



ACTIVE FAULT INVESTIGATION IN LUANG PHABANG AND UDOMXAY AREAS



Active fault research team

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Active faults and seismicity in Indochina

M 6.8
24 March 2011

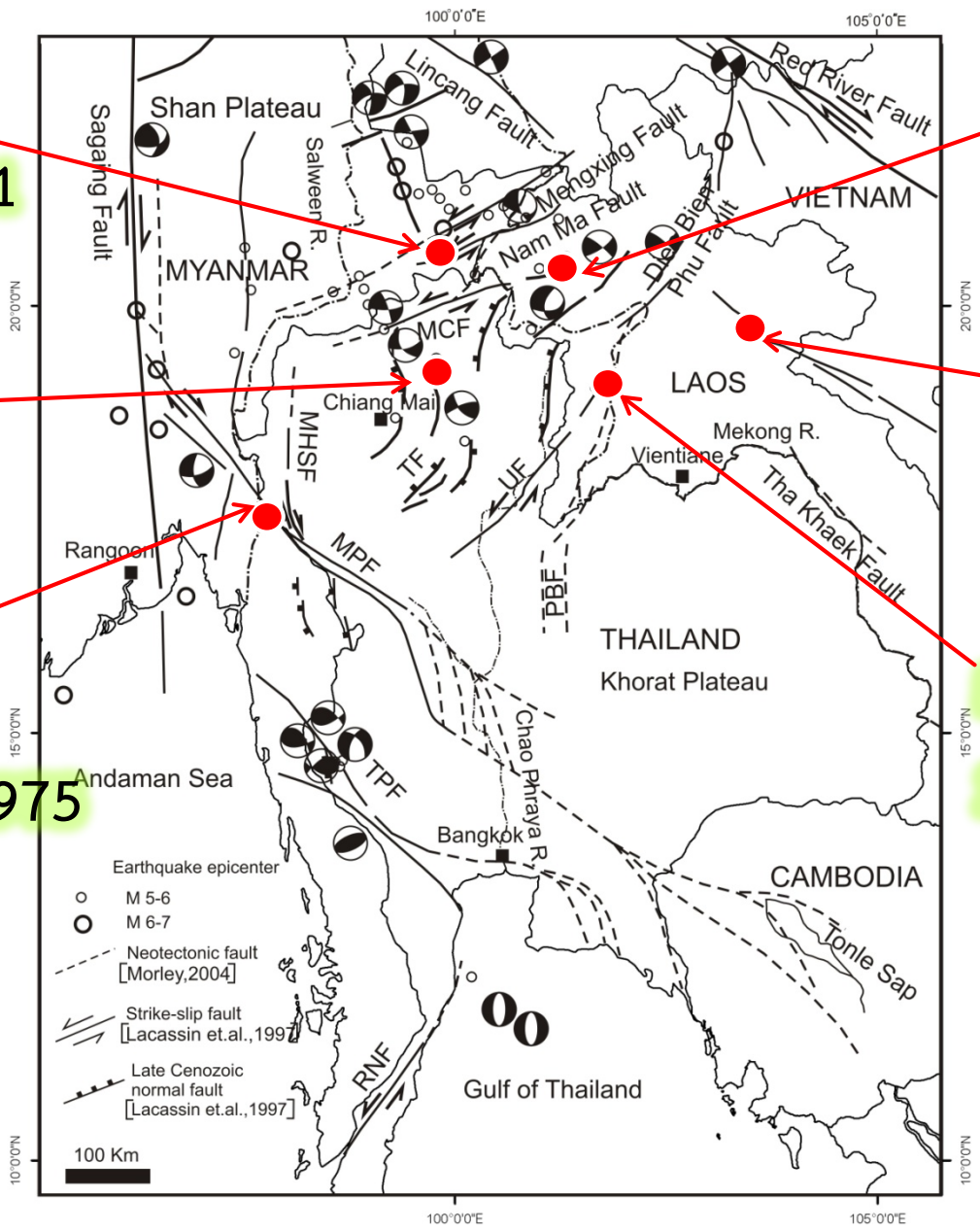
M 6.3
5 May 2014

M 5.6
17 February 1975

M 6.3
16 May 2007

M 5.0
27 May 2015

M 5.4
23 February 2011



Compiled from Lacassin et al.,(1998); Morley (2007)

Damage

M 6.3 (16 May 2007)

Earthquake generated by the Mae Chan Fault (Luang Namtha Fault) in Bokeao province, Lao PDR



Chiang khong,
Chiang Rai, Thailand



Mae Sai, Chiang Rai, Thailand

No damage reported in Lao PDR

Raster Dataset

Satellite image

- Landsat 7 etm+
- Ikonos (Google Earth)

Digital elevation Model

- Aster GDEM
- SRTM DEM

Image Processing

Enhancement

- False color composite
- Contrast stretching

Shaded relief

- Sun Azimuth
- Sun angle

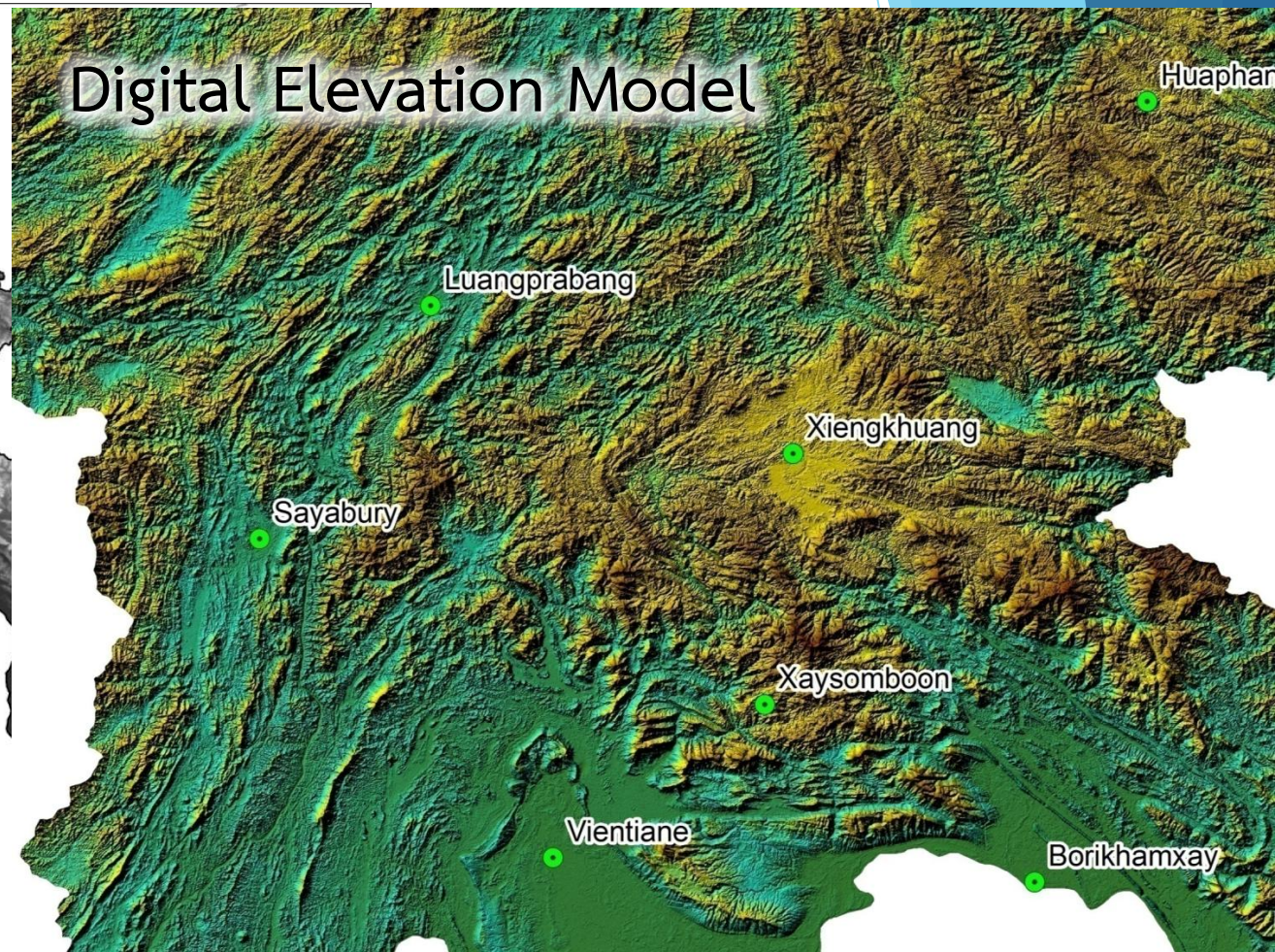
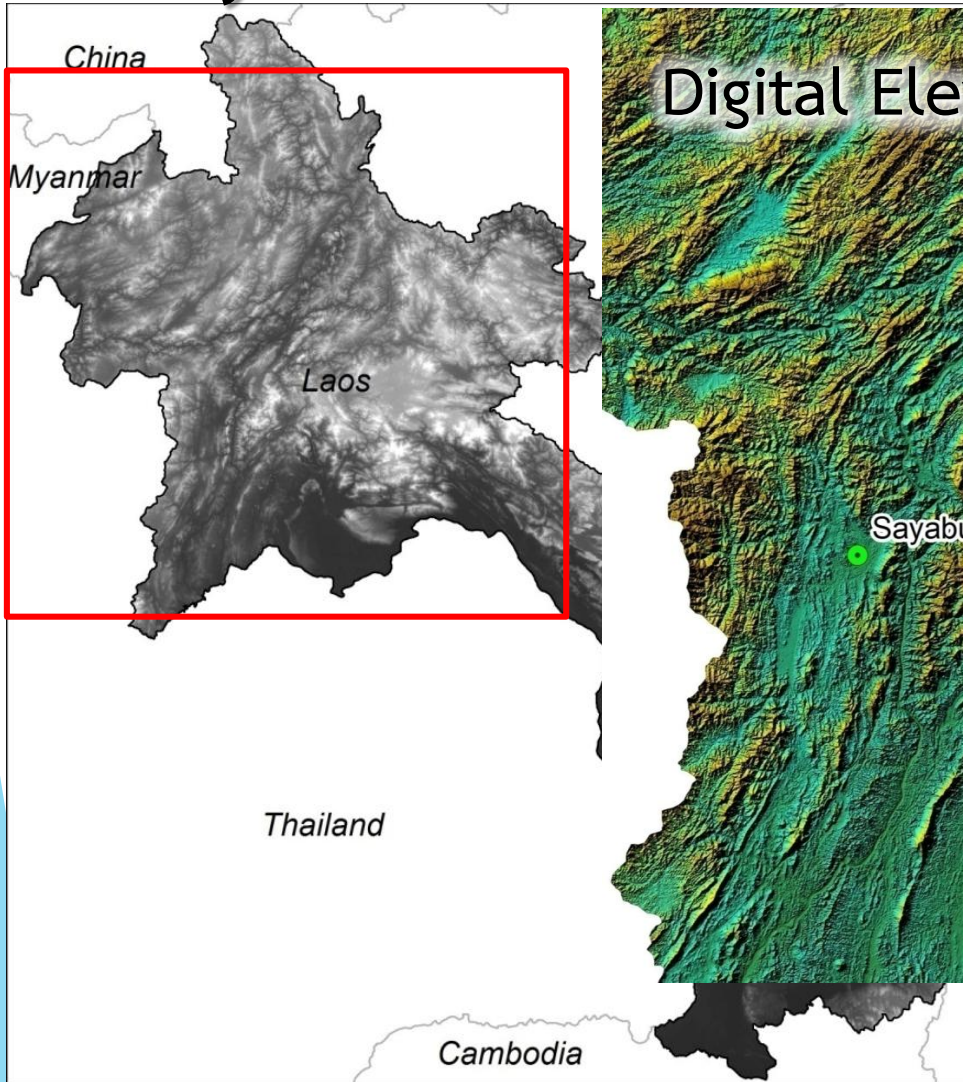
Interpretation

