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New U-Pb In-Situ SIMS Date in Baddeleyite from Mafic-Ultramafic Magmatism in the Goiás Magmatic Arc, Central Brazil: identification of a broad ca. 670-690 Ma event

CLÁUDIA THARIS AUGUSTIN[1,2], KEVIN CHAMBERLAIN[3], JAMES MUNGALL[2], MARIA EMILIA SCHUTESKY[1] AND RICHARD E. ERNST[2,4]

[1]University of Brasilia
[2]Carleton University
[3]University of Wyoming
[4]Tomsk State University

Presenting Author: claudiaaugustin@cmail.carleton.ca

Several small to medium mafic-ultramafic intrusions occur near the contact of the amphibolite-facies Arenópolis Arc and granulite-facies Anapólis-Itauçu Complex (AIC), in the Brasilia Belt, Central Brazil. The intrusions comprise mainly cumulates, ranging from more primitive olivine-cumulates to more evolved plagioclase-pyroxene cumulates. The intrusions have been previously interpreted as results of more than one event due to being hosted by rocks with distinct metamorphic grades in the Belt, together with scarce geochronological data. The granulite-hosted intrusions of the Anápolis-Itauçu Complex were previously dated by LA-MC-ICPMS zircon giving an "upper" intercept date ca. 668±32 Ma, coeval with granulite metamorphism dated in ca. 760-650 Ma [1]. The intrusions hosted in the amphibolite-facies gneisses of the Arenópolis Arc have been interpreted as the result of a second mafic magmatic event dated in ca. 630 Ma [1,2].

The Mangabal Complex is composed of two mafic-ultramafic intrusions 3 km apart, separated by faulted rocks and it is emplaced in gneisses of the Arenópolis Arc. Both northern and southern members show similar igneous features, including mineralogy, textures, and stratigraphic sequence. Norite is the most voluminous rock at the complex, but olivine orthocumulate that gradually transitions to poikilitic harzburgite occurs lower in the intrusion. Post-cumulus plagioclase is present in all units.

We obtained new in-situ U-Pb SIMS data in baddeleyite from olivine cumulates of the Mangabal Complex. The new data indicate a crystallization age for the complex ca. 689±36 Ma based on a weighted mean $^{206}Pb/^{238}U$ date. This suggests that the mafic-ultramafic cumulates hosted by granulites in Anápolis-Itauçu Complex and amphibolite-facies gneisses of the Arenópolis Arc are coeval, representing a single event. The age matches with granulite metamorphism in the Anápolis-Itauçu complex, which hosts UHP assemblages locally, and it could suggest that a thermal pulse from the mantle and/or injection of the associated mafic-ultramafic magmas could be associated with the UHT event.

References

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