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Evidence of a Paleoproterozoic basement in the Moroccan Variscan Belt (Rehamna Massif, Western Meseta)

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ABSTRACT

For the first time, an Eburnian magmatic event has been identified in the Rehamna Massif (Moroccan Variscan Belt, Western Meseta) located north of the South Meseta fault. The best estimate of the crystallization age of rhyolitic porphyry is given by a weighted mean $^{207}Pb/^{206}Pb$ age of 2050.6 ± 3 Ma (Rhyacian-Orosirian). The new U–Pb age obtained for rhyolitic porphyry from the Rehamna Massif is of great relevance for improving geological knowledge about the boundaries of the WAC because: (i) it overlaps the older Eburnian magmatic event described in the Anti-Atlas belt and the Icartian magmatic event of the European Variscan Belt; (ii) this suggests that exists Paleoproterozoic basement in the Western Meseta, a hundred kilometers further to the north of the South Meseta fault, as old continental crust slivers preserved in the Cadomian and Variscan belts; and (iii) this means that the Cambrian transgression in the Western Meseta probably took place based on a more complex structural architecture affecting the Precambrian basement composed not only of Ediacaran rocks, as has been suggested in the literature, but also with Paleoproterozoic rocks (ca. 2.05 Ga) as discovered in this study.

1. Introduction

The oldest segment of Precambrian crust of NW Africa (Fig. 1) is well represented in northern areas of the West African craton (WAC): (i) the Reguibat shield, which includes Archean and Paleoproterozoic basement rocks (Schofield et al., 2006; Key et al., 2008), and (ii) the Anti-Atlas belt with Paleoproterozoic basement rocks (Walsh et al., 2002; Thomas et al., 2004; Barbey et al., 2004). It is well known that northern areas of the WAC present fewer large mineral deposits with economic potential (e.g. Wright et al., 1985; Ennih and Liégeois, 2008). The Paleoproterozoic rocks of the Reguibat shield have been the subject of mineral prospecting because they probably include enigmatic primary sources of a diamond-bearing Reggane placer deposit located at the boundary of the WAC (Kahoui et al., 2008). In the Anti-Atlas belt there are Au-quartz veins related to a Paleozoic hydrothermal event which are emplaced in Paleoproterozoic basement rocks of the Tagragra d'Akka and Kerdous Inliers (Gasquet et al., 2004). The interest in the identification of new outcrops of Paleoproterozoic basement for extending the potential for the exploitation of mineral resources is in keeping with the overall aim of West Africa Exploration Initiative.

The geodynamic evolution of the WAC during the Paleoproterozoic is marked by several magmatic events related to the Eburnian-Birimian cycle (ca. 2.2–1.75 Ga; Abouchami et al., 1990; Boher et al., 1992; Egal et al., 2002; Schofield et al., 2006; Youbi et al., 2012). In the Eglab Massif, which represents the easternmost part of the Reguibat shield in Algeria, three magmatic pulses have been identified (Peucat et al., 2005) (Fig. 1): (i) orogenic magmatic suites emplaced at ca. 2.2 Ga that are associated with some 2.7 Ga-old relics of Archean crust; (ii) orogenic magmatic suites emplaced and deformed at 2.09 Ga; and (iii) post-orogenic magmatism dated at 2.07 Ga. In the Anti-Atlas there is a widespread magmatic event dominated by granites dated at ca. 2.05–2.03 Ga (Gasquet et al., 2001a,b; Chalot-Prat et al., 2001; Thomas et al., 2002; Walsh et al., 2002; Barbey et al., 2004). Recently, basic dykes from the Tagragra of Akka, Kerdous, Zenaga, Iguerda and Ait Melloul inliers have been dated, yielding a wide range of ages clustered at ca. 2 Ga, ca. 1.75 Ga and ca. 1.65 Ga (U–Pb baddeleyite and zircon; Youbi et al.,

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