CHAPTER VIII

GEOLOGIC EVOLUTION

After the ending of Hercynian Orogeny in Middle Carboniferous, the intermitten marine sedimentation took place in the region in which the study area lies. According to Abele and Beeser (1963), Tittirananda (1976) and Wielchowsky and Young (1985), the sedimentation was occurred in a shelf sea/platform environment in Permian Period. As especially for the present study area, there are at least 2 conflicting stratigraphic models, one of which is that of Tittirananda (1976) - Wielchowsky and Young (1985) where the landward side is to the south or southeast and the deep marine basin to the opposite direction. The other is that of Bunopas and Vella (1983) who proposed the open sea to the west of now-Loei Fold Belt (Figure 76) in where the area locates. Neither of the 2 models gains any support from the rather limited stratigraphic study performed by the present worker, only that the transgression/regression marine environment is possible here.

Some times after the youngest age of the sedimentary rocks, i.e. Upper Permian, the area became the venue of the strong folding/faulting movement(s). As the Indosinian Orogeny was generally recorded in this region, the orogeny was thought to be the one that controlled the significant structural formation here. The Indosinian Orogeny took place between the beginning of Triassic and the end of

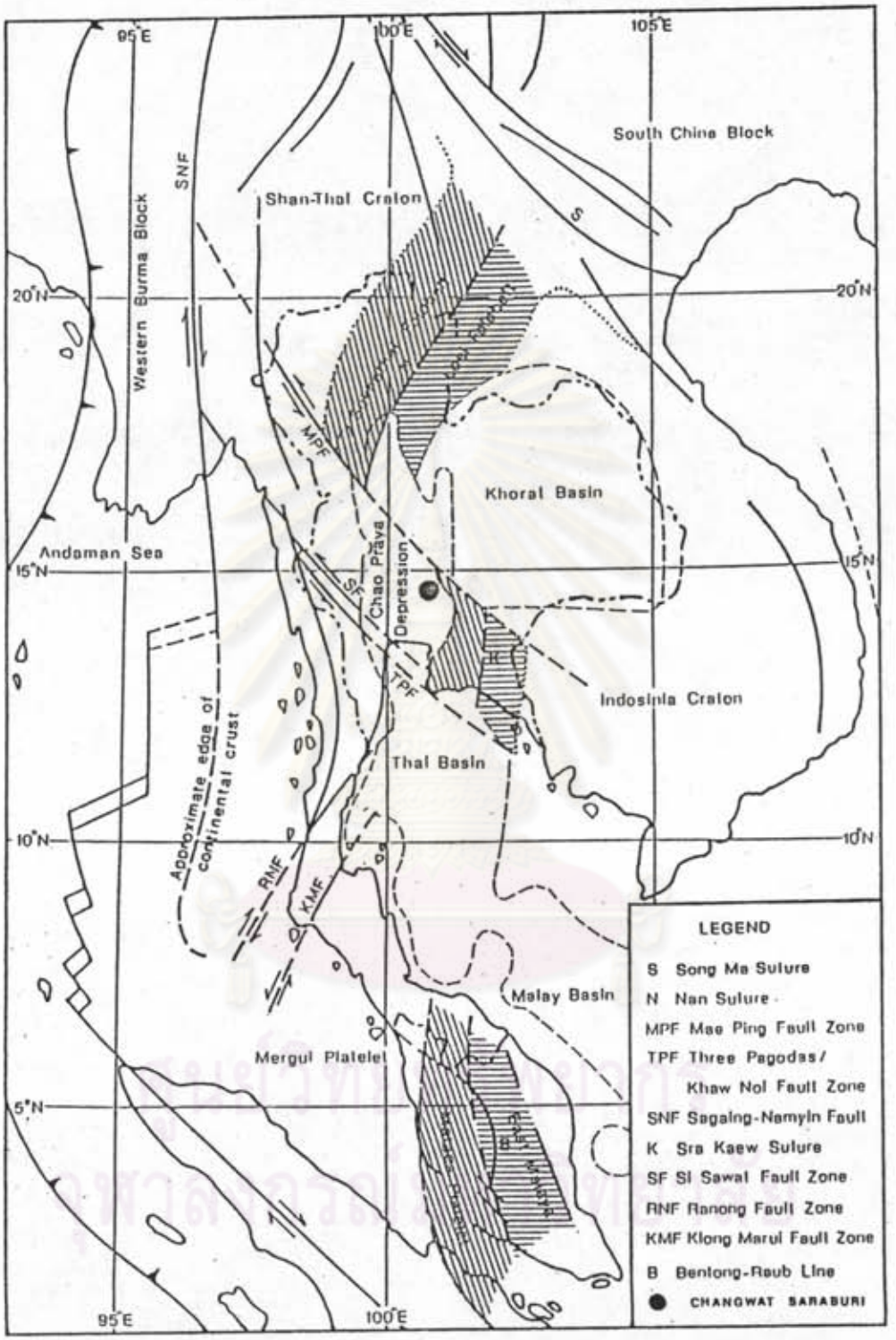

Figure 76 Major tectonic features of continental Southeast Asia (Slightly modified after Bunopas, 1981, Bunopas and Vella, 1983, and Burton, 1984).

Lower Jurassic (Workman, 1975) and was resulted from the collision between the Indosinian craton to the east and Shan-Thai craton to the west, and hence terminated the marine deposition in now-Thailand almost permanently (Bunopas and Vella, 1983).

From Jurassic to Cretaceous or early Tertiary, a shear tectonism took place with the occurrence of sinistral and dextral offset faults, the sinistral-offset Mae Ping fault (MPF in Figure 76), passed just southwest of the study area. The east-west structural trend in this area, contrarily to the generally north-south trending of the gigantic Loei Fold Belt could result from the Mae Ping fault drag. The alternative explanations for the east-west structural trending here are not possible since there are insufficient data collected in this relatively tiny spot. Those proposals are yet to wait for the future works to be performed here and elsewhere.

