

"Paleoseismological
Investigations of Xaiyabouri
area, central Lao PDR"

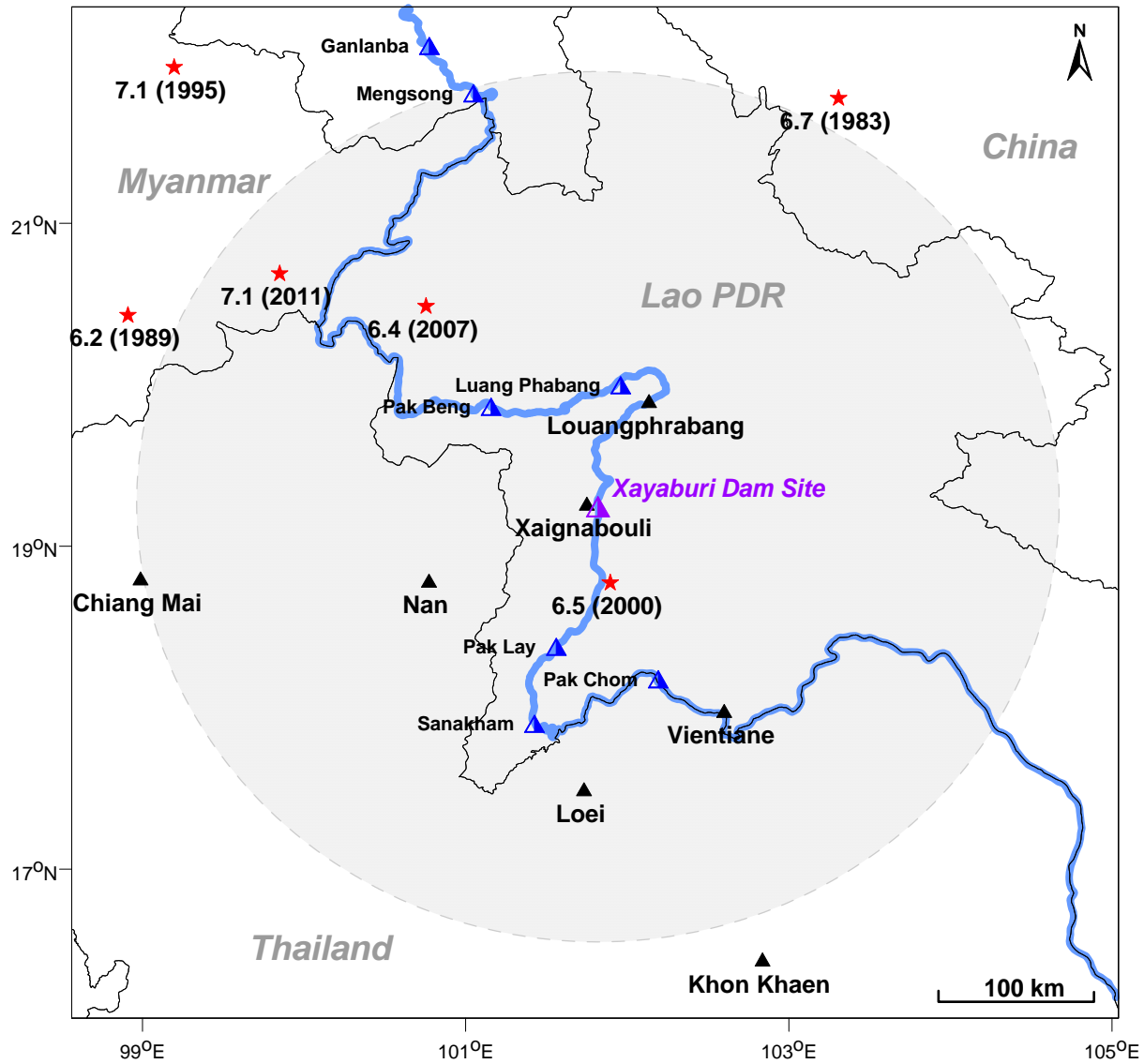
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and Chinda Sutivanich

Earthquake and Tectonic Geology
Research Unit (EATGRU), Chulalongkorn
University

Myanmar Earthquake Committee, Yangon, May 11, 2013

Topics

- Backgrounds
- Present-day Seismicity
- Remote sensing data
- Field data
- Geochronological data



- Country boundary
- Mae Khong River
- - - Radius 300 km from site
- ▲ Province
- ▲ Dam site
- ★ Earthquake

Present Day Tectonics of the Sunda Shelf



- Subduction zone
- Reverse fault
- Strike-slip fault
- Extensional fault
- Oceanic ridge

- | | | |
|-------------------|------------------------|---------------------------|
| Continental Crust | GT = Gulf of Thailand | Rrf = Red River Fault |
| Oceanic Crust | Mb = Malay Basin | Mpf = Mae Ping Fault |
| | Nb = West Natuna Basin | 3pf = Three Pagodas Fault |
| | AS = Andaman Sea | Rf = Ranong fault |

