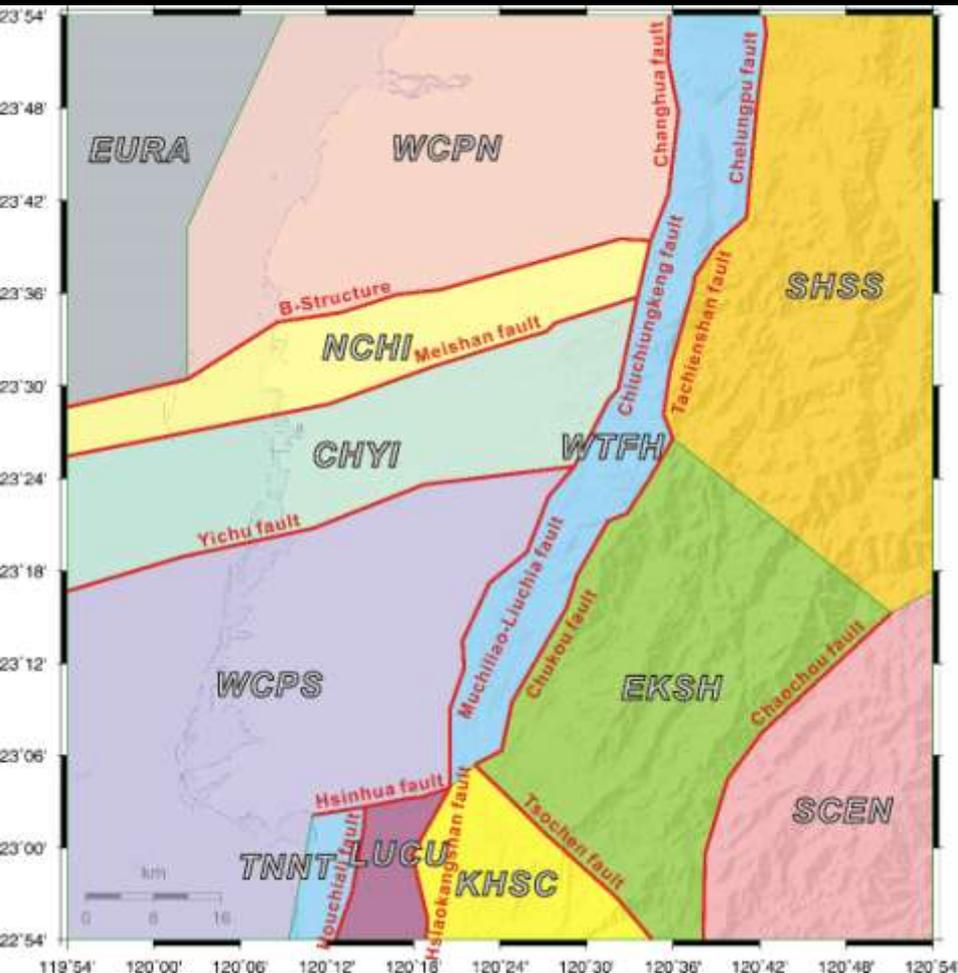
3D Block Modeling Approach (Horizontal Data)

Concept of modeling interseismic velocity field (DEFNODE: *McCaffrey, 2002*)