Lineament

Geological knowledge

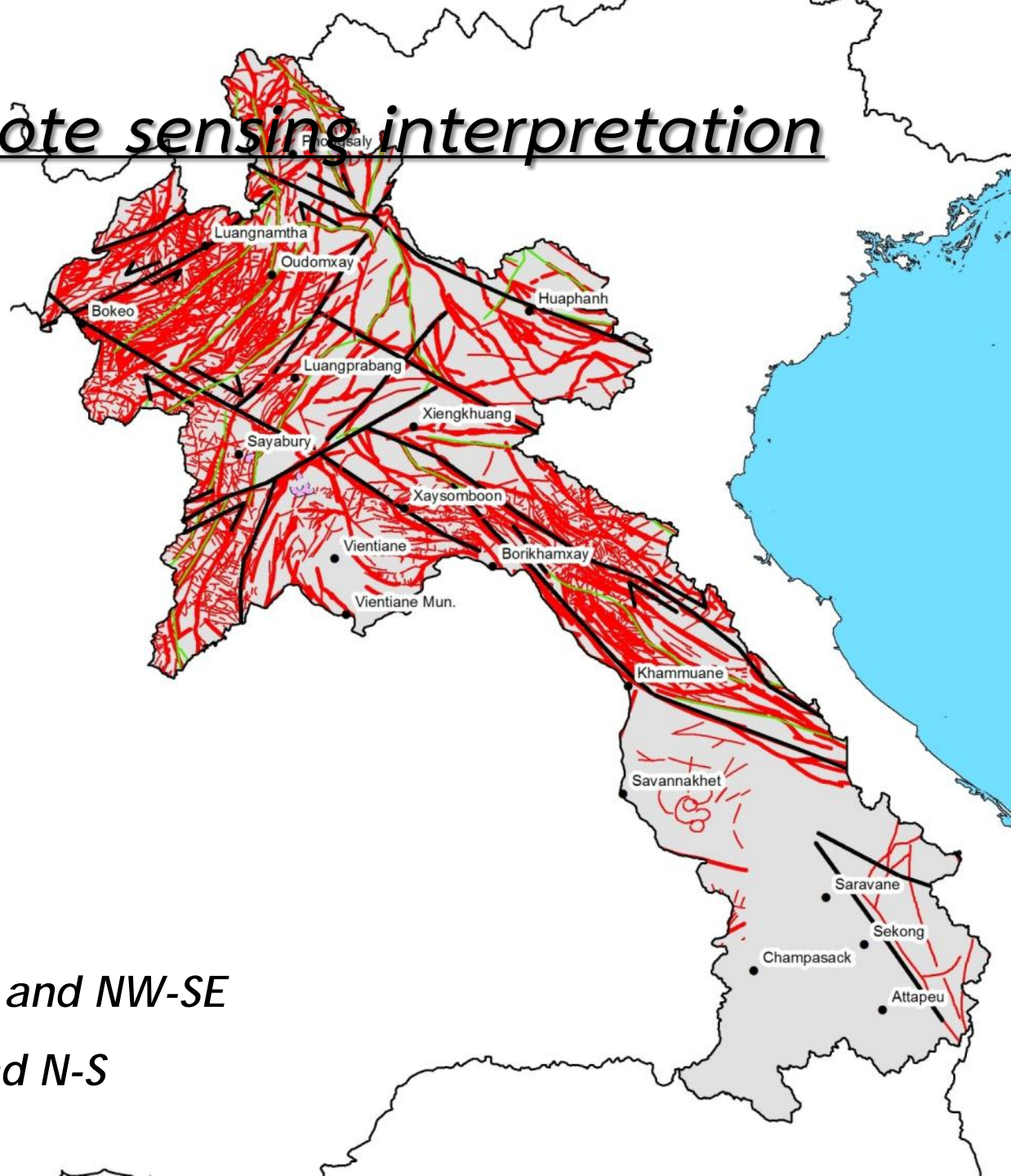
Active Fault (Morphotectonic landforms)

Study Area



2. Results of remote sensing interpretation

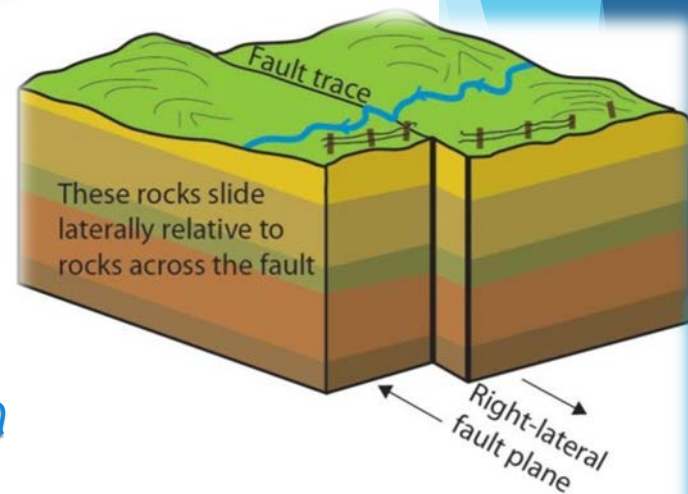
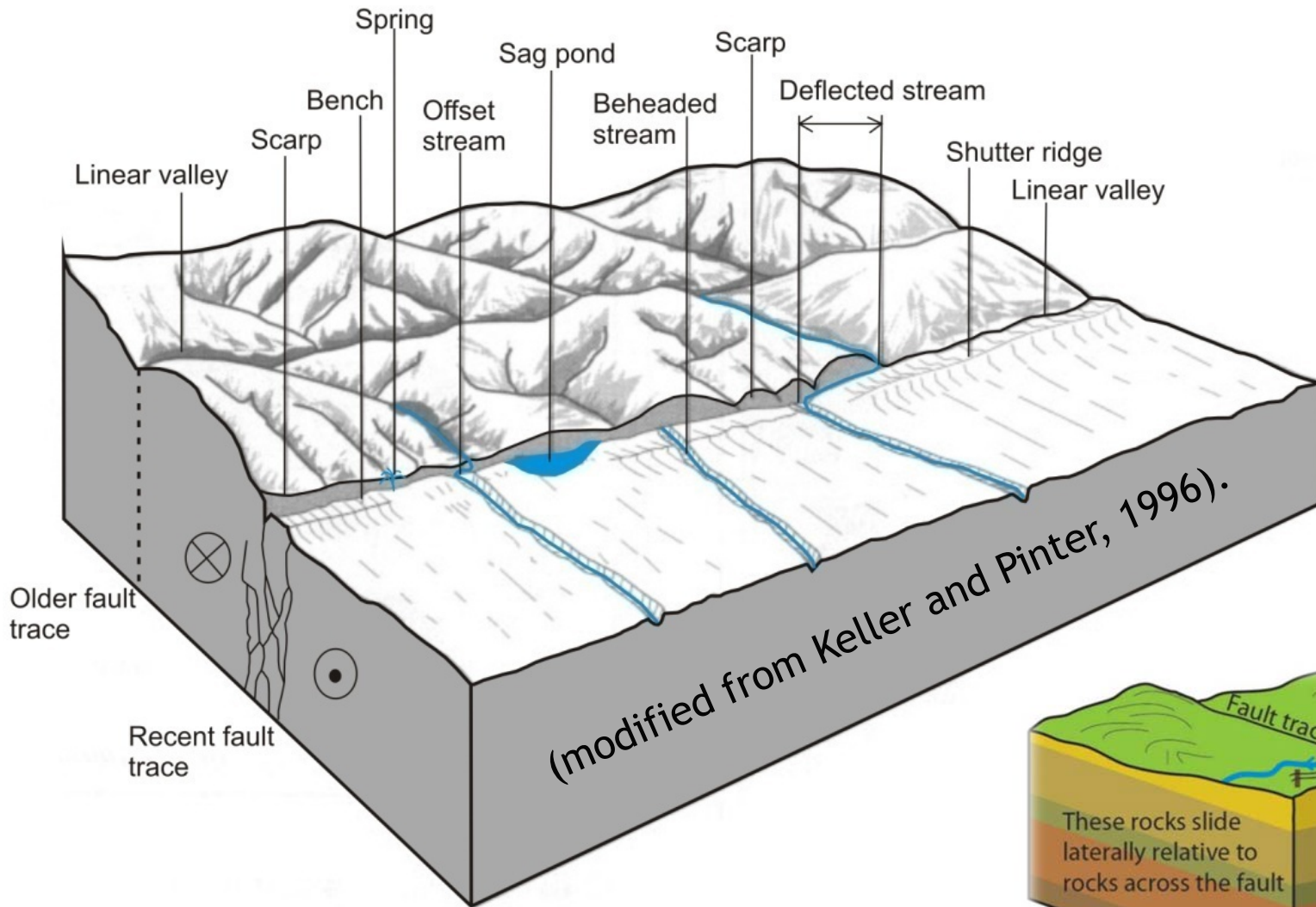
Principle orientations
of lineaments



