Chapter VII: Summary

Chapters III, IV, V and VI are papers published or in press. As such, they include their own relevant discussions and conclusions. This chapter will therefore only summarise the main findings and conclusions developed earlier.

1. The Basement

- Detrital zircons from a Muva quartzite and xenocrystic zircons from a tuffaceous layer from the Katangan sequence showed the existence of a c. 3.2 Ga terrane that we proposed to name Likasi terrane. It is buried under the tectonically thickened northwestern section of the Lufilian Arc (Chapter III) and is presumed to extend towards the northeast to the Kundelungu plateau where diamond-bearing kimberlites contain undated crustal gneiss and mica-schists xenoliths which may be samples of this Likasi terrane. To the southwest, this terrane is inferred to extend at least to the Mwinilunga (northwest Zambia) area where 2.54 Ga granitoid zircons were found to have cores at c. 3.2 Ga.

- The Likasi terrane is inferred to be tectonically accreted to the Congo craton (Chapter III).

- A U-Pb SHRIMP maximum age of deposition of 1941 ± 40 Ma (from detrital zircon) was found for the sedimentary Muva sequence in the Copperbelt (Chapter III).

- Petrology and geochemistry analyses of Lufubu schist samples definitely constrained the nature of these rocks. Whereas they were thought to be sedimentary in origin, they are in fact calc-alkaline

metavolcanic rocks whose precursors range in the domain andesite/ rhyodacite-dacite/ trachyandesite/ alkali basalt (Chapter IV).

- U-Pb SHRIMP analyses on gneisses, granitoids and Lufubu schist samples yielded ages between 2050 Ma and 1850 Ma. They represent stages in the evolution of a magmatic arc or several magmatic arcs that formed episodically over a 200 million year period (Chapter IV).

- These gneisses, granitoids and Lufubu schists define what we propose to name the Metamorphic Lufubu Complex (Chapter IV). This Complex belongs to a more extensive Palaeoproterozoic magmatic arc which stretches from northern Namibia to northern Zambia and the Marungu Plateau of the DRC, the Kamanjab-Bangweulu terrane, which collided with the Archaean Tanzanian craton during the ca. 2.0-1.9 Ga Ubendian orogeny, to produce a new composite minicontinental entity that we term the “Kambantan” terrane.

- The Kambantan terrane was accreted onto the southern margin of the Congo Craton during the Mesoproterozoic ca. 1.4-1.0 Ga Kibaran orogeny. The outboard side of the Kambantan terrane was the site of the ca. 1.05-1.02 Ga Irumide orogeny, caused by the collision of several terranes with the Congo craton.

2. The Katanga Supergroup

- U-Pb SHRIMP analyses on detrital zircons from samples collected at different levels of the stratigraphy showed that the sediments composing the Katangan sequence are derived from erosion mainly from the underlying Lufubu Metamorphic Complex of the Kafue Anticline and the Bangweulu Block. Some minor contributions include

a Neoarchaean component possibly derived from the Kasai craton, as well as a Mesoproterozoic to early Neoproterozoic contribution which may be derived from the Kibaran belt (Chapter V).

- The maximum age of deposition for the Biano Group (uppermost Group of the Katanga Supergroup), established with the ^{40}Ar-^{39}Ar technique on some detrital muscovite, is 573 ± 5 Ma. This age implies a terminal Neoproterozoic and/or early Palaeozoic deposition for the end of the Katangan Supergroup, strongly supporting previous models for the deposition of the Biano Group in a foreland basin of the Lufilian Orogen (Chapter V).

3. Metamorphic events affecting the Lufilian Arc

- Analyses of ^{40}Ar-^{39}Ar on biotite, muscovite and K-feldspar as well as U-Pb SHRIMP analyses on monazites yielded ages at c. 590 Ma, c. 530 Ma, c. 512 Ma and between 490 Ma and 450 Ma (Chapter VI).

- These ages are interpreted as follows (see chapter VI for developments);

    - c. 590 Ma records the timing of a subduction phase in an oceanic environment.
    - c. 530 Ma represents the final stage of collision between the Kalahari and Congo cratons.
    - The c. 512 Ma event seems to be related to a widespread mineralising event.
    - The range 492 Ma to 450 Ma maybe related to a regional uplift and regional cooling in the Copperbelt.

4. Conclusion

Prior to this study, geochronological data constraining the evolution of the Central African Copperbelt were scarce and mainly based on unreliable Rb-Sr ages. This study has shed light on the nature of the pre-Katangan basement, the deposition of the Katanga Supergroup and the metamorphic events which affected it and has yielded unequivocal U-Pb SHRIMP ages constraining the evolution of the Central African Copperbelt in its regional context.