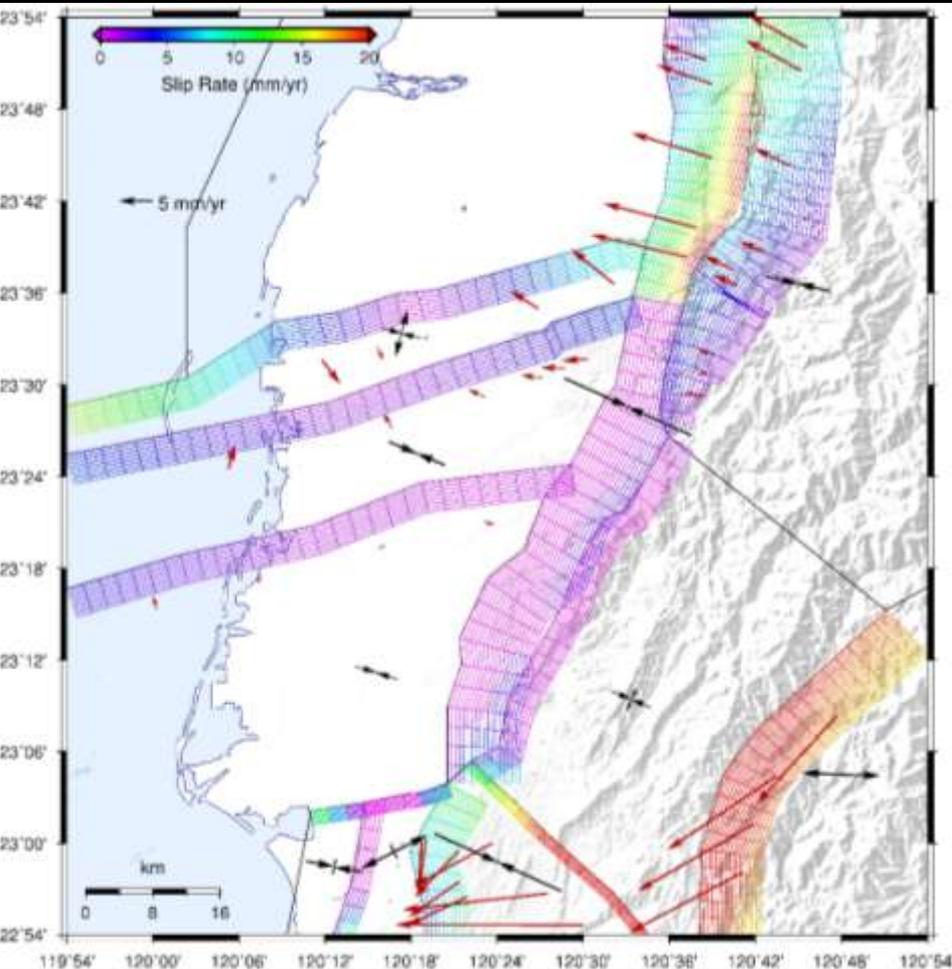


Distribution of Blocks

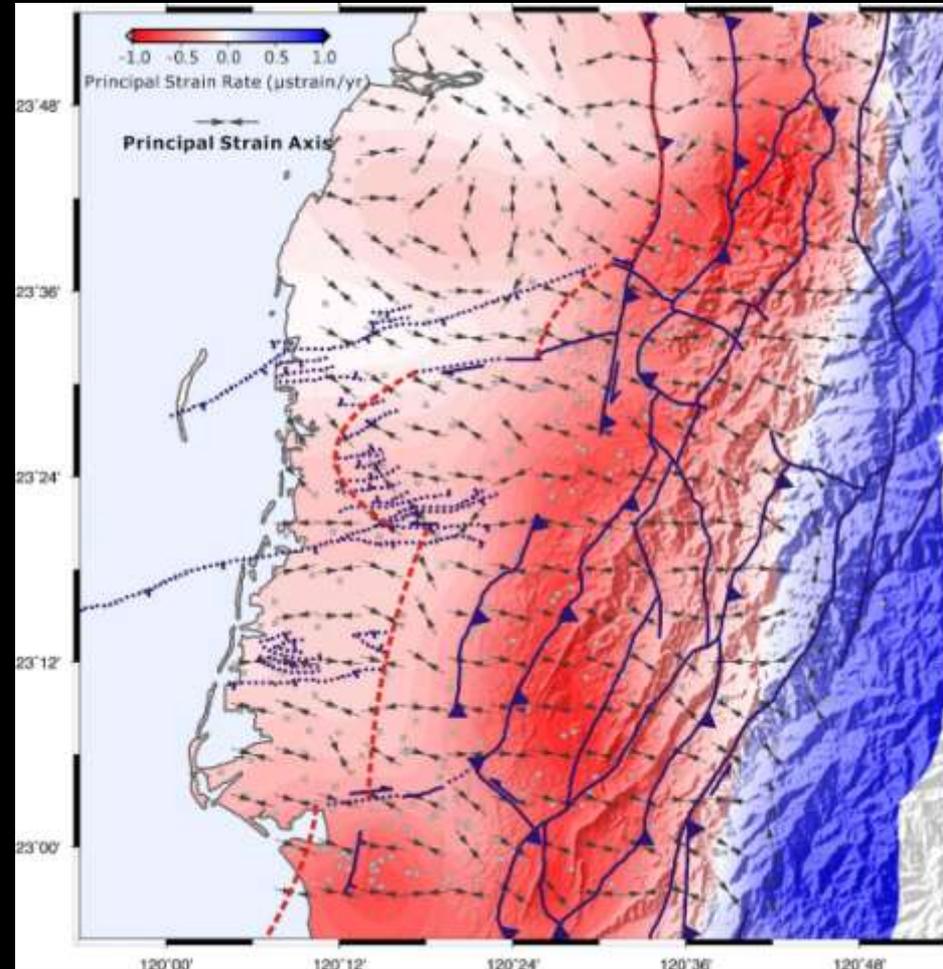
Velocity between Observation and Calculation



