

Combined U-Pb and Lu-Hf Isotopic Investigation of Zircons from the Regina Pluton, Central Zone of the Limpopo Belt, South Africa

Kirchenbaur, Maria¹ Zeh, Armin² Klemd, Reiner³

¹Universität Bonn, Steinmann Institut, Poppelsdorfer Schloss ²Universität Würzburg, Institut für Geodynamik und Geomaterialforschung, Am Hubland ³Universität Erlangen, GeoZentrum Nordbayern, Fachgruppe Krustendynamik, Schlossgarten 5

The application of the U-Pb and Lu-Hf systems by laser ablation ICP-(MC)-MS on zircons represents a powerful tool to discriminate between different episodes of crust formation and recycling. This is especially important in highly deformed terranes where other isotopic systems tend to be disturbed during metamorphic events.

In the present study 7 samples from a suite of granitoid rocks from the Archean to Proterozoic Central Zone of the Limpopo Belt in South Africa are investigated using LA-ICP-(MC)-MS spot analyses on zircons in combination with the geochemical analyses of the whole rocks.

The granitic to granodioritic and minor trondhjemitic rocks from the investigated Regina Pluton show an identical U-Pb age of ~2.65 Ga, which is considered as the intrusion age of the pluton.

According to the Hf data of the zircons as well as the REE and trace element geochemistry of the whole rocks, two different models can be inferred for the formation of the Regina Pluton.

First, the studied rocks might represent a mixture between a juvenile, depleted-mantle derived melt and Paleoproterozoic crust-derived material.

The second model, which can be deduced from the data obtained in this study involves a pure crust fractionation process taking place at 2.65 Ga caused by partial melting of the 3.28 Ga old Sand River gneiss.

The two different models improve our present knowledge of the crustal evolution of the Limpopo Belt and contribute to a better understanding of the geodynamic processes operating in the late Archean and early Proterozoic.

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