DEFORMATION AND METAMORPHISM OF THE AILEU FORMATION, EAST TIMOR.

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ABSTRACT

A 10 km wide coastal strip of the Aileu Formation was mapped in detail. This section of the north coast of Timor lies 70 km south of a recently active island arc and was chosen as a potential type example of the deformation style in an arc-continent collision zone. In addition a brief study was made of the petrography and chemistry of altered igneous rocks from this coastal strip and igneous rocks of a similar age from other regions in East Timor.

The Aileu Formation is composed of metamorphosed shales, siltstones and arenites with minor limestones and basites. The metamorphic grade of this formation is zoned from lower greenschist facies in the southwest to upper almandine-amphibolite facies in the east. Five structural phases are recognised. The first generation is a cleavage or schistosity which predates the single prograde metamorphism. No folds were found associated with this foliation and its significance is unknown. The second deformation phase occurred in the Late Miocene. It syn- and post-dates the prograde metamorphic event, produced tight folds and transposed the compositional layering and early cleavage on all scales. The last three deformation phases produced open to gentle macroscopic folds. Correlations with structural data from other formations suggest the third and fourth phases occurred in the Late Miocene and the fifth deformation occurred in the Early Pleistocene. The major high angle faults, which form the boundaries of the Aileu Formation, were also active in the Early Pleistocene.

The amphibolites and altered dolerites of the Aileu Formation are transitional, in composition, between alkaline and tholeiitic basalts. Permian and Mesozoic basalts and dolerites from other regions in East Timor include both alkaline and tholeiitic compositions. All these

igneous rocks are characteristic of continental rift valleys and ocean islands. However the associated sedimentary rocks were deposited on a continental shelf or slope. There is no evidence that the Aileu Formation or the Permian and Mesozoic formations were not formed on the Australian continental margin.

The geology of Timor is consistent with its evolution as a rift valley in the Late Palaeozoic and Early Mesozoic, and a trailing margin from the Cretaceous to the Early Miocene. Structural data suggests a Late Miocene arc-continent collision. There has been post-orogenic uplift and minor additional deformation in the Plio-Pleistocene. Comparison of Papua New Guinea with Timor suggests that the mobile belt in arc-continent collisions is characterised by medium pressure metamorphism, relatively coherent deformation style, and a short history of orogenic activity. Little evidence of thrusting or imbrication has been uncovered and their importance as deformation processes in this environment remains speculative.

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any University; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

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