

Detrital chromian spinels from the Sa Kaeo-Chanthaburi accretionary complex: traces of tectonic evolution of eastern Thailand

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The Nan Suture extends from the northern Thailand to the eastern and borders Sibumasu and Indochina. The geological evidence regarding the origin and tectonic setting of this suture is also limited. We studied the suture zone previously reported in the Sa Kaeo-Chanthaburi (SKCB) area, and discriminated several tectono-stratigraphic units there. The geochemistry of chromian spinels is applied to determine the petrological characteristics and tectonic setting of their ultramafic-mafic rocks as an insight into the tectonic scenario of this area. The rock assemblages, called here as the Sa Kaeo-Chanthaburi accretionary complex, comprise new 5 units from north to south, Khao Chan (KC), Khao Prik (KP), Khao Hleam (KH), Ban Nong Bon (BNB) and Soi Dao (SD) units, and Pong Nam Ron (PNR) Formation. 1) KC unit is composed of chromite-bearing serpentinite, basalt and limestone. 2) Without the occurrence of serpentinite, KP unit is very similar to the KC unit. 3) KH unit is represented by strong deformation and shear structures. Pillow lava, volcanoclastic rocks, serpentinite, limestone, chert, sandstone, and shale can be observed in these melanges. Early-Late Permian radiolarian and late Early-middle Middle fusulinacean faunas are identified from this unit (Hada et al., 1997). 4) BNB unit consists of broken and sheared units of sandstone and shale and displays melange features in several places. Chromian spinels can be discovered in sandstone. 5) SD unit contains basaltic pillow lavas and their associated volcanoclastic rocks dominantly compared with chert and limestone. Their volcanoclastic rocks yield abundant detrital chromian spinels. 6) PNR Formation displays almost characteristics of turbidite. Chromian spinels are found.

Numerous detrital chromian spinels are discovered in (1) volcanoclastic rocks of SD unit, (2) sandstone-conglomerate blocks (in shale matrix) of BNB unit, and (3) turbiditic sandstone of PNR Formation. Geochemically the detrital spinels from SD volcanoclastic rock (1) have high Cr content, and highly and widely vary in TiO₂ content. The atomic ratios Cr/(Cr+Al) or Cr# are about 0.5-0.8. Their TiO₂ contents are varying up to 5.5 wt %. On the other hand, chromian spinels from sandstone-conglomerate blocks of BNB unit (2), and from sandstone beds of PNR Formation (3) have a wider range of Cr#, 0.4-0.95. This group is lower and less varied in TiO₂, almost lower than 1 wt %. The atomic ratios Fe³⁺/(Cr+Al+Fe³⁺) in spinels from both volcanoclastic and clastic rocks are mostly below 0.3. Based upon provenance discrimination fields on the Fe³⁺-TiO₂ diagram (Arai, 1992), plots of detrital chromian spinels in volcanoclastic rock of SD unit can be related with spinels from intraplate basalt. To handle with spinels in sandstones and conglomerate of BNB unit and PNR Formation, we identified some grains which were derived from volcanic rock based on their physical properties such as rather small grain with euhedral shapes and black color. These plots of spinels seem to correspond to island-arc region. The other spinels, however, were possibly derived from serpentinites.

Late Paleozoic of SKCB is characterized by basaltic pillow lava, volcanoclastic rocks, chert, limestone, and some serpentinites. These rock assemblages probably suggest an oceanic-plate stratigraphy (OPS) of basalt lava and overlying chert with seamount-typed limestone. These sea floor materials were accreted to the western edge of Indochina, and covered by turbidite deposits during Late Triassic. According to occurrence of detrital chromian spinels, ultramafic-mafic rocks were possibly exposed relating with a subduction of Paleotethys oceanic plate in the nearly same time with deposition of clastic rocks. This study proves that the OPS-sedimentary complex of SKCB was formed as a Late Paleozoic-Early Mesozoic accretionary complex on the western margin of Indochina. The Nan Suture is now interpreted as a part of traces of ancient accretionary complex.