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[EA]Study of Relative Active Tectonic Features on Kaladan - Mrauk U Fault, Rakhine Coastal Region*

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Abstract

The present study is focused on regional assessments of the active tectonic features observed along the Kaladan-Mrauk U Fault (Figure 1) based on geomorphic indices in morphology and topography. The Fault lies along the western foot-hills of the Indo-Myanmar Ranges in the Rakhine Coastal region (Figure 2), i.e., it is located within the accretionary wedge region of the India-West Myanmar collision zone. In the study area, most of the Miocene clastic sedimentary units show ENE-dips with high angles (~50˚ - 65˚) and are highly folded in the eastern part. From the stress field analysis, the compressional and dilational fields are shown in NE-SW and NNW-SSE regimes respectively. Thus, the study has let us to identify the two different senses of shear along the fault trace.

In the longitudinal cross section along the Andaman subduction zone at Latitude N20° - N21°,the slab appears continuous (Persicek, 2009) based on the neotectonic features and previous micro-seismicity data (from 2000 to 2017 November) around the study area (the focal depth 10 km-169 km, magnitude is 4M-6.5M and 390 times, see Figure 3). The focal depth model analysis and earthquake data have indicated that the Mrauk U Fault is an active fault. The possible kinematic result is that overthrust faults on the overriding West Myanmar Plate caused upward slip motion along the fault plane because the subducted slab (subduction Indian oceanic crust) has been active beneath the study area. In addition to that, the style of fault dip and shear nature indicate an oblique slip shear or dextral reverse sense of shear (Figure 4). On the other hand, although the Kaladan-Mrauk U fault system expresses dextral features (with oblique slip), it had been active in a thrust manner.

Methodology for that evidence of active tectonic classification is based on morphometric analysis and geomorphic indices. Among the several geomorphic indices, we used to analyze topography as well as relative tectonic activity. We analyzed three selected areas along the Kaladan-Mrauk U Fault, i.e., 1. South of Ze Chaung Dam, 2. South of Kyaukse Byin village, and 3. Range of Talin Byin Taung (Figure 5).

Indices used include; index of mountain front sinuosity smf (smf = Lmf/Ls); ratio of valley floor width to valley height Vf (Vf= 2Vfw/(Eld-Esc)+(Erd-Esc); index of drainage basin shape Bs (Bs=Bl/Bw); and finally computed the classification of Lat (relative tectonic activity index). Relative tectonic activity index is obtained by the average of the different class of geomorphic indices S/n. Base on the geomorphic indices

classification of Bull and McFadden (1977), Rockwell et al. (1985), Silva et al. (2003), and Hamdauni et al. (2007); our present study was divided into three classes (Table 1). Where class 1 the S/n between 1 and 2 is the high tectonic activity; class 2 is moderately active tectonics with S/n >2 but <2.5; class 3 is low active tectonics with S/n > 2.5. That has provided the information about potential tectonic activity. The kinematic result of the present study is Lat (S/n>2 but <2.5) that indicate the Kaladan-Myrauk U fault area falls in Lat class 2 of moderately active tectonic region (Table 2). On the other hand, according to the Rockwell et al. (1985) classification, this geomorphic index can define this study area may had been uplift rate 0.5-0.05m/ka.

