TECTONIC EVOLUTION OF THE AILAOSHAN FOLD BELT IN SOUTHWESTERN YUNNAN, CHINA

by

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STATEMENT

This thesis contains the results of research done at CODES, the School of Earth Sciences, University of Tasmania, Hobart, Tasmania, Australia between 2009 and 2012.

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ABSTRACT

The Ailaoshan Fold Belt represents an important component of the geologically complex South China–Indochina suture zone. The fold belt is made up of the Eastern Ailaoshan (EAL) High-Grade Metamorphic Belt, the Paleozoic Central Ailaoshan (CAL) Melange, and the Carboniferous–Triassic Western Ailaoshan (WAL) volcanic belts. This thesis presents a new, better constrained tectono–magmatic evolution model for the Ailaoshan Fold Belt based on a detailed compilation of existing Chinese literature, complemented by extensive new sampling, as well as geochronological (U–Pb zircon and U–Th/Pb monazite), and whole rock and mineral geochemical data.

Contrasting with most published literature, magmatic rocks within the Paleozoic CAL Melange have been found to record two episodes of continental rifting and/or volcanic passive margin development, one Late Devonian–Early Carboniferous, the other Late Permian. There is no preserved record of the oceanic crust of the ocean basin which opened as a result of the Late Devonian–Early Carboniferous rifting episode, and the other magmatic suite recorded in the CAL is the earliest Mid–Triassic syn–collisional granitic magmatism. The WAL volcanic belts, in contrast, include fault–bounded slices of rocks formed during a Late Carboniferous–earliest Mid–Permian continental rift magmatism, a Mid Permian arc/backarc basin magmatism, a Late Permian syn–collisional granitic magmatism and an Early Triassic post–collisional magmatism. Magmatism/metamorphism in the EAL High–Grade Metamorphic Belt has been determined to have occurred during Neoproterozoic, Mid– to Late–Triassic and Cenozoic events, with protoliths originating from various magmatic– and sedimentary rocks in the Ailaoshan–western South China region.
A new regional tectonic model based on the newly compiled data suggests that diachronous continental rift magmatism, leading to volcanic passive margin formation and break up, occurred in the CAL and WAL during, respectively, Silurian–Late Devonian/Early Carboniferous (ca. 430–400 Ma and ca. 370–325 Ma) and Late Carboniferous/Early Permian–earliest Mid–Permian (ca. 300–270 Ma), before which these terranes were attached to the western South China margin in Eastern Gondwana. The volcanic passive margin development and the subsequent seafloor spreading opened the Ailaoshan–Song Ma Paleotethys branch, also known as the Ailaoshan–Song Ma Ocean.

Ridge push associated with WAL continental rifting may have facilitated the west–vergent subduction of the Ailaoshan–Song Ma Ocean beneath eastern Indochina since Early Permian (ca. 280 Ma), producing the Truong Son arc magmatism in Vietnam. In the WAL, in contrast, Mid Permian (ca. 265 Ma) arc/backarc basin magmatism may have only been active for a limited time before the WAL arc collided with and was accreted onto eastern Indochina during late Mid–Permian to Late Permian. This arc–continent collision has been accompanied by extensive Late Permian WAL–Truong Son syn–collisional granitic magmatism (ca. 260–250 Ma) and followed by Early Triassic WAL post–collisional magmatism (ca. 250–245 Ma). Coevally (ca. 260 Ma), the Emeishan Large Igneous Province located in the western South China Block, and may have extended to the CAL–Jinshajiang–Song Da regions.

Continued subduction of the Ailaoshan–Song Ma Ocean remnants may have eventually led to the South China–Indochina continent–continent collision, commenced during Late Permian–Early Triassic in central Vietnam and propagated
northward to the CAL–Song Ma (northwestern Vietnam) region during earliest Mid–Triassic to Late Triassic (ca. 230–200 Ma). This may have produced the major regional unconformity recorded across SE Asia, together with the syn– and post–collisional CAL and EAL magmatism/metamorphism.
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