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Palaeoproterozoic to Neoproterozoic growth and evolution of the eastern Congo Craton: Its role in the Rodinia puzzle

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Abstract

The Central African Cratons comprise various Archaean and Palaeoproterozoic blocks, flanked or truncated by orogenic belts ranging in age from Palaeoproterozoic (Rusizian, Ubendian and Usagaran Belts) to Mesoproterozoic (Kibaran and Irumide Belts). These various orogenic systems map out the progressive nucleation of the Central African Cratons to form the Congo Craton, which during late Neoproterozoic times participated in various collisional processes to form part of the Gondwana supercontinent. Subsequently, the opening of the South Atlantic separated a small portion from the Congo Craton, which now forms part of the South American cratonic assemblage and is referred to as the São Francisco Craton. The original continuity of the São Francisco and Congo Craton is supported by similarities in basement ages and craton stabilisation during Eburnean-aged tectonothermal events and the recognition of the original unity of the Araçuai and West Congo Belts and the Sergipane and Oubanguide Belts across the Atlantic. The nucleation of the Congo Craton from its composing cratonic blocks, which include the Angola-Kasai Block, the NE-Congo-Uganda Block and the Cameroon-Gabon-Congo-São Francisco Block to the west and northwest of the Mesoproterozoic Kibaran Belt, and the Bangweulu Block and Tanzania Craton, to the east and southeast, was at the latest completed after peak compressional tectonism in the Kibaran Belt at 1.38 Ga. Late Mesoproterozoic tectonism along the southern margin of this proto-Congo Craton, in a region called the Irumide Belt, marks compressional tectonism at ca. 1.05–1.02 Ga, which produced extensive reworking along this margin, possibly linked to the participation of the Congo Craton in the Rodinia Supercontinent. At present, insufficient evidence is available to support or deny the participation of the Congo Craton in Rodinia.

During the early Neoproterozoic, several rifting events occurred along the southern margin of the Congo Craton, in the Lufilian and Zambezi Belts, with localised volcanism and deposition of clastic sequences (Roan and Mwashya Groups), and followed by passive margin sedimentation (Nguba and Kundelungu Group). These sequences also contain large diamictite horizons (Grand and Petit Conglomérat). At ca. 570–530 Ma, convergence with the Kalahari Craton to the south and the Malagasy-Indian Cratons to the East culminated in collisional processes that formed the Damara-Lufilian-Zambezi and the East African Orogens, and led to the formation of Gondwana.

Keywords: Congo Craton; Irumide Belt; Kibaran; Rodinia; Palaeomagnetism; Supercontinent

1. Introduction

The Congo Craton is defined as the amalgamated central African landmass at the time of Gondwana assembly (ca. 550 Ma). Along its southern and eastern margins it comprises various Archaean blocks including the Angola-Kasai Block and the Tanzania Craton (Fig. 1). These Archaean units have been extensively affected by Palaeoproterozoic events between 2.2 and 1.9 Ga, collectively referred to as the "Eburnean" events, and which may also have reworked a cryptic Archaean terrane to form the Palaeoproterozoic Bangweulu Block (De Waele, 2005). By Palaeoproterozoic times, the various blocks of the proto-Congo Craton had stabilised and were subsequently affected by Mesoproterozoic convergent tectonism forming the Kibaran, Irumide and Southern Irumide Belts. During the Mid-Neoproterozoic, rift successions and subsequent passive margin deposits developed along the southern margin of the Congo Craton prior to collisional events leading to the amalgamation of Gondwana (Johnson et al., 2005). In this paper, we will review the Palaeo- to Neoproterozoic tectonic evolution of South-Central Africa where (1) Palaeoproterozoic events formed the Rusizian-Ubendian Belt along western and south-western

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