**Kyi Khin Western Indo-Burma Ranges – Supplementary material**

**Methods of petrographic and modal analyses**

Petrographic and modal analyses were conducted, following the Gazzi-Dickinson method (Dickinson 1970; Ingersoll *et al*. 1984; Zuffa 1985), counting sand-sized grains as lithic fragments, to minimize the dependence of rock composition on grain size. Point counting was carried out for each sample, first for the overall framework composition, 400-500 points per thin section, at a spacing of 0.5mm, and assigned to the petrographic categories in Table 1, and secondly for quantifying lithic components, at least 200-300 points for each sample, at a spacing of 1.0 mm. Because of the potential importance of the metamorphic grade of abundant metasedimentary lithic fragments, the LsLm1Lm2 diagram (Dorsey 1988) was used to distinguish between very low-to low-grade (Lm1) and low- to intermediate-grade (Lm2) metasedimentary fragments. In all cases, the effects of diagenesis, compaction and incipient clay formation, were removed mentally, so that original detrital composition was determined. Counting parameters and calculations were based on the methods of Ingersoll (1983) and Dickinson (1985).

In addition to classical QFL, QpLvmLsm, QmFLt and LmLvLs diagrams (Dickinson & Suczek 1979; Dickinson 1985; Ingersoll & Suczek, 1979), the less traditional diamond-shaped diagram (Basu *et al*. 1975) that discriminates plutonic versus metamorphic sources, based on the relative proportions of medium-grained fragments of non-undulatory monocrystalline quartz (Qnud.), undulatory monocrystalline quartz (Qud.), and two types of polycrystalline quartz (Qp) end member; Qp(>3) = polycrystallinity with >3 crystal units/grain and Qp(2-3) = polycrystallinity with 2-3 crystal units/grain, and QmKP diagram (Streckeisen 1976). In terms of monocrystalline light components a QmPK, P= plagioclase and K= potassium feldspar diagram (Dickinson & Suczek 1979; van de Kamp *et al*. 1994; Trop & Ridgway 1997; Uddin & Lundberg 1998) is also used to check the relative changes in feldspar content and their alteration in sandstones.

Petrographic classifications use quartz (Q), rock fragments (RF), and feldspar (F), according to Dott (1964), Leeder (1982), and Folk (1980). Differences in petrofacies among the sequence stratigraphic systems tracts were also interpreted, to determine the resolution of a function of variable mechanical desegregation and hydrodynamic sorting characteristics of different systems tracts, and erosional fluxes from the hinterland. To interpret the age of the provenance rocks, U-Th-Pb isotopic measurements were carried out on monazite and thorite grains contained in 6 selected sandstone samples from the Laung, Yezaw, and Mayu formations. All U-Pb analyses were performed in the Geology Department of the National Science Museum, Tokyo. Prior to the separation of the U-Pb minerals, standard heavy liquid and magnetic separation techniques were carried out, according to the analytical procedures of Parrish (1990).

The sequence stratigraphic approach was based on the proposals of Vail *et al.* (1991) and Posamentier *et al*. (1992).

**Preparation of samples for dating and chemical analysis**

To interpret the age of the provenance rocks, U-Th-Pb isotopic measurements were carried out on monazite and thorite grains contained in 6 selected sandstone samples from the Laung, Yezaw, and Mayu formations. All U-Pb analyses were performed in the Geology Department of the National Science Museum, Tokyo. Prior to the separation of the U-Pb minerals, standard heavy liquid and magnetic separation techniques were carried out, according to the analytical procedures of Parrish (1990). The heavy minerals were differentiated into two groups, less dissolved and easily dissolved with 12N HCL at 150°-220°, for about 60 hours. A second dissolution cycle was performed, following evaporation to dryness, when multiple sample dissolution was used (Parrish 1990).

Sandstones were crushed and sieved at 1 phi intervals from 1 to < 0.063 mm. Heavy minerals were separated, using liquid acetyline tetrabromoethane (specific gravity 2.9), followed by semiquantitative point-counting. Following the analytical method for purification recommended by Parrish *et al.* (1987), a mixed 205Pb-233U-235U isotopic tracer (Parrish & Krogh 1987) and a multicollector mass spectrometer (MAT-model 261) were used to date the U-Pb distribution in monazite and thorite at the laboratory of Geology Department, National Science Museum, Tokyo.

Samples for analyses were cleaned in distilled water by ultrasound for 5 minutes. About 50g of each samples were initially hand-crushed using a tungsten carbide mortar and pestle, and further powdered to a particle size <200 mesh, using an agate pestle and mortar. Only weakly indurated and readily disaggregated sandstones and shale samples were collected from measured sections, representing the various Miocene successions. A representative amount of fresh material was analyzed for major and trace elements by X-Ray Fluorescence at Fukuoka Education University. Unless otherwise stated, all plots and comparisons presented here were made with major element data normalized to 100%, without loss on ignition.

For geochemical analysis, 133 samples (both shales and sandstones) were collected from 23 measured sections on the Baronga Islands, Sittwe Township and Pauktaw Township. Each section is stratigraphically about 250 m thick, and is well exposed in the area, with the least amount of recent weathering on wave-cut platforms and in coastal cliffs. They were cleaned in distilled water by ultrasound for 5 minutes. About 50g of each samples were initially hand-crushed using a tungsten carbide mortar and pestle, and further powdered to a particle size <200 mesh using an agate pestle and mortar. Only weakly indurated and readily disaggregated sandstones and shale samples were collected from measured sections, representing the various Miocene successions. A representative amount of fresh material was analyzed for major and trace elements by X-Ray Fluorescence at Fukuoka Education University. Unless otherwise stated, all plots and comparisons presented here were made with major element data normalized to 100%, without loss on ignition.

Major elements (SiO2, TiO2, Al2O3, Fe2O3 (total Fe), MnO, MgO, CaO, Na2O, K2O, and P2O5) and trace elements (Rb, Ba, Sr, Zr, Y, Ni, Co, Cr, V, Nb, and Th) were analyzed using the RIX2000 XRF system (Rigaku Denki) installed in Fukuoka Education University, using the methods described by Norrish & Hutton (1969). Loss on ignition was determined by ignition of powdered samples at 1100°C in a muffle furnace for 1 hour.

All fractions used for strontium isotope analysis were leached with 10% acetic acid to remove biogenic carbonate and adsorbed cations. Chemical separations were performed as described in Miller *et al*. (1988). Isotopic compositions were measured on a Finnigan-MAT-RPQ 262 of Geosciences Institute, University of Tsukuba. Sr isotopic ratios were normalized to 87Sr/86Sr = 0.710245, with a mean value of NBS SRM-987= 0.710240 during the period of analysis.

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