In the study area, the Permian sedimentary rocks were intensively folded to form the east-west trending, southward-dipping overturned structures plus a significant ductile-to-brittle thrust. The rather uniform inclination and the small interlimb angles (higher degree of the fold tightness), except for some occasional lower-order associating folds, suggest only one significant tectonic event, perhaps the Indosinian Orogeny as mentioned, but possibly with more than one phase. The irregularity of the orientation of the small-scale lower-order folds may be interpreted as the result of the irregular fold geometry formed in the incompetent-bed flowage. It may also be considered as a superimposed folding nature formed in a separate deformation event, but approximately co-axial stress field. Unfortunately,

the latter idea is not well-supported by the structural information collected in this work alone.

From the end of the Mesozoic Era on, another orogenic episode took place, i.e. the Himalayan Orogeny. The significant deformation associating the development of the tensional regime results as the formation of the normal faults and block faults. Perhaps some of the observed fractures, i.e. joints and faults, were formed during then, though it is uncertain which fractures are of this group.

The undulating cross folds as seen from the variation of the bedding plane orientation in the pi-diagrams recorded a different fold-creating stress field from that creating the significant structures. This can be resulted from the local folding derived from the Himalayan orogenic tension or from a previous deformation event.

The igeous piercement and the unconformably overlying of the extrusive layers into and onto the Permian sedimentary rocks were occurred some times in Late or post-Permian. There was no obvious clue of the relationship between the folding/faulting event and both igneous activities, except that the sedimentary country rocks around the intrusive bodies were thermal metamorphosed, and the different sedimentary rock units were found to underly the volcanic rocks at their northern limit. Certainly the intrusive and extrusive igneous activities are post-Ratburi. Furthermore, as the continental Mesozoic Khorat Group was found to overly Khao Yai Volcanics, this put the upper limit in age of the extrusive activities to pre-Khorat. The angular (?) unconformity between the carbonate/clastic rock unit and the volcanic/

volcaniclastic rocks may further lift the lower limit of the age of the igneous activities up, to post- (Indosinian) tectonic. Without any firm support, the age is proposed for the intrusive Phra Ngam Diorite as post-tectonic also.