- **4,763 lineaments**

- **Major : NE-SW and NW-SE**

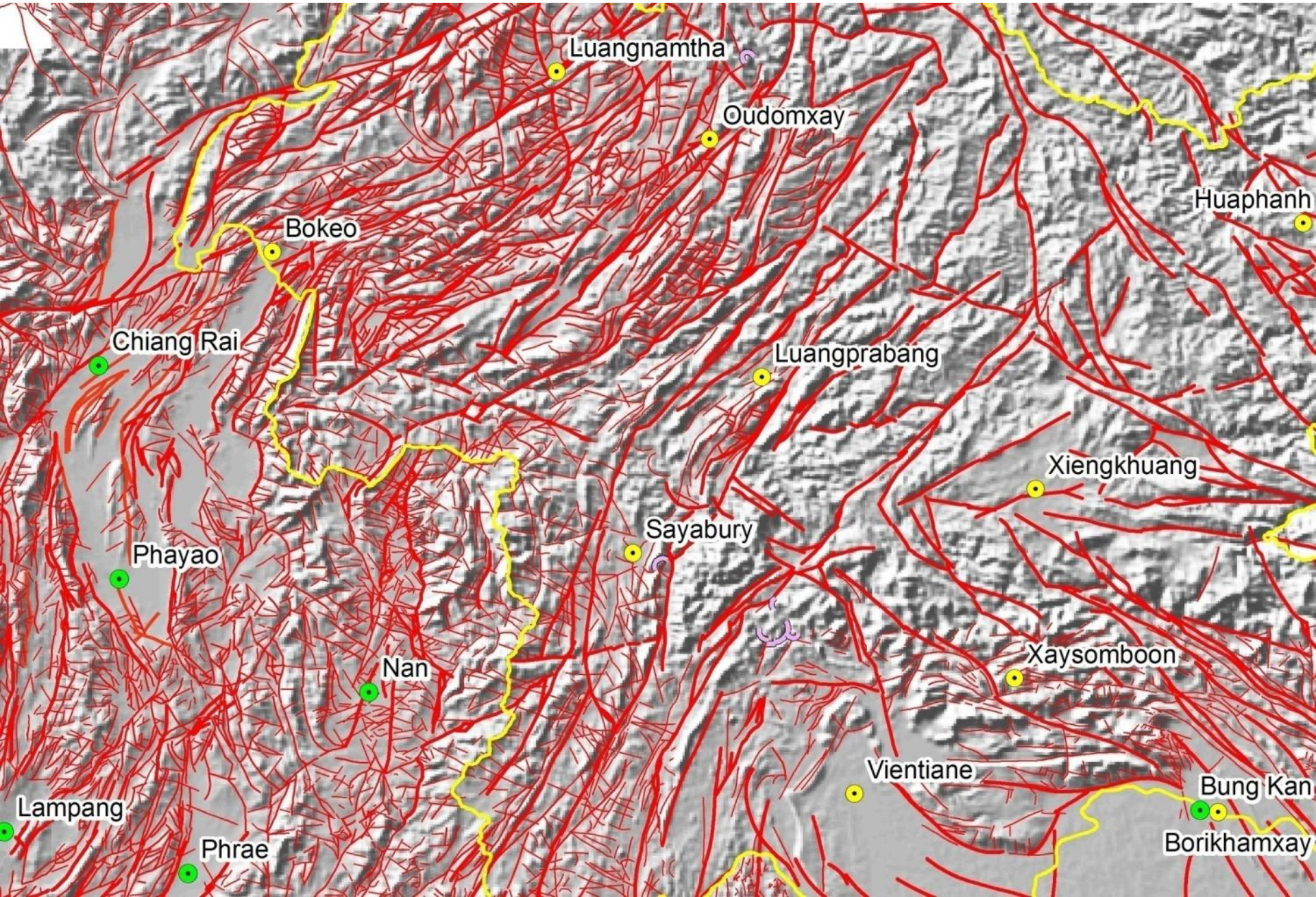
- **Minor : E-W and N-S**



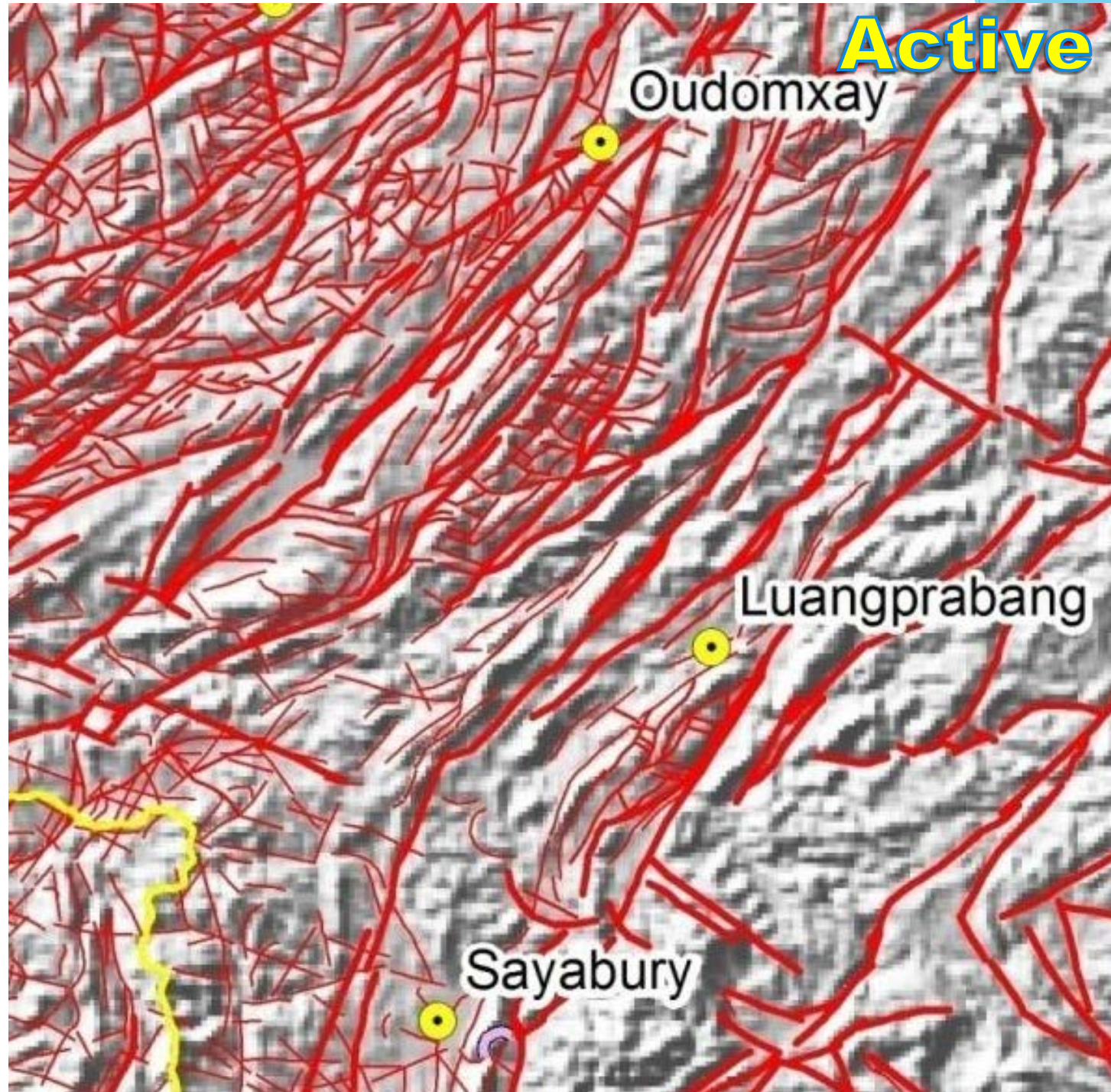
Strike-slip faulting

Morphotectonic landforms associated with active strike-slip faulting

Active fault



Active fault

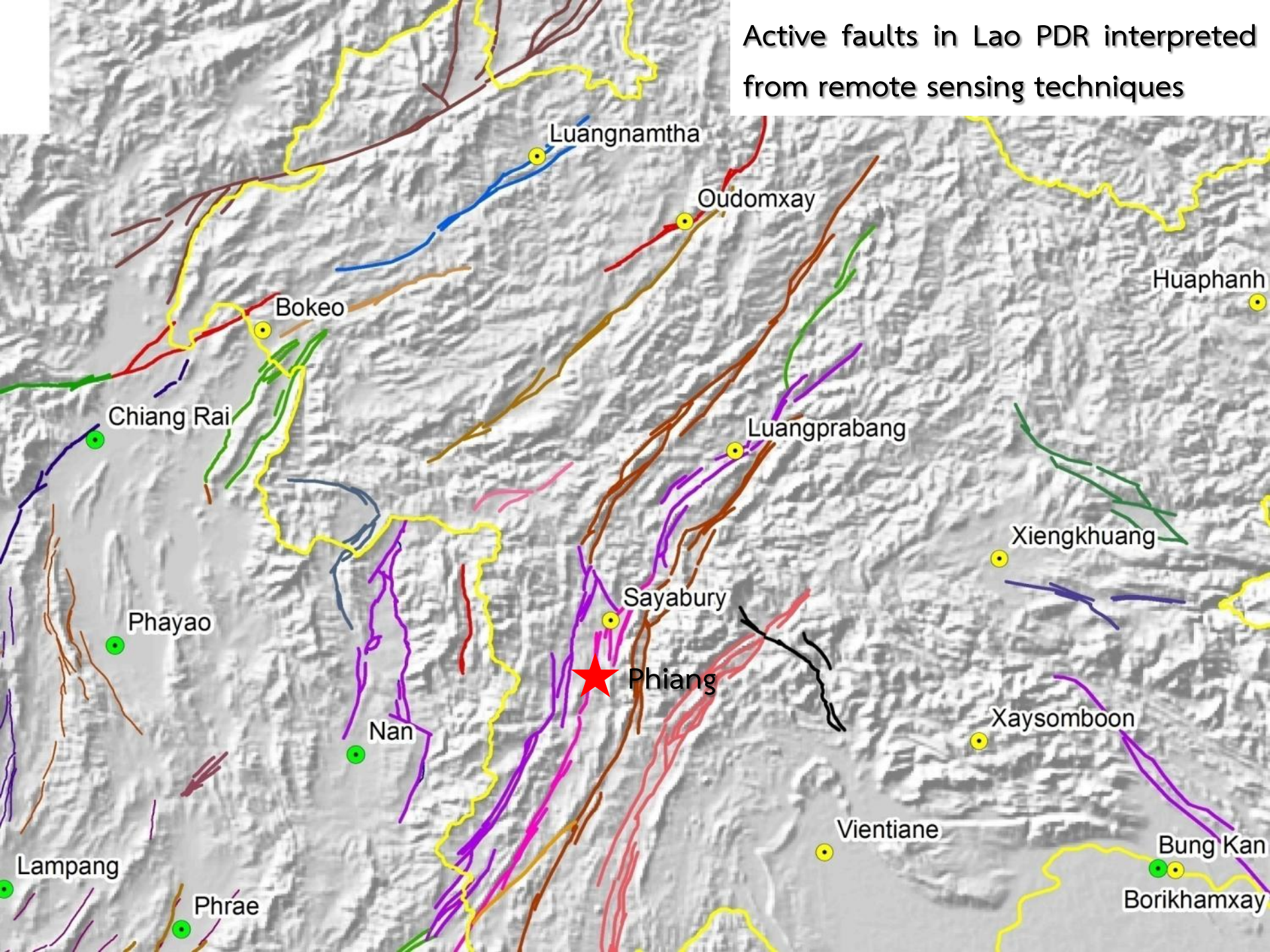


Oudomxay

Luangprabang

Sayabury

Active faults in Lao PDR interpreted from remote sensing techniques



Preliminary field investigation



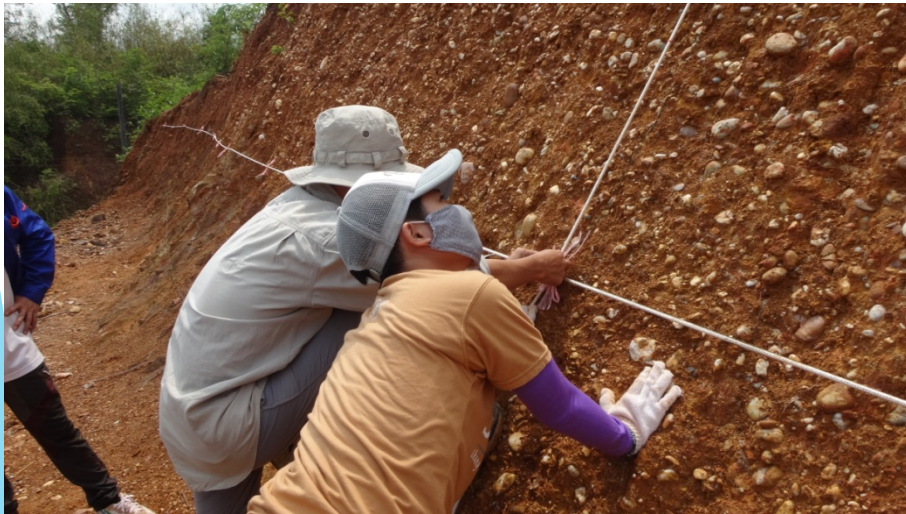
Three-dimensional model of the IKONOS image of the Ban Thin, showing locations of our field observation and fault traces.

