Journal of African Earth Sciences 114 (2016) 158–173

Contents lists available at ScienceDirect

Journal of African Earth Sciences

journal homepage: www.elsevier.com/locate/jafrearsci

# Paleoproterozoic structural frame of the Yetti domain (Eglab shield, Algeria): Emplacement conditions of the Tinguicht late pluton from magnetic fabric study

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ARTICLE INFO

*Article history:*
Received 4 July 2015
Received in revised form
6 November 2015
Accepted 23 November 2015
Available online 28 November 2015

*Keywords:*
Plutons
Yetti-Eglab shield
West African Craton
Paleoproterozoic
AMS
Emplacement
Shear zones

ABSTRACT

The Tinguicht pluton is part of the ~2.07 Ga post-collisional magmatic suites that intruded the Yetti Paleoproterozoic volcano-sedimentary series of the western part of the Eglab Shield (West African Craton). It represents one of the most recent units of these suites. This pluton, with a NW–SE elliptic shape, is unfoliated, and its deformational structures are practically restricted to fracturing and faulting. New structural, microstructural and aeromagnetic data are presented in order to analyze in particular the relationship between the Tinguicht pluton emplacement and the related NNW-SSE major mega-shear zone, separating the Yetti and Eglab domains. To constrain the context of the regional post-collisional evolution of the Eglab shield, a structural analysis was performed by mapping the magnetic structures (foliation and lineation) using AMS. The combination of the results of all the used approaches leads to a new and enriched image of this granitic pluton and of its tectonic emplacement context. The elliptic shape of the granitic body and the AMS strain pattern are consistent with the presence of a NNW-SSE major structure. NNW-SSE is also one of the major directions highlighted by the aeromagnetic data. This study thus evidences the role of the pre-existing major shear zones in controlling emplacement of post-collisional Paleoproterozoic plutons like Tinguicht, as shown for Drissa pluton in the Eglab domain earlier.



## 1. Introduction

In major shields, it is generally very difficult to determine the post-paroxysmal tectonics structural evolution. The available geological objects for such studies are mostly late intrusions, often without clear visible deformation markers. To analyze the structure of such rocks, the best and powerful approach is based on the anisotropy of magnetic susceptibility (AMS) method (e.g. Hrouda, 1982; Tarling and Hrouda, 1993; Borradaile and Henry, 1997; Borradaile and Jackson, 2004). However, the magnetic fabric data from plutons is sometimes difficult to interpret and can even be in some cases subject of controversy. The measured magnetic fabric of sedimentary, volcanic and metamorphic rocks can easily be compared to visible structures like stratification, flow and dyke planes, foliation and lineation. Often, magmatic foliation and/or lineation cannot be clearly specified in large apparently undeformed plutons. The single available structural indication is generally the contact with host-rocks, however rarely observable and difficult to specify in space.

In the Reguibat Rise (northern part of the West African Craton), the last major Paleoproterozoic magmatic events, are represented by the Aftout granitoids (Rocci, 1957, 1972; Buffière et al., 1965a,b; Buffière, 1966; Sabaté and Lomax, 1975; Kahoui, 1988; Kahoui and Mahdjoub, 2004; Peucat et al., 2005). These High-K calc-alkaline rocks form large batholiths where alkaline granites compose a great number of small-sized intrusions (Rocci et al., 1991). The Eglab shield (Eastern part of the Reguibat rise) is formed by two main domains; Eglab and Yetti. The previous study (Merabet et al., 2014)

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http://dx.doi.org/10.1016/j.jafrearsci.2015.11.018
1464-343X/

of the Drissa post-collisional pluton in the Eglab domain evidenced the role of major shear zones during this period, leading to the opening of a new page of the structural evolution in the Reguibat rise. In the Yetti domain, the Tinguicht pluton is one of the post-collisional granite and represents an equivalent to Drissa. Because of its particular tectonic position along the structural limit zone that separates Yetti and Eglab domains, this pluton has been chosen as a target for this multidisciplinary study (field structural observations, aeromagnetism and anisotropy of magnetic susceptibility). The aim of this study was to have a new understanding of the emplacement conditions of Tinguicht granite and therefore of the geological context during the post-paroxysmal period in the Reguibat rise.

## 2. Geological setting

The Tinguicht pluton, belonging to Eglab shield (Figs. 1 and 2), is located along the suture zone that separated two domains differing by their structural, lithological, stratigraphic and metamorphic features: the Yetti and the Eglab domains respectively to the west and the east, both cross-cut by different granitoids (Buffière et al., 1965a, b). The northern and southern parts of the shield are overlain by the Paleozoic Tindouf and Taoudeni basins (Figs. 1 and 2).

According to Peucat et al., 2005, the "collage" of the Yetti domain onto the Eglab domain, ca. 2.09 Ga, would have produced uplift, leading to crust–mantle delamination and slab rollback. The upwelling of hot asthenospheric mantle produced partial melting of fertile sources in the Yetti and Eglab terranes to produce a large amount of post-orogenic magmas (Aftout and Eglab) during a wide-spread rifting stage at 2.07 Ga.

