



Knowledge-driven mineral potential modelling: applying the Mineral Systems Approach to the west Kimberley, Australia.

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Regional prospectivity analysis of the west Kimberley has been undertaken using the results of geophysical structural interpretation and the mineral systems approach (MSA) to mineral potential modelling. Ore deposits are small expressions of much larger Earth processes and systems focusing mass and energy flux at multiple scales. The MSA provides a framework within which metal sources, fluid transport mechanisms and traps can be recognised and represented by predictor maps. Predictor maps act as proxies for mineral system processes and include distance to a particular geological feature, locations of rheological and chemical contrast, structural complexity and location of mantle-tapping structures. The approach to mineral potential modelling taken here combines different predictor maps in a knowledge-driven inference framework order to identify likely zones of mineralisation.

Nickel-sulphide analysis indicates that the Inglis Fault and Yampi Fold Belt localises areas of increased mineral potential. Carbonate-hosted base metal prospectivity is restricted to regions overlying basement highs in the Lennard Shelf. A buried NW extension of the Oscar Range interpreted from geophysics is identified as a region of high mineral potential. Gold potential is mostly associated with the Inglis Fault, the Yampi Fold Belt and the central portion of the King Leopold Orogen. The centre, west and east of the King Leopold Orogen and parts of the Yampi Fold Belt show small, but high, regions of mineral potential for stratiform-hosted base metal deposits. The northwest and east of the King Leopold Orogen show small regions of tin-tungsten mineral potential. Intrusion-related base metal mineral potential is restricted to the Wotjulum Porphyry in the Yampi Fold Belt and the northern central part of the King Leopold Orogen.