1. Quarry at Ban Thin

UTM 48Q 214133E 2211400N

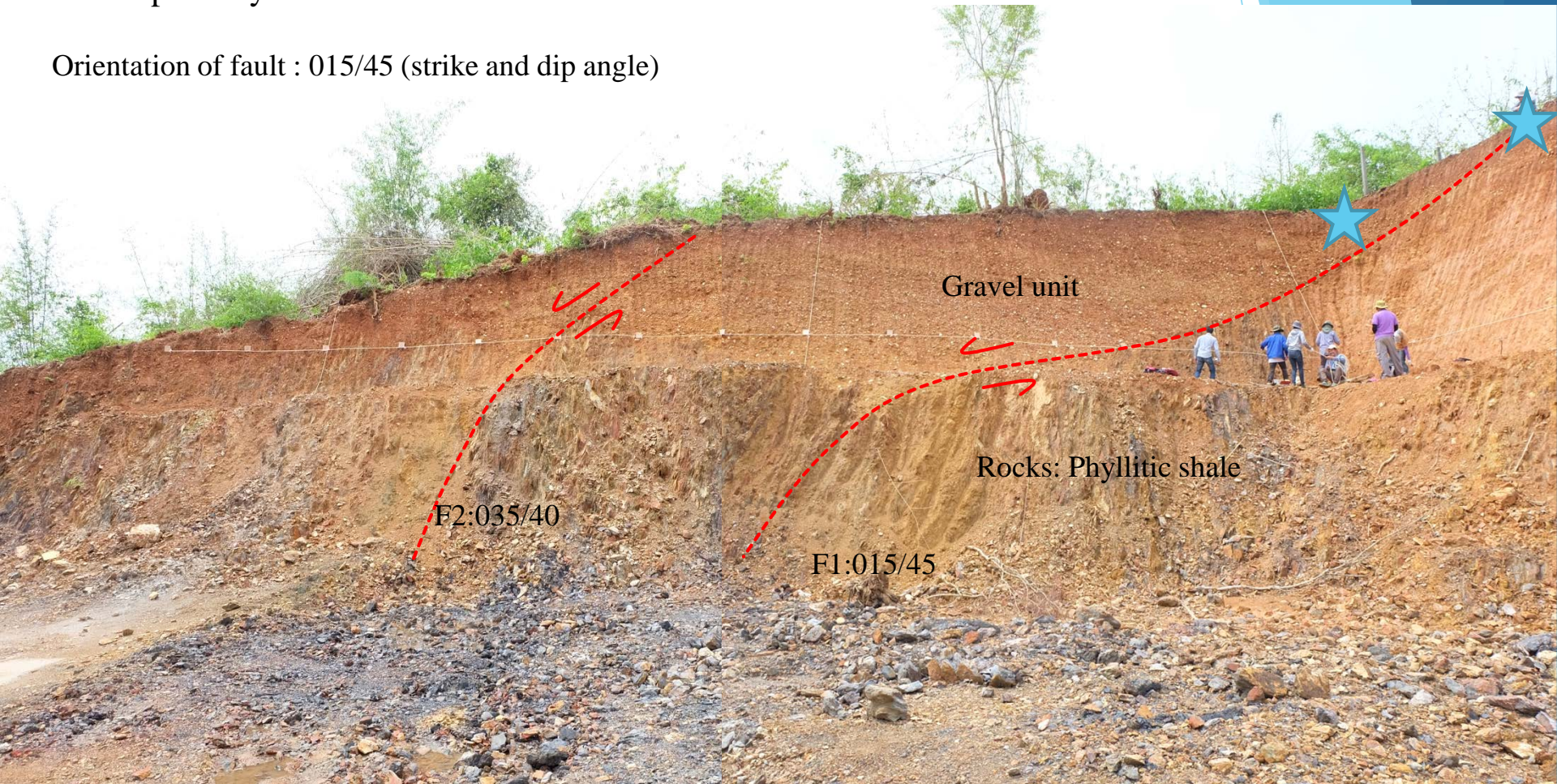


Trenching at Ban Thin



Fault cuts gravel unit (Qt) and young sediments on the upper part of section, and is possibly to be active fault

Orientation of fault : 015/45 (strike and dip angle)



Length: 60 km

Paleomagnetism: M 7.1

Paleomagnetism= $5.08 + 1.16 \log(\text{SRL})$

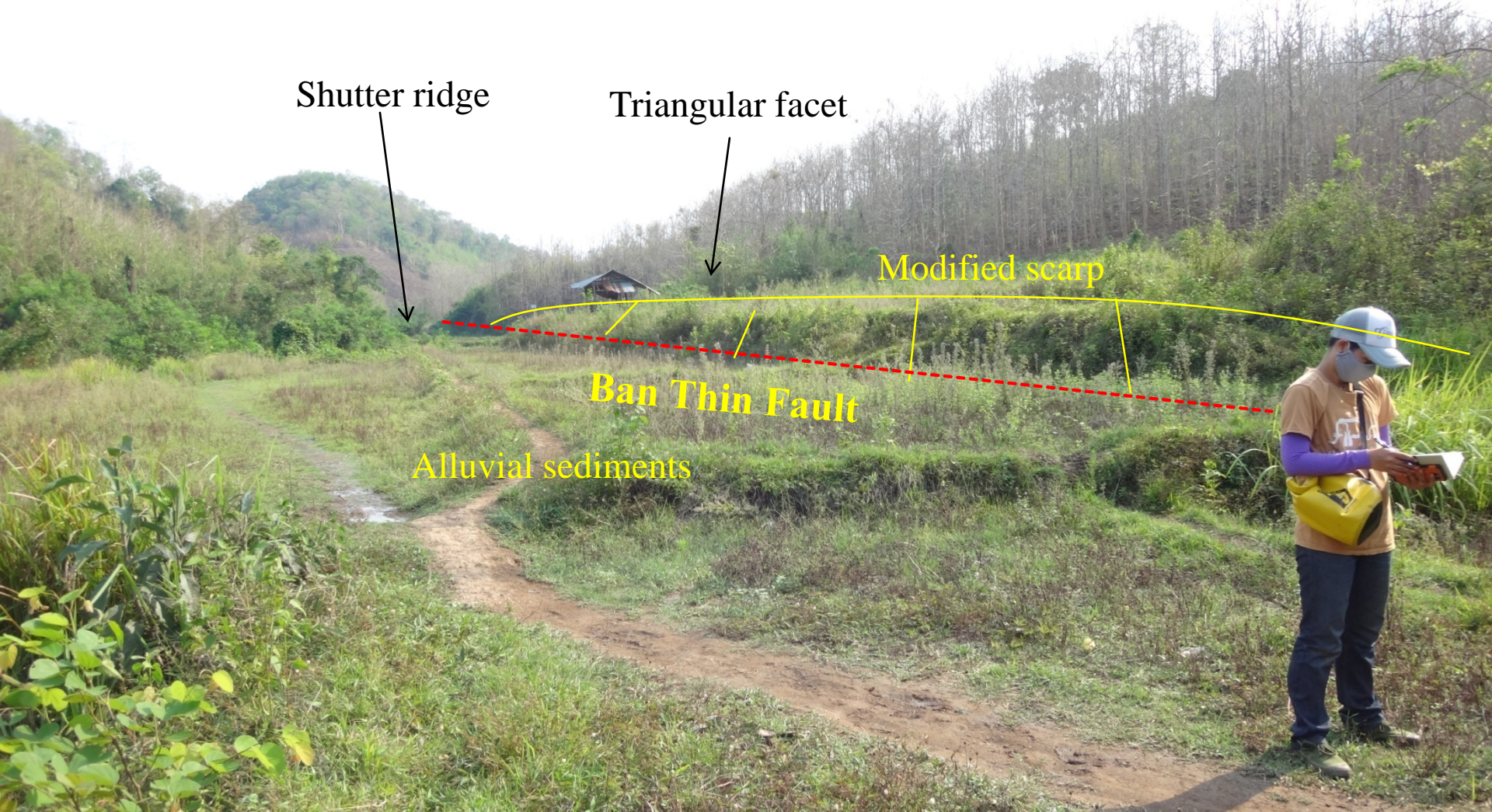
Preliminary field investigation



Three-dimensional model of the IKONOS image of the Ban Thin, showing locations of our field observation and fault traces.

2. Ban Phon Ngam

Morpotectonic landform of the Ban Thin Fault at Ban Phon Ngam, Luang Phabang





Three-dimensional model of the IKONOS image of the Ban Had Khang, showing locations of our field observation and fault traces.

3. Ban Had Khang

Morpotectonic landform of the Ban Thin Fault at Ban Hadkhang, Luang Phabang

The NE striking Ban Thin Fault locates at Hadkhang, Luang Phabang

Triangular facet

Linear valley

Trench site

Ban Thin Fault



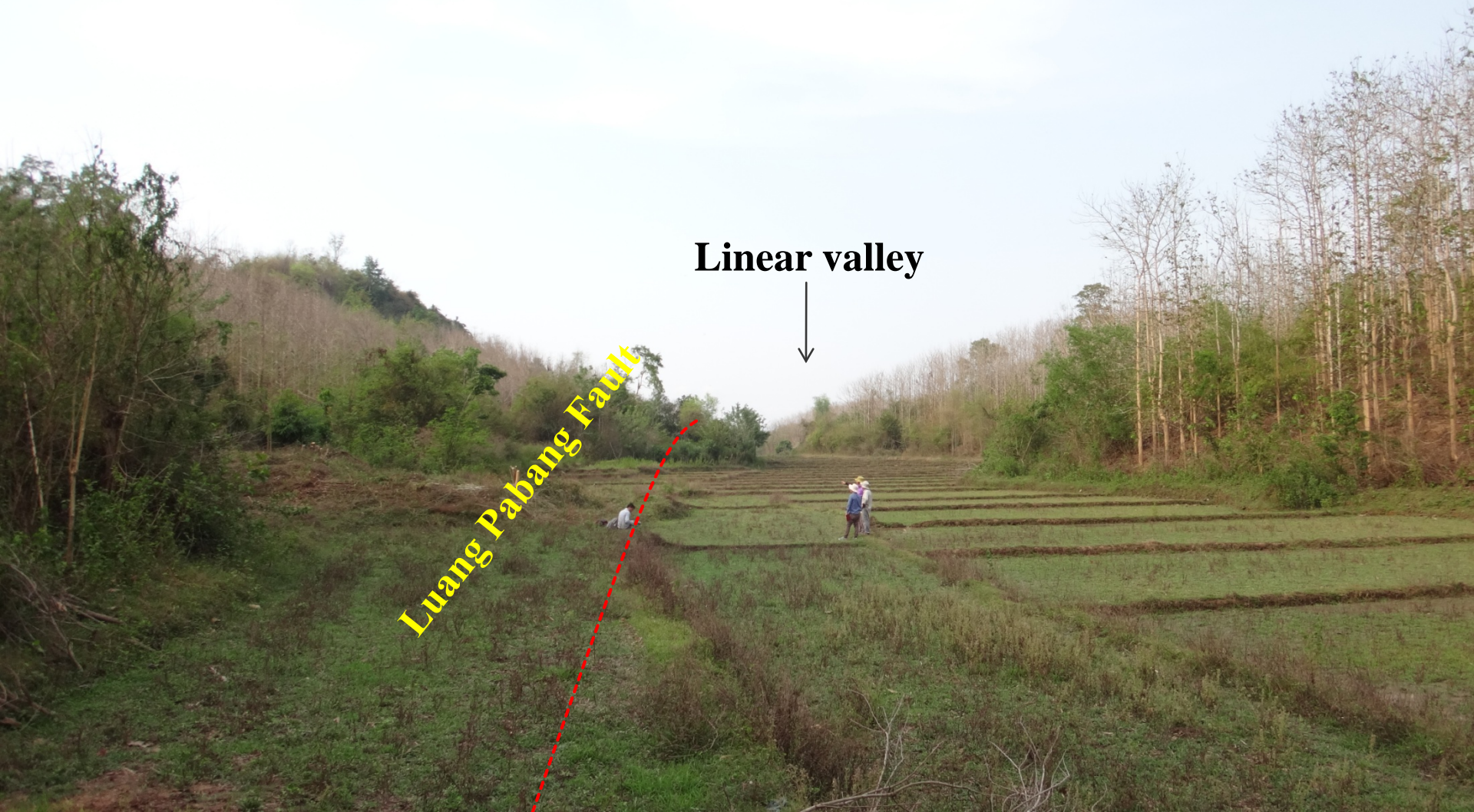
UTM 48Q 217575E 2218682N

4. Ban Natan



วันที่เก็บภาพ: 2/9/2016 19°54'52.88"น. 102°15'45.13"ต. ความสูง 348 ม. ความสูงระดับสายตา 511 ม.

