

**Regalpoint
Exploration Ltd**

Centre for **EXPLORATION
TARGETING**



A Continent-Wide Study of Australia's Uranium Potential

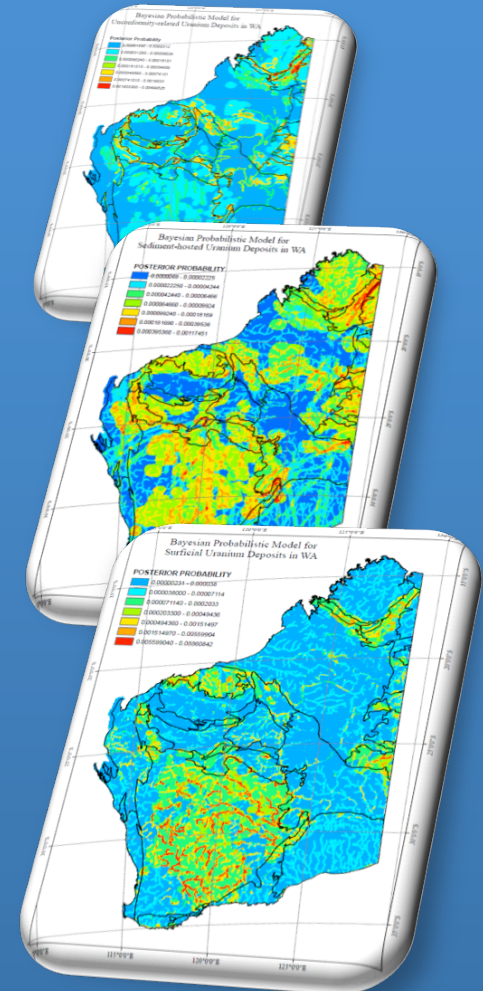
Oliver Kreuzer (Regalpoint / CET)

Alok Porwal (CET)

Vanessa Markwitz (CET)

Cam McCuaig (CET)

Australian Uranium Conference 2009, Fremantle



PRESENTATION OUTLINE

Regalpoint Exploration Ltd

- Overview

Prospectivity Study - Introduction

- Timing, Rationale and Aims
- Schematic Outline
- Preview of Results
- Uranium Systems Models

'Manual' Analysis

- Approach
- Prospectivity Maps

'Automated' Analysis

- Approach
- New / Derivative Data Layers
- Spatial Statistics
- Mathematical Modelling
- Prospectivity Maps
- Testing the Models

