

Abstract

An innovative exploration GIS-based method has been developed by Reford et al. (2004) using neural network analysis to improve integrated interpretation of variety of geosciences data for predictive mineral potential mapping. The Asseo area, Southern Hoggar, Algeria, was selected to apply this method on its recorded regional aerial magnetic and gamma-ray spectrometric survey data flown at 2 km line spacing at a nominal height of 150 m above terrain. Our choice for this area is justified by its distinct geological and structural setting and the existence of known uranium deposit, located close to the contact between an Eburnean crystalline basement composed of gneissic rocks and Cambrian-Ordovician conglomerates; it is a challenging area for uranium exploration. Numerous processed geophysical maps are prepared for predictive targeting. They include: the total magnetic intensity map, analytic signal and structural complexity grids of magnetic data as well as the total radiometric map, the three variables (eU, eTh and K) and the radioelement concentration ratios. The methodology consists to define the spatial distribution of the known uranium deposit and calculate its multi-map geophysical signature, which is then employed to predict and locate other uranium deposits targets with similar signatures using neural network training analysis. The final predictive map identifies new interesting unrecognized mining areas as targets for uranium mineralization, where one of them coincide with a number of well-known uranium occurrences