1/04 Vientiane上陸



Phou Khounで休憩



Guide -Mr. Keo Khamphavong-



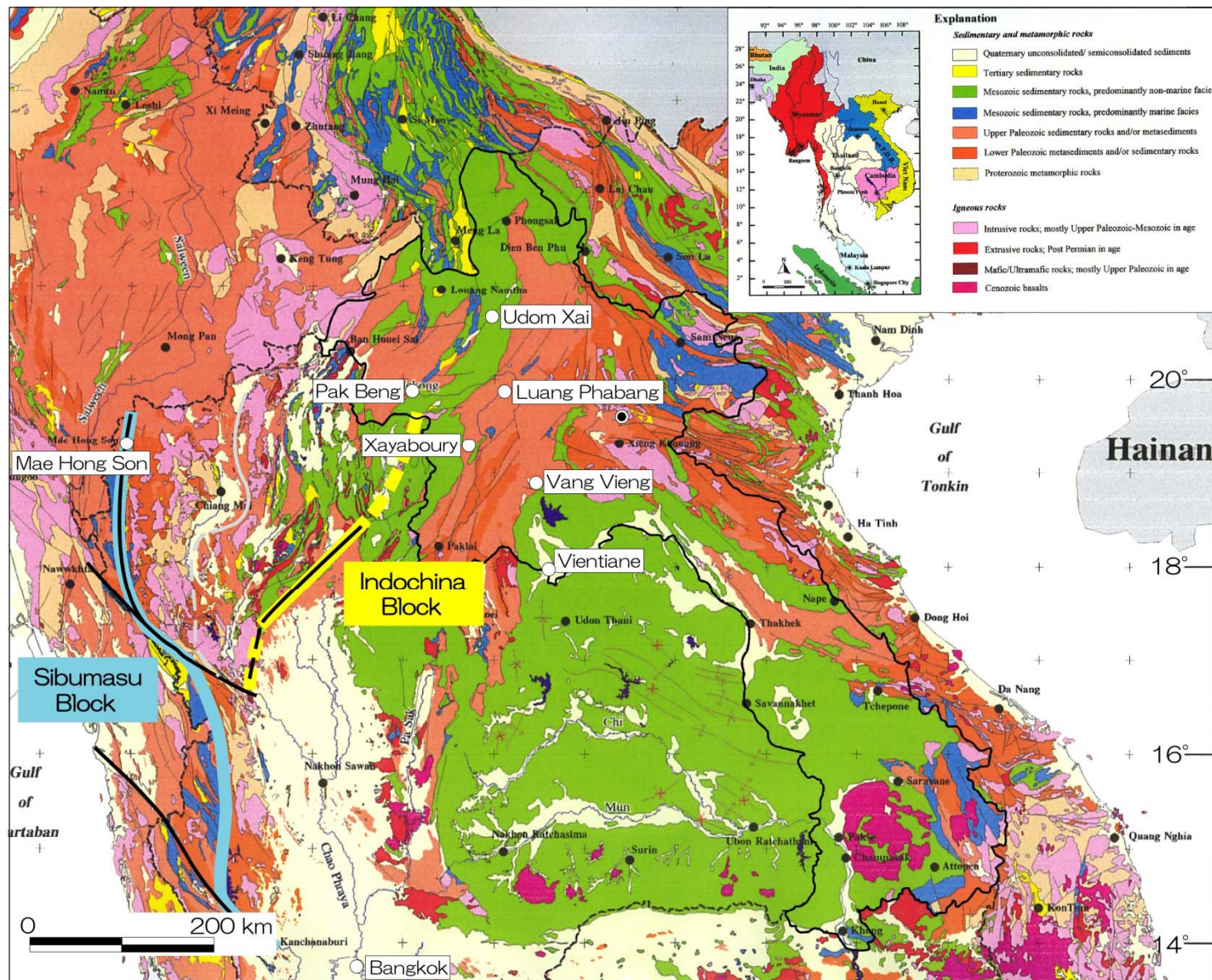
**MINISTRY OF INDUSTRY AND HANDICRAFTS
DEPARTMENT OF GEOLOGY AND MINES**

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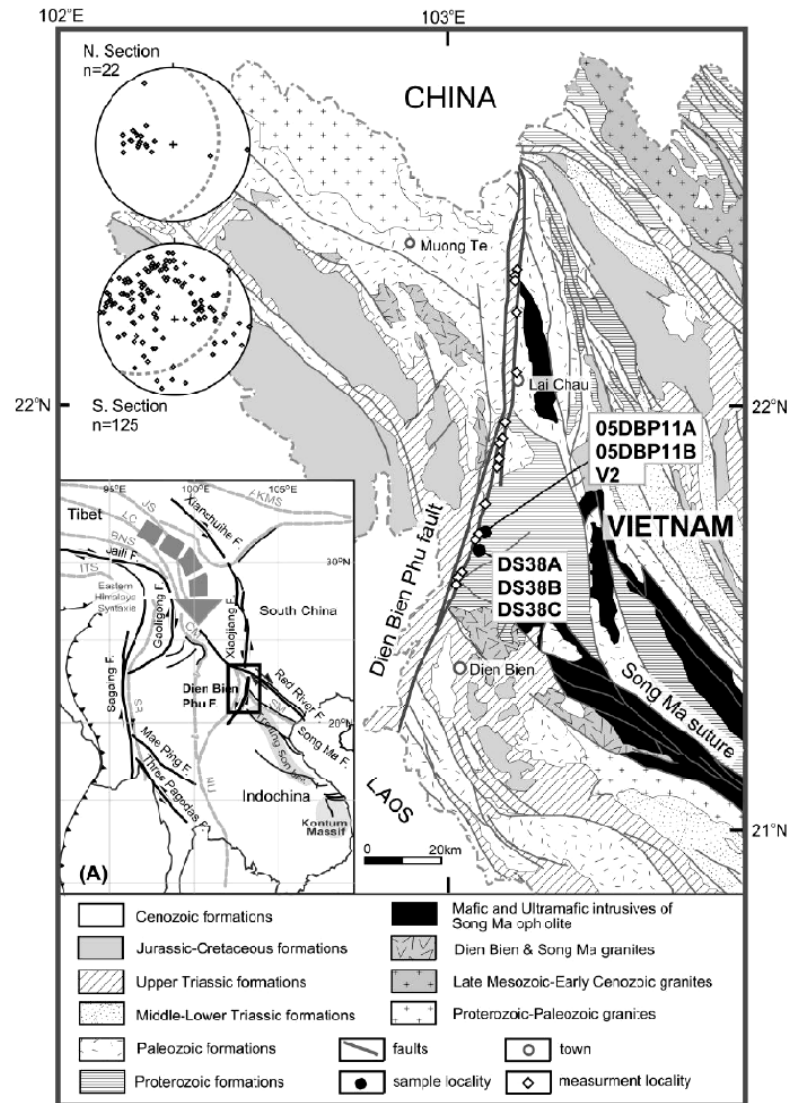
Tel. Office: (856- 21) 212080
Home: (856- 21) 560995
Mobile: (856- 20) 2249902

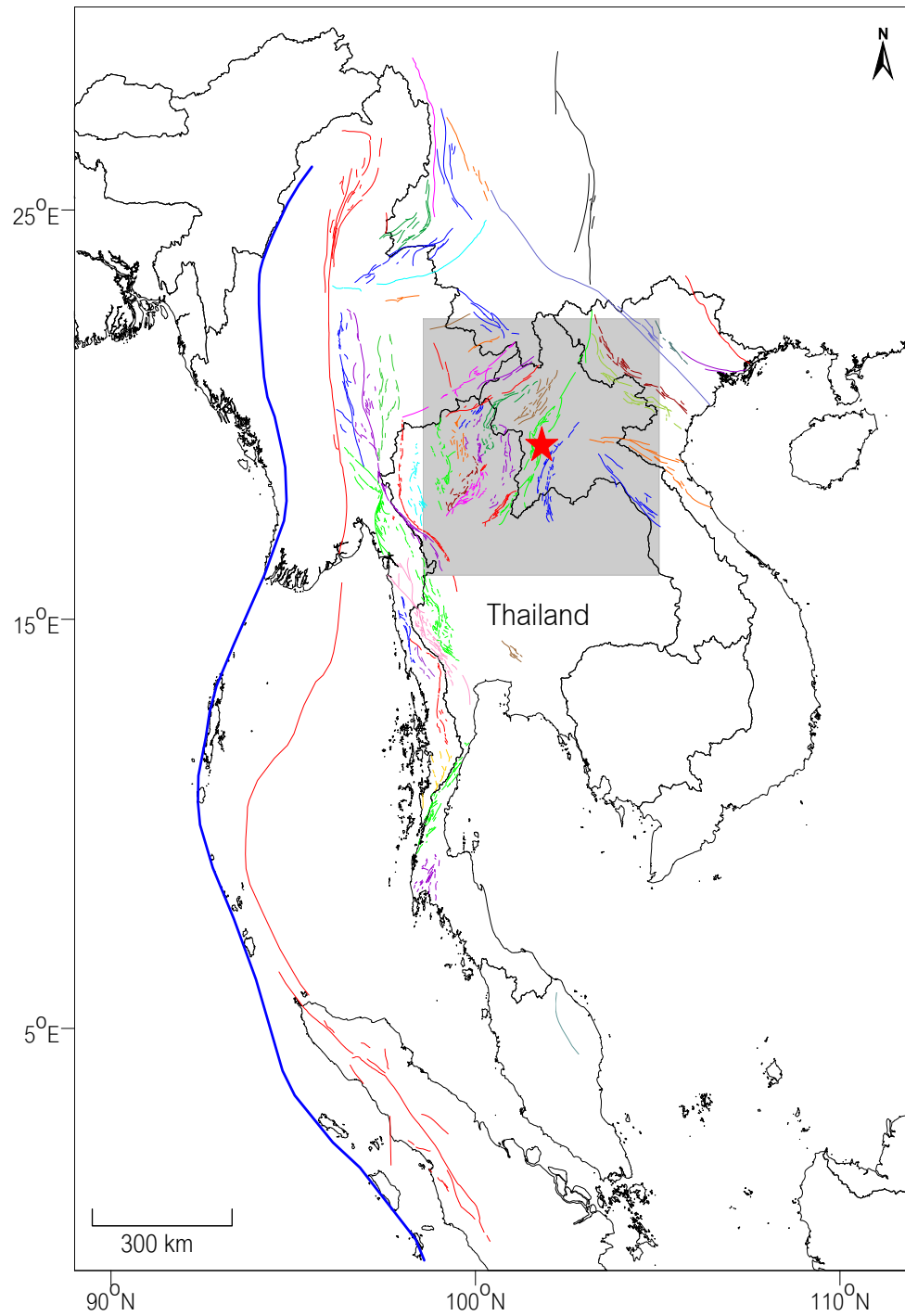
Geological Map of Mainland Southeast Asia (Wongsomsak & Charusiri, 2000)



Tectonic division...Ueno (2000)