Summary

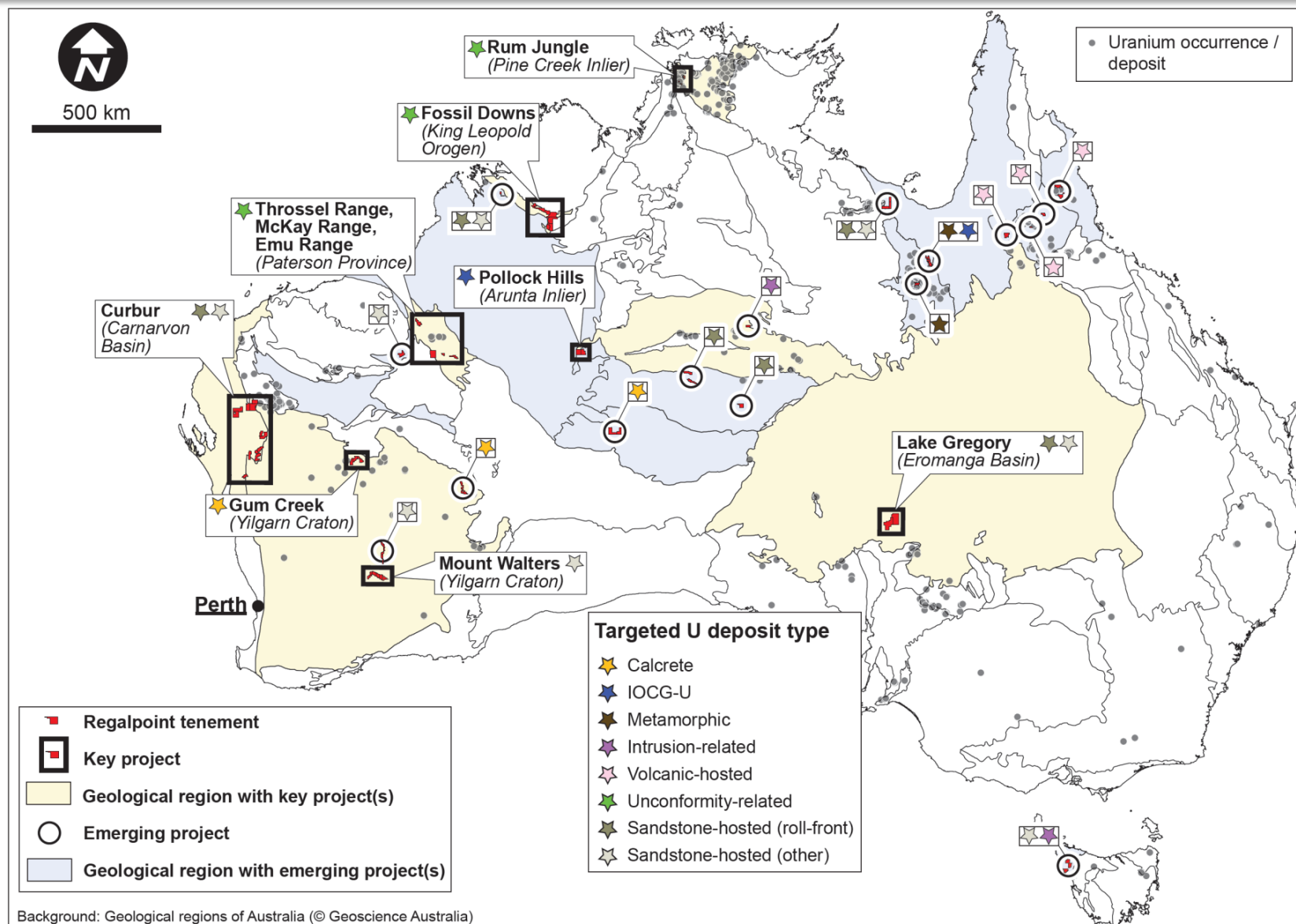
REGALPOINT EXPLORATION LTD – *Overview*

- **Experienced Directors and Management**
- **Strong financial backing**
- **Large holding of U prospective ground in Australia**
 - Geological variation
 - unconformity-related, metamorphic, volcanic, intrusion-related, IOCG-U, sediment-hosted, and surficial U projects
 - Main targets: high-value unconformity, sandstone, metamorphic and calcrete U deposits in proven and emerging U provinces
 - Large-scale conceptual plays
 - eastern King Leopold Orogen (>2,600 sq km), targeting unconformity-related U deposits
 - southern Carnarvon Basin (>4,400 sq km), targeting roll front-type U deposits
 - Geopolitical / land access diversity
 - most projects are located in 'U-friendly' jurisdictions (SA, NT, WA)
- **Unique “Comprehensive GIS”**
 - for U targeting and project generation / evaluation across Australia
- **Unique Australian U occurrence database**
- **Strong link to the Centre for Exploration Targeting**

Centre for **EXPLORATION
TARGETING**
Foundation Corporate Member



REGALPOINT EXPLORATION LTD – Overview

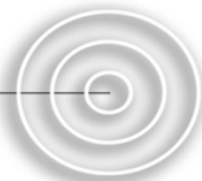


PROSPECTIVITY STUDY – *Timing, Rationale & Aims*

Timeframe

August 2006 to October 2007

Centre for **EXPLORATION
TARGETING**



Rationale

Little information in the public domain about the U potential and prospectivity of Australia that could be used to identify the most prospective available ground and new provinces for targeting U deposits