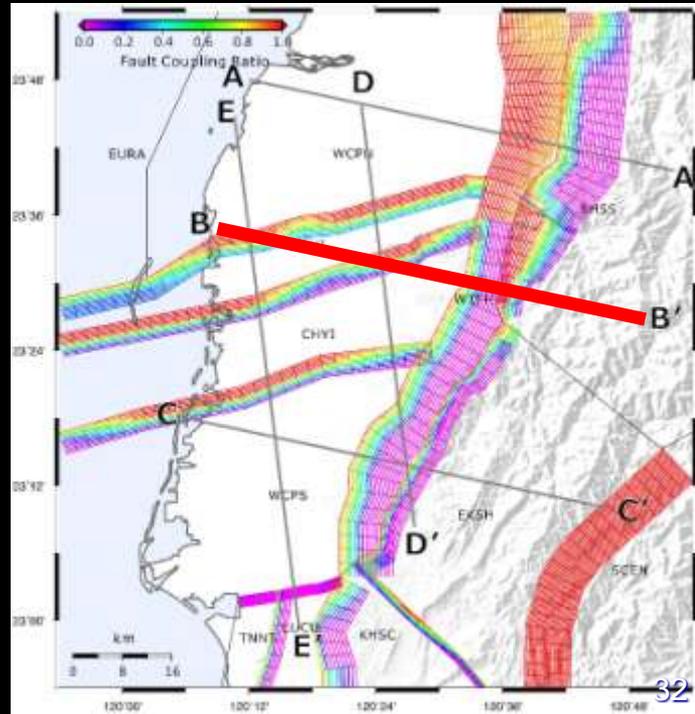
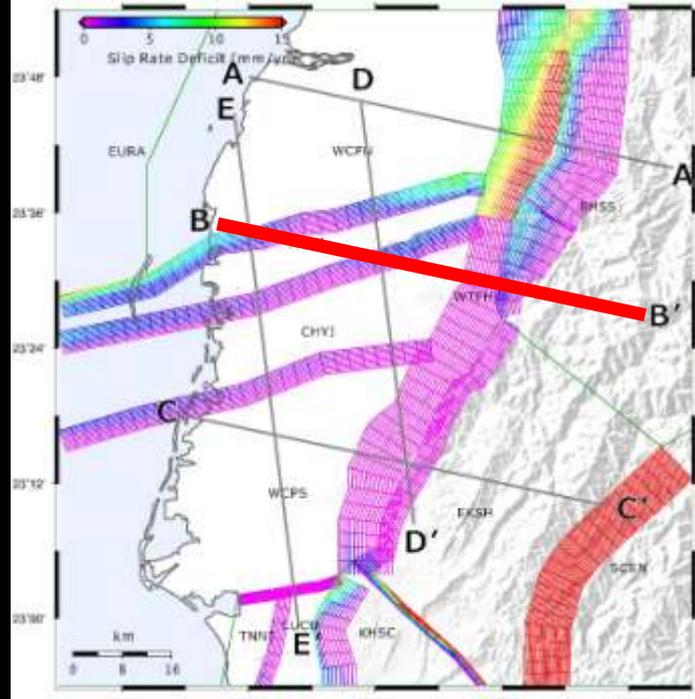
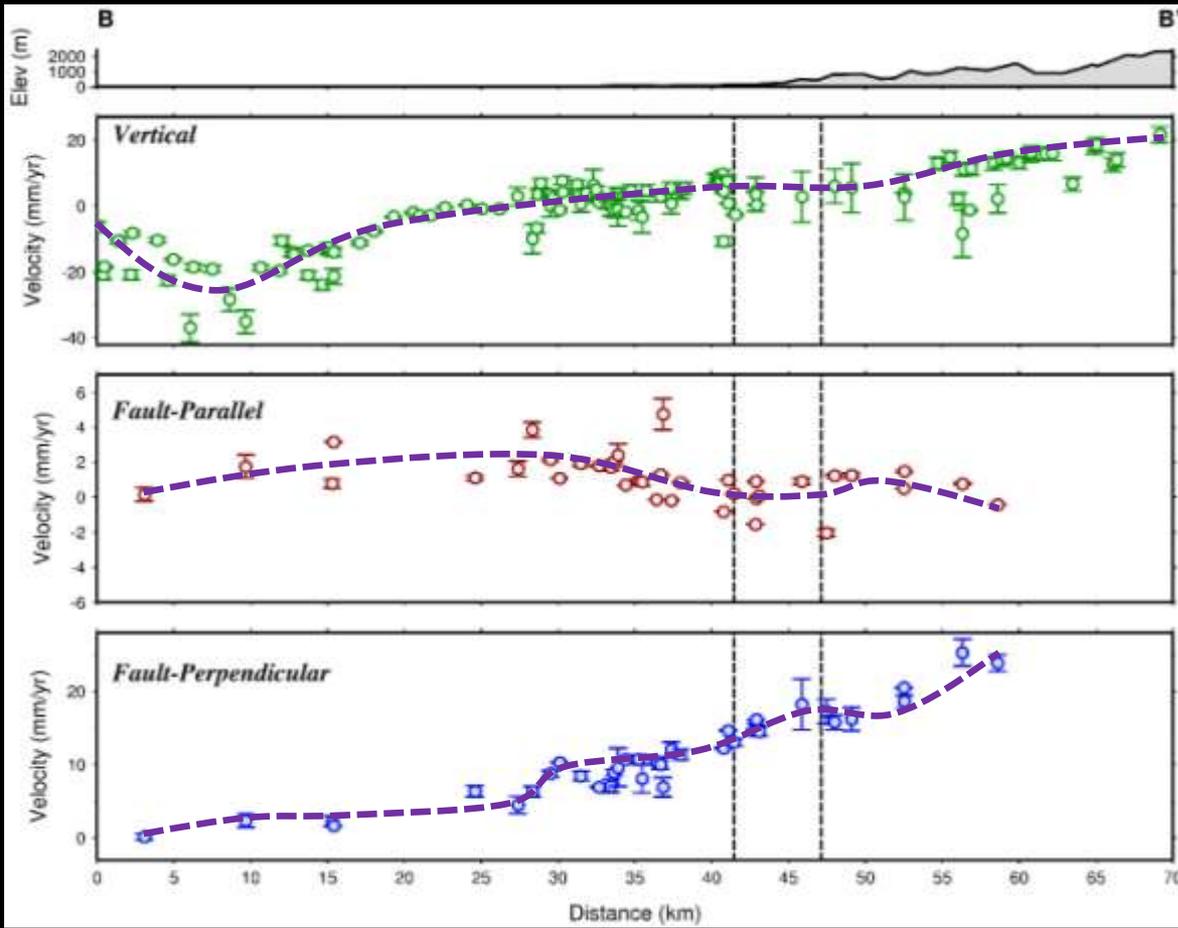
Fault Slip Rate and Block Strain



