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Dating rocks from the Central Zone, Damara belt, Namibia: Time constraints on orogenic events

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The Central zone (CZ) of the NE-trending Damara belt hosts limited volcanic and abundant granitic rocks. In an area south of Karibib (sCZ & nKZ: northern Khomas zone) the granitoids vary from gabbroic to granitic and syenitic and display variable degrees of tectonic imprinted fabrics. Their chemistry indicates early subduction and mantle source and later collisional and crustal source involvement and approximately 20 varieties, grouped into 16 Suites and units were identified. Intrusive contacts and tectonic fabrics assist in defining the relative timing of magmatism in correlation to the tectonic events. Synsedimentary volcanic units in the Damara Supergroup comprise the Naauwpoort (northern Zone) and Kawakeup metarhyolite and Daheim/Omusema basalt (CZ).

The northern Naauwpoort lava was dated at 752 ± 5 Ma ([1][2]) and the southern Kawakeup at 712 Ma with an metamorphic imprint at 516 Ma [2]. The tuff beds in the Daheim basalt (Ghaub Formation) was dated at 635 Ma [3].

The synorogenic granitoids of the Goas Suite (Neikhoes/Audawib gabbro) were dated at 570 ± 6 Ma [4]. The Okatuwo diorite has an age of 568 ± 3 [4]. The Okatuwo occurs mostly as D1-foliated enclaves in the D2-foliated Okongava "grey" (hornblende diorite) phase with an age of 562 ± 6 Ma [4]. The "leuco"-biotite phase ("leuco"-Okongava) of the Okongava Suite crystallized at 558 ± 5 Ma and cuts across F1 folds, developed a contact migmatite with prominent D2 biotite lineation [2]. The Otjimbingwe Alkaline Complex (Suite) was dated at 546.7 ± 5.5 Ma (Okamutambo body) displaying the nKZ (Hureb forearc basin) D1 foliation and the S2-foliated and folded enclaves west of Otjimbingwe, (541.7 ± 3.5 Ma) in the sCZ.

Younger granitoids comprise medium to small porphyritic to equigranular biotite and biotite–muscovite granodiorite and granites. They include the D3-foliated Kaikop monzodiorite (525.7 ± 5.6 Ma), grey Okamahoro, Quaiputs, Kurikaub (527.5 ± 4.5 Ma), Otjua (530.5 ± 4.6 Ma) and red Ombujondindi (532 ± 7.2 Ma) granites. The Kaikop monzodiorite was affected by multiple shear faulting. The non-foliated Ozombanda (520.9 ± 4.9 Ma) granite cuts the D3- domes and D3-foliated granite. The Elbé granite (at 517 ± 5.6 Ma) is affected by the pronounced sCZ Nomatsaus migmatitization between 517 and 511 Ma. The Okandukaseibe (511 ± 4 Ma) and Donkerhuk (508.6 ± 3 Ma) intrusions ended plutonism in the sCZ.

Conclusions: Felsic rift volcanism on the Congo margin defines a **northern branch** forming at **~750 Ma** and a delayed **southern branch** at **~712 Ma**. Mafic volcanism indicates **onset of drifting** in the southern branch at **~635 Ma**.

Orogenic granitoids and deformation define the tectonic events in the sCZ and across the Okahandja Lineament (OL) as such:

Closing of Khomas ocean; forming of Hureb forearc basin; deformation of Damara sequence on Congo margin, development of S1: **D_{CZ}1: 570-562 Ma**. (Previously ~580-575 Ma. [6]).

Kalahari edge subduction; recumbent D2 folding of continental margin & Damara sequence; upright D1 folds in Hureb forearc basin. **D_{CZ}2 & D_{nKZ}1: 560-540 Ma**. (Previously ~555 Ma. [6]).

Kalahari craton collision: Congo margin doming and continental arc magmatism: southward migration of inclined folding and thrusting in Hureb forearc: **D_{CZ}3 & D_{nKZ}2: 540-525 Ma**. (Previously 542 Ma. [6]).

Post-suture continental arc margin settling and shearing: **sCZ & OLZ dextral shearing: 520-517 Ma**.

Continental arc uplift and relaxation; **sCZ & OLZ anatexis: 517-511 Ma**. (Previously 527-520 Ma. [5]).

sCZ & OLZ boundary post-relaxation intrusions (**Donkerhuk**): **511-508 Ma**. (Previously 520 Ma [6]).

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