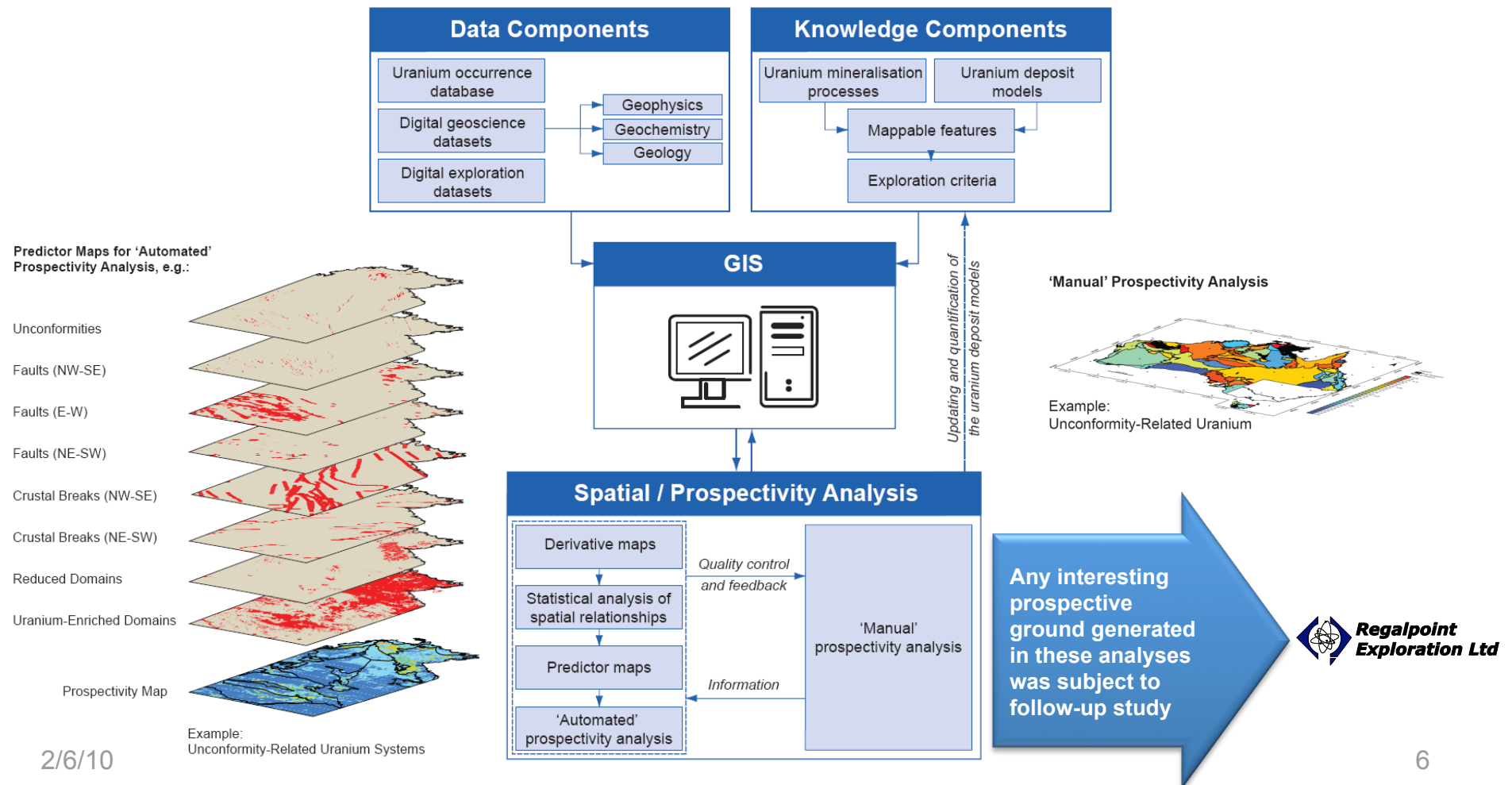
Main aims

- Develop an understanding of the processes that form U deposits and their expressions in geoscience datasets
- Formulate U targeting criteria and methodologies for a continent-wide prospectivity analysis
- Identify where in Australia is prospective for U systems and evaluate this ground
- Regalpoint Exploration Ltd to acquire the most prospective available ground