On geological maps (Figs. 1 and 2), the western part of Eglab domain that out-crops along suture area, is composed by the Bled M'Dena early Eburnean gneisses and amphibolites (ca. 2.18–2.15 Ga, De Wit et al., 2002). It was attributed to LRC (Lower Reguibat Complex, Buffière et al., 1965a, b) and overlain by the Akilet Deilel volcano-sedimentary formations (Sabaté, 1972, 1973, 1978, 1979; Sabaté and Lomax, 1975). The Akilet Deilel series (ca. 2.09 Ga), equivalent to Oued Souss series of Buffière et al., 1965a, b, consist predominantly of low grade metamorphic volcanic (andesites, dacites and rhyolites), detrital sediments (conglomerates and quartzites) and greso-pelitic and interbedded calcareous formations.

To the west of the suture zone, the Yetti domain (Fig. 2) is mainly composed of low grade metamorphic volcano-sedimentary series (Yetti series of Buffière et al., 1965a, 1965b; Buffière, 1966; Lasserre et al., 1970). Biotite can be found close to the Tinguicht intrusion. The Yetti series constituting an envelope of a migmatitic dome (Kahoui et al., 2008). In the Eglab and Yetti domains (Figs. 1 and 2), ductile deformations, coeval with low metamorphic conditions (prehnite ± chloride ± actinolite), are located along the collage zone and define a mega shear zone (Chegga shear zone). The latter are assumed to be due to a near E–W oblique convergence (ca. 2.09 Ga) between Eglab and Yetti terranes (Kahoui et al., 2008). The Tinguicht area corresponds to the north-western part of the Chegga mega shear zone (Fig. 1).

Deformations recognized in the Bled M'Dena gneisses (Fig. 2)

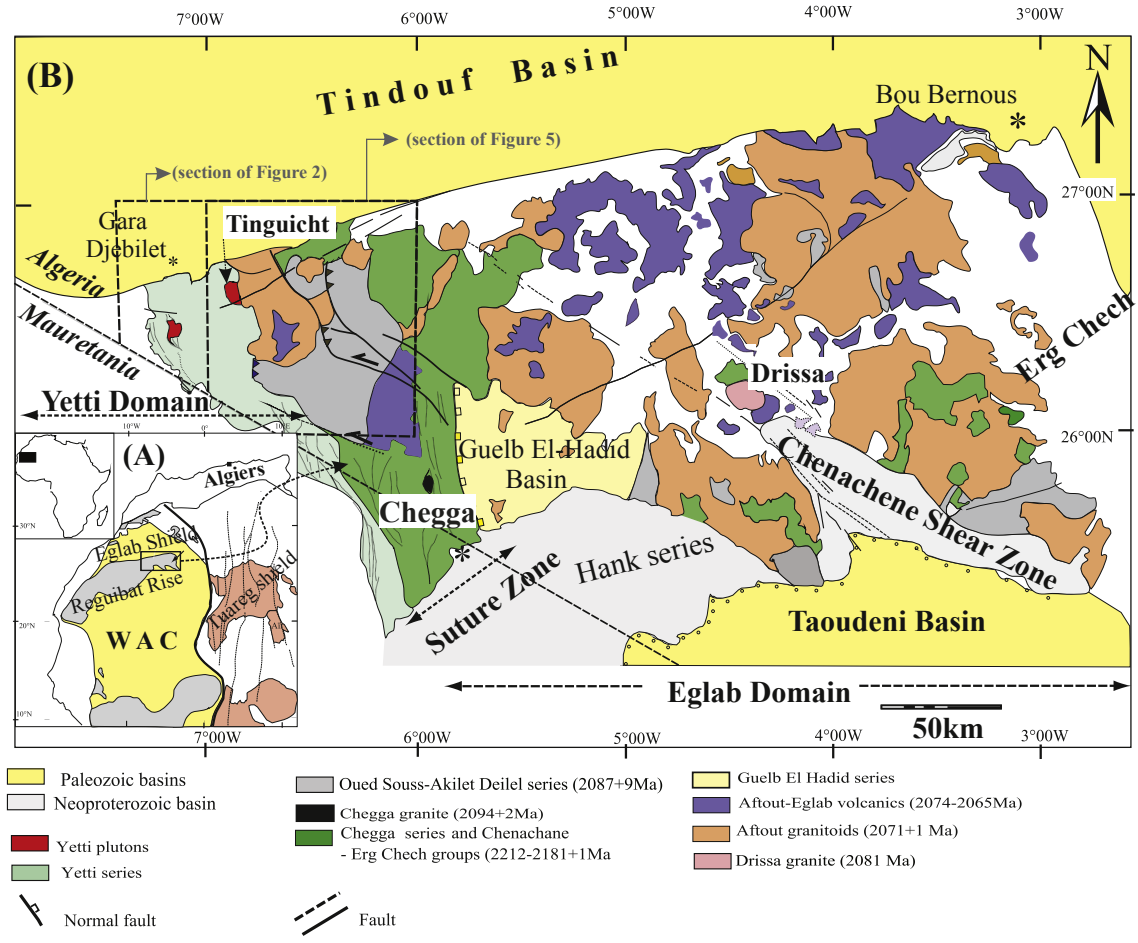


**Fig. 1.** (a) The Eglab shield in the West Africa craton (WAC). b) Geological sketch map of the Yetti-Eglab shields (Modified from Peucat et al., 2005).