Morpotectonic landform of the Luang Pabang Fault at Ban Natan, Luang Phabang



Linear valley



Luang Pabang Fault

5.Ban Naxiengdee, Nam Bak, Luang Phabang



5.Ban Naxiengdee

Pak Mong Fault

Google earth

20°23'39.08"น. 102°19'17.44"ตอ. ความสูง 343 ม. ความสูงระดับสายตา 2.02 กม.

Ban Naxiengdee, Nam Bak, Luang Phabang UTM 48Q 220640E 2257520N



Ban Naxiengdee, Nam Bak, Luang Phabang



6. Ban Na Mai Tai



วันที่เก็บภาพ: 2/10/2016 20°42'59.02"น. 102°29'56.83"ตอ. ความสูง 499 ม. ความสูงระดับสายตา 4.37 กม.

Ban Na Mai Tai



Pak Mong Fault

Triangular facet

7. Ban Fan, Oudomxay

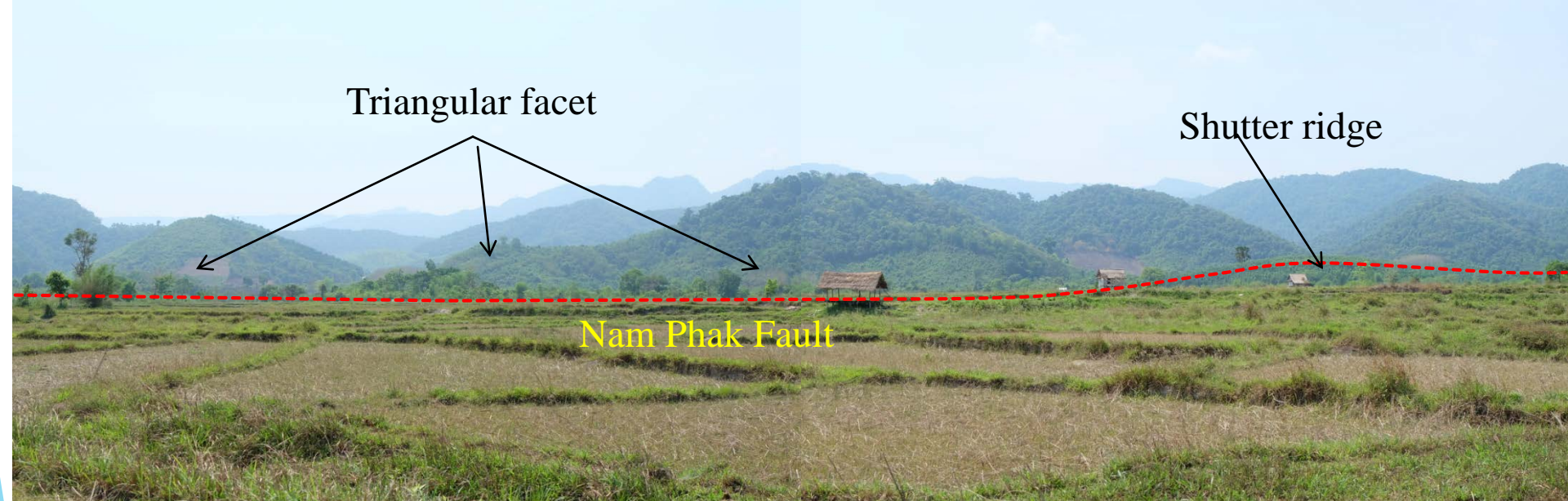


Ban Fan, Oudomxay

Triangular facet

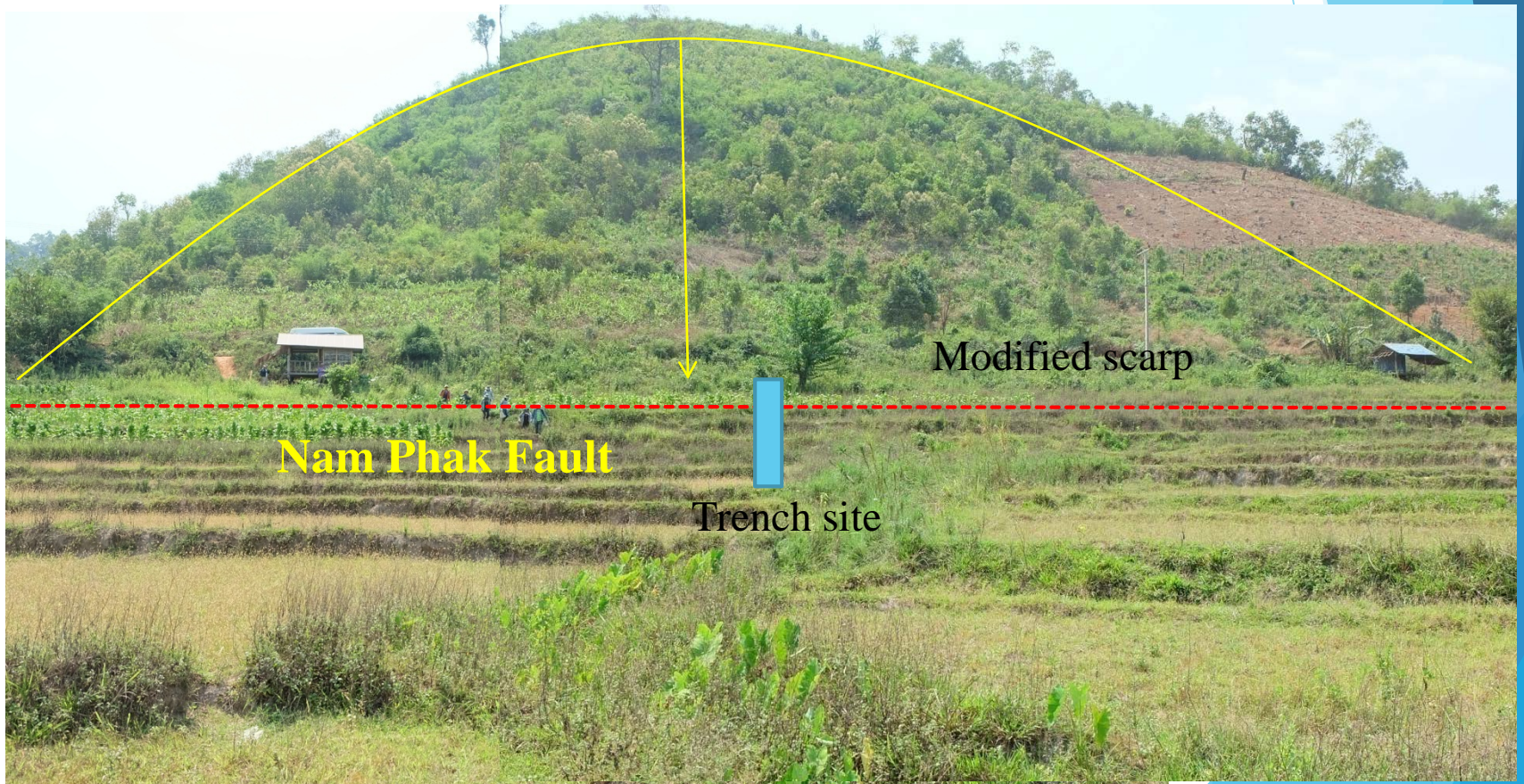
Shutter ridge

Nam Phak Fault



Ban Fan, Oudomxay
UTM 48Q 192931E 2293510N

Triangular facet



8. Ban Huay Xu, Muang La, Oudomxay



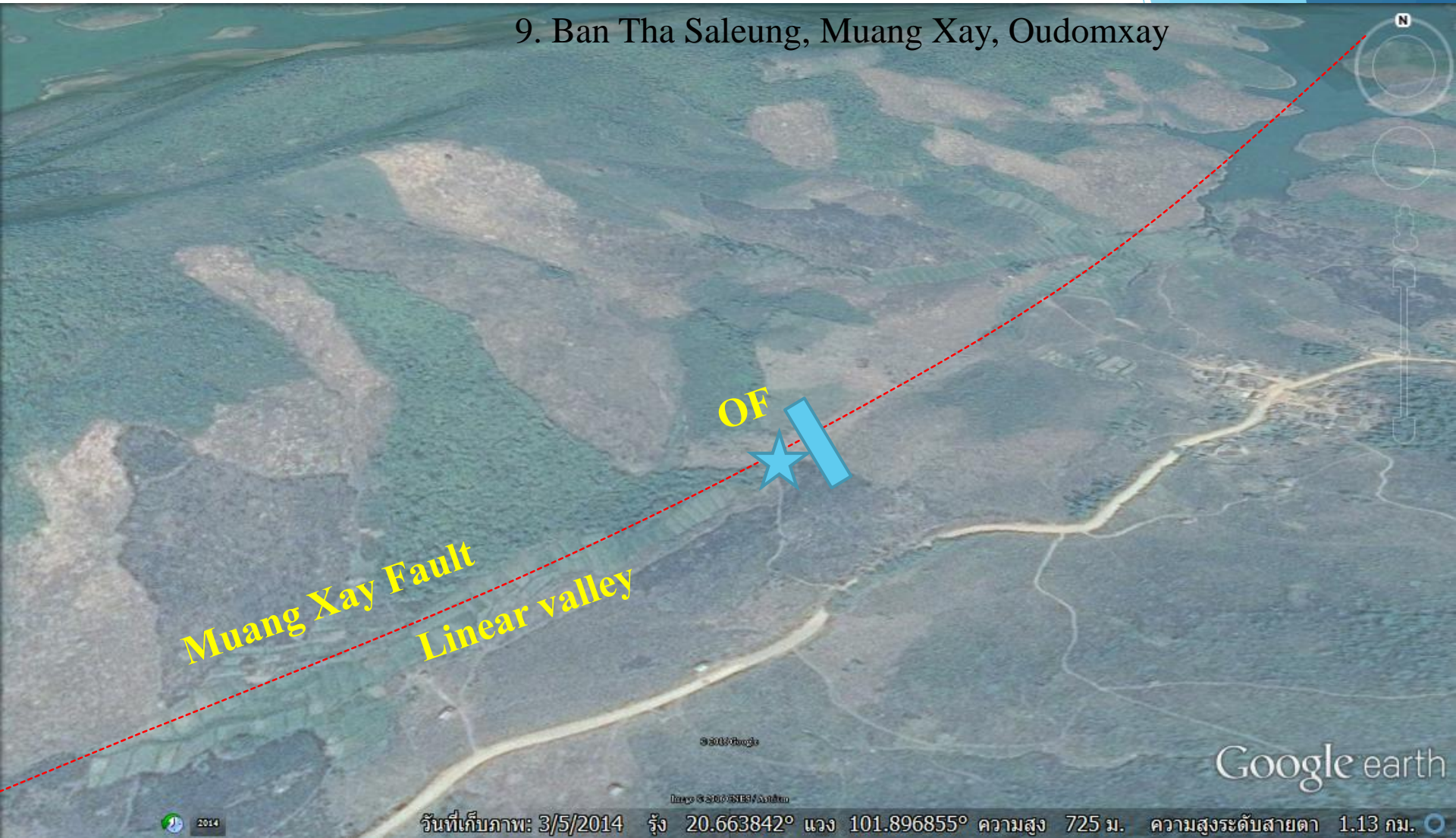
Ban Huay Xu, Muang La, Oudomxay

Linear valley

Muang La Fault



9. Ban Tha Saleung, Muang Xay, Oudomxay



Muang Xay Fault

Linear valley

OF

Google earth

2014

วันที่เก็บภาพ: 3/5/2014 รุ่ง 20.663842° แวง 101.896855° ความสูง 725 ม. ความสูงระดับสายตา 1.13 กม.