Principal Strain Rate

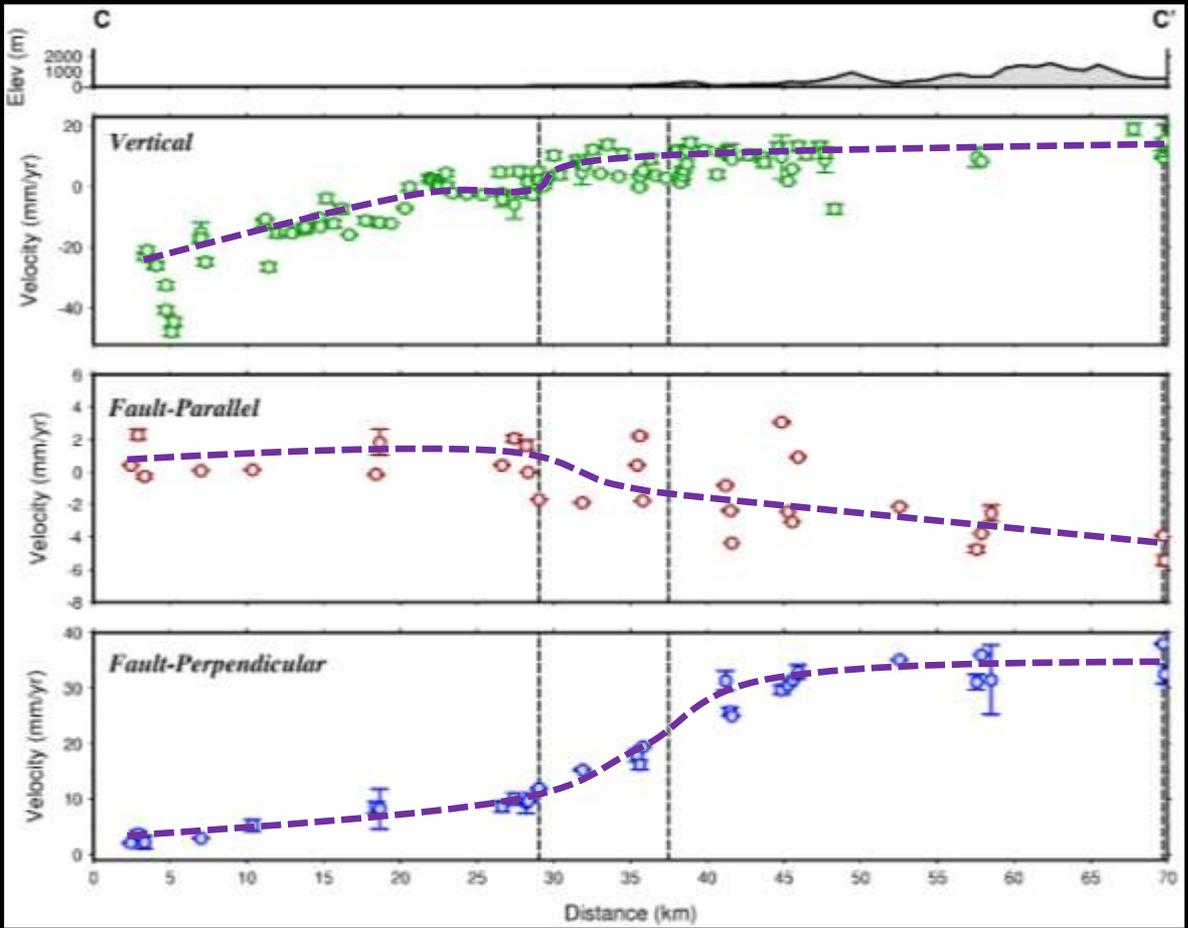


Behavior of Chiuchungkeng fault and Tachienshan fault

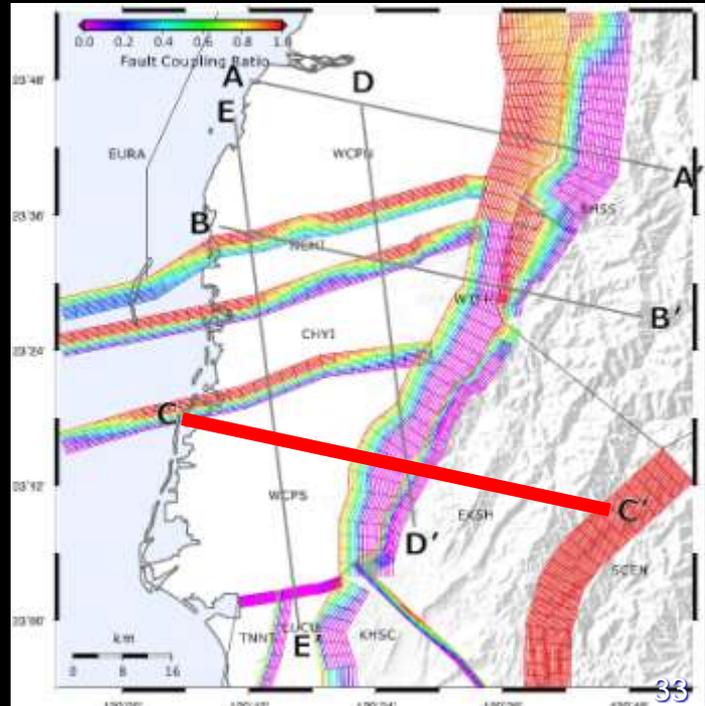
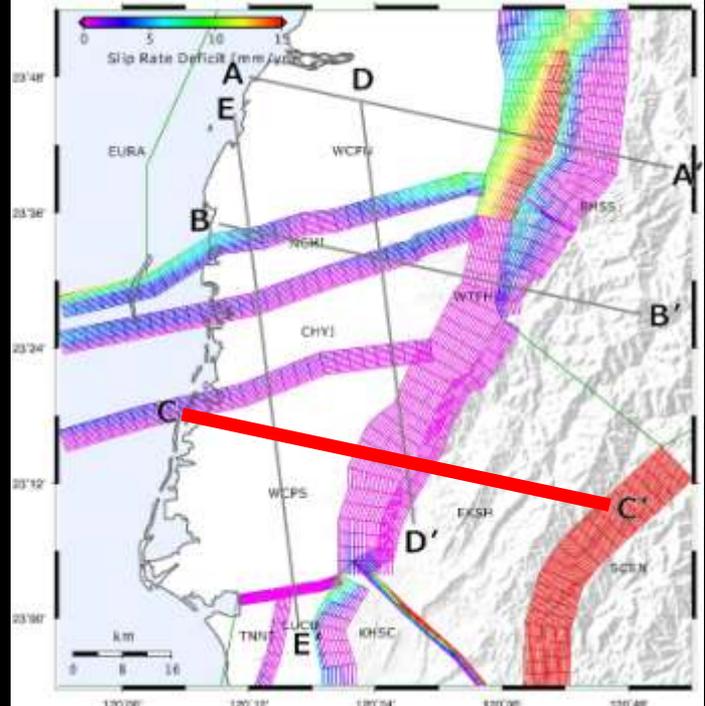


* Fault-Parallel and Fault-Perpendicular velocities include campaign and continuous GPS data. Vertical velocity includes continuous GPS and precise leveling data.

