

Biostratigraphic and chemostratigraphic constraints of the Mbuji-Mayi Supergroup, Democratic Republic of Congo



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European Research Council

Established by the European Commission

Meeting day « young researchers overseas »
December, 16th, 2014 - Brussels.

GEOLOGICAL SETTING

The Mbuji-Mayi Supergroup is a sedimentary sequence unaffected by regional metamorphism [1]. It was deposited between 1174 ± 22 Ma and ca. 800 Ma in the intracratonic failed-rift SMLL “Sankuru-Mbuji-Mayi- Lomami- Lovoy” basin [2] which extends from SE to NW between Katanga and Kasai Provinces and overlies the Mesoproterozoic Kibaran Belt Supergroup (in the eastern part of SMLL basin) while in the Western part, where we focused our work, it rests unconformably upon Archean Dibaya Granitic Complex [3]. The amygdaloidal basaltic pillow lavas (948 ± 20 Ma) overlie the Mbuji-Mayi Supergroup, at the confluence of Mbuji-Mayi and Sankuru rivers [4]. **Lithostratigraphically, this Supergroup consists in two distinct successions: a lower siliciclastic sequence (~500m) of BI Group and an upper carbonate sequence (~1000m) with stromatolitic build-ups and black shales of BII Group** [2]. Our own and previous sedimentological observations [5] indicate facies ranging from subtidal, low-energy stromatolitic environments to overlying intertidal to supratidal evaporitic settings of lagoon and sabkha.

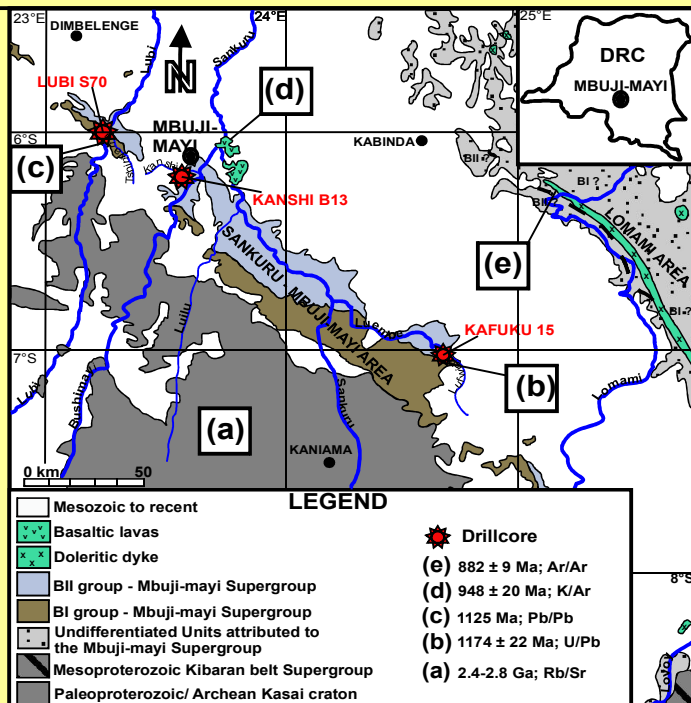


Fig. 1: Geological map of Mbuji-Mayi Supergroup with location of studied drillholes (Lubi, Kanshi, Kafuku), Modified from Delpomdor et al., 2013.

MICROFOSSILS ASSEMBLAGE

The diverse and well-preserved assemblage with 56 distinct taxa containing acritarchs, coccoids and filamentous forms, is similar to other coeval assemblages described worldwide outside of Africa. The presence of the acanthomorph acritarch *Trachyhystichosphaera aimika* is significant as it is indicative of the late Meso- to early Neoproterozoic age elsewhere, and is reported for the first time in Central Africa.



Fig. 2: Some typical species of the Mbuji-Mayi microbiota.

CHEMOSTRATIGRAPHIC FRAMEWORK

Chemostratigraphy based on $\delta^{13}\text{C}_{\text{carb}}$ values for 290 samples, records, for the BI Group, predominantly negative values down to -8 to -9 ‰ VPDB with few samples having more positive, up to $+3$ ‰, values. Although the siliciclastic-rich sediments in the lower part of the BI Group likely record early diagenetic signal, carbonates in the upper part of the BI Group show similar patterns in both the Lubi and Kafuku drill cores with the sharp fall from $+1$ to $+3$ ‰ values to -8 to -7 ‰ and recovery back to $+1$ ‰ values over 40 to 70 m of section. The BII Group shows a less dramatic rise from -1 ‰ to $+4$ to $+5$ ‰ over more than 150 m of section. **These carbon isotopic values variations are similar to those recorded worldwide in strata from late Mesoproterozoic and early Neoproterozoic age** [8, 9].

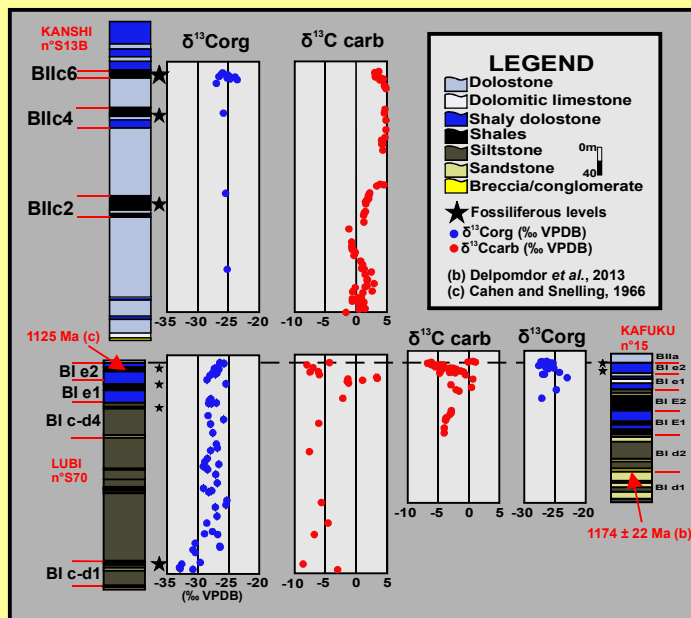


Fig. 3: Lithostratigraphic columns, fossiliferous levels and chemostratigraphic isotope profiles of studied drillholes.

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