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The late-Namaqua Sperlingsputs Shear Zone System, Haib region, southern Namibia

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The Richtersveld Magmatic Arc (RMA) forms a major ~200km wide Palaeoproterozoic block within the Mesoproterozoic Namaqua Metamorphic Province (NMP). The RMA consist of rafts of Orange River Group volcanic rocks intruded by voluminous coeval Violsdrif Suite granitoids (1905-1865 Ma, [1]). The RMA is further subdivided into two domains with equivalent stratigraphic units but different metamorphic grade and deformation. In the W are low grade greenschist-facies rocks affected only by D1 which have been termed the Violsdrif Domain. These rocks are separated by a ~2 km wide gradational transition zone (previously termed the Namaqua Front [2]) from the amphibolite-facies Pella Domain in the NE. The Pella Domain is strongly transposed by the main ductile D₂ phase of the Namaqua Orogeny at ~1215Ma [1, 2]. As part of a regional scale mapping program by the Namibian Geological Survey and the Council for Geoscience [1], the Namaqua Front has been re-examined and redefined. The Namaqua Front in fact coincides with the northern margin of a ~15 km deformation zone termed the Sperlingsputs Shear Zone System (SPSZS). The SPSZS consists of five main WNW-trending, steeply dipping shear zones that cross-cut the Violsdrif Domain and truncate the Haib porphyry Cu deposit. Collectively the SPSZS represents an anastomosing zone of deformation that mainly follows the less competent Orange River Group volcanic rocks which are sheared into fissile cataclasites and mylonites and wrap around largely unsheared blocks of bedded lava and, more often, granitoids of the Violsdrif Suite. The northernmost shear zone reworks the southern boundary of the Namaqua Front and cross-cuts the penetrative Pella Domain fabrics and structures, and thus post-dates D₂. The rocks on the north of the northernmost shear zone have a gneissic and schistose texture, with an overall mid to upper amphibolite-facies mineral assemblage, whilst those on the south of the northernmost shear zone, are

weakly deformed with a lower greenschist-facies mineral assemblage. The dominant steeply south plunging lineation along with various shear sense indicators suggest a significant vertical component to the shear with an overall top to the north sense of movement. However in some areas, the shear zones are accompanied by the development of a sub-horizontal lineation with a dextral sense of movement suggesting a transpression regime. The SSZS is intruded by pegmatite dykes and large plugs, both deformed and undeformed, which suggests intrusion during and soon after shearing - a relationship similar to that in other large shear zones in the area (Marshall Rocks-Pofadder Shear Zone (MRPSZ), Eureka shear Zone(ESZ)). Assuming that these pegmatites are equivalent to those in other parts of the Pella Domain (MRPSZ and ESZ), the SPSZS developed during the late Namaqua D₄-dextral shearing event between ca. 1005 and 950 Ma, together with the also NW-trending Marshall Rocks-Pofadder and Eureka Shear Zones [3].

[1] Macey, PH., et al. 2015. The Precambrian Geology of the 2818 Warmbad sheet, southern Namibia. An explanation to 1:50 000 geological map sheets, unpublished report. Council for Geoscience, South Africa.

[2] Blignault, H.J., Van Aswegen, G., Van Der Merwe, S.W., Colliston, W.P., 1983. Geol. Soc. South Africa, Spec. Publ. 10, 1–29.

[3] Lambert, C. W. 2013. Unpubl. MSc Thesis. University of Stellenbosch, 140pp.

