Prospectivity Mapping, Permissive Tracts, Quantitative Assessment and the Search for Economic Uranium Deposits

A.R. Wilde, PhD, FSEG, FAIG, RPGAIG, GAICD
Chief Geologist, Deep Yellow Ltd., Subiaco, WA 6008. Andy.Wilde@deepyellow.com.au

Prospectivity mapping or mineral prospectivity analysis (MPA) is perhaps the most effective way to accelerate greenfields discovery and reduce overall discovery cost. MPA encapsulates the author's understanding of ore deposit models and involves translating a genetic and descriptive model to a set of spatial criteria that can be represented as digital layers or "predictor" maps. Layers are combined, typically using fuzzy logic, to generate a map in which each pixel is attributed with a prospectivity value.

MPA also provides a method of defining the boundaries of permissive tracts by adopting a particular threshold prospectivity value beyond which the probability of discovery is deemed to be negligible. This permits more rigorous quantitative mineral resource assessments and prioritisation of individual tracts. It is the latter aspect of MPA that makes it of considerable value in regional assessments of undiscovered resources.

For example, the International Atomic Energy Agency (IAEA) periodically publishes a snapshot of the nuclear industry including an assessment of undiscovered uranium resources by country. This snapshot is better known as the "Red Book". Surprisingly there has never been a systematic approach to the assessment. In 2018 the IAEA published a collection of papers designed to help member states adopt a more rigorous and systematic approach.

In this paper from that collection, I describe an example MPA for albitite-type uranium deposits in the Mount Isa region of Queensland and how that is used to derived a quantitative mineral assessment. This work indicates that there should be at least 10 undiscovered deposits within the tract with resources in excess of 1,000t U.

Such systematic delineation and statistical evaluation of a large number of comparable permissive tracts could provide a far more rigorous basis for investment of grass-roots exploration dollars than any currently available (and of course this applies to commodities other than uranium as well).