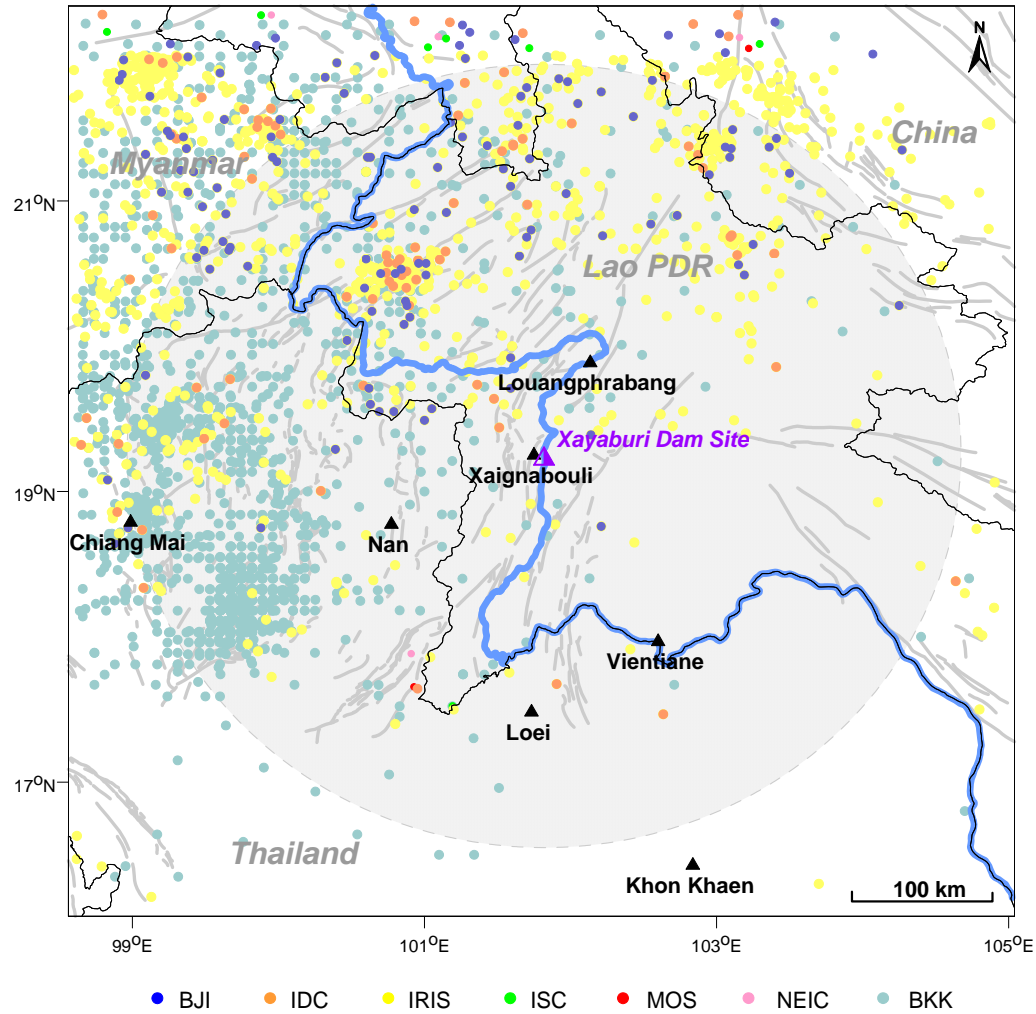
Zhang et al. 2004

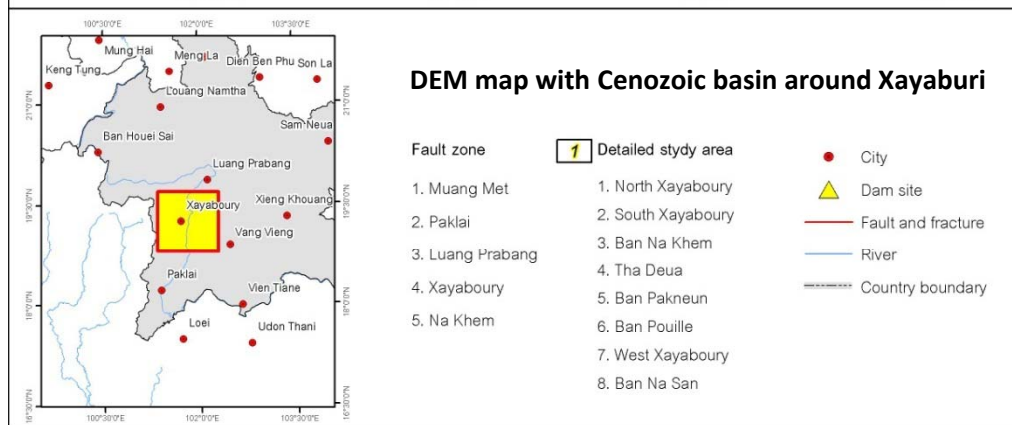
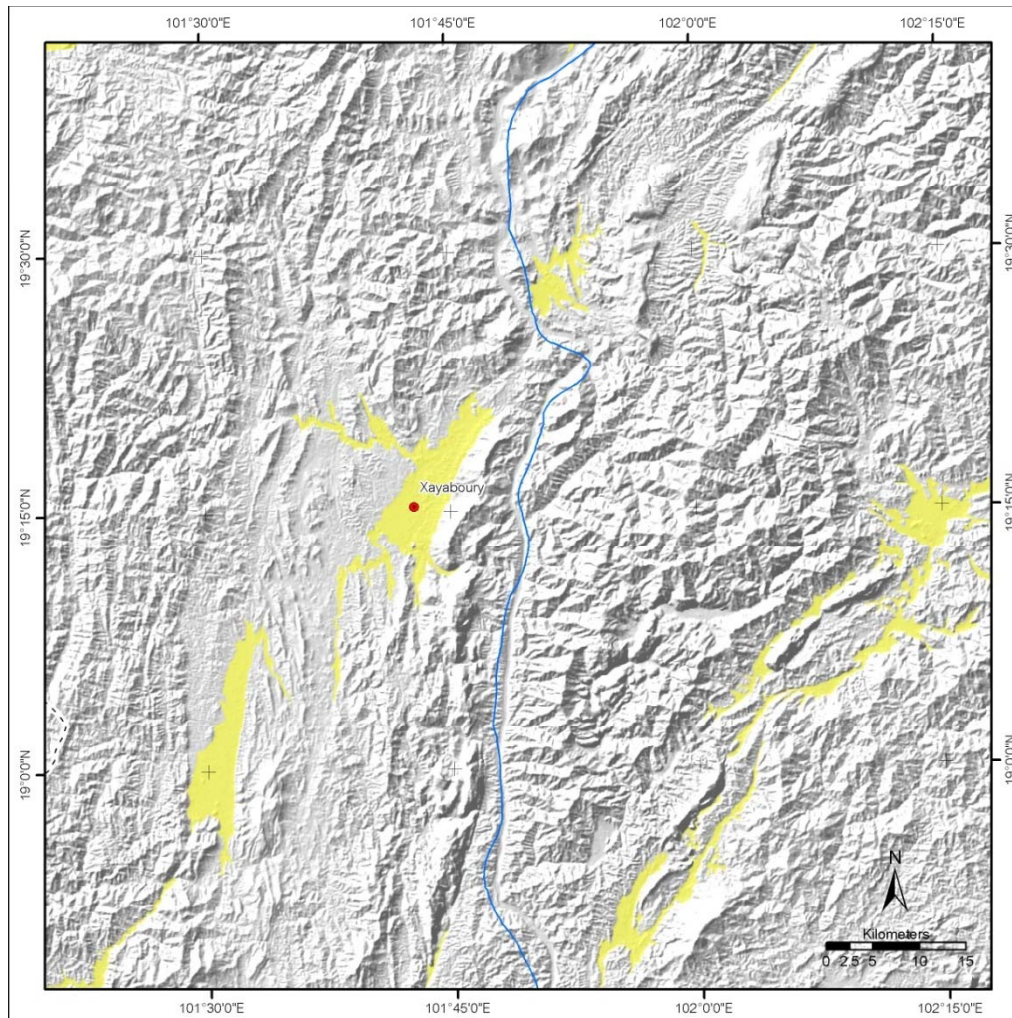


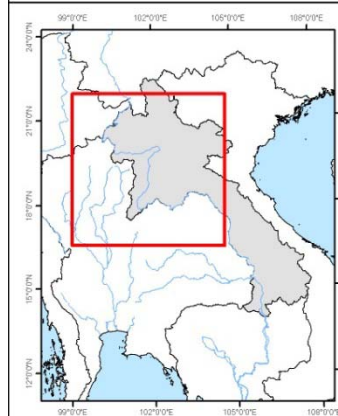
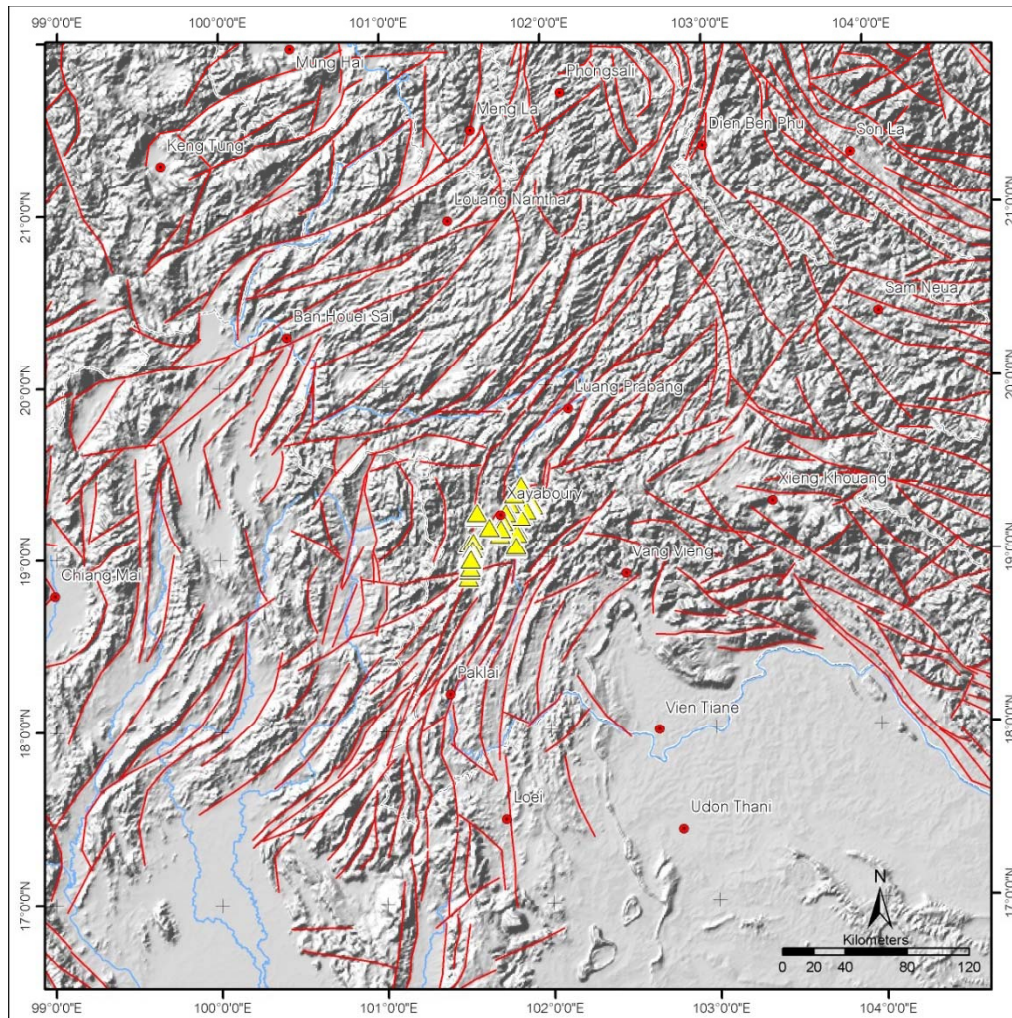


Pailoplee et al. (2009).

Map of study area showing the distribution of earthquake events and lineaments collected from various seismic recording networks.



