

THE 1000m THICK REDBEDS SEQUENCE OF THE CONGO RIVER BASIN (CRB): A GENERALLY OVERLOOKED TESTIMONY IN CENTRAL AFRICA OF POST-GONDWANA AMALGAMATION (550 Ma) AND PRE-KAROO BREAK-UP (320Ma)

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Keywords: Congo River Basin, Redbeds, lithostratigraphy, Neoproterozoic, Palaeozoic, Gondwana, Karoo

The CRB is a continent-scale feature known to coincide with a major gravity low. It consists of a pile of less than 2000m loose and/or poorly consolidated sedimentary rocks, spaced in time between the base of the Karoo Supergroup (ca. 320Ma) and the Holocene. These sequences rest on a pre-Karoo basement, outcropping along the edges of the CRB. The CRB is part of a large cratonic block comprised of several Archaean nuclei, supposedly welded together between 2.1-1.8Ga during Eburnean-aged collisional orogeny. Throughout the late-Palaeoproterozoic and Mesoproterozoic this block remained united. After Gondwana amalgamation at ca. 550Ma, the block became bordered by Pan African collisional high-grade terranes to the N (“Central African Orogenic Belt”) and E (“East African Orogenic Belt”), while the W and SE rim acted as foreland domain for respectively the “Araçuaí/West Congo” and “Katanga/Zambezi” Pan African accretionary belts. In both forelands, Neoproterozoic tabular sedimentary sequences were largely preserved and define respectively the West Congo and Katanga Supergroups. The uppermost unit of these Supergroups consists of a ca 1000m thick Redbed-facies sequence, respectively the “Inkisi” and “Plateaux (also known as Kilungu-Lupili or Bianco)” Subgroups. Other similar Neoproterozoic sequences are known in intracratonic aulacogenes in and/or around the CRB, where they define distinct Supergroups (e.g. the Mbuji-Mayi Supergroup in the DRC Kasai region). The most prominent is the Lindi/Ubangi Supergroup exposed to the N and NE of the CRB. Its uppermost unit (the “Banalia Arkoses”) is also a ca. 1000m thick Redbed sequence. It was shown that these Redbeds overlie unconformably the folded Neoproterozoic sequences of the Pan-African West Congo and Katanga belts and are thus post ca. 550Ma (paroxysm of Pan African orogeny). Therefore, they can no longer be considered as Precambrian but are Phanerozoic in age. The Redbeds are themselves overlain by the ca. 320Ma Karoo tillite (base of the Karoo Supergroup). The Neoproterozoic sequences in the Lindi/Ubangi, Katanga and West Congo regions dip under the CRB cover deposits. This was confirmed by various geophysical exploration works and four drillholes in the CRB (including the ca. 2000m cored Samba- and Dekese drillholes). Estimates of a ca. 1000m thickness for the Redbeds observed along the edges of the CRB compare well with the minimum 871m given for the Samba core, while the Dekese core confirms that they are overlain by the Karoo Supergroup. Re-interpretation of abundant seismic reflection profiles obtained in the 1970-80ies in the frame of hydrocarbon exploration programmes in the CRB, now groups these Redbed sequences and overlying Karoo Supergroup together into a single seismo-stratigraphic unit, bound by two prominent regional unconformities (“Pan African” and “Gondwanide”), thus underlining a similar geodynamic history. The Redbeds of the CRB are characteristic of lacustrine and fluvio-deltaic (semi)arid palaeo-environments, in contact with atmospheric oxygen as indicated by their colour due to iron oxides/hydroxides coating around detrital grains, but their palaeo-depositional history is still poorly constrained. Sedimentation is ascribed to the development of a subsiding basin under extensional regime after Gondwana amalgamation, spanning the whole CRB and (large parts of) its rim. As such, the Redbeds form a more than 1600km wide intracratonic blanket with remarkable similarities in depositional facies. Attempts to better constrain the age of the Redbeds (post-Pan African but pre-Karoo) are subject to controversial interpretations of available data, including, amongst others, SHRIMP on detrital zircons or ⁴⁰Ar/³⁹Ar on detrital muscovites. Notwithstanding all the above arguments, many recent works still refer to the synthetic geological map of the DRC (1974) and consider the CRB Redbeds as part of the “upper Precambrian (615-645 Ma)”.