Ni and Cu deposits occur over trans-lithospheric discontinuities in Northeastern Brazil

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Main metallic mineral deposits are situated along lithospheric scale discontinuities such as collisional or rifted tectonic belts. Sulfide magmatic Ni-Cu-EGP deposits are located at the edges of resilient lithospheric blocks with mantle plume interactions. IOCG (Cu-Au) type deposits have been associated to back-arc trans-lithospheric discontinuities, pathways for the ascension of hydrothermal fluids from fertilized sources. Lithospheric studies focus on the deeper parts of continents, making use of long wavelength geophysics to map the architecture of crust and lithospheric mantle for mineral exploration, defining prospective trends associated to specific tectonic events.

A study on the Neoproterozoic Borborema Orogenic System, of the Brasiliano/Pan African Orogenic event (600 Ma), in Northeastern Brazil, used deep sourced geophysical methodologies, such as continental scale gravity, satellite magnetics, seismic wave tomography and magnetotelluric resistivity sections. Coincident results using i) vertical derivative of satellite gravity, ii) P-wave velocity anomaly tomography and iii) the low-pass vertical integral filter applied to satellite magnetics define the deeper boundaries of the São Francisco Craton and surrounding lithospheric suture belts. The integration of the results from twenty continental scale magnetotelluric sections supports this interpretation, emphasizing the differences in resistivity character of the lithospheric mantle (depth of 60-80 km).

The fundamental limits of the lithosphere beneath the São Francisco Craton and the Parnaíba Lithospheric Block, with the core of the Borborema Metacraton Lithospheric Block are related to Brasiliano colisional mobile belts and late stage extensional rifting or post orogenic tectonic collapse. Deep into the mantle two mobile belts, at the Transversal and Ceará Central sectors, close to Pernambuco lineament and Orós-Jaguaribe tectonic belt, respectively, are paleosutures of the cratonic collisions of blocks from the Brasiliano event, the São Francisco Craton and the Parnaíba Lithospheric Block with a relic Archean core at the Borborema Metacraton.

Along the upper crust of the thrusted and transcurrent margins of the Pernambuco Belt, important nickel sulfide deposits of Toninan age (800-900 Ma) are associated to the São Francisco / Borborema margins. Examples are the Limoeiro (PE), Brejo Seco (PI) and Riacho Santa Maria (SE) deposits. The Cu-Au deposits and occurrences of Cambrian age on the Western side of Borborema and the Parnaíba Basin are hosted on extensional / transcurrent back-arc systems. These are post-Brasiliano trends that host deposits like Jaibaras (CE), a rift of Cambrian age located at the Transbrasiliano Lineament. Another important post Brasiliano extensional trend, as

defined from MT sections, is the host of Cu-Au deposits in Ceará state, like Cococi, Mandacaru-Aurora and Estrada Padre Cícero, associated to the transcurrent Patos Lineament.