

U-Pb zircon dating of the Ediacaran Central Iapetus Magmatic Province (CIMP) in the Meseta Domain (Morocco)

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The 615-540 Ma Central Iapetus Magmatic Province (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 West African Craton and possibly Amazonia. CIMP occurrences are particularly prominent 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, 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. It had been previously presumed that the Ediacaran CIMP magmatism occurs also in the Meseta Block (see [Gigout 1951](#); [Morin, 1962](#); [Michard, 1967, 1976](#), [Cornée et al., 1984](#); [Corsini et al., 1988](#); [Hoepffner et al., 2005](#), [Michard et al., 2010](#) and references therein), and the presence of CIMP magmatism is confirmed herein. We present an updated review and new U-Pb dating on magmatic rocks from the Meseta Domain, which is part of the Moroccan Variscan belt. Rhyolites, granites and associated volcanics and sedimentary series of Ediacaran age crop out locally in the Zaïan Mountains (southeastern of Moroccan Central Massif), Central Rehamna, and the Coastal Block (El Jadida) of the Meseta Domain. The Neoproterozoic-Cambrian stratigraphy in the Zaïan Mountains (region of Goaïda) consists of limestones with conglomeratic and felsic volcanoclastic units, pelites and mafic volcanic rocks assigned to the Cambrian which unconformably overlie rhyolites, andesites, rhyodacites and felsic tuffs associated with the Goaïda and Berreda granites of probable Neoproterozoic age ([Morin, 1962](#)). The Goaïda granite yielded U-Pb zircon ages of Ediacaran age, ranging between ~ 610 Ma and ~ 540 Ma, with a discordia upper intercept age of 598 ± 32 Ma that could be interpreted as the age of intrusion. The two youngest fractions yielded a Concordia age of 590 ± 3 Ma ([Pereira et al., 2014](#)). Recently, [Ouabid et al. \(2017\)](#) reported U-Pb zircon ages for all the facies of Goaïda granitoids. Concordant U-Pb zircon data yield a lowermost Ediacaran mean age for white granites (625 ± 9 Ma) and Ediacaran mean ages for dark granitoids (600 ± 10 Ma) and pink granites (552 ± 10 Ma). The Neoproterozoic-Cambrian stratigraphy of the Rehamna region is roughly similar to the Goaïda region, and also includes a volcanic-sedimentary series with limestones, arkoses, rhyolites and conglomerates. The conglomerates contain pebbles of granite and rhyolite, whose source is in the Neoproterozoic basement. The majority of zircon ages in one granite pebble are Cryogenian-Ediacaran in the range ~ 640-600 Ma, with the youngest yielding a Concordia age of 609 ± 2 Ma ([Pereira et al., 2014, 2015](#)) interpreted to be the emplacement age of the granite from which the pebble was derived. The rhyolitic basement shows porphyroclastic pink feldspars, corroded quartz and relics of volcanic textures. The rhyolites are metamorphosed into orthogneisses, and the Sidi Bahilil gneiss yielded an Ediacaran age: 593 ± 8 Ma, U-Pb zircon ([Baudin et al., 2003](#)). This basement unit is the same as observed in the Moroccan Central Massif and the Coastal Block (El Jadida) outcrops. At El Jadida City, the coastal

outcrops are composed of rhyolitic formation I, overlain by mainly dolomitic and at the bottom, conglomeratic formation II. These formations could be Neoproterozoic or Cambrian in age and are unconformably overlain by Cenomanian sedimentary rocks (Cornée et al., 1984). El Jadida rhyolites yielded a U-Pb zircon age of 597.6 ± 4.6 Ma (this work). This Neoproterozoic age allows correlation of the El Jadida sequence with those of Rehamna and Moroccan Central Massif. All these CIMP ages suggest that the Meseta Domain is essentially built on Pan-African continental crust. So, caution is needed when interpreting the provenance of Ediacaran zircons in the northern margin of Gondwana (Morocco) which are usually interpreted coming from the Anti-Atlas, but perhaps a source in the Meseta Domain should be considered. The Ediacaran volcanic rocks of the Meseta Block may have formed during extension leading to the formation of Iapetus Ocean and therefore are comparable to similar-age, rift-related volcanic rocks found in the High and Anti-Atlas.

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