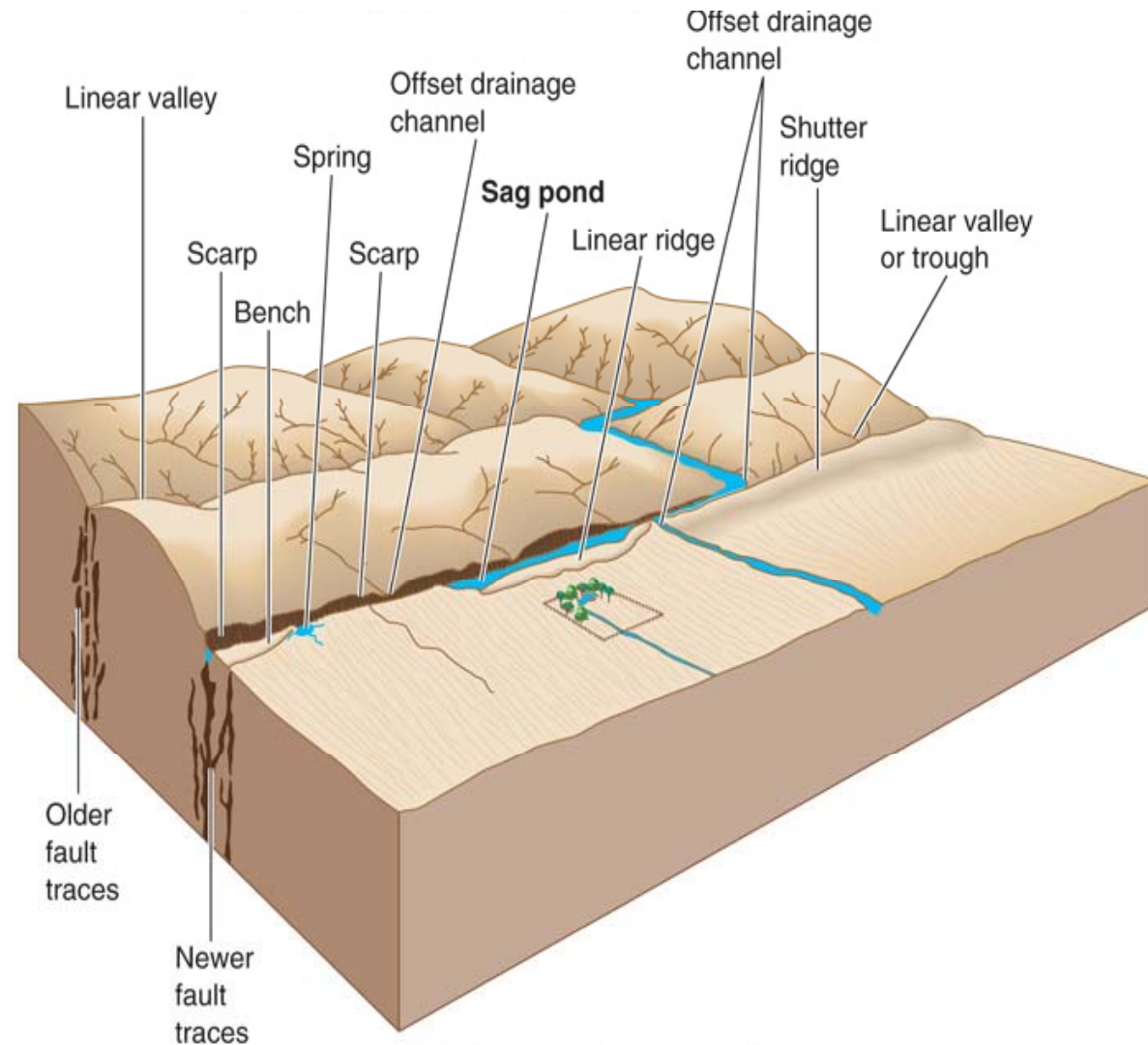


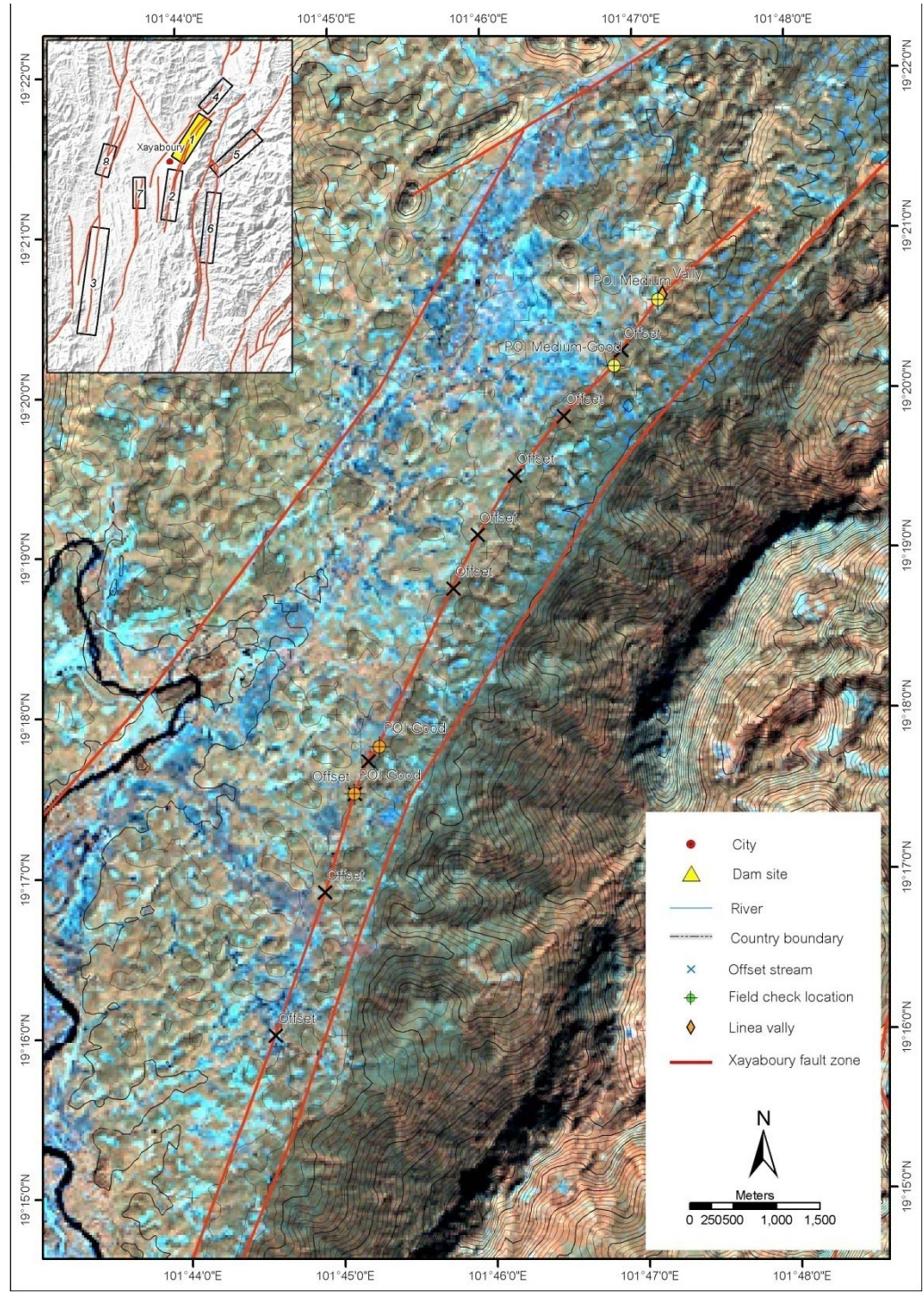


DEM map in 300 km around Xayaburi

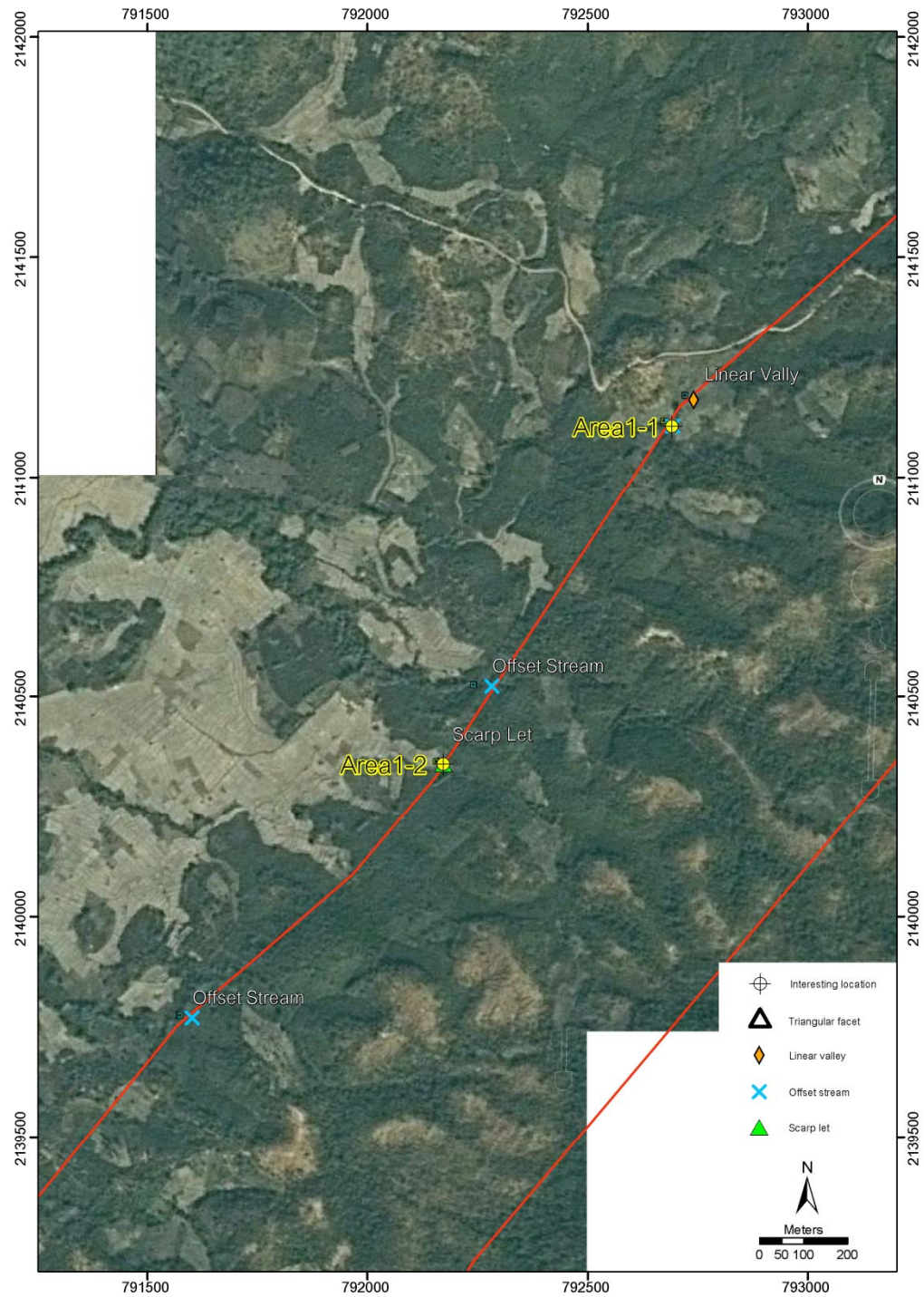
- City
- ▲ Dam site
- Fault and fracture
- River
- Country boundary

