

PREDICTIVE GEOPHYSICAL MODELS FOR THE RIO DAS VELHAS GREENSTONE-HOSTED MINERALIZATION, BRAZIL

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The Rio das Velhas Greenstone Belt, located in the Quadrilátero Ferrífero region in the southeastern part of Brazil, accounts for over 1000 tons of past gold production and current reserves for Archean-greenstone-hosted mineralization. The region is marked by a complex multi-phased history, which resulted in the heterogeneous superposition of successive tectonic events. An empirical modeling approach was used to locate zones that are favorable for gold mineralization in Rio das Velhas Greenstone Belt. Quantitative relationships between airborne geophysical and known deposits were determined using probability ratio analysis. Spatial associations between geophysical data and mines were combined to produce predictive models to explore for Archean greenstone-hosted deposits. The purpose of the probability ratio method is to use the airborne geophysical data to determine whether or not there exists a characteristic signature over a deposit with a known high potential for gold mineralization. Probability ratios are given as weights that describe how strong a spatial association the test data layer (magnetics, electromagnetics, and radiometrics) has with the training area (mine). The larger the weight, the stronger the spatial association. This approach has shown great capability for linking geological and geophysical interpretation. The results of this modeling map the known mineralized environments, as well delineate other prospective areas that share the same geophysical signatures. The results are important to gold exploration in the area and can direct new ways for mineral prospecting in the Rio das Velhas Greenstone Belt.