Southeast Brazil-Ribeira Valley District Gold Potential Estimated by GIS-Based Weights of Evidence Model.

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The gold potential of a region in the Ribeira Valley district, southeast Brazil, was estimated by two distinct modelling methods, carried out in a Geographic Information System. The dataset included a geologic map, geochemistry of stream sediments and panned concentrates, gamma-ray and magnetic airborne data, thematic mapper data, and mineral occurrences data. The most widespread mineralised lithological unit is a metavolcanic-sedimentary sequence of deep-water carbonaceous phyllites, grading up to shallow-water carbonate-bearing phyllites associated with basanite volcanism of a distensive tectonic regime. The gold deposit model presumed metamorphic devolatilization of the volcano-sedimentary pile associated with an anomalously high geothermal gradient, with gold-bearing fluids moving along northeast trending brittle-ductile strike-slip shear zones, which developed late in regional metamorphism. The gold potential was estimated by the index overlays model, like the linear addition of maps, which involves a subjective choice of map weights, and by the weights of evidence model, which is objective in that it statistically determines the weight of each evidence map according to its spatial association with the known occurrences. These analysis generated two similar gold potential maps and have as positive evidence the following factors: the presence of the Piririca Unit and correlative sequences, the presence of mainly basic/ultrabasic metavolcanic rocks and Ca-phyllites, the proximity of Piririca-like metavolcanic rocks, the presence of silver, arsenic, lead, copper, chromium and nickel geochemical anomalies, the proximity to northeast brittle-ductile strike-slip or normal shear zones and north-south fractures and finally the presence of gamma-ray U/K ratio signatures ranging from 0.105 to 0.151.