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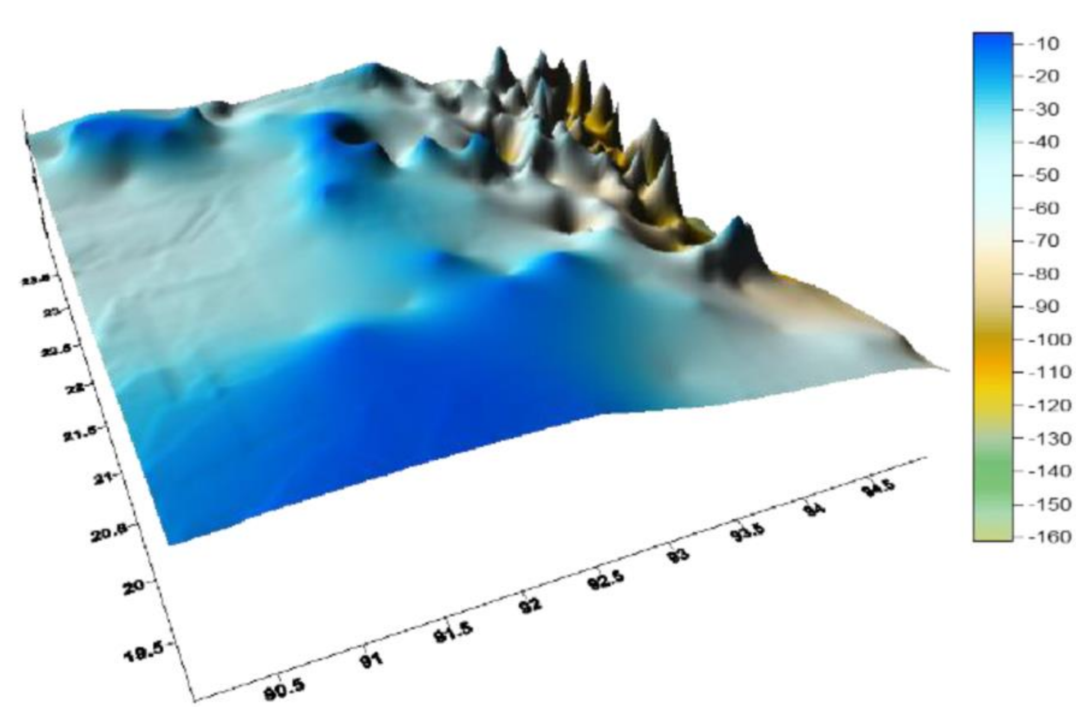

Figure 1. Satellite image of Kaladan-Myrauk U Fault.

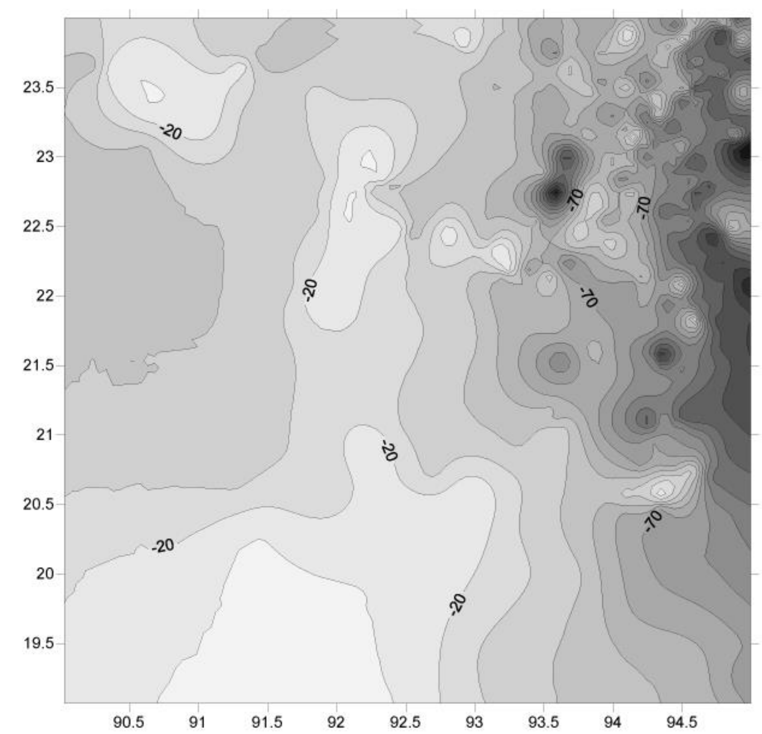

Figure 2. Physiographic nature of study area.

