

SPATIAL ANALYSIS OF MINERAL OCCURRENCE CONTROLS AND PROSPECTIVITY

Emmanuel John M. Carranza¹

¹ ITC, HOLANDA

This presentation demonstrates that analysis of the spatial pattern of known occurrences of mineral deposits of the type sought in a study area and analysis of their spatial associations with certain types of geological features are useful in conceptual modelling of geologic controls on mineral deposit occurrence and in predictive modelling of mineral prospectivity. For conceptual modelling of geologic controls on mineral deposits, fractal analysis and Fry analysis were employed to study the spatial pattern of known occurrences of mineral deposits of the type sought, whereas distance distribution method was applied to study the spatial associations between various geological features and known occurrences of mineral deposits of the type sought. In the case study area – Aroroy gold district (Philippines), a synthesis of results of the applications of these spatial analytical techniques with published empirical knowledge and data, about hydrothermal mineral deposits in general and epithermal Au deposits in particular elsewhere and in the district, leads to an inference of a more-or-less regular mesh of interlinked zones of extension faults/fractures at and/or around intersections of NNW- and NW-trending strike-slip faults/fractures representing a system of geologic controls on epithermal Au mineralization in the district. For predictive modelling of mineral prospectivity, spatial evidential data layers representing geologic controls and surficial geochemical anomalies were weighted and integrated via data-driven evidential belief functions. This resulted in delineation of prospective areas occupying about 25% of the case study area, in which there is about 70% likelihood of undiscovered occurrences of epithermal Au deposits. The results of this study demonstrate the values of the spatial analytical techniques described as applied to GIS-based mapping of mineral prospectivity.