



## Provenance and tectonic significance of the Palaeoproterozoic metasedimentary successions of central and northern Madagascar

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### ABSTRACT

New detrital zircon U–Pb age data obtained from various quartzite units of three spatially separated supracrustal packages in central and northern Madagascar, show that these units were deposited between 1.8 and 0.8 Ga and have similar aged provenances. The distribution of detrital zircon ages indicates an overwhelming contribution of sources with ages between 2.5 and 1.8 Ga. Possible source rocks with an age of 2.5 Ga are present in abundance in the crustal segments (Antananarivo, Antongil and Masora Domains) either side of a purported Neoproterozoic suture (“Betsimisaraka Suture Zone”). Recently, possible source rocks for the 1.8 Ga age peak have been recognised in southern Madagascar. All three supracrustal successions, as well as the Archaean blocks onto which they were emplaced, are intruded by mid-Neoproterozoic magmatic suites placing a minimum age on their deposition. The similarities in detrital pattern, maximum and minimum age of deposition in the three successions, lend some support to a model in which all of Madagascar’s Archaean blocks form a coherent crustal entity (the Greater Dharwar Craton), rather than an amalgamate of disparate crustal blocks brought together only during Neoproterozoic convergence. However, potential source terranes exist outside Madagascar and on either side of the Neoproterozoic sutures, so that a model including a Neoproterozoic suture in Madagascar cannot be dispelled outright.

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### 1. Introduction

Madagascar occupies a critical, central position within the East African Orogen (EAO; Fig. 1). Consequently, an understanding of the geological history of its component terranes is important for constraining the palaeogeography of the entire region through time and elucidating the assembly history of Gondwana. Many recent studies of the geology of Madagascar have focused on comparisons between the three component Archaean cratonic domains and intervening paragneiss assemblages (Collins, 2006

and references therein). However, new data have been obtained for the northern half of Madagascar through a concerted phase of geological mapping and research undertaken by teams from the British and United States Geological Surveys (BGS-USGS) and the Council for Geoscience of South Africa (CGS), in conjunction with Malagasy geologists from the *Projet de Gouvernance des Ressources Minérales* (PGRM), as part of a multi-disciplinary, World Bank-sponsored project which ran between 2004 and 2008 (see BGS-USGS-GLW, 2008 and CGS, 2009a,b). This study facilitated re-interpretations of the tectonic framework of the northern half of Madagascar. In this paper we focus on a poorly understood aspect of the Precambrian shield: the age and provenance of the enigmatic metasedimentary units of Proterozoic age that rest upon the Archaean cratons of central and eastern Madagascar.

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