

Geological origin of the Permian bedded chert succession distributed in Central Plain of Thailand

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The geotectonic divisions, which are distributed as narrow zones in the north-south direction, are clear in the northern Thailand, but not clearly recognized in the Central Thailand. The Chao Phraya Plain, which occupies the central part of Thailand, is broadly covered with Quaternary sediments. Therefore, the basement rocks of the Paleozoic and Mesozoic are scattered in the form of residual mounds, and due to the lack of stratigraphic and age-determination data, the geological origin of these rocks have been not sufficiently discussed. In this presentation, we will report the results of a study on the geological belongings of bedded chert sporadically exposed in the Chao Phraya Plain, Central Thailand by the microfossil age and geochemical characteristics.

The study areas are Thung Saliam (TS) (50 km northwest of Sukhothai) in the northern part of the plain and the Nakorn Sawan–Uthai Thani (NS-UT) area in the central part of the plain. About 20 outcrops of chert were surveyed in both areas. The cherts are distributed in scattered, and most of the cherts are recrystallized and are considered to have undergone contact metamorphism. Chert of the TS is well-bedded with red and the direct contact relationship is unknown, but tuff and limestone (marble) are exposed around it. Chert of the NS-UT is also well-bedded with red, black, gray and milky white in color. Altered slaty shale and sandstone accompany the chert and form monadnocks. These cherts might be categorized into typical pelagic cherts because they contain radiolarian tests and sponge spicules in a matrix consisting of very fine clay minerals and microcrystalline quartz, and do not contain coarse-grained terrigenous materials.

Sashida & Nakornsuri (1999) reported the occurrence of *Pseudoalbaillella simplex*, *Ruzencevispongus* sp., and so on from the TS chert and they assigned their age to Wolfcampian. Whereas, Saesaengseerung *et al.* (2007) report radiolarian occurrence of the *Ps. loemntaria* Assemblage (Artinskian) and *Follicucullus scholasticus* Assemblage (Capitanian–Wuchiapingian) from the NS-UT chert.

Whole-rock chemical analysis was performed on three sections their ages were determined by radiolarians. In the Chondrite-normalized REE pattern, TS chert indicates negative anomaly of Ce, and NS-UT chert shows relatively flat

and profile of the downward-sloping in the LREE. The geological age of the study sections and their REE patterns are similar to those observed in the Sa Kaeo area in southeastern Thailand.

The Permian bedded cherts exposed in TS and NS-UT areas are often accompanied by thin layers of fine-grained siliciclastics and tuff, which are weakly metamorphosed and foliated. Since the chert itself has a relatively thin thickness (several meters to 10–20 m) in each outcrop, and basically has a north-south strike. These cherts occurrence and lithofacies of both areas are similar and indicate that cherts of both areas are geologically comparable as pointed out by Ueno *et al.* (2012).

Ueno *et al.* (2012) clarified that the central part of Thailand, where the geotectonic division was unclear, can be divided into three geotectonic units from west to east: Sibumasu Block, Sukhothai Zone and Indochina Block. However, the origin of the Permian chert has not been clarified. Paleozoic and Mesozoic cherts distributed in Thailand remind us bedded cherts deposited in the Paleo-Tethys from the Devonian to the Triassic. However, no cherts other than the Permian have been reported in the central part of mainland Thailand. Instead of the Paleo-Tethys chert, the Sa Kaeo-Chanthaburi suture and the Nan-Uttaradit suture are well-known as geological units containing Permian chert in southeastern Thailand. These sutures have been understood as a closed remnant of the Permian to Triassic back-arc basin stretched between the Indochina Block and the Sukhothai Arc. The fact that the Permian cherts of the central plain are distributed in the eastern part of the Sukhothai Zone and near Indochina Block suggests that these Permian cherts comparable to the Permian chert of the Sa Kaeo-Chanthaburi Suture. In addition to the geological evidence, the geochemical features of the Permian chert represented by the REE pattern are similar to those of the Permian chert in the Sa Kaeo area. Line of evidence mentioned above suggests that the Permian bedded chert distributed the central Thailand (TS and NS-UT areas) have originated to the Permian chert of the Sa Kaeo-Chanthaburi or Nan-Uttaradit sutures which is a remnant of back-arc basin.