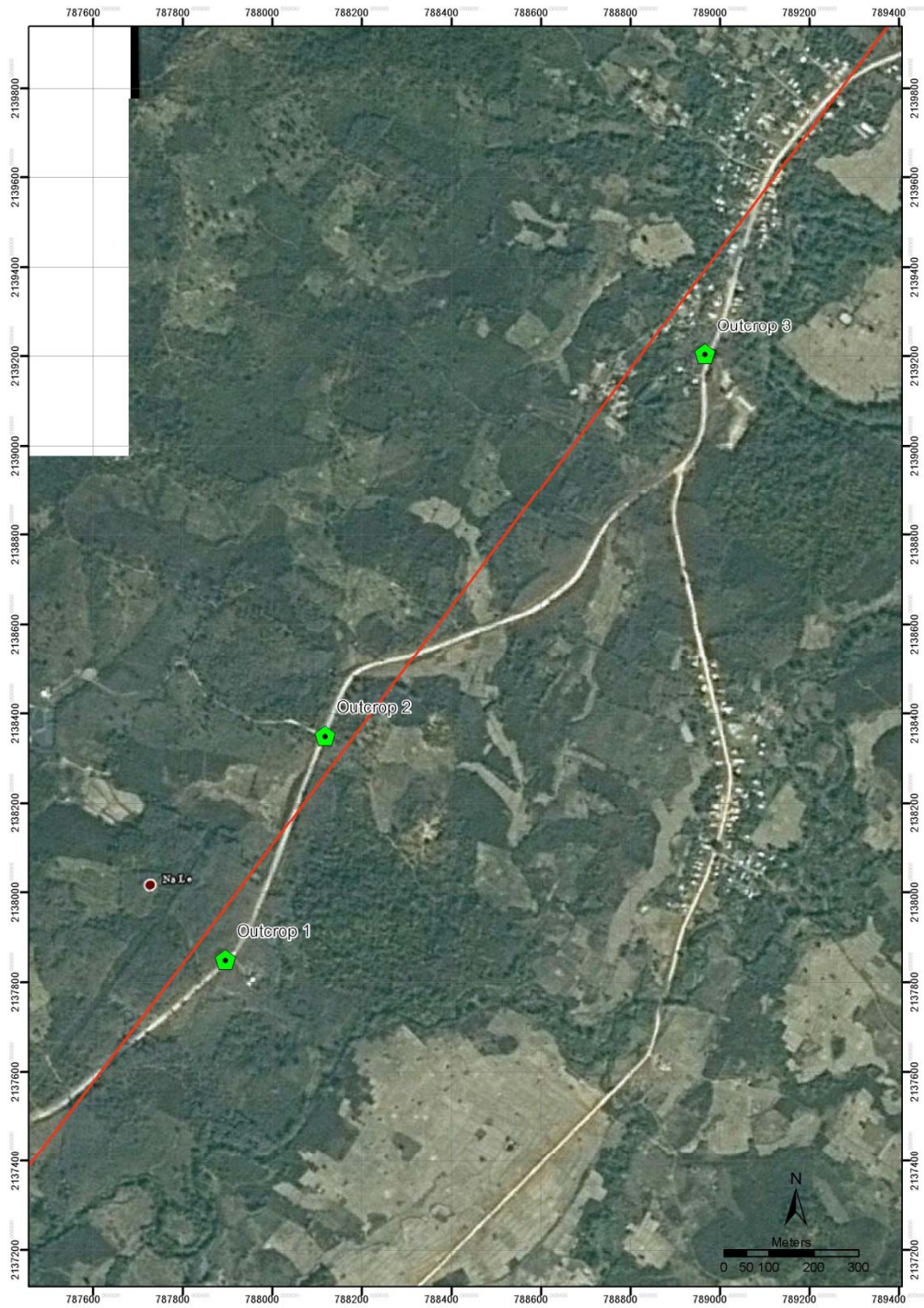
Characteristics of morpho-tectonic landforms associated with active faulting (McCalpin, 1996).

