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The Geochemistry and Geochronology of the Barby Formation, Southern Namibia

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Volcanic and sedimentary rocks of the Sinclair Supergroup occur in the Konkiep Terrane of Southern Namibia. Three conformable volcano-sedimentary cycles are recognised. In this work we describe and date volcanic rocks of the Barby Formation, a key unit in the Sinclair area. The rock units in the Barby Formation are basaltic trachyandesites, trachydacites and rhyolites. Based on geochemistry of the rock samples, the bulk of the rocks are calc-alkaline. The plate tectonic setting of the region was an arc, as constrained by high calc-alkaline rocks of the Barby Formation, which suggests that their emplacement was in an active continental margin setting. The Barby Formation rocks contain between 51- 78 wt. % SiO₂ and abundant K₂O. Most of the analysed zircons have two domains and faint oscillatory zonation as distinguished using cathodoluminescent images. The Barby Formation samples record a U-Pb age of 1214 ± 5 Ma. From the same area, the Spes Bona syenite was also dated and records a slightly older age than the Barby Formation, having a U-Pb age of 1217 ± 3 Ma. The coeval Spes Bona syenite and the Barby Formation units have Lu-Hf crustal residence ages between 1682 and 1873 Ma, suggesting the two units were formed from a mixture of younger and older material. Though they have two slightly different U-Pb ages, they are from the same geological environment. The Barby Formation reflects a subduction event which took place during the assembly of the Rodinia supercontinent. Rocks in the area of the Kairab Formation have been dated at 1370 Ma, showing the initiation of the collision event that ended at about 1100 Ma, as evidenced by late granites of the Rooiberg.

