

Precambrian Large Igneous Provinces of Morocco: The record preserved in regional dyke swarms

Nasrddine Youbi^{1,2,*}, Richard E. Ernst^{3,4}, Ulf Söderlund^{5,6}, Moulay Ahmed Boumehdi¹, Mohamed Khalil Bensalah¹, Moha Ikenne⁷, Abdelhak Ait Lahna¹, Colombo Celso Gaeta Tassinari⁸, Warda El Moume¹, Abdelhafed Barzouk¹

¹Department of Geology, Faculty of Sciences-Semlalia, Cadi Ayyad University, Prince Moulay Abdellah Boulevard, PO Box 2390, Marrakech, Morocco, ²Instituto Dom Luiz, Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa, Portugal, ³Department of Earth Sciences, Carleton University, 1125 Colonel By Drive, Ottawa, K1S 5B6 Canada, ⁴Faculty of Geology and Geography, Tomsk State University, 36 Lenin Ave, Tomsk 634050, Russia, ⁵Department of Geology, Lund University, Sölvegatan 12, SE-223 62 Lund, Sweden, ⁶The Swedish Museum of Natural History, SE-114 18 Stockholm, Sweden, ⁷Department of Geology, Faculty of Sciences, Ibnou Zohr University, PO Box 28/S, Agadir, Morocco, ⁸Centro de Pesquisas Geocronológicas (CPGeo), Instituto de Geociências (IG), Universidade de São Paulo-USP, Caixa Postal 11348, CEP 05422-970, São Paulo (SP), Brazil

*E-mail : youbi@uca.ac.ma

Morocco hosts a Dyke Swarm Bonanza! Remarkable mafic dyke and sill swarms (plumbing systems of Large Igneous Provinces, LIPs) have been recognized in the Sahara and in most inliers in the Anti-Atlas of southern Morocco. In the Sahara, numerous mafic dyke swarms with various trends are found in the southwestern and oldest portion of the Reguibat Shield, of the West African craton (WAC). An Archean age of 2688 ± 3 Ma (U-Pb baddeleyite) was obtained for a member of the plagioclase phenocryst-bearing, NW-trending Aousserd-Tichla swarm (Söderlund et al., 2013, Youbi et al., in progress). In the Anti-Atlas, the Paleoproterozoic basement is composed of metasedimentary schists, granites, paragneisses, migmatites, with U–Pb zircon ages ranging from 2200 to 2030 and cut by dolerite dyke swarms, mostly with unknown age. The ages of the dolerite dyke swarms were previously poorly constrained by an old Rb-Sr isochron date of 787 ± 10 Ma (Cahen et al., 1984), and Walsh et al. (2002) obtained a U-Pb age of 2040 Ma for a dyke in the Tagragra of Tata Inlier. More recently, our group (Youbi et al., 2013 and references therein) obtained 6 clusters of ages in Zenaga, Agadir Melloul Iguerda-Taïfast, Tagragra of Akka, Kerdous and Bas Drâa inliers: 2040 Ma, 1380-1416 Ma, 1750 Ma, 1650 Ma, 885 Ma and 612 Ma. In addition to these dated Precambrian mafic dyke and sill swarms, a number of mafic units can be linked to the Central Iapetus Magmatic Province (CIMP) event. The 615-540 Ma (CIMP) was emplaced in multiple pulses during Ediacaran-Cambrian times, and has been linked to the disruption of the Rodinia supercontinent leading to the opening of the Central Iapetus Ocean. It is well represented in Laurentia and Baltica but also present on other formerly attached blocks such as the Congo craton, the WAC and Amazonia. In Morocco, the CIMP occurrences are particularly impressive in the High and Anti-Atlas of Morocco, as the 600-541 volcano-sedimentary sequences of the Ouarzazate Supergroup (i.e. “XIII” or PIII of Choubert et al., 1963) that covered ca. 2×10^6 km² with an estimated magma volume of ca. 1×10^6 km³ and volcanic thicknesses greater than 3000 m. The CIMP event also occurs as dyke swarms and sill complexes that are the plumbing systems of the Ouarzazate Large Igneous Province. All these results combined with the U-Pb geochronology in the literature are

used to provide a new interpretation of the regional lithostratigraphy and also reveal several periods of tectonic and magmatic activity in the central and western Anti-Atlas, particularly during the Paleoproterozoic and the Mesoproterozoic. Essentially, a new magmatic (LIP) barcode can be defined for the northern part of the WAC.

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