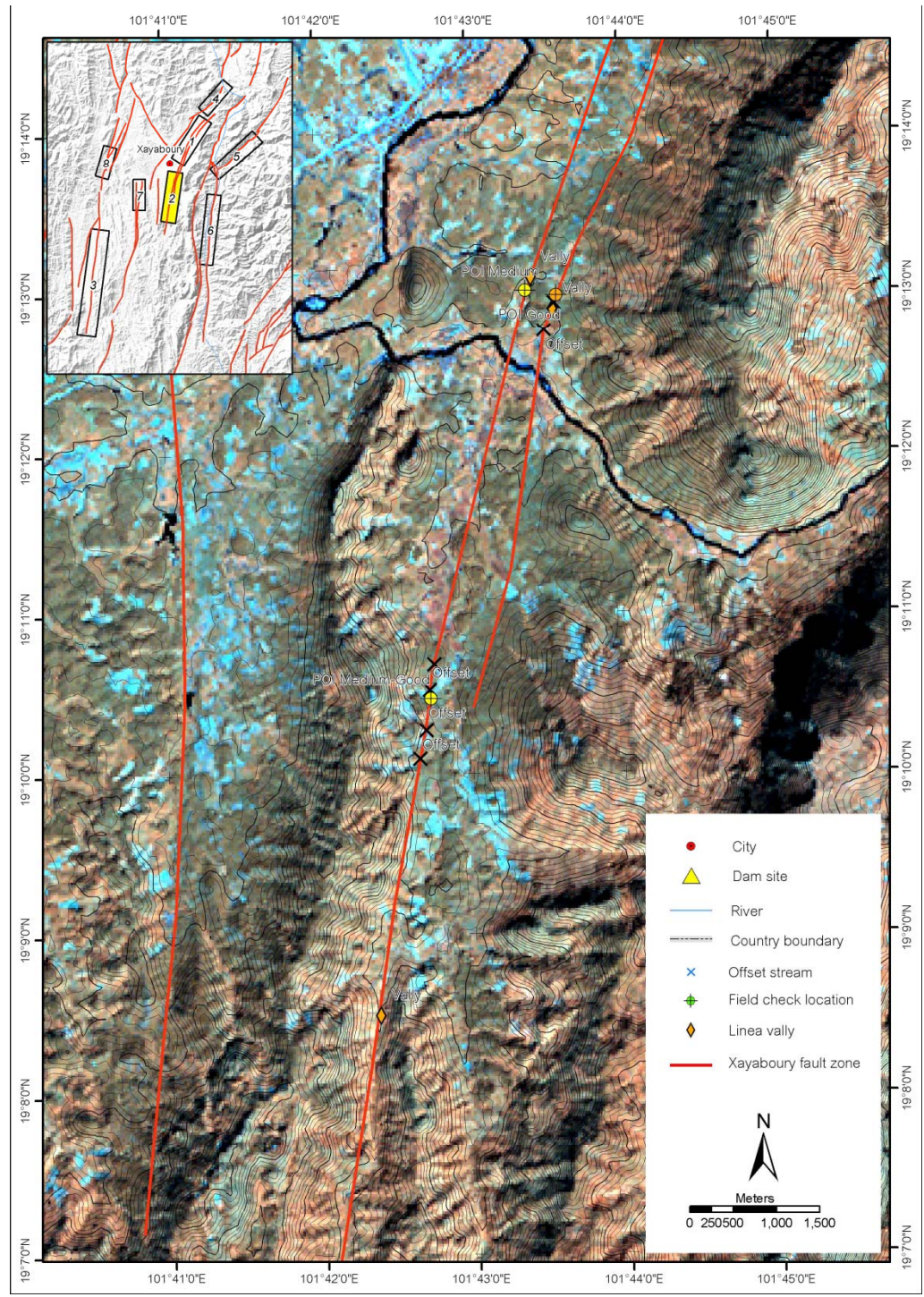




Several
scarps are
recognized

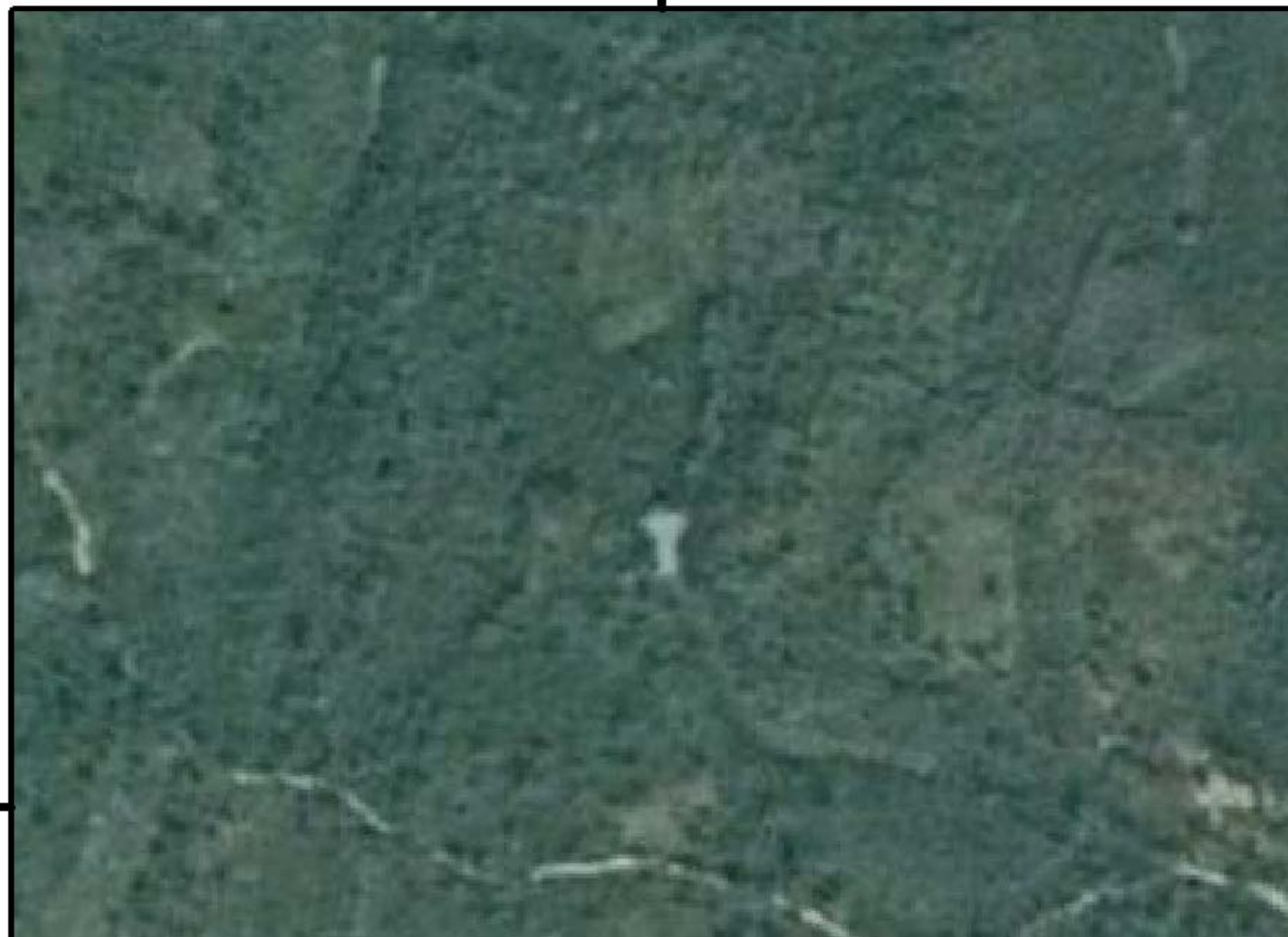




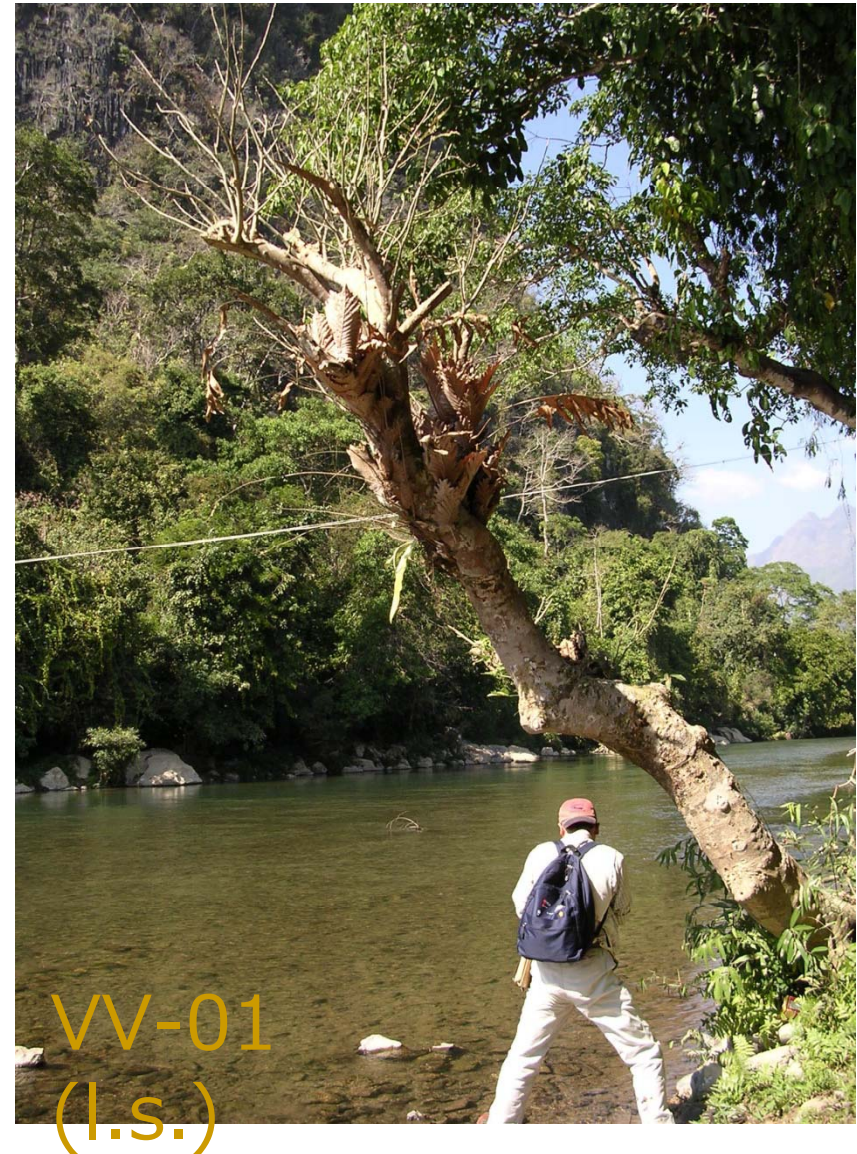


786000

2128000



1/05 Vientiane → Louangphrabang



1/10 Louangphrabang → Vang Vieng



1/09 Louangphrabang → Xayaboury → Louangphrabang

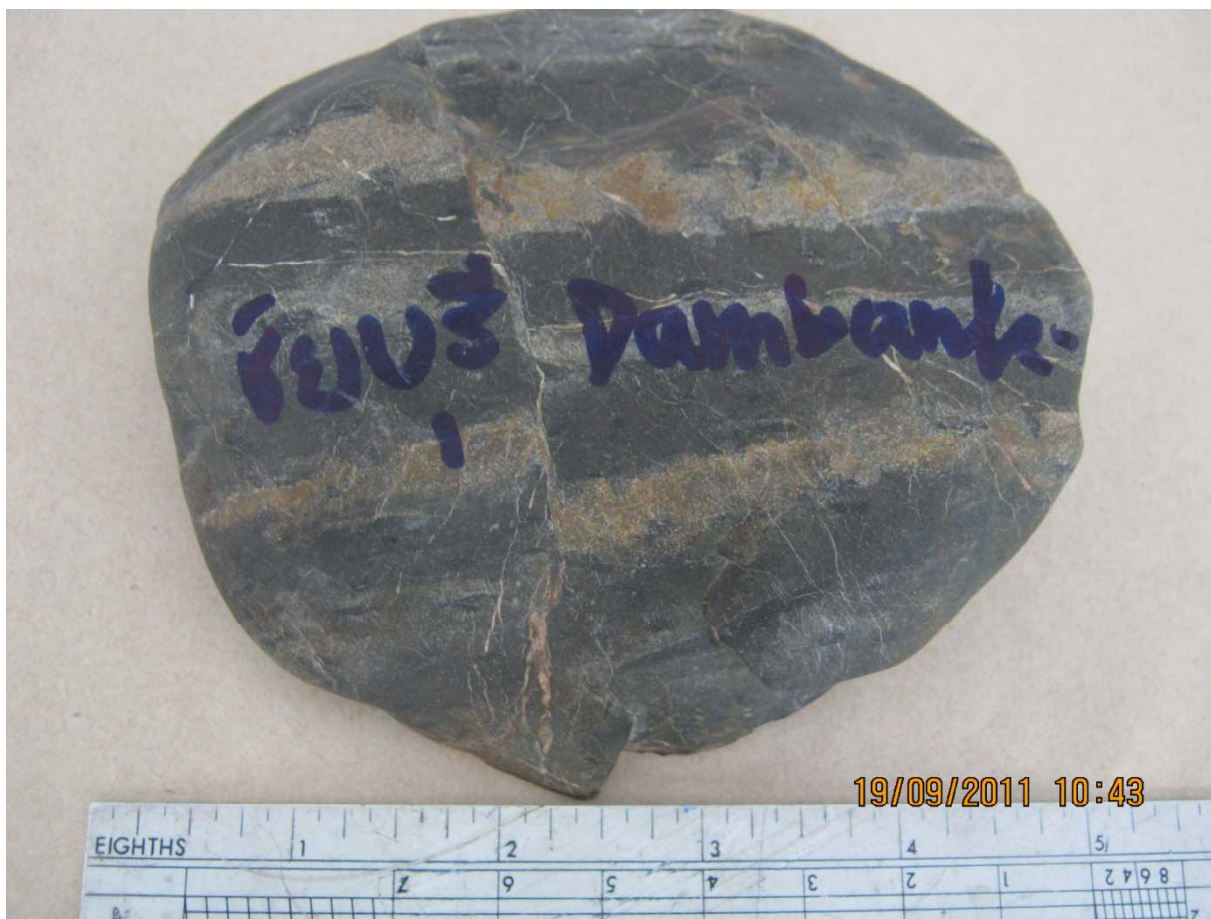


Outcrops near the fault zone