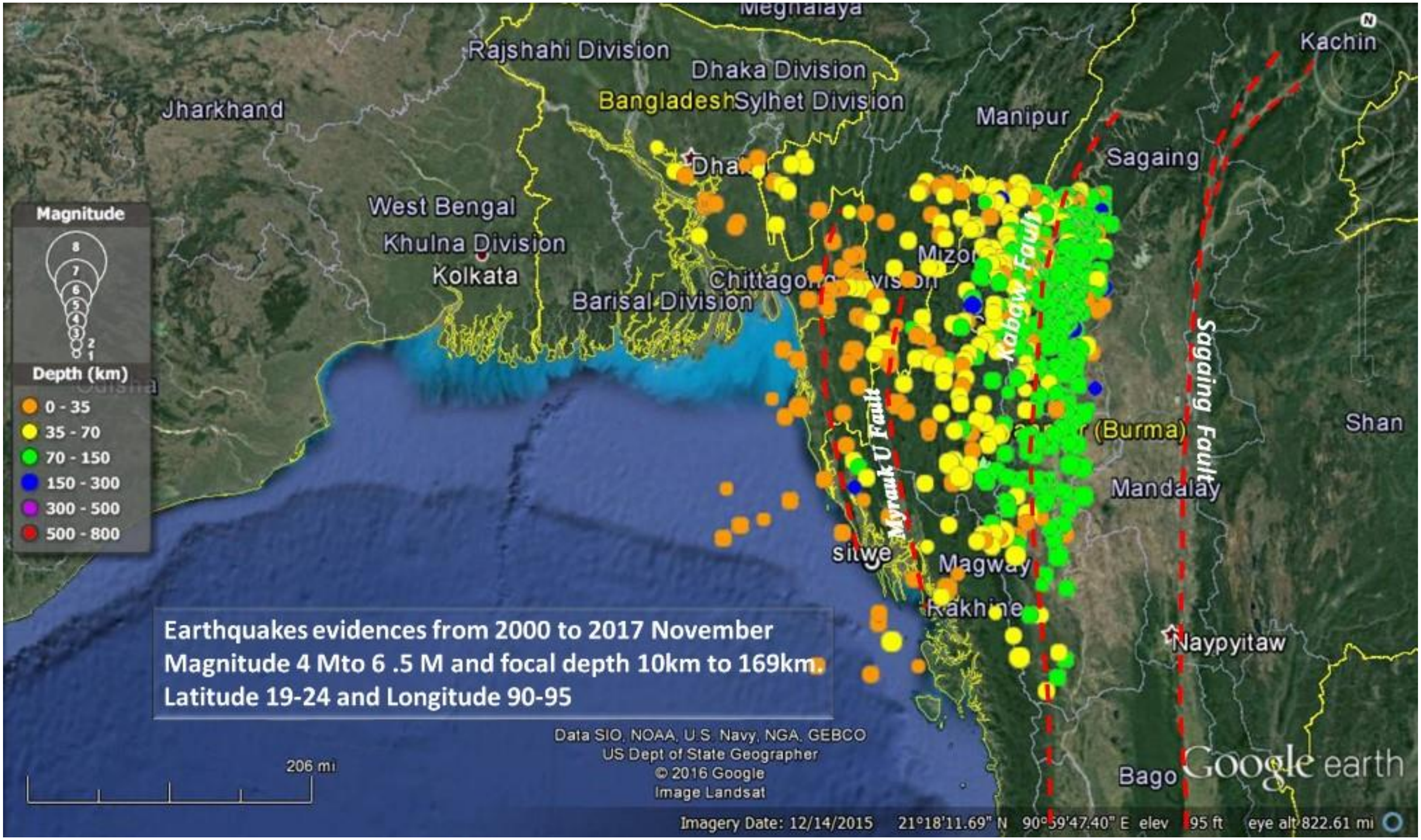

Figure 3. Micro-seismicity map of Western Myanmar including study area. ANSS earthquake catalog data 2000 to 2017 November, Magnitude 4 M to 6.5 M, and focal depth 10 km to 169 km Latitude 19-24 and Longitude 90-95.

