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Structural and tectonic evolution of the Buffels River Shear Zone, western Namaqua Sector, Namaqua-Natal Province, South Africa: preliminary studies

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The Namaqua Metamorphic Province (NMP) is a mid- to late- Proterozoic orogenic belt that extends along the south and southwest boundary of the Kaapvaal Craton [2]. The orogenic belt is a structurally controlled belt consisting of metasedimentary and meta-igneous rocks which has experienced metamorphism ranging from greenschist to granulite facies [1]. The NMP can be subdivided into various tectonostratigraphic terranes [1] which were amalgamated during the 1.2-1.0 Ga Namaquan Orogeny [2] namely, the Kheis, Gordonia, Bushmanland and Richtersveld subprovinces, from east to west respectively [1].

The study area focusses on the Buffels River shear zone (BRSZ), located in north-western Namaqualand within the Bushmanland Subprovince (BS) approximately 50km south of the town of Springbok in the NMP of South Africa. It has been described as a boundary between the Okiep and Garies terranes of the BS. The BS consists of mainly granitic orthogneisses and metamorphosed supracrustal rocks [2]. The supracrustal rocks are defined by five main lithologies, namely quartzo-feldspathic paragneisses, metapelitic schists, hercynite-quartz granulites, quartzites and plagioclase-rich calc-silicates lenses [2]. The metamorphic rocks in the BS have undergone metamorphic facies ranging from upper amphibolite to upper granulite facies [2].

The aim of the study is to map the structural features of the BRSZ. This also includes determining whether the BRSZ represents a terrane boundary between the Okiep and Garies terranes or whether it simply represents a structural feature located in the Okiep terrane. A description of the lithological units along the BRSZ will be done in order to determine the structural evolution of the shear zone. Field work, undertaken during 2015, involved describing the lithostratigraphy and determining the metamorphic grade. Structural features were mapped by means of measurements taken in the field in order to visualise the structural development of the BRSZ. Geological and structural mapping combined with sampling for lithogeochemical analysis and isotopic investigations was also undertaken.

According to previous research many workers have described the BRSZ as likely only being a structural feature located within the Okiep terrane and not as a terrane boundary, but the question remains as to where the terrane boundary is located and as to the exact nature and origin of the rocks along and adjacent to the shear zone. This study will contribute to help addressing the disagreement amongst workers in the area.

Structural measurements, which include that of foliations and lineations, show that the shear zone has an overall ENE-WSW orientation with some evidence of a dextral sense of shear along the shear zone. Sheath folds, which represent type 1 fold interference patterns, are present within the shear zone and indicate that the deformation occurred under high strain conditions. The lithologies mapped within the shear zone are streaky biotite gneiss, leucocratic gneiss, schist, metasedimentary rocks, streaky augen

gneiss, mafic amphibolite gneiss, amphibolite biotite gneiss, and mafic rafts (thought to be of sedimentary origin) orientated in an ENE-WSW direction.

References:

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