Filling the gap: a prolonged history of continental crust generation during the Siderian magmatic shutdown

HUGO MOREIRA *[1], CRAIG STOREY[1], MIKE FOWLER[1], GUILHERME O. GONÇALVES [2], LUÍS A.R. SEIXAS[2], STEPHANIE LASALLE[1]

[1] School of Earth and Environmental Sciences, University of Portsmouth, Portsmouth, UK

[2] Departamento de Geologia, Universidade Federal de Ouro Preto, Brazil

Accessory minerals have become an important tool for understanding continental crust evolution. U-Pb dating of zircons, titanites and apatites constrain the crystallisation history of plutonic bodies and coupled with major and trace element analyses of the host rock can distinguish evolutionary trends through Earth's history. An important change is described by the transition from TTG to sanukitoid-type magmatism (high Ba-Sr) which is inferred to represent the onset of subduction-driven plate tectonics due to the opening of the mantle edge angle (Martin et al., 2010). Globally, this transition started at 3 Ga and "concluded" at around 2.5 Ga (Laureant et al., 2014). Plutonic rocks from the Mineiro Belt, Brazil record this transition much later, during the Siderian quiet interval (Pehrsson et al., 2014) when few juvenile magmas were added to the continental crust. The magmas evolve to a 2.13 Ga sanukitoid suite. Geochemical data indicate that these rocks mostly belong to the calc-alkaline series, which are meta- to peraluminous and originally "I-type". They show a notable trend of being less-evolved the older they are. Plausibly, this is the case of a continuous process of fractional crystallisation from a similar source, with various degrees of crustal/sediment assimilation. Zircons and titanites analysed in this study range in age from 2.35-2.1 Ga and 2.16-2.05 Ga, respectively. Both minerals have abundant apatite inclusions which were analysed by EPMA for trace elements (Mn, Sr, Y, La, Ce, Nd and Sm), and when possible for U-Pb dating. Apatites from either the rock matrix or inclusions in zircons/titanites depict similar ages at ca. 2140 Ma and therefore mark the crystallisation age of the parental rocks. Although the overlap in age shows no Pb-diffusion effects, the trace elements concentration differs between matrix and inclusion apatites. The covariance between Y-Sr of the apatites seem to interact with both Si and Sr content of the whole rock. This mineral-inclusion equilibrium coupled to geochronology of multiple accessory phases of the host rock can provide information into petrogenesis and thence overall evolution of the continental crust. H. Moreira thanks CNPQ scholarship (234610/2014-0).