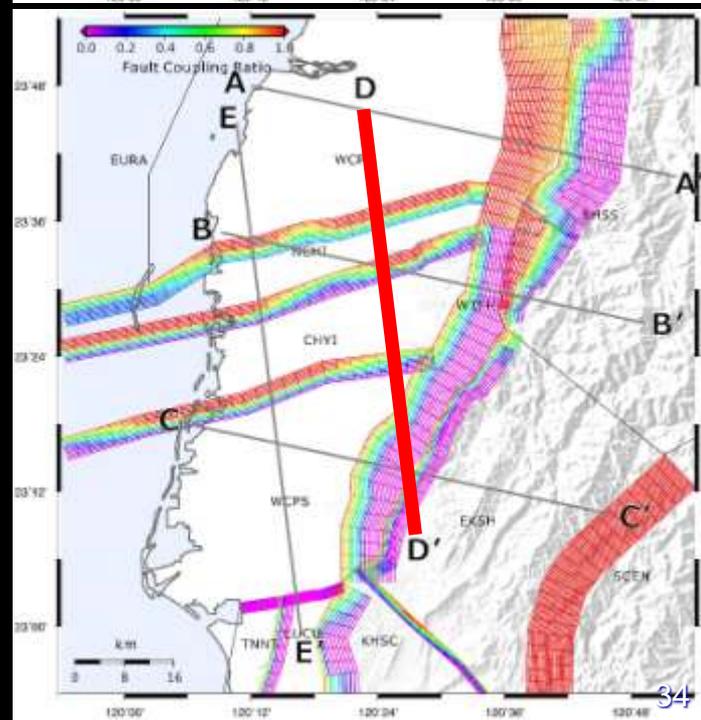
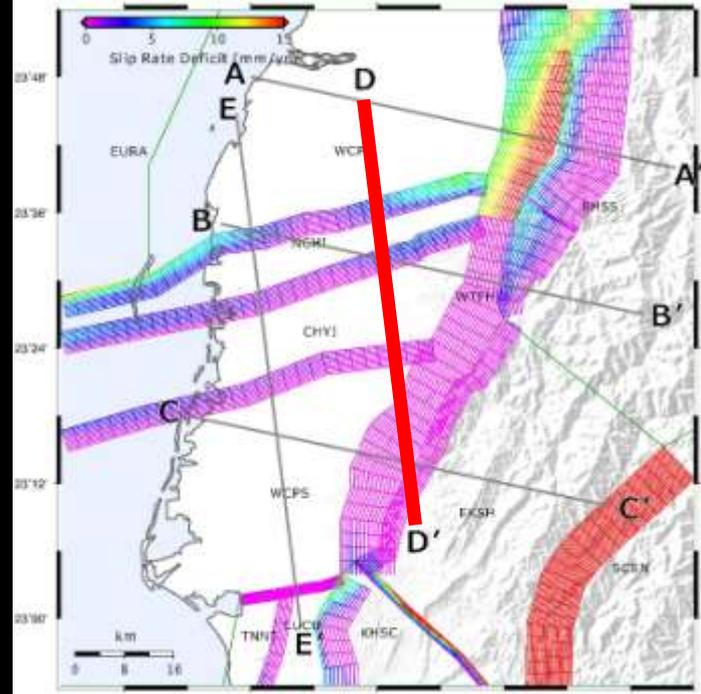
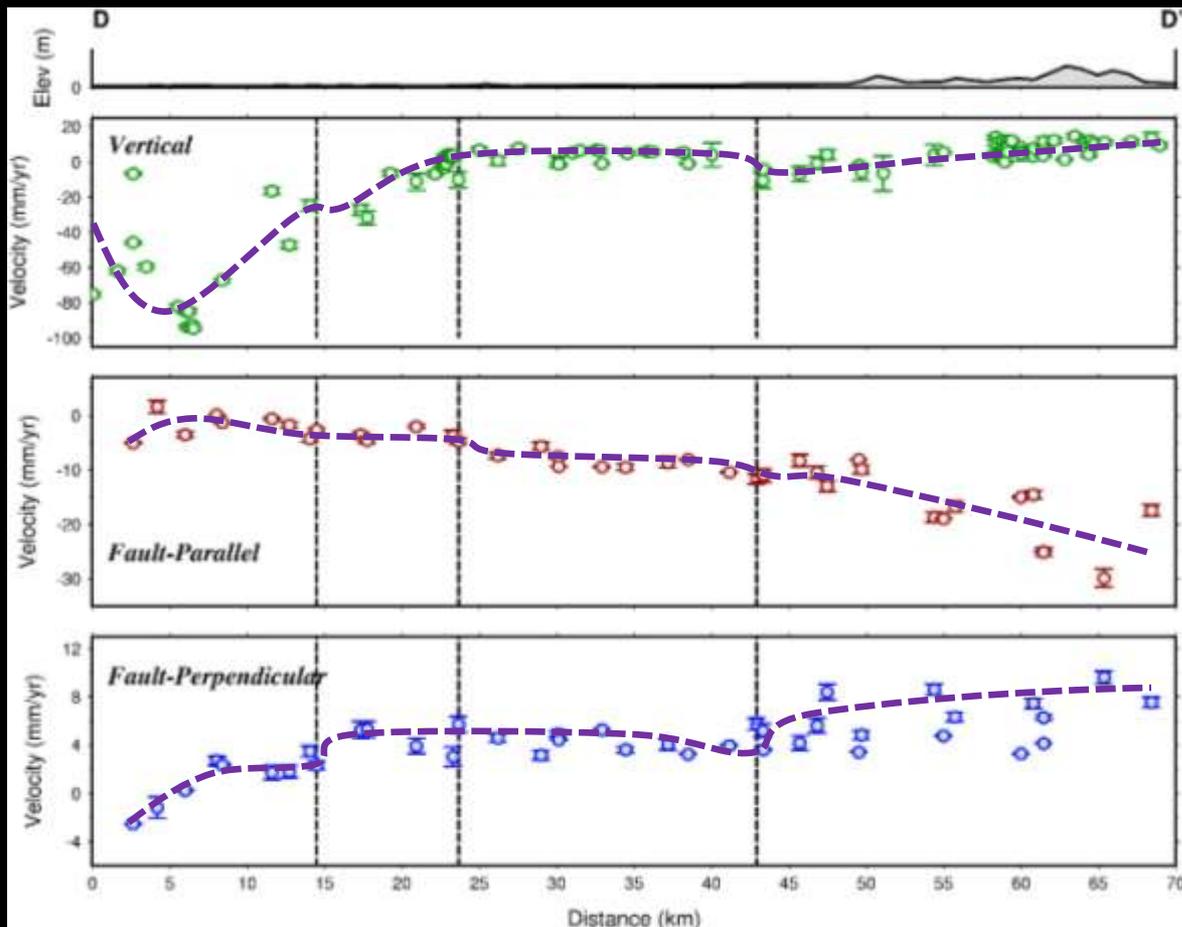
Behavior of Muchiliao-Liuchia fault and Chukou fault



* Fault-Parallel and Fault-Perpendicular velocities include campaign and continuous GPS data. Vertical velocity includes continuous GPS and precise leveling data.

