

Target areas for Uranium exploration from airborne geophysical data using weights of evidence analysis - Hoggar region, Algeria

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The Hoggar region of south Algeria is a vast and difficult access geographic area of high mineral potential. Using classical exploration method which is based on searching prospect information from known mineral occurrences reduces success potential. Actually, modern scientific exploration approach consists of GIS integration and combination of geo-information data from multiple sources and of diverse nature using comprehensive analysis based on mathematical and statistical methods. This innovative approach leads directly to increase success deposits discovery and reduce exploration risk. Since a number of uranium occurrences and deposits are known in the Hoggar regions, the weights of evidence analysis approach could be tested and implemented for potential mapping and new target-area recognition. This technique is a Bayesian statistical method that uses the conditional probabilities to predict a hypothesis about the occurrence of mineralization on the basis of the combination of airborne geophysical datasets.

Various geophysical evidential maps, completed from the airborne magnetic and gamma spectrometric survey of the Hoggar are considered. The methodology is based on the measured association between known uranium occurrences and the values on the maps used as predictors to evaluate and locate all possible other locations using the calculating spatial association weights. The method belongs to a group of methods suitable for multi-criteria decision making.

The obtained uranium potential map identifies new interesting unrecognized sites as potential targets for uranium mineralization on which more detailed follow-up surveys can be planned to better evaluate the effectiveness of the results.