Cover sequences at the northern margin of the Antongil Craton, NE Madagascar

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**ARTICLE INFO**

**Article history:**
Received 11 May 2011
Received in revised form 26 July 2011
Accepted 28 July 2011

Keywords:
Andrarona Group
Ampohafana Formation
Masindray tonalite
Antongil craton
U-Pb zircon geochronology
Illite crystallinity
Madagascar

**ABSTRACT**

The island of Madagascar is a collage of Precambrian, generally high-grade metamorphic basement domains, that are locally overlain by unmetamorphosed sedimentary rocks and poorly understood low-grade metasediments. In the Antalaha area of NE Madagascar, two distinct cover sequences rest on high-grade metamorphic and igneous basement rocks of the Archaea Antongil craton and the Neo-proterozoic Bemarivo belt. The older of these two cover sequences, the Andrarona Group, consists of low-grade metasedimentary rocks. The younger sequence, the newly defined Ampohafana Formation, consists of unmetamorphosed sedimentary rocks.

The Andrarona Group rests on Neoarchaean granites and monzogranites of the Antongil craton and consists of a basal metagreywacke, thick quartzites and an upper sequence of sericite-chlorite meta-mudstones, meta-sandstones and a volcaniclastic meta-sandstone. The depositional age of the volcaniclastic meta-sandstone is constrained in age by U-Pb laser-ablation ICP-MS analyses of euhedral zircons to 1875 ± 8 Ma (2σ). Detrital zircons of Archaean and Palaeoproterozoic age represent an input from the Antongil craton and a newly defined Palaeoproterozoic igneous unit, the Masindray tonalite, which underlies the Andrarona Group, and yielded a U-Pb zircon age of 2355 ± 11 Ma (2σ), thus constraining the maximum age of deposition of the basal part of the Andrarona Group. The Andrarona Group shows a low-grade metamorphic overprint in the area near Antalaha; illite crystallinity values scatter around 0.17 ± 0.02° CuK, which is within the epizone.

The Ampohafana Formation consists of undeformed, polymict conglomerate, cross-bedded sandstone, and red mudstone. An illite crystallinity value of >0.25 ± 0.02° CuK obtained from the rocks is typical of the diagenetic zone. Occurrences of rhyodacite pebbles in the Ampohafana Formation and the intrusion of a basaltic dyke suggest a deposition in a WSW-ENE-trending graben system during the opening of the Indian Ocean in the Upper Cretaceous, that was characterized by extensive rhyolitic to basaltic magmatism along Madagascar’s eastern coast.

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1. Introduction

The Precambrian shield of Madagascar consists of a number of geological domains, ranging in age from Mesoarchaeans to Neoproterozoic, which were finally amalgamated during the formation of Gondwana in the Cambrian (De Wit, 2003; Collins, 2006). In the Antalaha area of NE Madagascar, the Neoproterozoic Bemarivo belt is juxtaposed against the Archaean Antongil craton (Collins and Windley, 2002; Thomas et al., 2009). The Antongil craton extends over a distance of ca. 300 km down the east coast south of Antalaha (Fig. 1). It consists mostly of Mesozoic-Neotropical oceanic terranes and granitoids with minor amounts of paragneisses and schists. The last pervasive tectono-metamorphic event preceding low-grade conditions was recorded at the Archaean/Proterozoic boundary at around 2.5 Ga, when large volumes of granitoid intrusions (the Masaola Suite), were emplaced (Tucker et al., 1999, 2011a; Paquette et al., 2003; Schofield et al., 2010). The Antongil craton, together...