

U-PB SHRIMP ZIRCON GEOCHRONOLOGY AND PB-PB, SR and ND ISOTOPE DATA TO UNDERSTAND METALOGENY AND TECTONIC EVOLUTION AT THE FARALLÓN NEGRO VOLCANIC COMPLEX, ARGENTINA

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RESUMO: In the NW of Argentina, Central Andes, lies the Farallón Negro Volcanic Complex. The two world-class Cu-Au porphyry deposits of Bajo de la Alumbreira and Agua Rica occur in this area and are genetically associated to this volcanic complex activities. Isotope studies and high-resolution geochronology were carried out for the two deposits, aiming to investigate the source of the mineralization and crustal influence in its genesis, and ages for the Agua Rica porphyries. Pb isotopes show that the whole-rock samples from Bajo de la Alumbreira are less radiogenic than those from Agua Rica, with close ratio values. The whole-rock samples from Agua Rica show higher dispersion compared to Bajo de la Alumbreira. The pyrite samples from both deposits present similar ratios, which allows grouping them. The Pb isotopic compositions of sulfides and host rocks for the Agua Rica deposit and Bajo de la Alumbreira indicated that, despite the difference in the lithology present in the two deposits, the values obtained are close and very homogeneous. Sulfide samples from Bajo de la Alumbreira show ratios of $^{206}\text{Pb}/^{204}\text{Pb}$, $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{208}\text{Pb}/^{204}\text{Pb}$ very close to the whole-rock ratios, but with a slight enrichment in radiogenic Pb. Sulfide samples from Agua Rica present variable distribution, however, the pyrite samples from diorite and from metasandstone present ratios close to the pyrite from Bajo de la Alumbreira. The Sr and Nd isotopes obtained and combined with literature data may suggest more evidence on the source of magmas and fluids for these deposits. Rocks with juvenile pattern, incorporated during the Andean orogeny, are one group observed, but there are also rocks that indicate the presence of crustal contamination, not homogeneous, with variations in Epsilon Nd(t) positive to negative. U-Pb SHRIMP zircon ages in the porphyries Trampeadero and Quebrada Seca, from the Agua Rica deposit, presented ages of 6.20 ± 0.16 Ma and 5.66 ± 0.22 Ma, respectively. These ages indicate a short time interval between these intrusions, of about 0.54 Ma, and represent the youngest ages obtained for Agua Rica by U-Pb SHRIMP zircon. Rb-Sr ages in pyrite combined with the U-Pb SHRIMP zircon ages matches the main magmatic phase and shows that the main mineralization phase is coeval to the intrusions. Based on these group of data, it is suggested that the genesis of the Agua Rica deposit was coeval to the last magmatic stages of Bajo de la Alumbreira, and this marks the youngest ages to the Farallón Negro Volcanic Complex rocks. In addition, the crustal participation was significant in the genesis of these deposits, with a major component in the Agua Rica deposit, because the fluids interaction with the Paleozoic basement. Based on this study, we indicated that in flat-subduction zones, the mineral deposits generated present more significant interaction with the crustal fluids than those normal subduction zones.

PALAVRAS-CHAVE: FARALLÓN NEGRO, CU-AU-PORPHYRY, BAJO DE LA ALUMBRERA