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In situ U-Pb dating and Hf isotope geochemistry of zircons from granites of the Costeiro Domain, SE Brazil: timing and source contrasts with neighboring terranes of the Ribeira Belt
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New in situ U-Pb (Shrimp and LA-ICPMS) zircon age determinations carried out in the Ubatuba Charnockite (582.4 ± 4.8 Ma), Ilhabela Granite (573.5 ± 3.6 Ma) and Alcatrazes Granite (568.8 ± 3.4 Ma) are within the range of the main period of high-K calc-alkaline granitic magmatism in the Costeiro Domain of the Ribeira Belt, SE Brazil. This is also the timespan when some large batholiths were emplaced in this domain; examples are the Natividade da Serra Batholith (dominated by peraluminous leucogranites; 587 ± 7 Ma; Janasi et al. 2003, Geologia USP 3:13-24) and the Pico do Papagaio Batholith (579 ± 2 Ma; Meira et al. 2014, IX South American Symposium on Isotope Geology, Brazil). Therefore, a large amount and variety of granite magmas was generated in the Costeiro Domain during the “Rio Doce orogeny” (590-565 Ma; Campos Neto & Figueiredo 1995, J South Amer Earth Sci 8:143-162). This time range is slightly younger than observed for peak granitic magmatism in the Ribeira Belt immediately to the NW (the Embu Terrane and São Roque Domain; ~ 605 -580 Ma).

Shrimp U-Pb zircon ages of the Santos and Guarujá stocks (respectively, 497.3 ± 7.0 Ma and 496.9 ± 6.6 Ma) indicate that they are related to the extensive belt of Cambrian bimodal (granite-diorite) magmatism that developed throughout the Atlantic coast of east Brazil. This event occurred at least 60 Ma later than post-orogenic magmatism in the northwestern domains of the Southern Ribeira Belt (the 590-560 Ma Itu Granitic Province, Janasi et al. 2009, Can Min 47:1505-1526). Zircon ϵ Hf(t) varies between 0 and -11 in the dated samples, with the two younger granites showing the lowest range of values; the data also suggest a SE-NW shift (perpendicular to the main structural trend) with decreasing ϵ Hf(t) from Alcatrazes (0 to -4) to Santos (-5 to -11). These slightly negative zircon ϵ Hf(t) indicate that all studied granites have sources with shorter crust residence times when compared to neighboring terranes (e.g., Hf T_{DM} = 1.5-2.1 Ga versus 2.1-3.0 Ga in São Roque and Embu). Our new data, taken together with the Nd isotope signatures of other granites from the Costeiro Domain, and with information from detrital zircons of supracrustal sequences (both indicative of the predominance of mesoproterozoic crust residence ages), confirms correlation with the Oriental Terrane (Heilbron et al. 2004. J Virtual Explorer 17, Paper 4). Therefore, the Costeiro Domain is interpreted as an accretion margin terrain which began to develop at least since 790 Ma, and marks the closure of an oceanic space between the Neoproterozoic São Francisco and Congo-Angola paleoplates.

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