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Note: Proposed lithostratigraphic subdivision of the Ugab Subgroup (Damara Sequence) in Kaokoland, Namibia

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Introduction

The Upper Proterozoic Damara Sequence is well exposed in Kaokoland in the remote northwestern area of Namibia. Geological mapping is only available on a small scale (unpublished 1 :250 000 provisional geological compilations for Open File of the Geological Survey of Namibia:- 1712 Swartbooisdrif (1968); 1812 Ohopoho (1968), 1912 Sesfontein (1968), 1:1 000 000 scale Geological Map of South West Africa/Namibia (1965, 1980); 1:100 000 scale, Guj (1970); Hedberg (1979); 1 :500000 scale, Miller and Grote (1988)). Kaokoland has recently become the focus of mineral exploration activities, and Tsongoari Exploration (Pty) Ltd have mapped in detail the area around the Tsongoari Pb-Zn-Cu occurrence (E & MJ, December 1990). The deposit is hosted by rocks of the Ugab Subgroup of the Damara Sequence. The U gab Subgroup comprises a wide variety of rock types, and SACS (1980) proposed the formal term Mudorib Formation (after the Mudorib River 45 km southwest of Sesfontein) to encompass these. We believe, however, that the Mudorib Formation is not useful for detailed mapping because it is too broadly defined. Tsongoari Exploration (Pty) Ltd have divided the Ugab Subgroup into distinct mappable units which are bounded by unconformities or paraconformities.

Proposed stratigraphic subdivision of the Ugab Subgroup

A complete succession through the Ugab Subgroup rocks crops out in the area around the Tsongoari base metal occurrence (Fig. 1). The area has been mapped on a 1 : 10 000 scale by Tsongoari Exploration (Pty) Ltd using the stratigraphic subdivisions shown in Figure 2. The formation names were chosen from the available place names on the 1 : 50 000 topographic maps. Type sections for the individual formations are therefore not necessarily exactly at the locality indicated on Figure 1. Formal descriptions of the type sections are in preparation.

The Ugab Subgroup is para-conformably developed on Nosib Group metapsammites, meta-arkoses and conglomerates. The Nosib Group is highly variable in thickness due to irregular Pre-Damaran basement topography and pre-Swakop Group erosion. Frets (1969), Guj (1970) and Hedberg (1979) have reported an unconformity between the Nosib Group and the Swakop Group in northwestern Namibia.

At Tsongoari the Ugab Subgroup is para-conformably overlain by diamictites and iron formations of the Chuos Formation (Khomas Subgroup). Dropstones, found within the iron formations, indicate a glaciogenic origin for the Chuos Formation, similar to that in the Central Zone of the inland branch of the Damara Orogen (Henry *et al.*, 1986; Badenhorst, 1988).

Omuhiva Formation

This formation consists mostly of pelite with subordinate carbonate intercalations several centimetres thick towards the base. A carbonate bed up to 1.5 m thick is developed extensively at, or immediately above, the Nosib Group contact.

The Basal Carbonate Member occasionally has an associated iron formation. Conglomerates are locally developed towards the middle of the formation. The formation becomes less pelitic and more psammitic towards the upper contact, and the thickness ranges from 40 m to 450 m, averaging 300 m. Occasionally preserved wave ripples, the overall fine-grained nature of the sediments and the presence of thin carbonates suggest deposition in a playa lacustrine or shallow marine setting.

Outuwo Formation

This formation comprises mostly clean orthoquartzite with minor arkosic psammite. Small-pebble to pebble conglomerates are commonly developed at the top.

The thickness varies from 1 m to 700 m, averaging about 300 m. Locally well-preserved trough and planar tabular crossbedding and the mineralogical maturity of the ortho-quartzites suggest a shallow marine depositional environment. Large scale crossbedding (up to 2 m) is interpreted as coastal aeolian dune bedding.

