

Petrography and Provenance of Carboniferous Sandstone at Ban Mae Jo, Ban Pao Subdistrict, Mae Tang District, Chiang Mai Province

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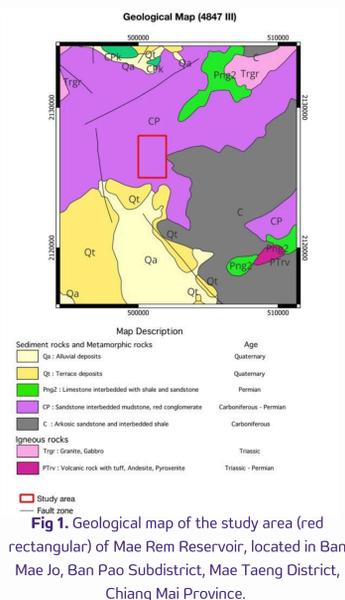


ABSTRACT

Carboniferous red-bed sandstone is widely distributed in Ban Maejo, Ban Pao Subdistrict, Mae Taeng District, Chiang Mai Province. This study aims to investigate petrography and stratigraphy for interpreting the provenance of sandstone sediments by analyzing of the petrographic characteristics and mineral compositions under a polarizing microscope. The sandstones in this area can be classified into 3 types: lithic arenite, sublith arenite, and lithic wacke, according to the classification of Pettijohn (1987). The sandstone samples are mainly composed of fine- to coarse-grained, subangular to subrounded roundness, high sphericity, and poorly sorted. The mineral compositions mainly consist of monocrystalline quartz, polycrystalline quartz, and lithic fragments with a minor amount of feldspars. The lithic fragments mainly composed chert, sandstone, silicified rocks, shale, and mudstone. The feldspars are rare, including orthoclase and plagioclase. Other mineral components include zircon and tourmaline. The matrix is quartz and lithic fragments with an iron oxide cement. From the petrographic study, the lithic sandstones fall in the 'Recycled orogenic' on the Q-F-L diagram and 'Quartzose recycled' field on the Qm-F-Lt diagram according to the classification of Dickinson et al. (1983) and Dickinson and Suczek (1979), respectively. Based on the provenance interpretation, the sediment sources of the studied sandstones were derived from the quartzose rocks, which was uplifted and eroded from by multicycle origin.

INTRODUCTION

- In the Ban Mae Jo area, Ban Pao Subdistrict, Mae Taeng District, Chiang Mai Province, where the Carboniferous sedimentary rocks widely exposed (Bunopas, 1981).
- These rocks consist of:
 - Gray sandstone interbedded with gray shale
 - Volcanic siltstone
 - Reddish-brown conglomerate
- They are classified under the Mae Tha Formation (Piyasin, 1972).



OBJECTIVE

- To study petrography, stratigraphy, and the lithological characteristics of sandstone in the Ban Mae Jo area, Ban Pao Subdistrict, Mae Taeng District, Chiang Mai Province.
- To interpret the sedimentary provenance of sandstone in the study area.

METHODOLOGY

- Field data collection:
- Collect 15 outcrop rock samples
 - Logging coordinates in the UTM system
 - Measuring the orientation of rock layers
 - Taking field photographs

Petrography: Study 15 thin sections under microscope to identify mineral compositions and classify rock types.

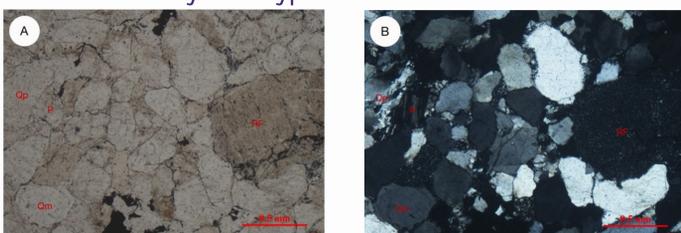


Fig 2. Petrography sandstone sample No. M15-2.2 under polarizing microscope (A: ppl, B: xpl, Qm= monocrystalline quartz, Qp= polycrystalline quartz, RF= rock fragment, P= plagioclase)

RESULTS

Sandstone Classification

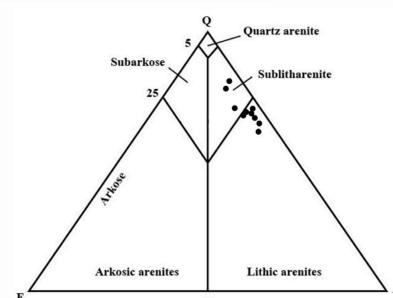


Fig 3. The Q:F:L classification diagram shows the naming of arenite rocks with a matrix content of less than 15%. Q = quartz, F = feldspar, and L = lithic fragments (Pettijohn et al., 1973).

- Sublith arenite 3 samples.
- Lithic arenite 7 samples.

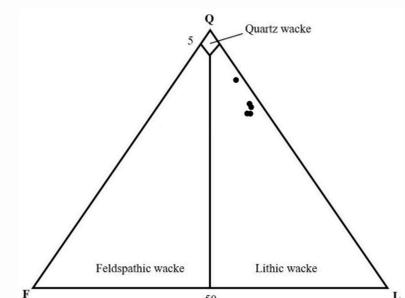


Fig 4. The Q:F:L classification diagram shows the naming of wacke rocks with a matrix content between 15%-75%. Q = quartz, F = feldspar, and L = lithic fragments (Pettijohn et al., 1973).

- Lithic wacke 5 samples.

Sedimentary Provenance of Sandstone

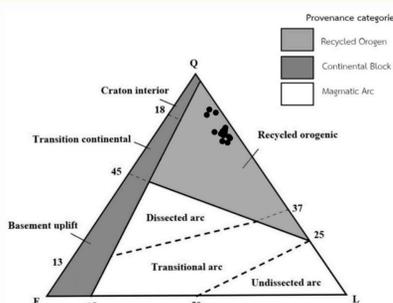


Fig 5. The diagram for analyzing the province of sedimentary sandstone. Q = mono-polycrystalline+chert, F = plagioclase+K-feldspar, L = rock fragments (Dickinson et al., 1983)

- Recycled orogenic 15 samples.

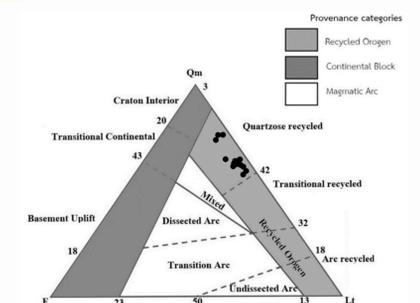


Fig 6. The diagram for analyzing the province of sedimentary sandstone. Qm = monocrystalline quartz, F = plagioclase+K-feldspar, L = rock fragments+polycrystalline+chert (Dickinson and Suczek, 1979)

- Quartzose recycled 15 samples.

CONCLUSIONS

- The Carboniferous sandstone in Ban Mae Jo, Ban Pao Subdistrict, Mae Taeng District, Chiang Mai, consists of 79.87% grains, 10.99% matrix, and 9.14% cement. The grains have an average size of 0.30 mm, mostly medium sand, with sub-angular to sub-rounded shapes, high sphericity, poorly sorted. The cement mainly composed of iron oxide.
- The sandstone in this area are originated from an uplifted mountain range primarily composed of quartz, resulting from tectonic plate collision, repeated weathering, and sediment transport, which likely contributed to its formation.