

## CHAPTER VI

### CONCLUSION

This study is mainly focused on 7 measured sections in the Mae Hong Son-Mae Sariang area. The present study is a preliminary attempt to understand the marine Triassic strata in the Mae Hong Son-Mae Sariang area based on stratigraphy, age, and paleogeography. To date, the preliminary results can be concluded as follows.

1. Based upon field investigation, the Mae Sariang Group in Changwat Mae Hong Son can be subdivided into 3 formations, namely, Kong Sum formation, Pra Trumuang formation, and Mae Leab formation, in ascending order. The total thickness above 900 meters.

2. The Kong Sum formation, the lowermost formation of the Mae Sariang Group, can be further subdivided into 2 lithofacies, namely, the lower conglomerate lithofacies and the lithic sandstone lithofacies. The total thickness of the Kong Sum formation about 150 to 250 meters. The lower conglomerate lithofacies overlies unconformably the older unit, and consists largely of thickly bedded, reddish brown siltstone interbedded with pebbly sandstone. Clasts are mostly chert, limestone, and sandstone varying in size from 1 to 10 cm. Sorting is moderate, and subangular to subround clasts are quite common. The conglomerate is mostly clast-supported. Both sandstone and siltstone contain feldspar. At present, it is difficult to assign the age of this lithofacies. Although without age fossils supported, Triassic is proposed for this lithofacies. The lithic sandstone lithofacies is mainly characterized by thick-bedded (up 4-40 cm), gray-colored, fine- to coarse-grained lithic sandstone with graded bedding. This sandstone is always interbedded with the thinly-out blackish gray, shale. This sandstone is interbedded with gray mudstone with cross lamination and load casts. Structurally the whole sequence are folded. Important fossils such as *Halobia* sp. and *Daonella* cf. *sumatrensis* suggest Upper Triassic. Based on the report Hahn & Siebenhüner (1982), most of fossils are *Crinoidea* indet (Wolfart), *Halobiidae* indet (Wolfart), *Halobia* cf. *comata* BITTERN?, *Halobia* cf. *austriaca* MOJSISOVICS, *Halobia* sp., ex gr. *sturiaca* MOJSISOVICS, and *Daonella* sp.. These fossils indicate the ages of Anisian-Norian – Early Carnian (or Middle to Late Triassic).

3. The Pra Trumuang formation, the thickness ranging from 200 to 770 meters, is characterized by thin-bedded mudstone intercalated with thin-bedded sandstone, thin-bedded chert intercalated with thin-bedded mudstone, conglomerate interbedded sandstone, and sandstone interbedded shale with common cross-bedding, graded bedding, and flute cast. The Pra Trumuang formation consists of four lithofacies; the dark gray mudstone and sandstone lithofacies, the chert interbedded mudstone lithofacies, the conglomerate interbedded sandstone lithofacies, and the sandstone and shale lithofacies, respectively. The dark gray mudstone and sandstone lithofacies, its thickness is about 60 to 70 meters. This lithofacies are characterized by thin-bedded dark gray mudstone intercalated with thin-bedded dark gray sandstone. The sandstone composes mainly of quartz, feldspar, and rock fragments. Most of quartz are fine-grained, round, and poorly sorted. The chert interbedded mudstone lithofacies are characterized by gray chert intercalated with thin-bedded mudstone, however, interbedded gray limestone in some parts. The thickness ranges approximately from 16 to 148 meters. The conglomerate interbedded sandstone lithofacies is characteristic a predominantly conglomerate interbedded sandstone and shale, and thin- to medium-bedded sandstone, sedimentary structures, i.e. graded bedding and cross bedding. Conglomerates are matrix-supported and clasts are made up mainly of chert and quartz whose size varies from 0.2 to 5.0 cm. The sandstone is light gray to yellowish brown, thin-bedded, and medium-bedded, medium-grained consisting mainly of quartz, feldspar, and dark minerals with common graded bedding, and usually shows sharp contacts with overlies reddish brown mudstone. The sandstone and shale lithofacies is a predominantly sandstone interbedded shale, unconformably overlies the conglomerate interbedded sandstone lithofacies. This lithofacies is characterized by medium- to very thick-bedded sandstone with interbedded thin-bedded shale, commonly flute casts and graded bedding. The sandstone is white to light gray, medium to very thick-bedded, consisting mainly of quartz, feldspar, and rock fragments. The shale is gray to brown, thin-bedded.

4. The Mae Leab formation consists three lithofacies, namely, the calcareous mudstone and sandstone lithofacies, the siliceous shale interbedded mudstone lithofacies, and the medium sandstone lithofacies in ascending order. The calcareous mudstone interbedded sandstone lithofacies are characterized by medium-bedded mudstone intercalated with thin-bedded sandstone. Apart from quartz, clay and

micaceous mineral, calcite is also present as calcareous cement in mudstone. The sandstone composes mainly of quartz, feldspar, and rock fragments. The detrital grains are fine- to medium-grained, subround to round, moderate sorted, with ferrogeneous and siliceous cement. The siliceous shale interbedded mudstone lithofacies usually characterized by black, thin-bedded, siliceous shale interbedded with black thin-bedded mudstone. The lithofacies has the thickness of about 80 to 120 meters. The 20 to 30 m-thick medium sandstone lithofacies is characterized at the lower part by mainly white sandstone. The sandstone strata occur at the top part of the sequence and are characterized by medium- to thick-bedded, parallel bed type.

5. From stratigraphical and paleontological evidences, the age of the Mae Hong Son Group should be assigned as Middle to Upper Triassic.

6. The marine Triassic rocks of Mae Hong Song-Mae Sariang area were deposited on deep-water submarine fan.

7. Detrital chromian spinels are mostly encountered in graywacke of turbiditic sequences. Sedimentary and structurally, the sandstone and shale were deposited by deep-water submarine fan due to turbidity current activity. Numerous detrital spinels are discovered as rather small grains of the accessory minerals only in sandstones as turbidities. They are varied from 20  $\mu\text{m}$  to 160  $\mu\text{m}$  in size. They display brown and deep brown under microscope. Several grains exhibit subhedral to euhedral habits suggesting the preservation of original crystal shape. Characteristically these spinels have high Cr content and relatively vary in  $\text{TiO}_2$  content (0.014-0.723). The atomic ratios  $\text{Cr}/(\text{Cr}+\text{Al})$  or  $\text{Cr}\#s$  vary considerably from 0.360 to 0.740, but mostly above 0.4 and with the average about 0.500. The atomic ratios  $\text{Mg}/(\text{Mg}+\text{Fe}^{2+})$  or  $\text{Mg}\#s$  range widely from 0.45 to 0.75 and average about 0.62, with Mg concentration generally decreasing as Fe increases. The  $\text{Fe}^{3+}$  concentration is considerably low. The atomic ratios  $\text{Fe}^{3+}/(\text{Cr}+\text{Al}+\text{Fe}^{3+})$  in detrital chromian spinels are mostly below 0.15 with the average of about 0.05. Only one out of twelve grains analyzed had the atomic ratios  $\text{Fe}^{3+}/(\text{Cr}+\text{Al}+\text{Fe}^{3+})$  almost down to 0.

8. Detrital chromian spinels probably indicate the provenance of ultramafic and basaltic volcanics for the Mae Sariang Group spinels. Evidences from geochemical as well as petrographical investigations reveal that the detrital chromian spinels of the Mae Sariang Group occurred in response to mid-ocean ridge and intraplate basalts.