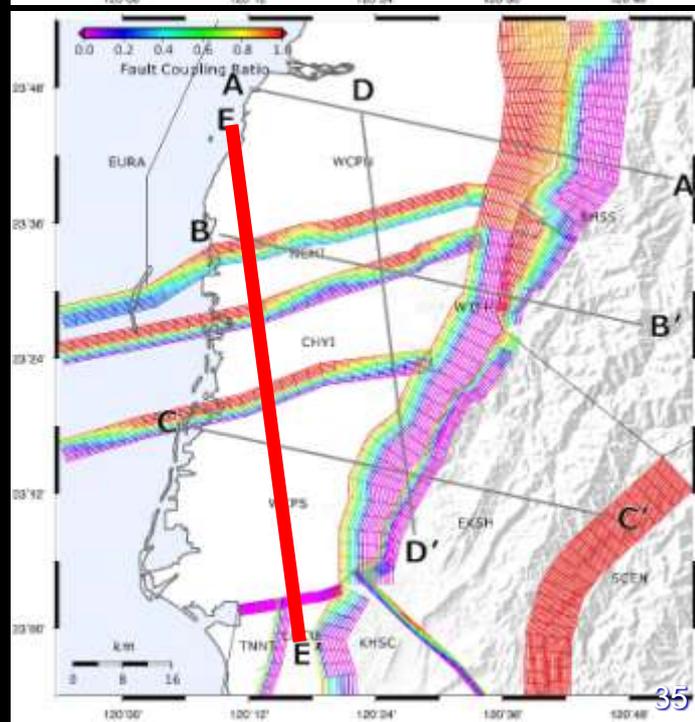
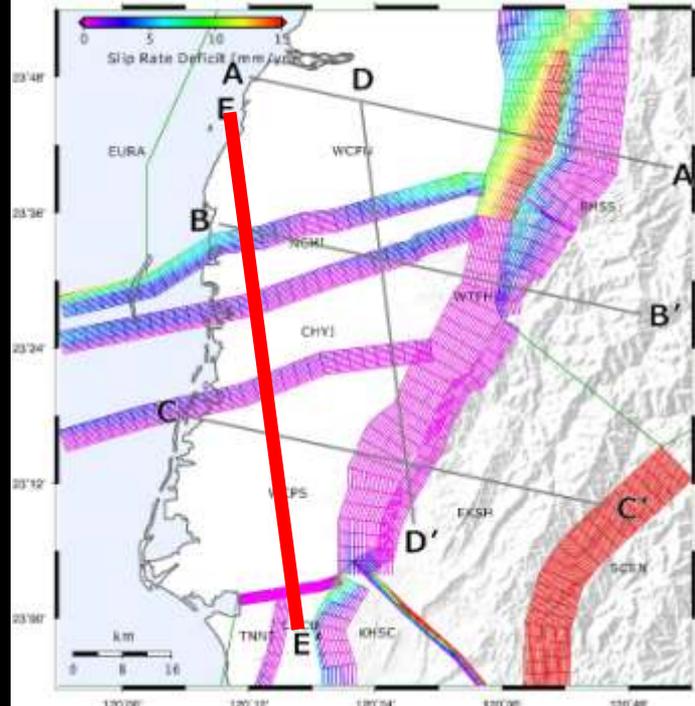
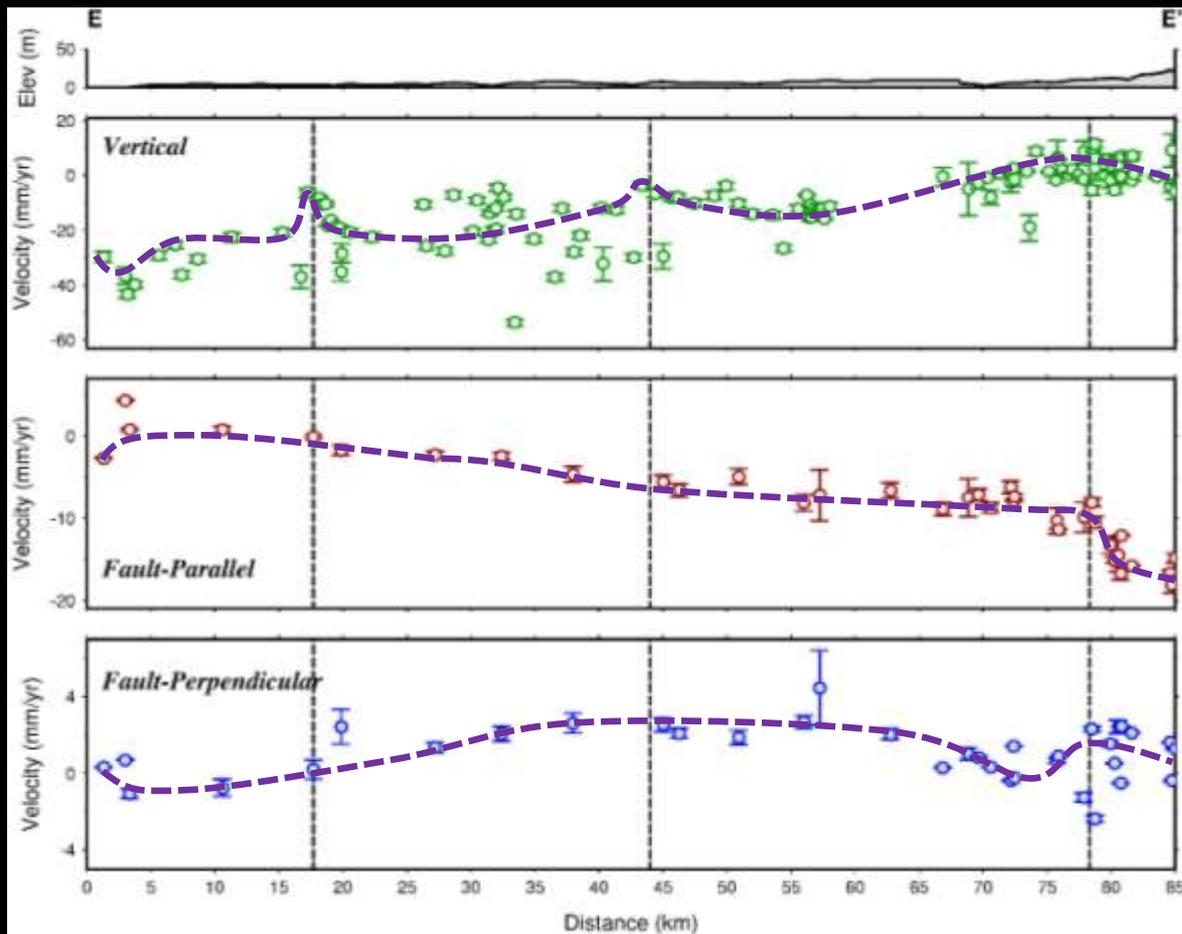