PROSPECTIVITY STUDY – *Schematic Outline*

- **Two-pronged approach:**

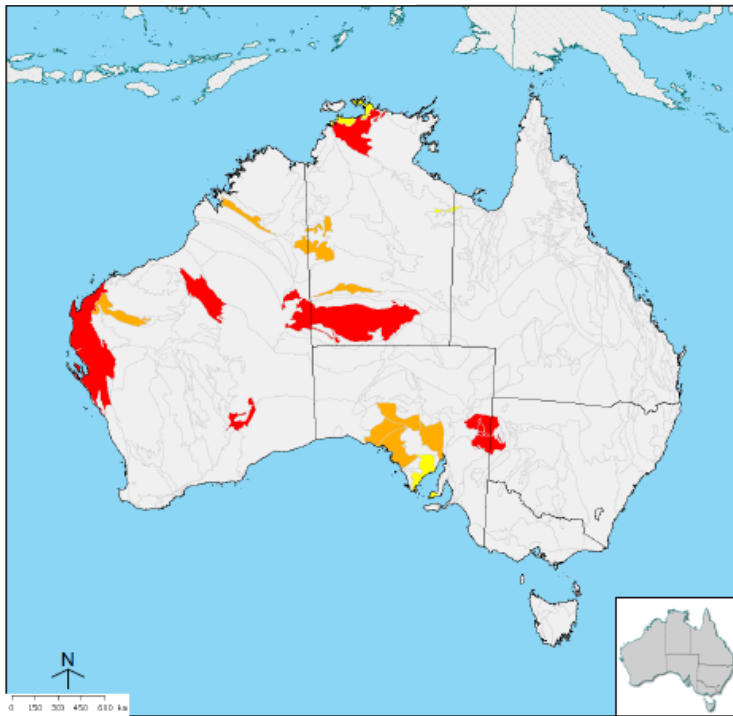
- 'manual' = GIS-assisted, cognitive assessment of spatial and non-spatial data
- 'automated' = sophisticated computational techniques applied to spatial data



PROSPECTIVITY STUDY – *Preview of Results*

Public domain product (2006/07)

www.australianminesatlas.gov.au

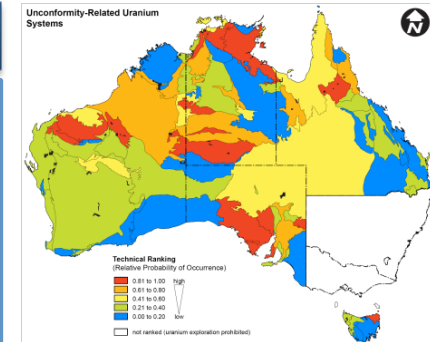


Mineral Potential - Uranium

- Unknown/Non-permissive
- Low
- Low to Moderate
- Moderate
- Moderate to High
- High

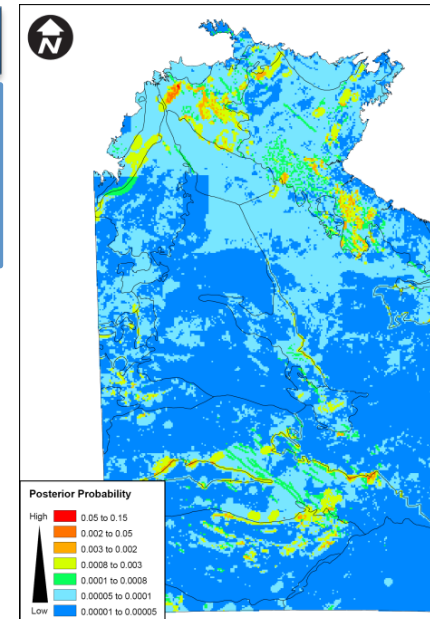
‘Manual’

Example:
Probability of occurrence map for unconformity-related U deposits on a geological region basis