Lunch





Offset chert pebble at the
barge site



EIGHTHS

1

2

3

4

5

7

6

5

4

3

2

1

8

6

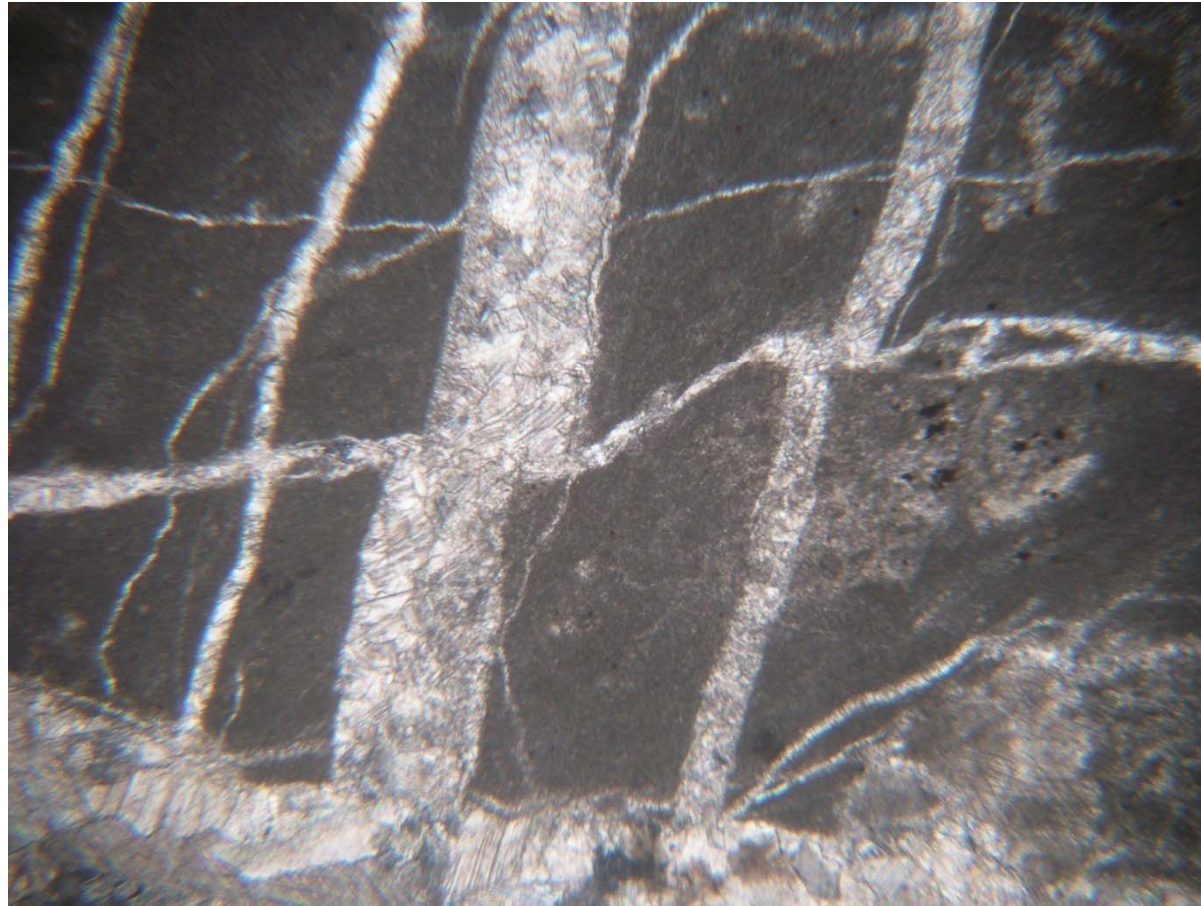
4

2

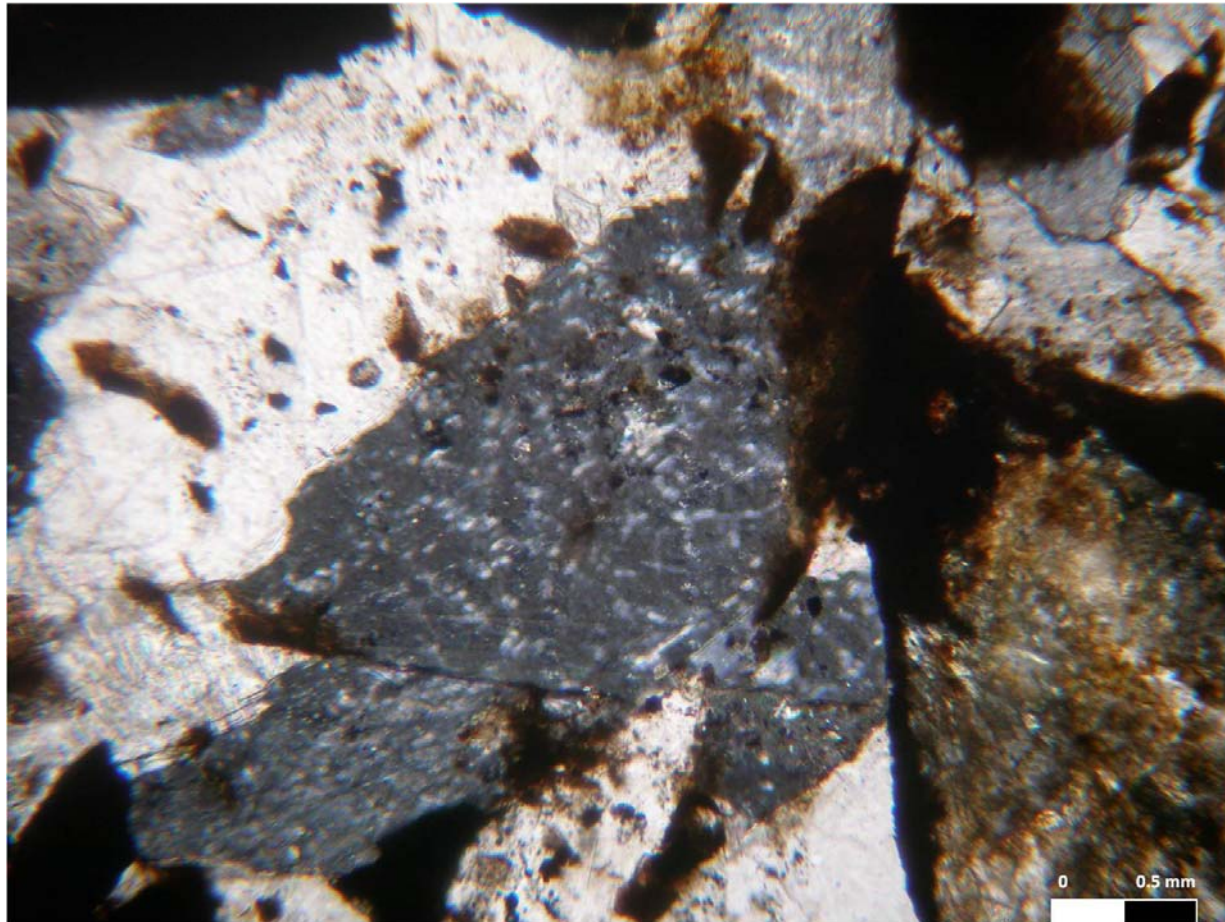
19/09/2011 10:44



Micro-offset of post –Triassic vein at the barge site



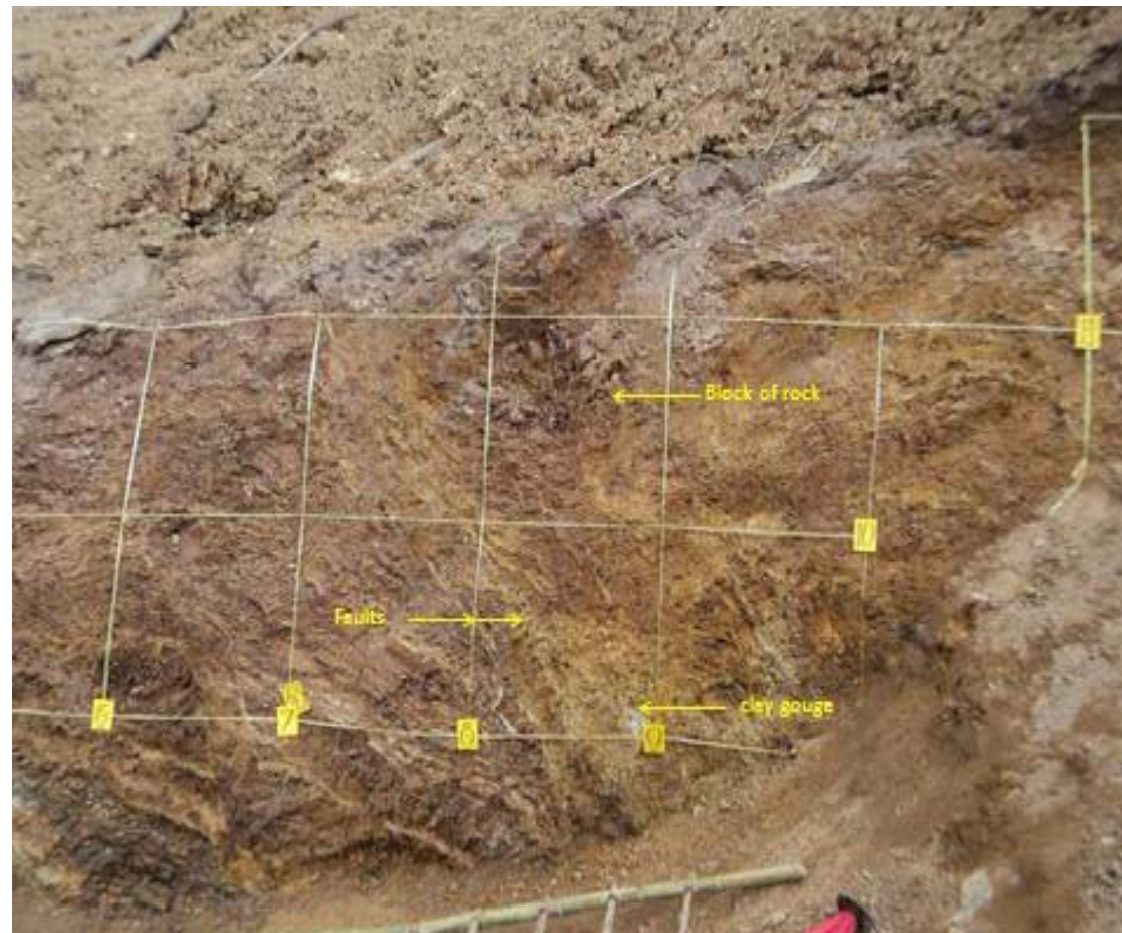
Fault breccia in calcareous sandstone at the barge site