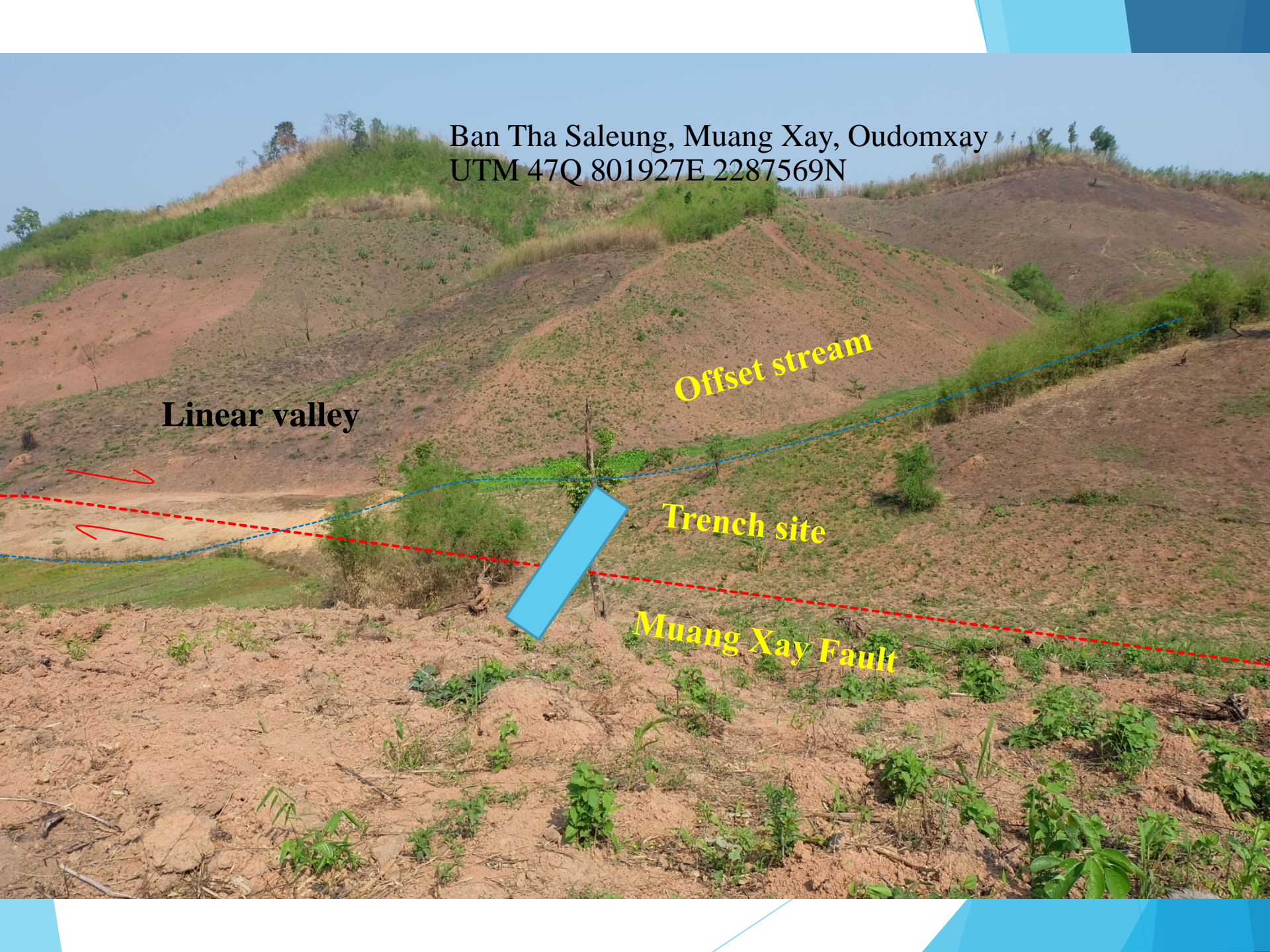
Ban Tha Saleung, Muang Xay, Oudomxay
UTM 47Q 801927E 2287569N

