Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.14381

The Late Neoproterozoic LIP in the Northwestern Part of the West African Craton: Evidences from Stratigraphy, Geochronology, Geochemistry and Nd isotopes of the Ouarzazate Group, Anti Atlas, Morocco.

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The Late Neoproterozoic Ouarzazate Group (OG) in the eastern and central regions of the Anti-Atlas comprises a >1.8 km-thick pile of pyroclastic rocks and lava flows, sedimentary rocks, and is intruded by associated sills, granitoid plutons, and swarms of basalt, andesite, quartz-microdiorites and keratophyres dykes. The stratigraphy of the OG in the vicinity of the Imiter Mine, in the eastern Anti Atlas, is referred to as IMS and includes four mixed volcanic and sedimentary units that reflect a gradual change from fluvial to lacustrine environments. In the central Anti Atlas, near the Bou Azzer Mine, five caldera-facies units of the OG are termed BMS. In-situ U–Pb dating on zircon from the rhyolite lava at the top of the IMS constrains the latest volcanic activity of the IMS to 570.7 ± 2.1 Ma. In the Bou Azzer inlier, the stratigraphically correlated basal andesite and top dacite lava flow were emplaced at 590.6 ± 4.2 Ma and 555.9 ± 20.4 Ma, respectively, suggesting that the OG was constructed through successive pulses within a long-lived magmatic episode. The magmatic rocks of the OG display geochemical signatures typical of continental arc magmas, including high-K calc-alkaline to shoshonite composition, enrichment in LILE, and negative Nb, Sr, Ti and P anomalies. Nd isotopes suggest that magmas feeding the plumbing system of the IMS and BMS represent transitional products of orogenic to intraplate volcanism with deep crustal recycling, and that their compositions evolved through crustal contamination and bulk assimilation with minor fractional crystallization of the parent melt. High εNdt values of the BMS volcanic lava (-4.91 to -0.01) argue for a juvenile origin, whereas lower εNdt values of volcanic lava (-4.72 to 3.38) and high εNdt of mafic dykes (-2.78 to 2.84) recorded in the IMS likely reflect old crustal protoliths and overall less contribution of juvenile material in their source. Based on their geographic distribution, thickness, intra-plate setting, as well as composition, the magmatic rocks of the OG are interpreted as products of a silicic large igneous province developed during the post-collisional stage of the Pan-African orogeny in the northwestern part of the WAC.