Metamorphic Framework of the Nagaland Ophiolite Complex

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The Nagaland Ophiolite Complex, NE India, a Neo-Tethyan ophiolitic mélange at the south-eastern margin of the Yarlung-Tsangpo suture zone preserves an array of high-pressure (*HP*) metamorphic rocks from pumpellyite-diopside through lawsonite and epidote blueschist to hornblende- and epidote eclogite facies. While metamorphic *P-T* path information of some of these rocks are now available and reveal a complex burial-exhumation and heating-cooling history in the Nagaland subduction channel, this is not well integrated with the architecture of the Nagaland accretionary complex.

In this study, we combine published and new metamorphic data of the Nagaland *HP* rocks and present them in the framework of their occurrences in three different structural levels of the accretionary complex. The structurally lowermost unit, named the Mokie-Satuza unit shows a progressive metamorphic sequence from greenschist through pumpellyite-diopside (T_{Max} ~335 ^{o}C at ~6 kbar), lawsonite blueschist (T_{Max} ~340 ^{o}C at ~11.5 kbar) to epidote eclogite (T_{Max} ~550-660 ^{o}C at ~24 kbar) facies structurally upward. The Mokie blueschists record a hairpin clockwise (CW) *P-T* path of evolution. The structurally intermediate unit (Washelo-Thewati unit) reveals a partially preserved metamorphic sequence as in the Mokie-Satuza unit. The Thewati epidote eclogite (T_{Max} ~ 630 ^{o}C at ~26-28 kbar) is transitional to ultra-high-pressure metamorphic conditions. The structurally uppermost unit (Moya-Salumi unit) consists of a structurally upper hornblende eclogite facies and a lower epidote eclogite facies subunits. The eclogite subunit is polyphase metamorphosed (M_1 with T_{Max} ~ 625 ^{o}C at ~13.8 kbar and M_2 with T_{Max} ~ 540 ^{o}C at ~14.4 kbar) with both the events recording counter-clockwise (CCW) P-T paths.

We relate the progressive cooling of the Nagaland *HP* metamorphic rocks (apparent peak thermal gradient from ~14 ^{o}C/km to ~7 ^{o}C/km) and change in metamorphic style (CCW to CW P-T paths) structurally downward with the full life cycle of a Neo-Tethyan subduction channel from an initially warm during subduction infancy to a cold mature stage of subduction. The different metamorphic units are likely to reveal an architecture of the Nagaland accretionary complex that is produced by sequential accretions of subducted oceanic crust structurally downward.