

The Mesoproterozoic Kibaride belt (Katanga, SE D.R. Congo)

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Received 15 February 2004; accepted 15 January 2006

Available online 17 July 2006

Abstract

Five representative key regions from the NE–SW-trending Mesoproterozoic Kibaride belt of SE Congo are described. Although the present database is still insufficient for a definitive reconstruction of the tectonic setting, available data suggest that the investigated areas experienced a similar geological history. The Kibaran Supergroup comprises four major lithostratigraphic units in SE Congo. The Kiaora Group is the oldest unit. It starts with a basal conglomerate which is overlain by siliciclastic rocks deposited in fluvial and possibly lacustrine environments. The conglomerate is overlain by abundant metapelites (predominantly black schist) with calc-silicate, volcano-sedimentary rocks and minor metachert deposited in shallow marine environments. These units are cut by 1.38 Ga granitoids. The overlying Nzilo Group is composed of coarse-grained, siliciclastic metasedimentary rocks including metaconglomerates, quartzites and minor metapelites and metamorphosed ironstones. Frequent herringbone and wavy ripples suggest tidal flat deposition. The maximum depositional age of this group is given by the 1.38 Ga granitoids on which it rests disconformably and by detrital zircons from a quartzite, which yields a concordant age of 1360 ± 27 Ma. The above two groups are separated by a disconformity along with the matrix-supported Kataba Conglomerate occurs at the base of the Nzilo Group. Higher in the succession, the Hakansson Group is essentially pelitic with minor quartzites. At the top of the succession, the Lubudi Group is made of (stromatolitic) carbonates, black schists and minor black quartzites and is inferred to record shallow marine deposition. All these metasedimentary rocks were deposited before the emplacement of ca. 1.0–0.95 Ga tin granites and are older than 1.08 Ga, which is the age of the climax of Kibaran deformation in the Mitwaba area.

Two major deformational events have been recognized in the study areas. The earliest (D_1) is characterized by ENE-trending asymmetric folds and thrusts showing N to NNW transport directions. These structures occur in the Kiaora Group and predate the deposition of the Nzilo, Hakansson and Lubudi Groups. The second deformation (D_2) marks the climax of the Kibaran orogeny and affects all sedimentary units. It is defined by NW-verging mesoscopic and macroscopic isoclinal folds (F_2) and reverse faults parallel to D_2 planar fabrics. M_2 metamorphism is characterized by medium-pressure/medium-temperature (MP/MT) mineral parageneses, with preliminary data indicating peak P–T conditions between 740–780 °C and 6–6.5 Kb. U–Pb dating of metamorphic zircon in older orthogneisses in the Mitwaba region tentatively constrains the timing of M_2 metamorphism at 1079 ± 14 Ma.

The Kiaora Group was intruded by widespread arc-related gabbro-diorite and ca. 1.38 Ga syn- D_1 calcalkaline and strongly peraluminous granitic plutons similar to those documented in the Lachlan and Hercynian belts. Late to post-kinematic granites and related pegmatites and greisens hosting tin-group ore deposits were emplaced at ~ 1.0 –0.95 Ga and exhibit geochemical similarities with SE Asian collisional granites. The Kibaran orogenic system was active between ~ 1.4 –1.38 (accretionary stage) and ~ 1.0 –0.95 Ga (continental collision and post-orogenic exhumation), but the Kiaora Group sedimentary rocks were deposited prior to 1.4–1.38 Ga, which is the igneous crystallization age for the syn- D_1 Kibaran orthogneisses intruding them. Sedimentological data broadly indicate that the Kiaora Group was deposited in shallow marine environments, during the rift-drift stage of the evolving Kibaran basin while the post- D_1 Nzilo

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Group was deposited in an intra-arc environment, although more modern data are required before a definite conclusion can be reached. Available structural, sedimentological, geochronological and petrological data support a convergent margin setting for the Kibaride belt and are inconsistent with an intracontinental, rift model.