Okarondokavi Formation

The Okarondokavi Formation is mainly composed of interbedded pelites and psammites with thin carbonate lenses present near the base. A thick and persistent conglomerate marks the base of the unit. Psammites and pelites are intercalated above the conglomerate. Locally the formation is cut out completely below the overlying Otjorongwari Formation. A typical thickness of the formation is about 130 m. Locally developed graded

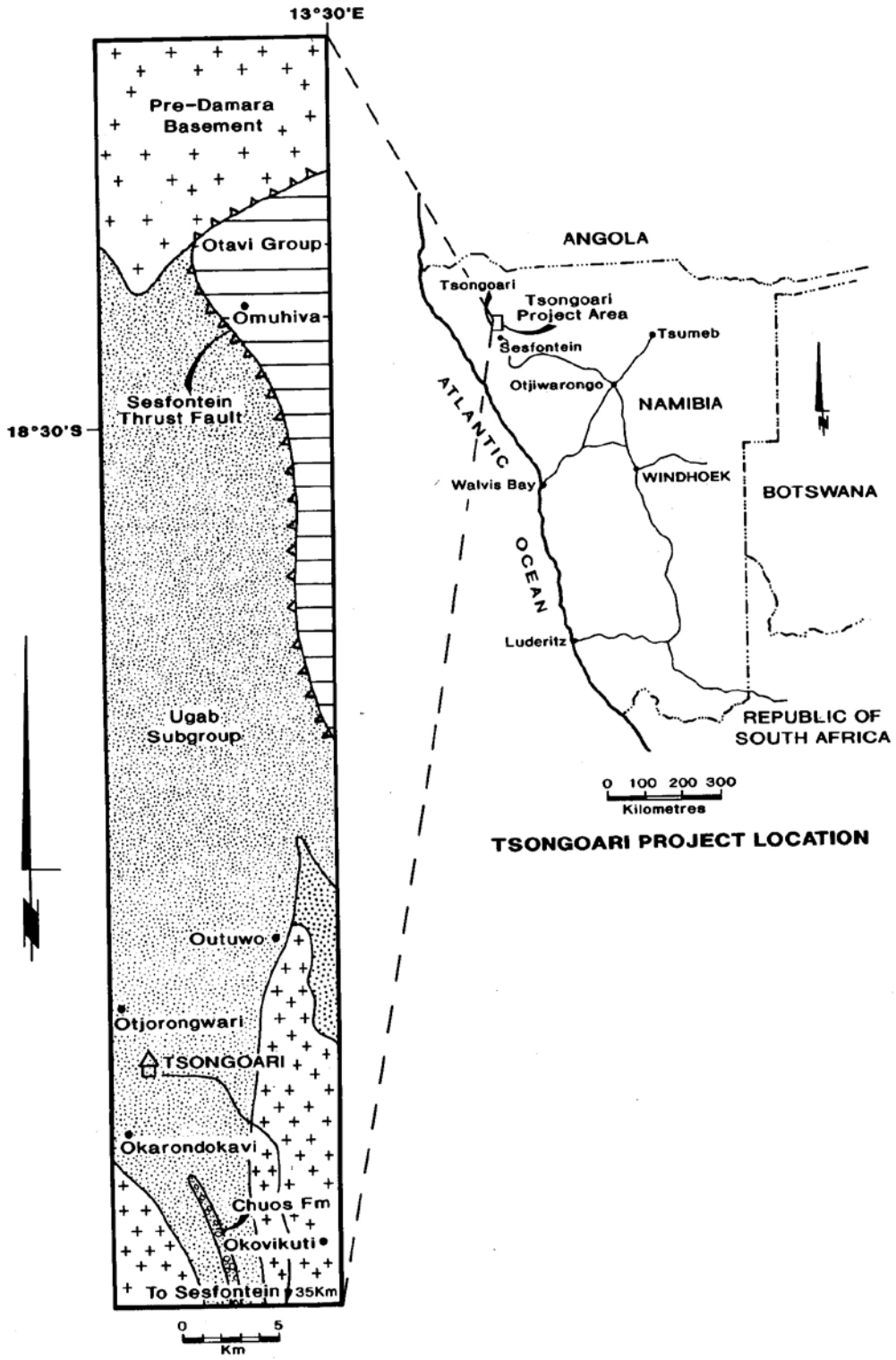
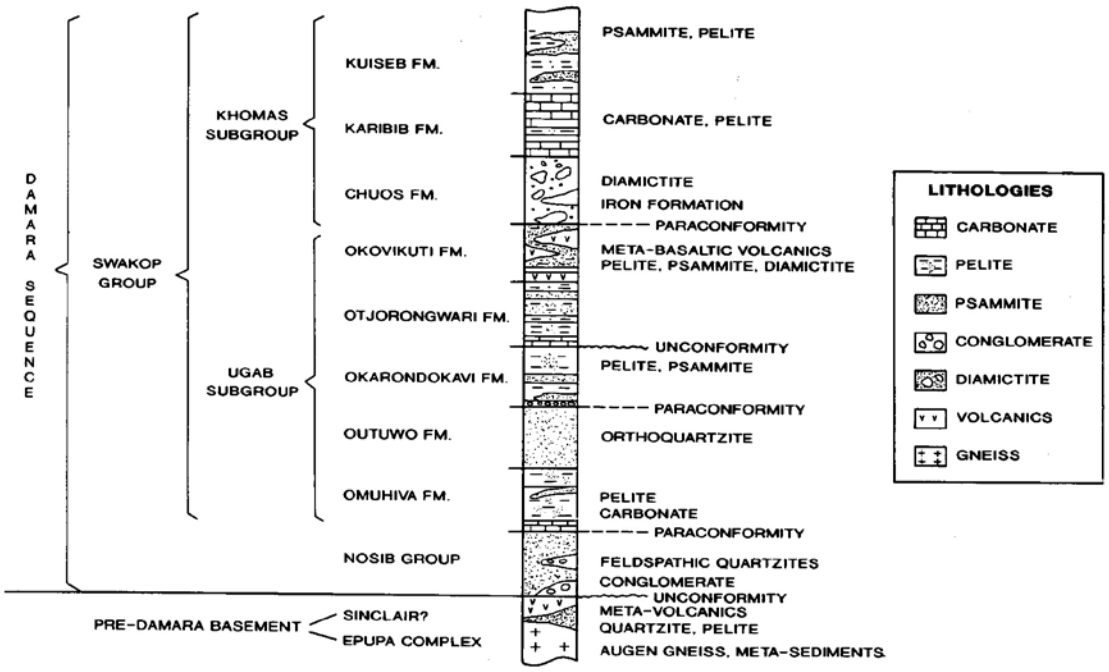