Linear valley

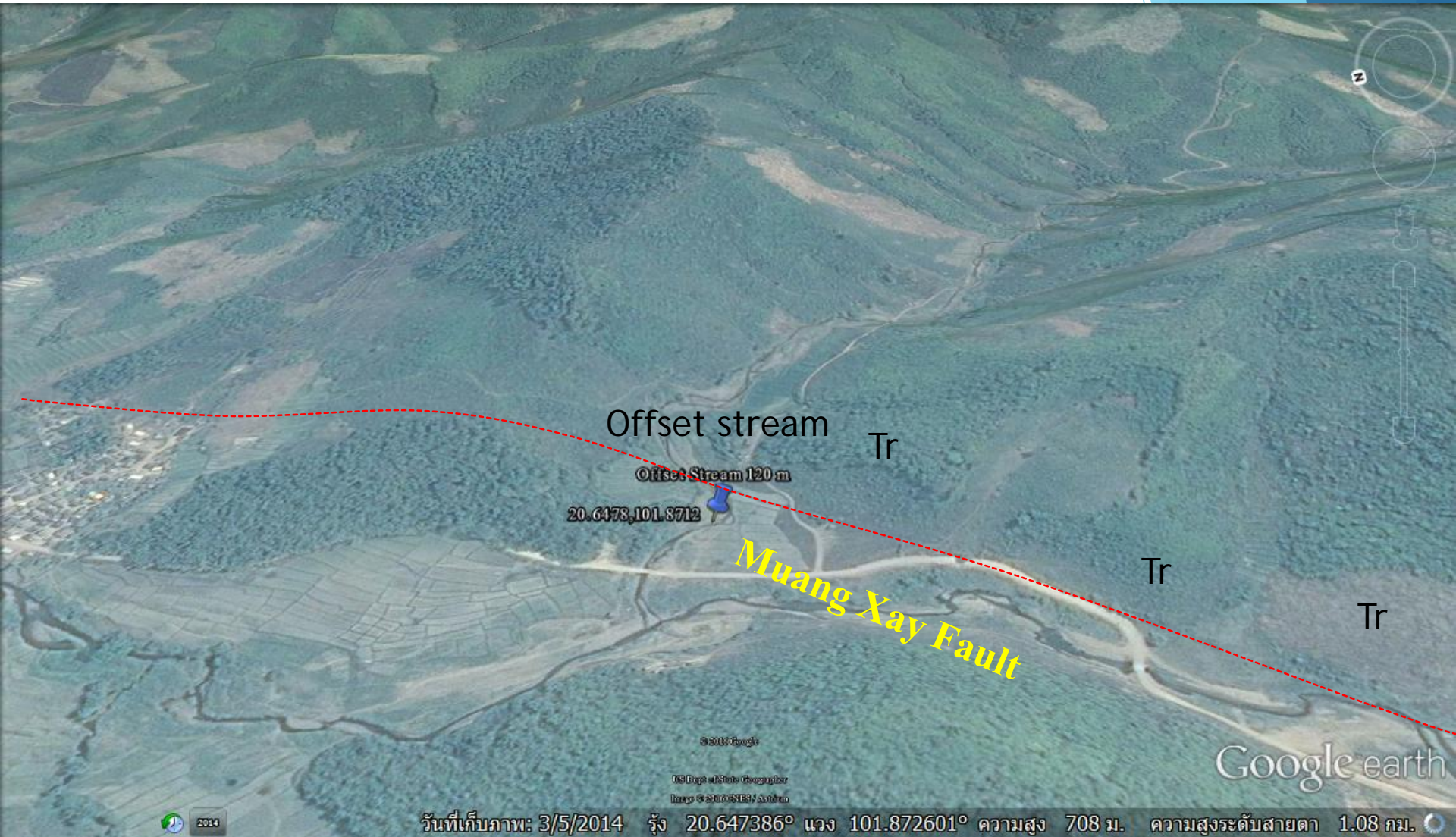
Offset stream

Trench site

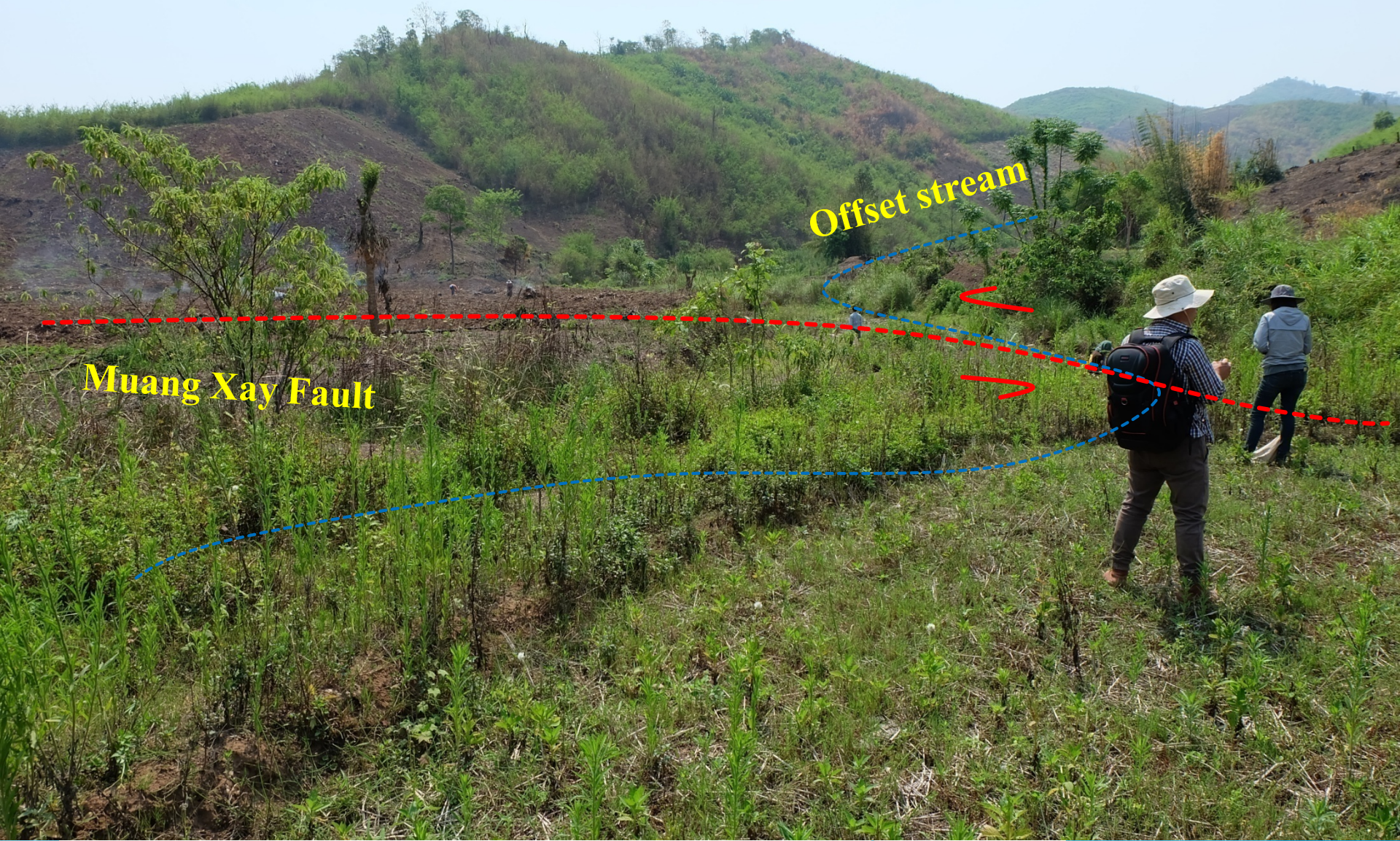
Muang Xay Fault



10. Ban Na Ngam, Muang Xay, Oudomxay



Ban Na Ngam, Muang Xay, Oudomxay



Offset stream

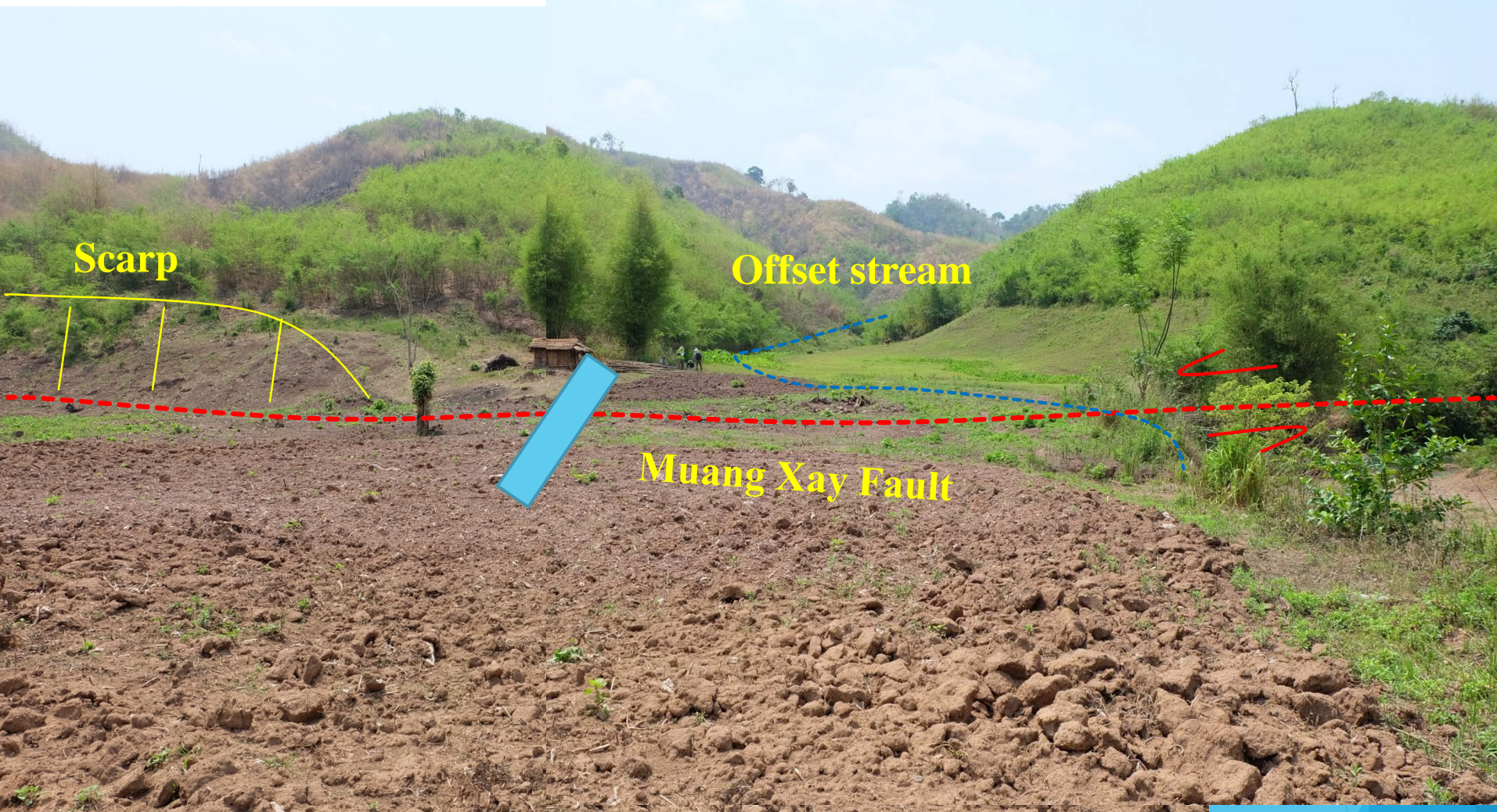
Muang Xay Fault

Triangular facet



Muang Xay Fault

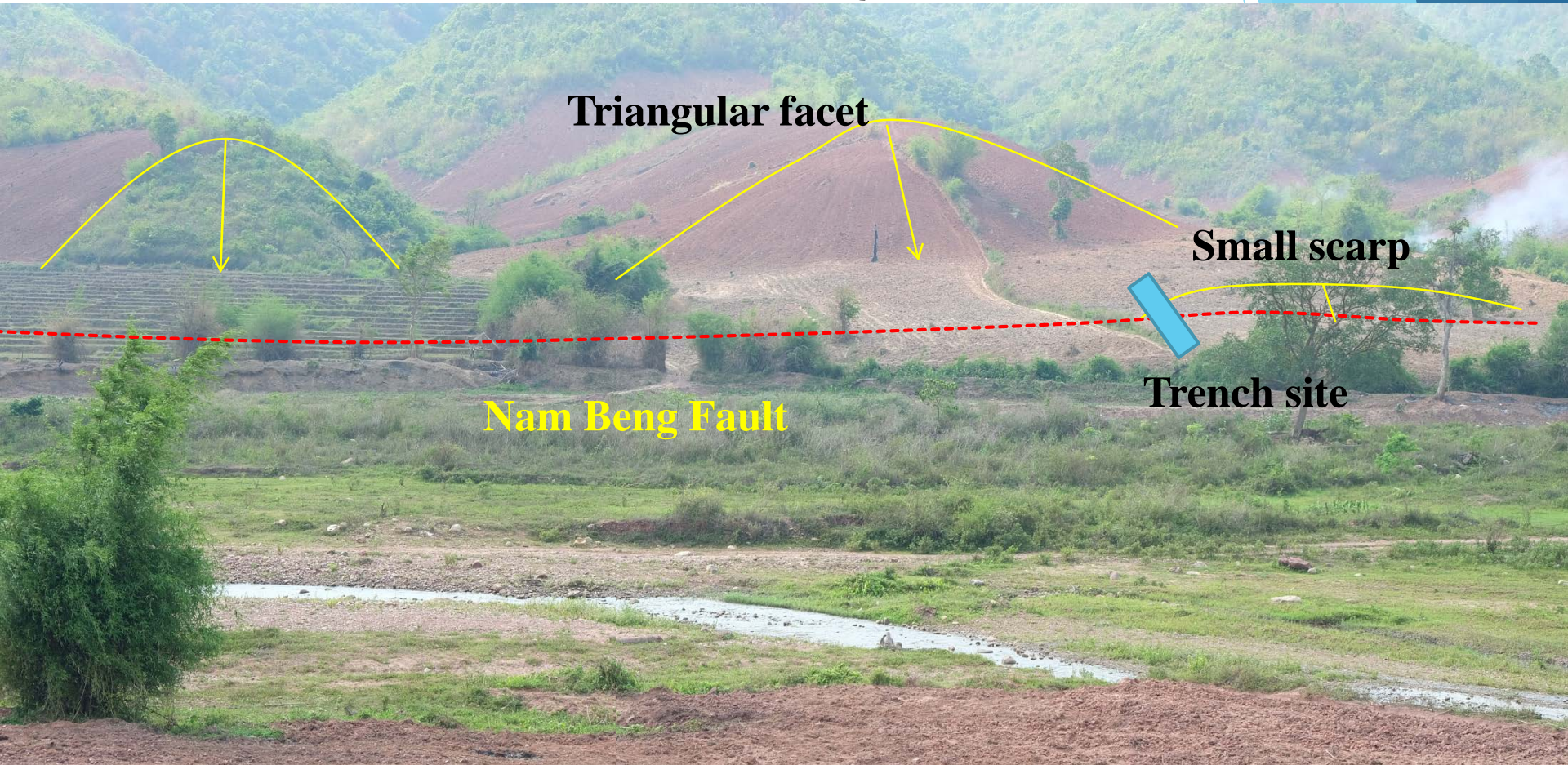
Ban Na Ngam, Muang Xay, Oudomxay
UTM 47Q 798643E 2285254N



