

## Dating the hidden Archaean bedrock of Kimberly South Africa

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We mapped and sampled Archaean granitoids and mafic greenschists exposed in the 750-850m deep bedrock of Kimberley mines. The granitoids are mainly trondhjemites and tonalites (TTG). We dated zircon and monazite by laser ablation ICP quadrupole mass spectrometry.

The mafic sample we investigated is a greenschist facies metamorphic basaltic komatiite. It contains scarce zircons which proved to be a single near-concordant population with weighted mean Pb-Pb age of  $2916 \pm 22$  Ma, supported by a Th-Pb age of  $2917 \pm 73$  Ma. Considering the whole rock concentrations of only 10 ppm Zr and 52% silica, these scarce zircons are most likely xenocrysts. The age either represents that of the country rock through which the magma extruded, or more likely reflects resetting of older xenocrysts within the hot komatiitic basalt magma.

We zircon-dated this  $2956 \pm 24$  Ma tonalite cut by  $1993 \pm 24$  Ma pale granitic veins. They both also contained monazite, yielding  $2856 \pm 21$  Ma and  $1043 \pm 42$  Ma respectively. The 1993 Ma age reflects previously unknown granite generation due to the massive 2 Ga Bushveld (or Vredefort?) thermal event which affected the Kaapvaal Craton. The monazite ages each reflect the first metamorphic event to which their host rocks were exposed. The 1200-1000 Ma Namaqua-Natal Orogeny clearly caused the 1043 Ma metamorphism in the Kaapvaal Craton, also evidenced by an imprecise  $1180 \pm 440$  Ma granitic zircon lead-loss event

We have identified the oldest crust-forming event in the Kimberley Block at 3280 Ma, represented by one trondhjemite magmatic age and a group of xenocrysts. Development of a substantial granite-greenstone terrane is reflected by seven dates covering 150 Ma of magmatic activity between 3019 and 2856 Ma, probably due to subduction with TTG generation, terminated by terrane collision between the Kimberley and Witwatersrand blocks of the Kaapvaal Craton.

