Project 3.7: Palaeoproterozoic terrane assembly in the Lewisian Gneiss Complex of northwest Scotland: evidence from SHRIMP U-Pb zircon and titanite analyses

Project Co-ordinators: Peter Kinny

Aims:

SHRIMP U-–Pb dating of gneisses from the Lewisian Gneiss Complex has been undertaken in order to determine the tectonic architecture and history of assembly of the complex, which our work has shown to comprise an amalgamated series of Archaean and Palaeoproterozoic terrane remnants [TSRC Publication # 146].

Progress:

Dr Pete Kinny, Dr Gary Love and British collaborator Dr Clark Friend have completed a major synthesis of the tectonic architecture of the Lewisian Gneiss Complex, based on all data obtained thus far [TSRC publication # 296], plus a detailed paper on the Assynt and Gruinard terranes [TSRC publication # 219]. A discussion paper on our terrane model by Professor Graham Park, and a reply by Kinny et al., are in press (J. Geol. Soc. London). Up to ten individual terranes have now been identified within the complex, each with distinct ages of protolith formation and unique metamorphic histories. This project has shown that amalgamation of the complex occurred episodically during the Palaeoproterozoic, involving both evolved Archaean crustal blocks and juvenile Proterozoic terranes of arc-like affinities. Terrane assembly was essentially completed by 1670 Ma ago. A paper on Lewisian-age basement inliers within the Moine Supergroup is currently in preparation, and Dr Kinny will undertake further fieldwork in northern Scotland, Shetland and the Outer Hebrides, in 2005.

Participants: Pete Kinny, Gary Love, Clark Friend

Project 3.8: Pre-Gondwanan Supercontinents and West Africa

Project Co-ordinator: B. De Waele

Aims:

The West African Craton comprises two main crustal blocks, the Reguibat Shield in the North, and the Leo Shield in the

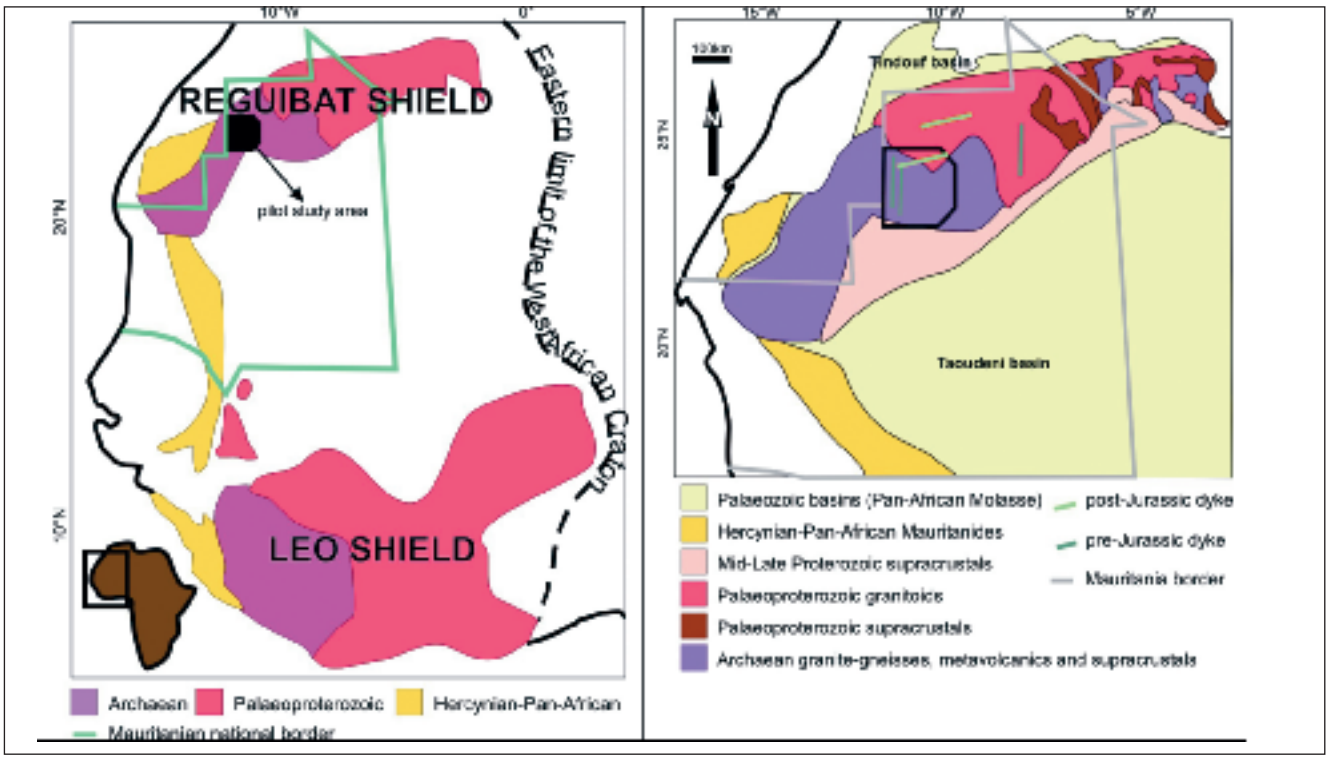

Figure 1: An overview of the West African Craton (left); Generalised map of the Reguibat Shield in northern Mauretania (right)

South, which each consist of a western Archaean domain, and an eastern Palaeoproterozoic domain (Rocci et al., 1991; Pique, 2001)(Figure 3.2). The craton is considered to have stabilised during Eburnian magmatic events (ca. 2.2-1.8 Ga)(Clifford, 1966; Rocci et al., 1991; Villeneuve and Cornée, 1994), in a time of widespread worldwide magmatism and cratonisation linked to the formation of the postulated supercontinent, Columbia (Meert, 2002; Pesonen et al., 2003). However, the details of the craton's involvement in pre-Gondwanan supercontinents is poorly constrained. The proposed research will concentrate on the detailed study and geochronology of samples collected in the Reguibat Shield of northern Mauritania which have yielded reliable preliminary palaeomagnetic data, using Ar-Ar geochronology with the aim of yielding a time constraint for the obtained preliminary poles of the West African craton.

Research Plan, Methods and Techniques:

Preliminary work on a small sample set of dykes and country rock from the Reguibat Shield in northern Mauritania has shown the existence of two main magnetic directions (De Waele and Pisarevsky, unpublished data, see location of pilot study area on Figure 1). However, the analysed dykes are yet to be dated. Dating will be conducted at the Ar-Ar facilities of Curtin University of Technology, on suitable minerals from the analysed samples. Detailed work on the magnetic minerals will be conducted, including the study of polished and thin sections on both optical and electron microscopes, in an attempt to decide whether the magnetic remanence obtained from the samples are primary or secondary.

Plans for 2005:

A reliable age constraint, together with the detailed petrographic work, will enable us to obtain a preliminary, testable set of palaeomagnetic poles for the Reguibat Shield of the West Africa craton. Although the number of sites included in the study is too few to allow the calculation of a good pole, the data will indicate whether the N Mauritanian dykes provide a suitable target for an in depth study of the Reguibat Shield in the future.

Participants: Dr B. De Waele (TSRC), Dr. S. Pisarevsky (TSRC), Mr. A.F. Wilkinson (International Mining Consultants), Mr. E. Limam (Office Mauritanien de Récherches Géologiques).

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Project 4.2: ERAS – Earth's Accretionary Systems in space and time

Project Co-ordinator: Peter Cawood

Aims:

Classic orogens involve a Wilson cycle of ocean opening and closing, culminating in continental collision. However, this