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Keywords: Congo; Kibaride belt; Mesoproterozoic orogeny; Subduction; Continental tectonics

1. Introduction

Available geological, tectonothermal, geochronological and paleomagnetic data from 1.4 to 1.0 Ga orogens and adjacent cratonic blocks around the world suggest that the Mesoproterozoic was dominated by accretionary and collisional orogenic processes that culminated in the assembly of the Rodinia supercontinent (e.g. Dalziel et al., 2000

and references therein). In central and southern Africa (Fig. 1, upper inset), Mesoproterozoic orogenic events led to the development of the Kibaran orogenic system (Robert, 1931; Cahen, 1954; Cahen et al., 1984; Thomas et al., 1994). The segment of the Kibaran system exposed in SE Democratic Republic of Congo (hereafter Congo) is known as the Kibaride belt, and has been defined as the type-area of the Kibaran orogenic system of Africa (e.g. Cahen

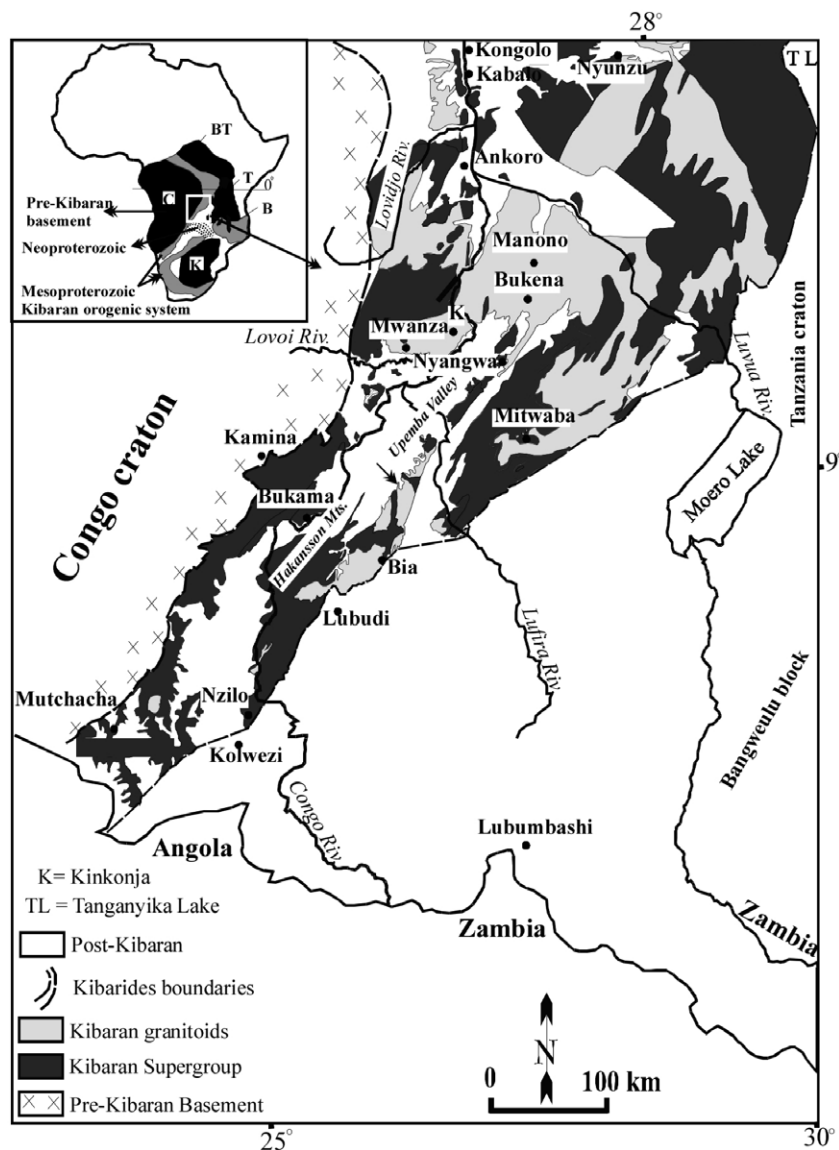


Fig. 1. The Kibaride belt of SE Congo. Inset shows the distribution of the Kibaran orogenic system in sub-equatorial Africa. C = Congo craton, B = Bangweulu block, BT = Buganda-Toro, K = Kalahari craton, T = Tanzania craton. Compiled from Cahen (1954) and Lepersonne (1974).

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