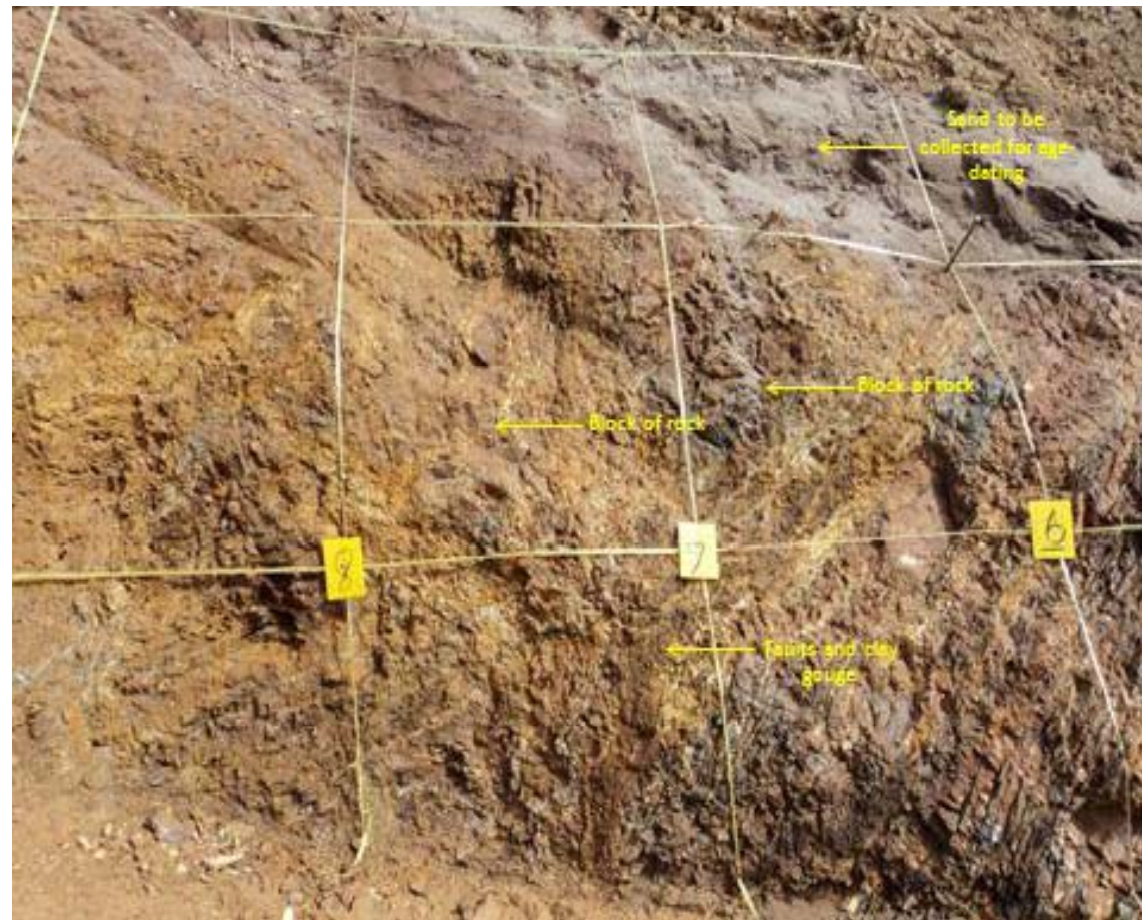
- *M_w calculated from the equation proposed by Wells and Coppersmith (1994).*

Item No.	Fault Segment	Length (km)	M _w	Seismogenic Depth (km)	Distance (km)	PGA (g)
1	Fault segment producing the earthquake magnitude of MW 5.4	18	6.5	10	48	0.06
2	Fault segment producing the earthquake magnitude of MW 3.9	40	6.9	10	60	0.06
3	Phiang fault segment	44	7.0	10	27	0.15
4	Faut along Mekong River	40	6.9	10	0.2	0.33
5	Fault at the damsite	0.43	4.6	10	10	0.08
6	Longest fault segment	61	7.1	10	37	0.12

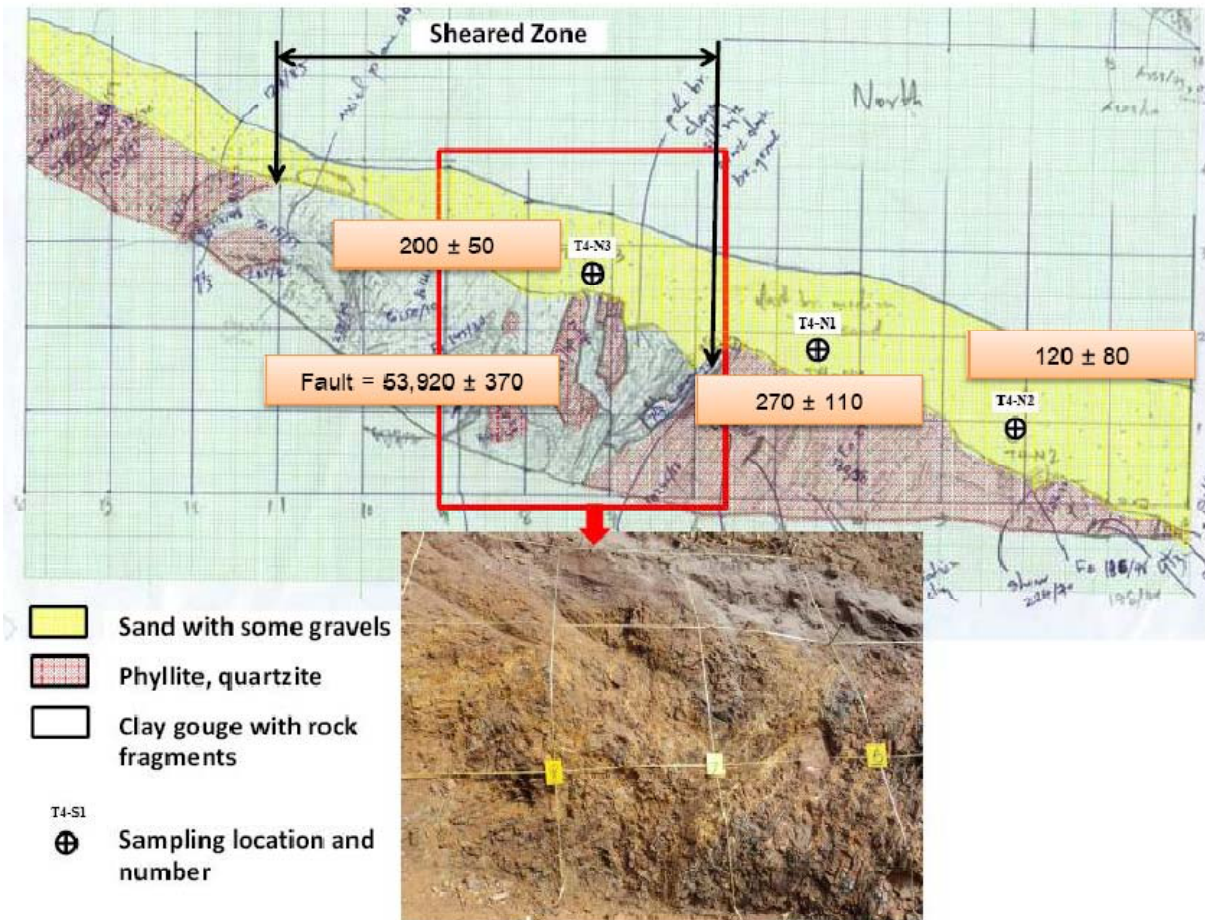
An excavation showing a fault observed in the southern wall of the Xayaburi barge site (before dam-site construction).



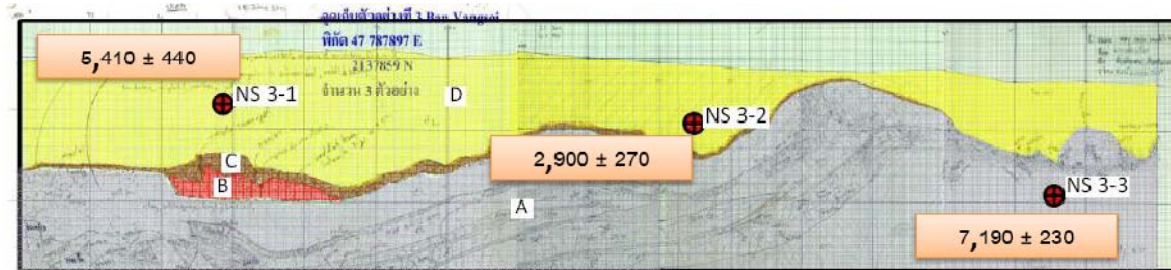
An excavation showing a fault (near no. 7 grid line) observed in the northern wall of the Xayaburi barge side (before dam-site construction)



Trench log and photograph of trench T4 northern wall.



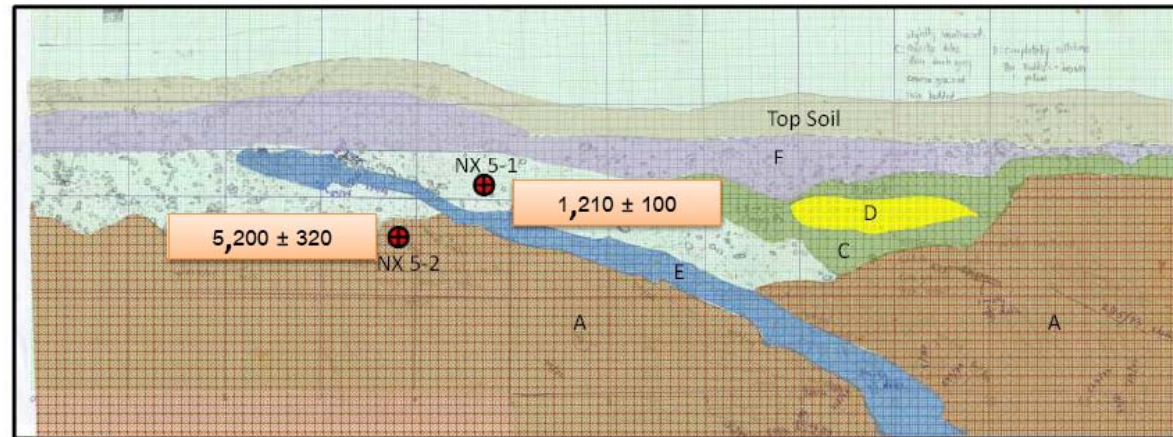
Log of trench no.T16, Ban , Xayaburi district.



Symbols

- A Silty clay, yellowish brown to brown, medium to high plasticity.
 - C Gravels, sub-angular, 0.5-5 cm size, poorly sorted, composed of mostly sandstone.
 - B Laterite, reddish brown, about 1 cm size.
 - A Sandstone and siltstone, yellowish brown to whitish gray, moderately to completely weathered.
- NS 3-1 Sampling point

Trenching data near the Fault at xaiyabouri



Symbols

- F Clayey gravel, brown, sub-rounded to well rounded, poorly sorted, 0.4-10 cm size.
- E Smoky quartz dike
- D Clay, brown, high plasticity
- C Clayey gravel, brown, sub-rounded to well rounded, 0.3-0.5 cm size
- B Clayey gravel, brown, sub-rounded to well rounded, poorly sorted, 0.4-14 cm size
- A Highly-completely weathered siltstone, yellowish to reddish brown
- NX 5-1 Sampling point

Conclusion

- Fault at Xaiyabouri in Lao is still active
- No active fault have been found at the barge site
- Active faults are shown by Remote sensing data with the max. paleoEQ of M6
- Latest movement is 8,000 yrs
- Slip rate is 0.06mm/yr

SB-06 (with lao kids at Ban Dan)

