Tectonic Environment of Pondaung Formation, Southern Chindwin Basin, Myanmar: Evidence from Geochemistry and LA ICP-MS U-Pb Zircon Geochronology

KYAW LINN OO[1, 2], KHIN ZAW[3], S. MEFFRE[3], MYITTA[1], DAY WA AUNG[1]

[1]*Department of Geology, University of Yangon, Yangon, Myanmar,*
[2]*Schlumberger Information Solution, 33C/35, 7-1/2 Mile, Pyay Rd., Yangon, Myanmar*
E-mail address: koo@yangon.oilfield.slb.com

[3]*CODES ARC Centre of Excellence in Ore Deposits, University of Tasmania, Hobart, Tasmania, Australia, E-mail address: Khin.Zaw@utas.edu.au*

Detrital information preserved in the Eocene clastic sequences of Southern Chindwin Basin in the northern part of Central Myanmar Basin could reveal the "Erosional Unroofing History" of a calc-alkaline continental magmatic arc during the fluvial sedimentation of Pondaung Formation in late Middle Eocene (Bartonian). The XRF-immobile trace element plots and LA ICP-MS U-Pb zircon geochronology of the volcaniclastic Pondaung sandstones document that the arc was originated along the convergence continental margin in early Middle Eocene (Lutetian) and their detritus were deposited in the fore-arc Central Myanmar Basin.

Sandstone modal analysis and provenance studies provide a significant change in petrofacies spectrum from the older to the younger units; the volcaniclastic, late Middle Eocene Pondaung sandstones (Q_{37}-F_{22}-L_{41}; Lm_{25}-Lv_{72}-Ls_3; Qm_{47}-P_{40}- K_{13}) at one extreme, quartzo-feldspathic and quartzolithic, Late Eocene Yaw sandstones of plutonic-metamorphic derivatives (Q_{65}-F_{22}-L_{15}; Lm_{57}-Lv_{38}-Ls_5; Qm_{68}-P_{8}- K_{24}) at other extreme. Pondaung sandstones are derived from transitional to dissected magmatic arc whereas Yaw sandstones are the derivatives of recycled uplifted continental margin provenances. The detrital components of sandstones characterized by volcano-plutonic and green-schist to amphibolite metamorphic derivatives are the characteristics of erosional unroofing of a magmatic arc and deeper level of erosion down to the plutonic root at an uplifted continental margin.

XRF-immobile trace element plots (Zr/TiO_2 - Nb/Y; Zr/Y – Zr; Rb - Y+Nb; and Nb - Y) for the volcaniclastic Pondaung sandstones characterized by plagioclase feldspar-phyric volcanic lithic fragments also suggest Andesite and minor Rhyodacite / Dacite in composition indicating a geochemical characteristic of a calc-alkaline continental volcanic arc related to syn-collision tectonic setting. The radiometric dating on the detrital zircon grains found in the volcaniclastic Pondaung sandstones by using LA ICP-MS U-Pb zircon method give mostly early Middle Eocene (during 51.6 and 43.3 Ma or average age around 47.2 Ma) indicating the geochronology of the active volcanic activities originated in a convergence continental margin setting. These data combined with the mean paleo-current

direction suggest that there was a magmatic arc sitting to the north-east (relative to present position) of the southern Chindwin Basin (i.e., analogous to the present plutonic belt along the western margin of Shan Plateau).
Erosional Unroofing of the inferred volcanic arc might have been occurred throughout late Middle Eocene (Bartonian) time during deposition of the Pondaung Formation until before the deposition of the Yaw Formation (Priabonian). It can also be explained by the abrupt changes in lithofacies and petrofacies at the major sequence boundary between the Pondaung and the overlying Yaw Formations. The Pondaung Formation was deposited in an aggrading fluvial system. The Yaw Formation was deposited in a fluvial and tide dominated deltaic system. A regional-wide correlative surface or highly ferruginous lateritic horizon observed between the Pondaung Formation and the overlying Yaw Formation is proposed here as a sequence boundary (Emergence Surface coupled with marine Transgressive Surface or ES-TS) formed between the end of Bartonian and the early Priabonian. It is correlative to the major sequence boundary (37.10 Ma at Bart 2/Pr 1) defined in the sequence stratigraphic framework of the European Basins.

KEY WORDS: Erosional Unroofing History; Volcaniclastic Pondaung sandstones; Yaw sandstones; Southern Chindwin Basin; Central Myanmar Basin; Calc-alkaline continental magmatic arc;