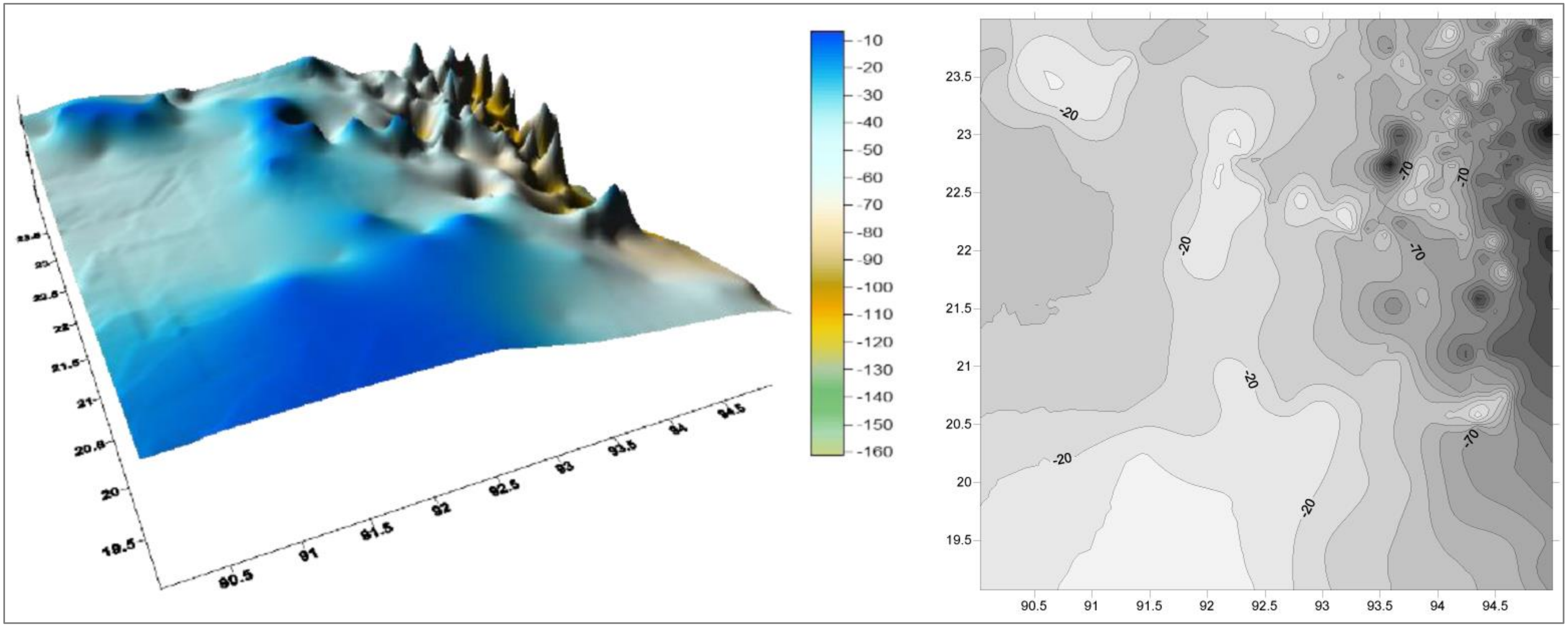

Figure 4. By using location and focal depth of earthquake catalog data, the figure clearly shows focal depth nature on dip of subduction slab which down dip to northeast (NE) beneath the focus area.

