

TIMING AND SOURCE OF GOLD AND BASE-METAL MINERALIZATION IN THE RIO GRANDE DO SUL SHIELD, SOUTHERN BRAZIL

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Lead isotope studies combined with SHRIMP U-Pb geochronology of Au and base-metal deposits and rocks of the metallogenic province of the Rio Grande do Sul Shield show that its mineralization occurred at three different times - at about 700, 590 and 560 Ma - during the Brasiliano Cycle. The Bossoroca gold deposit (700 Ma) has an epizonal orogenic origin and was formed from deeply derived circulating fluids, whereas the mineralization of the Camaquã Cu(Au) and Santa Maria Pb-Zn-Ag Mines (594 Ma) were both contemporaneous with granite-related epithermal veins (as in porphyry-Cu-Au style deposits). The youngest epigenetic base-metal deposits (562 Ma) are hosted by meta-volcanosedimentary rocks of the Passo Feio Formation and are linked to emplacement of the Caçapava Granite batholith. Ore-related metals in the Bossoroca gold deposit came from rocks of the juvenile volcanic-arc (Pb-isotope ratios of ore galenas are compatible with those from dacitic rocks at 700 Ma), whereas the metals of the Camaquã-Santa Maria Mines were derived mostly from a depleted crustal source (primitive Pb-isotopes in ore sulphides at 594 Ma), and the mineralization in the Passo Feio Formation came from a largely crustal source at about 562 Ma (either basement metamorphic rocks or host metasedimentary rocks). Thus, the oldest deposits have more metals from a juvenile-mantle material, whereas the youngest have a greater contribution from an ancient depleted crust. The overall Pb-isotope evolution of province demonstrates a progressive increase in contribution from primitive composition material to deposits.