11. Ban Na Pa, Muang Beng, Oudomxay



Ban Na Pa, Muang Beng, Oudomxay
UTM 48Q 796365E 2266096N

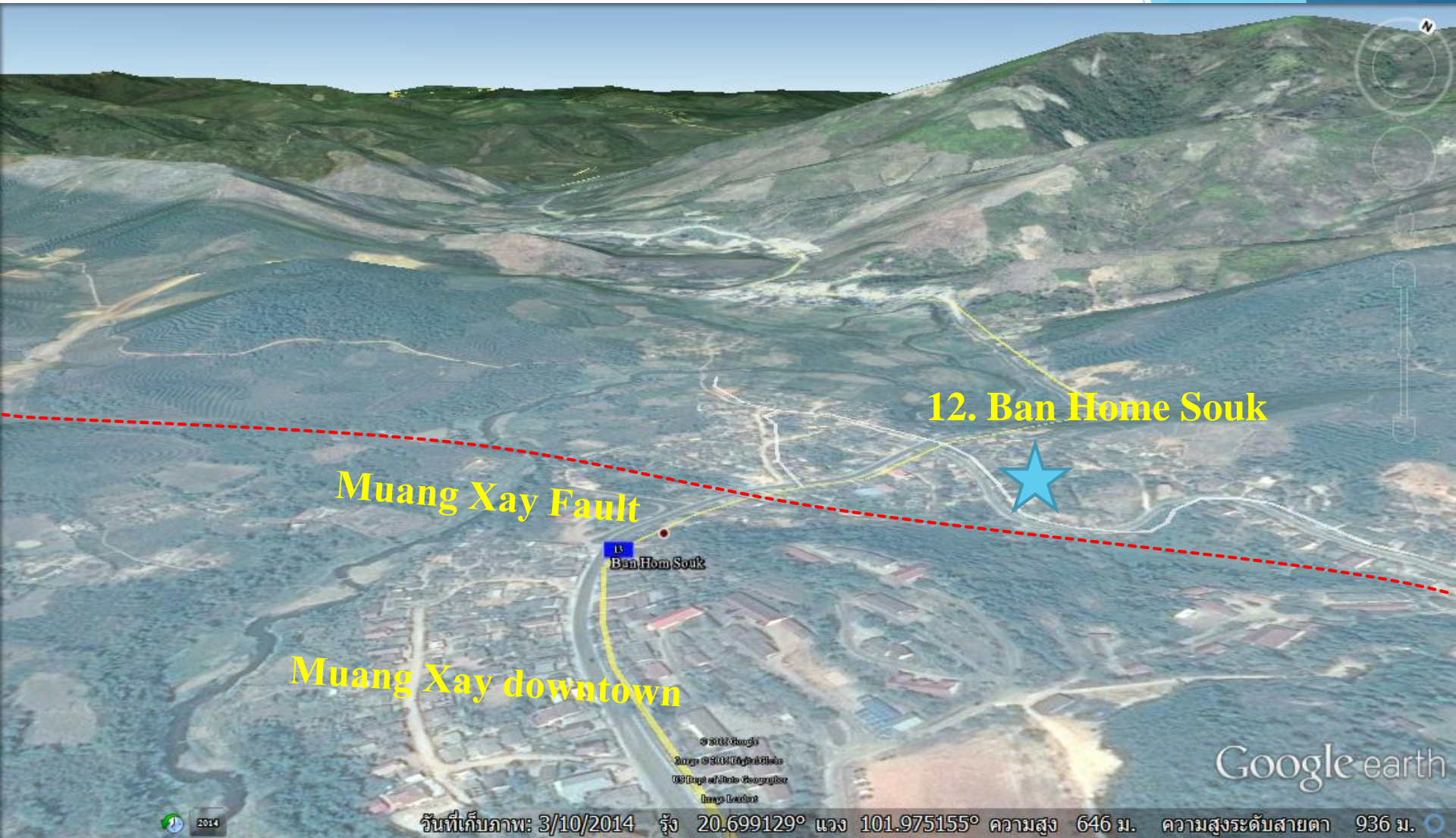


Triangular facet

Small scarp

Nam Beng Fault

Trench site



12. Ban Home Souk

Muang Xay Fault

Ban Home Souk

Muang Xay downtown

Google earth

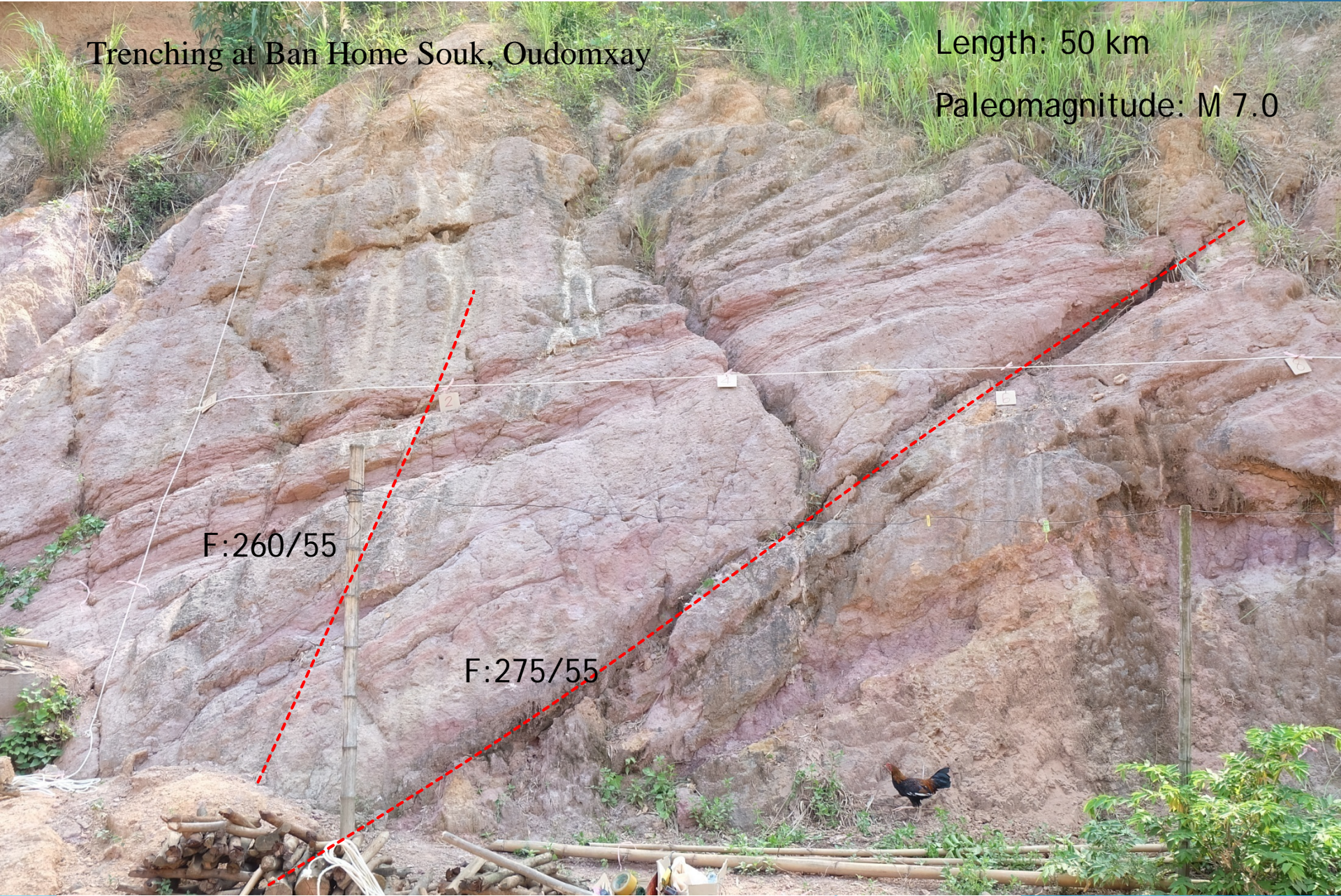
2014

วันที่เก็บภาพ: 3/10/2014 รุ่ง 20.699129° แวง 101.975155° ความสูง 646 ม. ความสูงระดับสายตา 936 ม.

Trenching at Ban Home Souk, Oudomxay

Length: 50 km

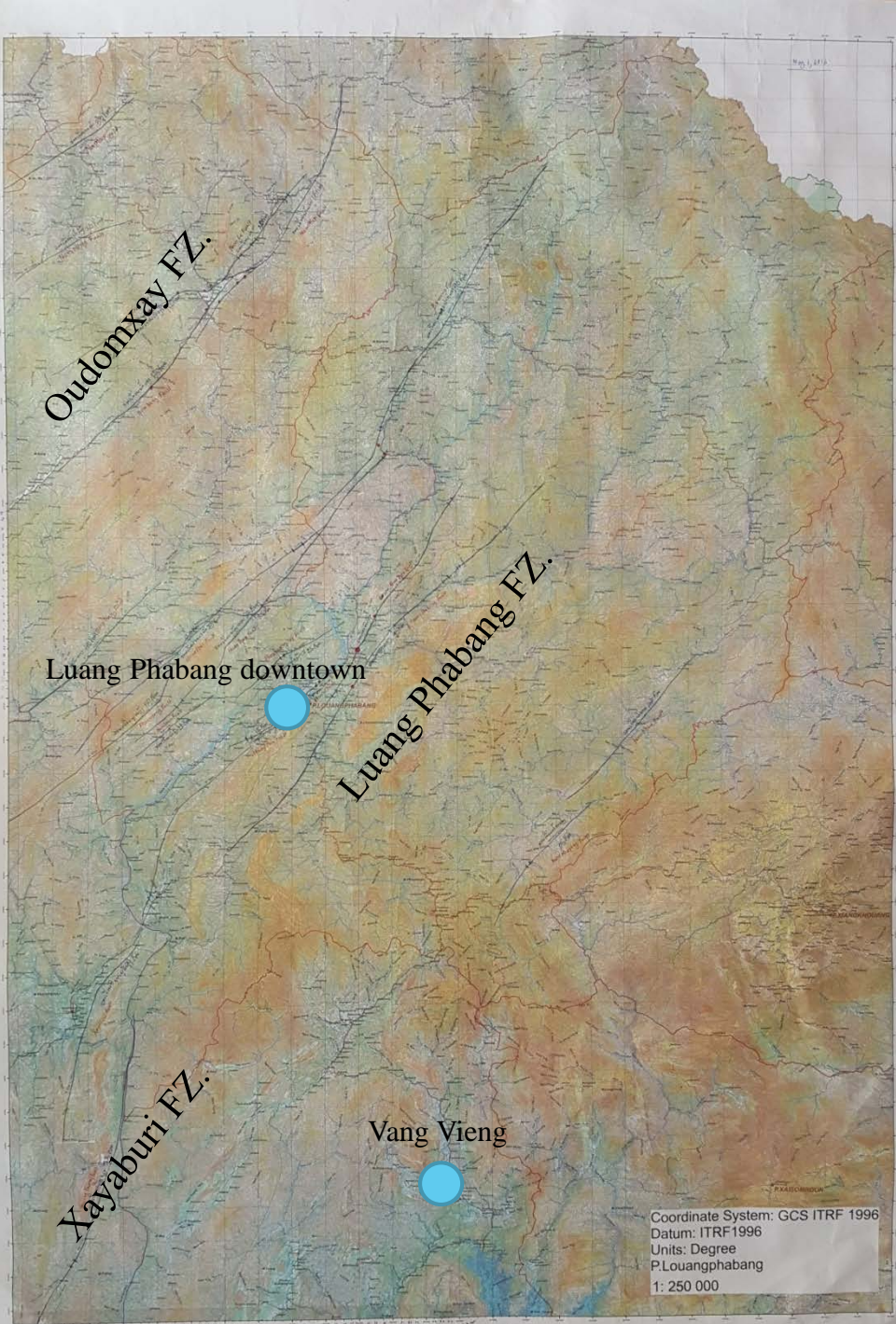
Paleomagnetism: M 7.0





Active faults are delineated on topographic map (scale 1:250,000)





***Active fault map of Luang Phabang,
Oudomxay and Xayaburi
Scale 1:250,000***

Summary

1. Lineaments in Luang Pabang, Xayaburi, and Oudomxay trend mainly NE–SW, NW–SE, and show conjugate lineament sets trending N–S and E–W.

2. Active faults in Luang Pabang, Xayaburi, and Oudomxay can be classified into three fault zones (21 faults), including

1. Luang Phabang Fault Zone

Luang Phabang F. 110 km

Ban Thin F. 60 km

Phousy F. 18 km

Phou Luang Tay F. 25 km

Nam Loum F. 22 km

Chomphet F. 73 km

Pakmong F. 90 km

Huay Hang F. 40 km

Phou Mieng F. 50 km

Huay Thon F. 48 km

Nam Khan F. 44 km

Nam Khayong F. 35 km

Huay Mon F. 15 km

2. Oudomxay Fault Zone

Muang Xay F. 50 km

Nam Baeng F. 58 km

Nam Phak F. 65 km

Nam La F. 30 km

Na Mor F. 33 km

Nam Ming F. 30 km

3. Xayaburi Fault Zone

Xayaburi F. 99 km

Muang Phieng F. 73 km

3. The main morphotectonic landforms associated with active faults in Luang Phabang, Xayaburi, and Oudomxay are fault scarps, offset streams, linear valleys, triangular facets, and beheaded streams. These morphotectonic landforms indicate that these faults are still active.

ឧទបទៃ