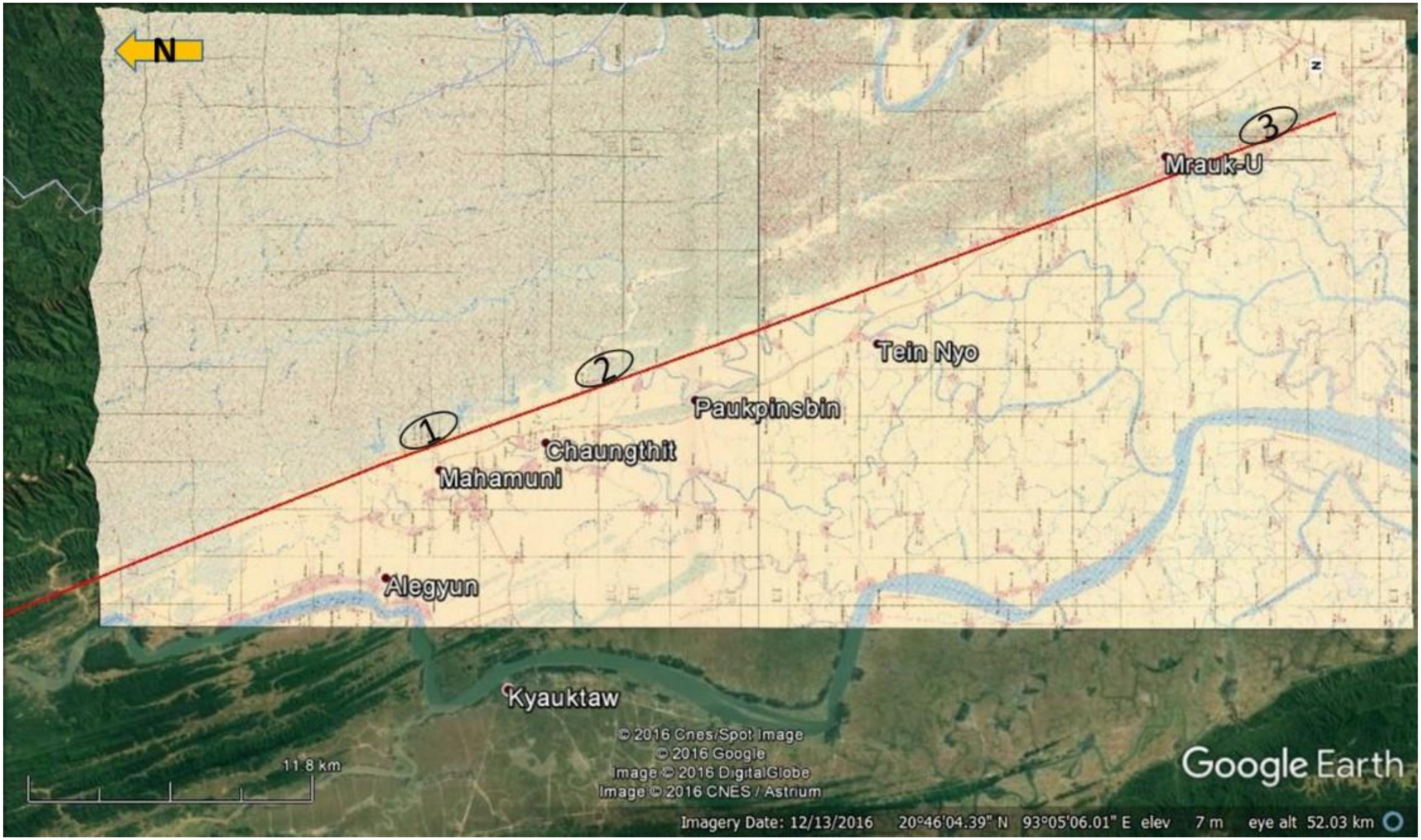

Figure 5. Satellite image overlaid by UTM map of the three selected areas for relative tectonic activity analysis.

	Bull and McFadden (1977)	Rockwell et al (1985)	Silva et al(2003)	Hamdouni et al(2007)
Class.1	Smf 1.2-1.6 Vf 0.05-0.5	Uplift rate : > 0.4-0.5m/ka Smf <1,4 Vf<1	Smf <1.53 Vf <0.60	Smf <1.4 Vf <0.60 Bs >4
Class.2	Smf 1.8-3.4 Vf 0.5-3.6	Uplift rate:0.5-0.05m/ka	Smf 1.8-2.3 Vf 0.3-0.8	Smf 1.4-3 Vf 0.6-0.8 Bs 4-3
Class.3	Smf 2-7 Vf 2-4.7	Uplift rate: <0.05m/ka Smf >1.4 Vf >1	Smf 2.8-3.5 Vf 0.8-1.2	Smf >3 Vf >0.8 Bs <3

Table 1. The geomorphic indices classification used in this study is Hamdouni et al. (2007) and others from USA (Bull and McFadden (1977); Rockwell et al. (1985); Silva et al. (2003).

Ref no	Analyzed Area	Class of			S/n	Lat
		Vf	Bs	Smf		Class
1	South of Ze Chaung	2	3	2	2.3	2
2	South of Kyauk Se Byin	2	3	2	2.3	2
3	Range of Talin Byin Taung	2	2	2	2	2

Table 2. Classification of the Lat (relative tectonic activity index) in the study area of along the Kaladan-Myrauk U Fault.