Behavior of B-Structure, Meishan fault, and Yichu fault



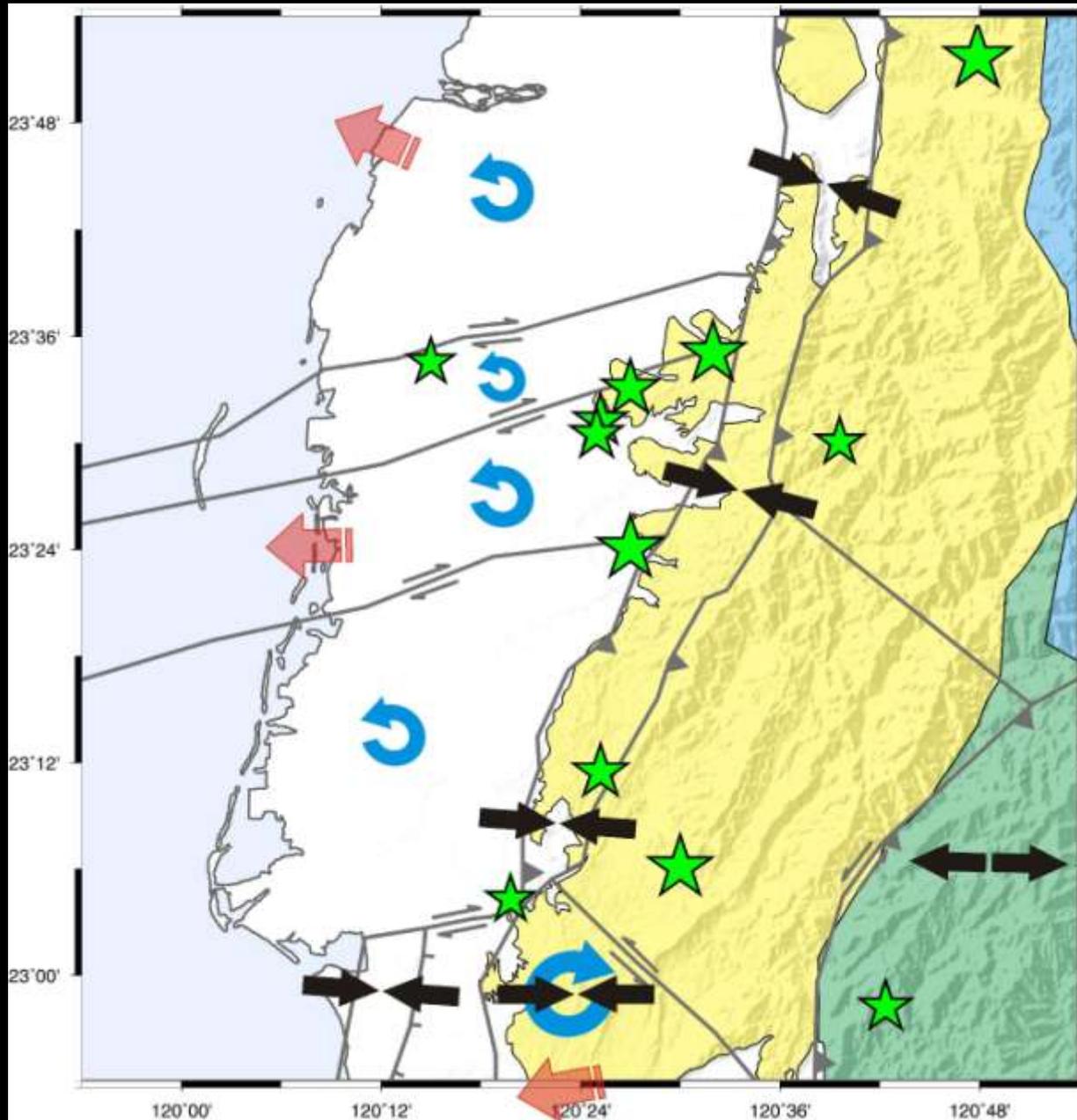
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Behavior of B-Structure, Meishan fault, and Yichu fault



* Fault-Parallel and Fault-Perpendicular velocities include campaign and continuous GPS data. Vertical velocity includes continuous GPS and precise leveling data.

Model of Present-Day Crustal Deformation in SW Taiwan



Summary

1. A series of pre-orogenic Neogene extensional structures in western Taiwan have inverted and remain active
2. Frontal thrusts and the pre-existing extensional faults are the two most important seismogenic structures in western Taiwan
3. SW Taiwan has experienced nine large earthquakes over the last 220 years, and is due for another!