



# Lithostratigraphy of the Friersdale Charnockite (Keimoes Suite), South Africa

**C.W. Lambert, P.H. Macey and S. Doggart**

Council for Geoscience, PO Box 572, Bellville, 7535, South Africa

e-mail: clambert@geoscience.org.za; pmacey@geoscience.org.za; doggartshane@gmail.com

**S.S. Nethenzheni and R.H. Bailie**

University of the Western Cape, South Africa

e-mail: shane.sedzani@gmail.com; rbailie@uwc.ac.za

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## Abstract

The Friersdale Charnockite is a late-Mesoproterozoic ( $1078 \pm 10$  Ma), fine- to medium-grained to porphyritic orthopyroxene-bearing monzogranite intrusion with characteristic opalescent quartz that outcrops in the Keimoes-Upington region of the Northern Cape, South Africa. The weakly to undeformed, northwest-southeast trending granitoid body represents the most extensive member of the Keimoes Suite and intruded across the tectonic boundary between the granulite facies Kakamas and Areachap Terranes of the Namaqua-Natal Metamorphic Province during the final stages of the main Namaqua orogeny. The Friersdale Charnockite is a metaluminous, ferrous and potassic monzogranite with major, trace, REE and isotope chemistries suggesting a mixed crustal source with significant input from both Paleoproterozoic- and Mesoproterozoic-aged source regions.

## Introduction

The Friersdale Charnockite occurs as large, unfoliated to weakly foliated, orthopyroxene-bearing granite intrusions in the Keimoes region in the Northern Cape, South Africa (Figures 1 and 2). It has traditionally been included in the granitic Keimoes Suite (SACS, 1980 and references therein) which forms a north-northwest-trending line intruding the Kakamas and Areachap Terranes in the Namaqua sector of the Mesoproterozoic Namaqua-Natal Province (Figures 1 and 2).

The charnockitic rocks derive their name from the Friersdale missionary settlement where the unit was first described by Poldervaart and Von Backström (1950) and was named Charnockitic Adamellite Porphyry by Von Backström (1964). Geringer (1973) and Geringer et al. (1988) named the granite the Friersdale Charnockite Granite and SACS (1980) shortened the name to Friersdale Charnockite. It has since been mapped by Stowe (1983) and Moen (2007) and has formed the subject of petrological and isotopic studies by Pettersson et al. (2007, 2009), Pettersson (2008), Bailie et al. (2011, in prep), Cornell and Pettersson, (2007); Cornell et al. (2009, 2012) and Nethenzheni (2016).

## Type area

Fresh, well exposed outcrops are found at the Friersdale Quarry ( $28.7560^{\circ}\text{S}$ ,  $20.8153^{\circ}\text{E}$ ) and intermittently along the N14 national route between the Friersdale Mission and the Warmsand settlement (Figure 2).

## Stratigraphic position and age

The relatively undeformed Friersdale Charnockite, one of the youngest members of the Keimoes Suite (SACS, 1980; Moen, 2007), intruded older foliated gneisses at the end of the main regional Namaqua orogeny.

The Keimoes Suite was originally defined by SACS (1980) as a spatially associated group of variably deformed and undeformed biotite, biotite-hornblende and orthopyroxene-bearing granitoids that intruded the granulite facies rocks of the Kakamas and Areachap Terranes and the terrane boundary separating them (Boven Rugzeer Shear Zone; Figures 1 and 2)