

On the relationship of the Nebo Granite to the Rustenburg Layered Suite, Bushveld Complex

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The world's largest A-type granite (the Nebo Granite), the underlying Rustenburg Layered Suite (RLS), and various granophyre units make up the Bushveld Complex, South Africa. Previous chronology suggests that the Nebo Granite is slightly younger and essentially unrelated to the mafic rocks of the Bushveld Complex. To test this interpretation, we here report on a 60 m thick transition zone between ferrodiorites of the RLS and the overlying Nebo Granite in the Bierkraal drill core, Western Bushveld. Upsection in the transition zone first zircon, then alkali feldspar and finally quartz joins the primocryst assemblage. In the same interval, the total amount of mafic phases decrease from 46 to 12 % as hornblende becomes the dominating mafic phase and olivine and apatite becomes accessory phases. Plagioclase An decreases rapidly but continuously from 40 to 18 through the transition zone before returning to a slow decrease (down to An 11) in the overlying Nebo Granite, ruling out simple fractional crystallization in the transition zone. Accessory olivine (fayalite) and augite and abundant hornblende (ferro-edenite) remains present up through the granite. Preliminary Sr isotope data (measured *in situ* in plagioclase by laser ablation) suggest that the granite and the mafic rocks are isotopically similar. New zircon U-Pb chronology shows that the ages of granite and mafic rocks are indistinguishable at c. 2,055 Ma. Rocks of the transition zone and granite also contain minor amounts of slightly older zircons (all <2065 Ma) that could potentially be interpreted as antecrysts. We interpret the transition zone as a product of continuous mixing between residual RLS magma and a granitic magma. The Nebo Granite is interpreted as having crystallized from a completely homogenized magma resulting from mixing of residual RLS magma and granite magma. The Sr isotopic similarity between the Nebo Granite and the mafic rocks suggests that the RLS residual magma is the main component of the final Nebo Granite magma.