THE CHRONOLOGY OF CENTRAL AND NORTH MADAGASCAR

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Sutures between continental plates/blocks provide key evidence for the existence of former oceans and for collisional tectonics throughout the geological record. The correct identification and delineation of these sutures is of critical importance for regional tectonic models and, as these suture zones themselves host economically important lithologies (ultramafic pods) and are important conduits for the mobilisation of precious metals, such identification can be of tremendous economic value. Unfortunately, the correct identification of suture zones in the Precambrian is hampered by various factors. The majority of sutures recorded in the literature are located in the upper crust of orogens, where the sutures have a greenschist grade of metamorphism and therefore have an identifiable anatomy that can be directly related to present-day suture zones. Older orogens have, however, invariably been highly eroded to expose predominant granulite and high amphibolite tonalite-trondhjemite-granodiorite (TTG) gneisses, as in Madagascar, and lack modern equivalents for comparison. This, together with the poor preservation of diagnostic rock assemblages (e.g. eclogite, whiteschist) adds to the difficulty in identifying ancient sutures.

In current tectonic models, Madagascar comprises two Archaean toPalaeoproterozoic crustal provinces, the Anatananarivo and Antongil blocks, separated by a purported north-south Betsimisaraka suture. An east-west suture separates these older units from a younger arc terrane, the Bemarivo Block, to the north. Due to deep weathering profiles and a lack of accessible critical sections, there is very little tangible evidence for the presence of these sutures in the field. Moreover, the age data reported in the literature show a desperate shortage of data for central and northern Madagascar. Recent zircon U-Pb SHRIMP dating has confirmed that the Antongil Block comprises igneous components of 3.2 and 2.5 Ga, while in the Antananarivo Block only magmatic units of around 2.5 Ga occur. In the Antananarivo Block these Archaean units have been intruded by younger plutons at ~800 and ~550 Ma. Both the Antananarivo and Antongil blocks were strongly affected by a thermal/metamorphic event at around 550 Ma. Ages on granitoids and volcanic units in the Bemarivo Block to the north indicate a plutono-volcanic event at ~720 Ma, with no record of inheritance.

The data so far thus shows some similarities between the Antongil and Antananarivo Block, which both record profuse crustal growth at 2.5 Ga. The lack of recorded 3.18 Ga dates to the west of the possible suture zone may merely reflect a scarcity of data on the Antananarivo Block, upon which further geochronological work is ongoing. The Bemarivo Block has been confirmed as a ~720 Ma arc terrane, in which a lack of Archaean inheritance suggests it to be exotic to the Antananarivo-Antongil blocks until its final docking at ~550 Ma. Work is in progress to characterise the detrital age populations of supracrustal units of central and northern Madagascar, in an effort to fingerprint the different terranes and thus reveal the cryptic sutures between the Antananarivo, Antongil and Bemarivo blocks.

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