Figure 1: Outline of the Tsongoari Grant area of Tsongoari Exploration (Pty) Ltd showing localities mentioned in text. The geology is modified from the 1:1 000 000 Geological Map of South West Africa/Namibia (1980)



GENERALISED STRATIGRAPHIC COLUMN OF THE DAMARA SEQUENCE

Figure 2: Lithostratigraphy of the Damara Sequence in the Tsongoari area showing the proposed subdivision of the Ugab Subgroup

bedding in the psammites is interpreted as turbiditic in origin, and suggests marine deposition.

Otjorongwari Formation

The Otjorongwari Formation comprises mainly pelites and psammites with several thin, but laterally continuous, carbonate beds and minor iron formations and amphibolites. The Lower Dolomite Member is commonly developed at the base of the Formation on an unconformity. The thickness of the Formation ranges from 70 m to 450 m, with an average of 280 m in the Tsongoari area. About 15 km northeast of Tsongoari a section of thickly- and thinly-bedded, graded psammites intercalated with thin pelitic beds is interpreted as a turbidite sequence.

Preliminary facies analysis indicates thickening- and thinning-upward cycles suggestive of submarine turbidite fan deposition.

Okovikuti Formation

The Okovikuti Formation is composed of a thick sequence of amphibolites and amphibole schists (metabasalts), with interbedded carbonates, pelites (locally graphitic), psammites and locally developed diamictites. The thickness of the Formation varies from 180 m to 1100 m, averaging about 440 m at Tsongoari. Major and trace element geochemical plots indicate a within-plate alkaline signature for the basalts. The graphitic schists suggest a comparatively deep marine environment of deposition and the diamictites are interpreted as debris-flow deposits.

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