Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.6253

The Central Iapetus Magmatic Province in Mexico: Novel dating approaches reveal early Ediacaran mafic magmatism coeval with dyke swarms in Baltica and Laurentia

BODO WEBER[1], AXEL SCHMITT[2], ALEJANDRO CISNEROS DE LEÓN[2] AND RENEE GONZÁLEZ-GUZMÁN[3]

[1]Centro de Investigación Científica y de Educación Superior de Ensenada BC (CICESE)
[2]Heidelberg University
[3]CICESE

Presenting Author: bweber@cicese.mx

Laurentia, Baltica and Amazonia formed the last fragment of the Rodinia supercontinent that broke apart during the Ediacaran period. Essential to establish such reconstructions are coeval dyke swarms that occur across formerly adjacent cratons defining a Large Igneous Province (LIP). Whereas ca. 615 Ma plume-related dykes from Baltica (Egersund dykes, [1]) and Laurentia (Long Range dykes, [2]) are known for long, similar dykes have not been recognized in Amazonia or in *Oaxaquia* (Mexico), a Mesoproterozoic block located in Rodinia reconstructions between Amazonia and Baltica [3]. Here we report new dating approaches by Secondary Ion Mass Spectrometry (SIMS) from Mexico proofing a previously unrecognized LIP that produced plume-related magmas across all cratonic masses involved in final Rodina breakup and birth of the Iapetus Ocean. Weathering of these LIP basalts may have contributed to Ediacaran Gaskiers glaciation. Our evidence comes from two distinct regions geologically related to *Oaxaquia*: (1) E-MORB magmas intruded ~1.0 Ga metamorphic basement rocks (including massif-type anorthosite) of the Chiapas Massif (southeastern Mexico) prior to ductile deformation and Ordovician high-grade metamorphism. Since metamorphism precluded direct dating of these mafic dykes, we used metamorphic zircon that crystallized from Fe-Ti oxides in massif-type anorthosite at intrusive contacts with the mafic dykes and at temperatures >700°C (Ti-in-zircon thermometry). The resulting U-Pb ages between 615 ±7 Ma and 608 ±12 Ma reflect the time of dyke intrusion. (2) Plume-related subvolcanic mafic dikes intruded the ~1.2-1.0 Ga Novillo metamorphic complex of northeastern Mexico. In-situ U-Pb dating of micro-baddeleyite (<10-15µm) yielded dyke intrusion ages at 619 ±9 Ma. Baddeleyite crystals with secondary perturbation or partly recrystallization into zircon yielded ~550-540 Ma U-Pb dates, similar to a previously reported $^{40}Ar/^{39}Ar$ age at ~546 Ma [4], reflecting thermal overprinting. Coeval dyke intrusion ages suggest large geographical extension of Ediacaran mafic magmatism in Mexico and a single LIP driving final Rodinia breakup and opening of the Iapetus Ocean.

[1] Bingen, Demaiffe & van Breemen (1998), *J. Geology* 106, 565-574.

[2] Kamo, Gower & Krogh (1989), *Geology* 17, 602-605.

[3] Li et al. (2008), *Precambrian Research* 160, 179-210.

[4] Keppie et al. (2006), *Precambrian Research* 147, 342-353.