

Connecting West Gondwana orogens in southeastern Brazil: the Rio Doce arc revisited

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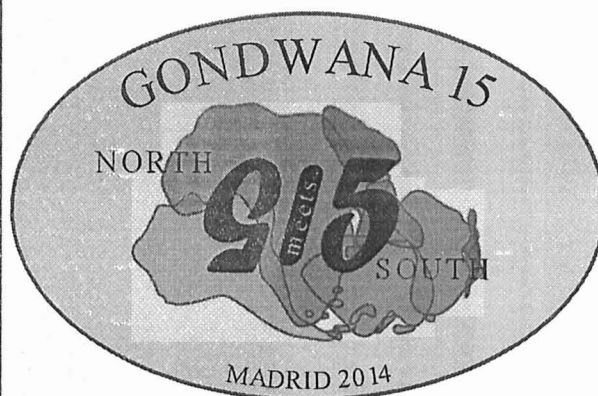
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Magmatic arcs can help to correlate Precambrian orogenic belts. Araçuaí and Ribeira are neighbouring orogenic sectors of the Neoproterozoic Mantiqueira Province in southeastern Brazil, with important geological targets for understanding West Gondwana assembly. Among them, we focus on batholiths and metavolcano-sedimentary successions from the central to southern Araçuaí and northern Ribeira sectors, constituting the Rio Doce magmatic arc and including the G1 plutonic supersuite and the metavolcano-sedimentary Rio Doce Group. Lithochemical, isotopic (Nd and Sr) and U-Pb geochronological data from G1 plutons and Rio Doce volcanic rocks characterize a medium- to high-K calc-alkaline magmatic arc, generated on an active continental margin from ~ 630 Ma to ~ 580 Ma. Two samples of dacitic to rhyolitic metapyroclastic rocks from the lower Rio Doce Group (Palmital do Sul Formation) yielded zircon U-Pb ages of 595 ± 13 Ma and 584 ± 5 Ma. A magmatic crystallization age of 585 ± 4 Ma was obtained from a dacitic metavolcaniclastic rock of the middle Rio Doce Group (Tumiritinga Formation). U-Pb ages of detrital zircon grains from a metapelite of the Palmital do Sul Formation suggest a maximum depositional age of 665 ± 25 Ma, indicating provenance from sources located in the Cryogenian Rio Negro magmatic arc and/or the South Bahia alkaline province. The detrital zircon age spectra for metasandstones from the São Tomé and João Pinto formations (upper Rio Doce Group) record maximum depositional ages of 594 ± 3 Ma and 619 ± 19 Ma, respectively, indicating a significant contribution from sources located in the Rio Doce arc. Tonalitic to granodioritic gneisses from Baixo Guandu, Muriaé and Conceição da Boa Vista batholiths (G1 supersuite) yielded zircon U-Pb ages of magmatic crystallization at 621 ± 5 Ma, 620 ± 3 Ma and 586 ± 7 Ma, respectively. These ages are similar to those obtained from other arc batholiths (e.g., Galiléia, São Vitor) in the Araçuaí orogen, composing a dataset of forty U-Pb ages, including data from the Serra da Bolívia complex located in northern Ribeira orogen. In fact, the southern tip of the Conceição da Boa Vista batholith is spatially connected to the Serra da Bolívia complex, representing the southern segment of the Rio Doce magmatic arc. Therefore, this arc is an important connection between the Araçuaí and Ribeira orogens. The Rio Doce arc also represents an active continental margin developed during the plate convergence process that culminated in the amalgamation of this Mantiqueira Province sector with its counterpart in southwestern Africa, the West Congo and Kaoko belts after ~ 580 Ma. U-Pb ages from S-type granites in the arc region and zircon metamorphic overgrowths in arc-related rocks suggest an onset of the collisional event around 580–575 Ma, representing an outstanding time marker for West Gondwana assembly in this region.

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ABSTRACTS
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