ABSTRACT

This thesis presents the results of a broad geochronological investigation into the nature and evolution of the Central African Copperbelt, host of world class Cu-Co deposits in Zambia and the Democratic Republic of Congo. U-Pb SHRIMP dating of detrital, xenocrystic and magmatic zircons and metamorphic monazite as well as ^{40}Ar-^{39}Ar analyses on biotite, muscovite and microcline constrained the nature and the evolution of the basement, the deposition of the Katangan sedimentary sequence and the provenance of the sediments, and finally the different metamorphic episodes which affected the region.

Regarding the pre-Katangan basement, U-Pb SHRIMP analyses of detrital and xenocrystic zircons revealed the first evidence of a cryptic c. 3.2-3.0 Ga Mesoarchaean terrane, named the Likasi terrane, in the basement of the Copperbelt. It was also discovered that the Lufubu schists, previously thought to be sedimentary in origin, are in fact intermediate metavolcanic rocks. These Lufubu schists, together with granitoids and gneisses from Zambia, yielded U-Pb SHRIMP ages between 2050 Ma and 1850 Ma and are interpreted as being related to the evolution of a large magmatic arc (or several magmatic arcs). These Paleoproterozoic terrains define the Lufubu Metamorphic Complex, which evolved together with the Bangweulu Block, the Ubendian Belt and the Tanzanian craton to collide with the Angola-Kasai craton to form the Kibaran Belt during the 1.4-1.0 Ga Kibaran Orogeny. Unconformably overlying the Lufubu Metamorphic Complex is the Muva Group, which is sedimentary in origin. A maximum U-Pb age of 1941 ± 40 Ma was found for its deposition in the Copperbelt area.

Concerning the Katanga Supergroup, U-Pb SHRIMP analyses on detrital zircons showed that the sediments are mainly derived by erosion from the Paleaoproterozoic basement. ^{40}Ar-^{39}Ar analyses of detrital muscovites from the Biano Group, which forms the topmost unit of the Katanga Supergroup,

yielded a maximum age of deposition of 573 ± 5. This implies a terminal Neoproterozoic and/or early Palaeozoic age for terminal Katangan deposition, and supports previous models for the deposition of the Biano Group in a foreland basin to the Lufilian Orogen .

Finally, U-Pb SHRIMP analyses on monazites and ^{40}Ar-^{39}Ar analyses on biotite, muscovite and K-feldspar yielded ages at c. 590, c. 530, c. 512 and a range between 492 and 450 Ma. These ages correspond respectively to various events during and following the Pan-African Damaran-Lufilian-Zambezi orogeny, formed by collision of the Congo and Kalahari cratons, namely to a tectonic event coinciding with subduction-related eclogite facies metamorphism elsewhere in the Lufilian orogen; to the final stage of collision between the Kalahari and Congo cratons; to a wide-spread regional mineralising event; and finally to post-orogenic uplift and regional cooling.