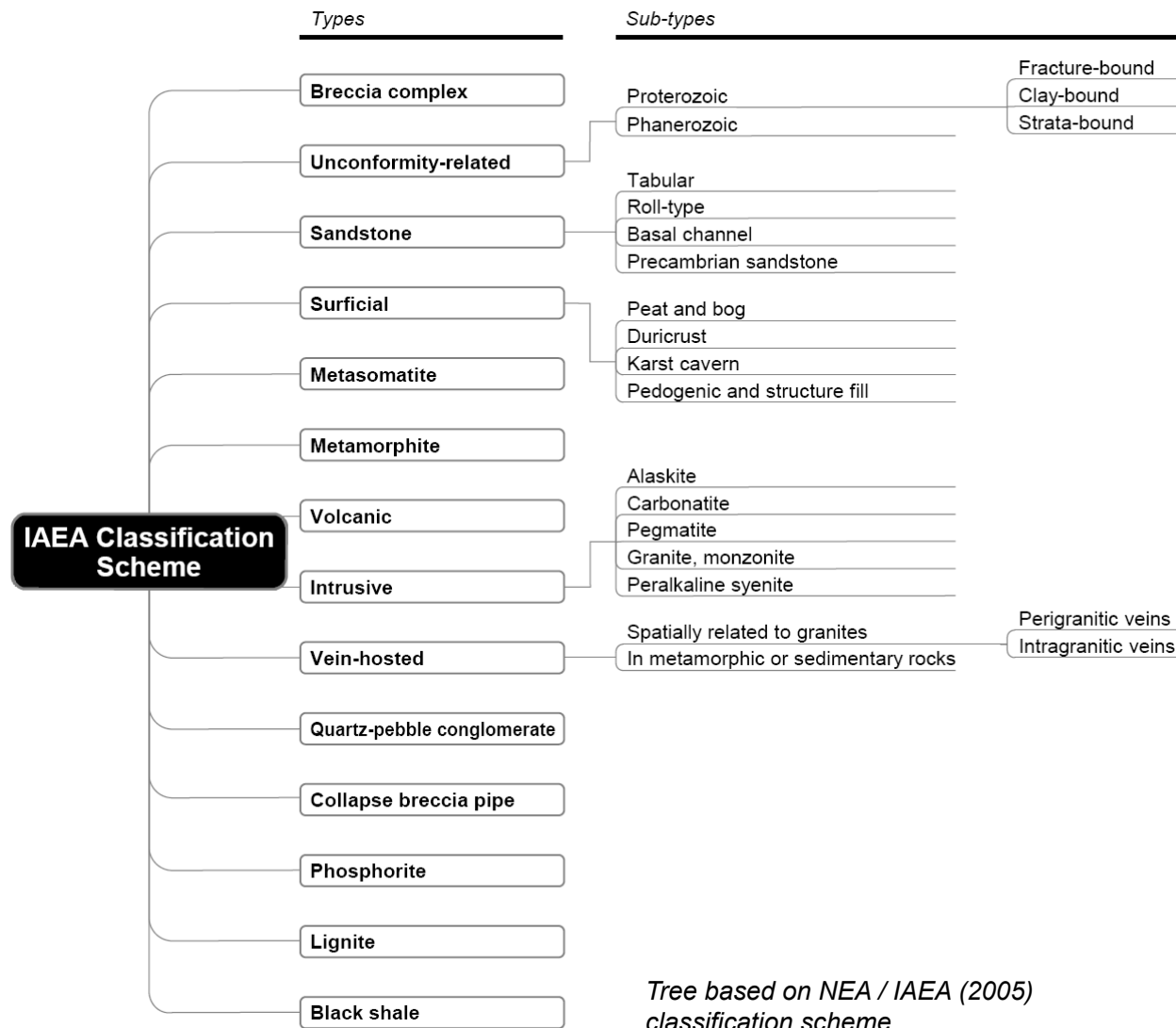
‘Automated’

Example:
Unconformity-related U potential map for the NT



Regalpoint Exploration Ltd (2006/07)

PROSPECTIVITY STUDY – *Uranium Systems Models*



14 principal U deposit types

22 sub-types

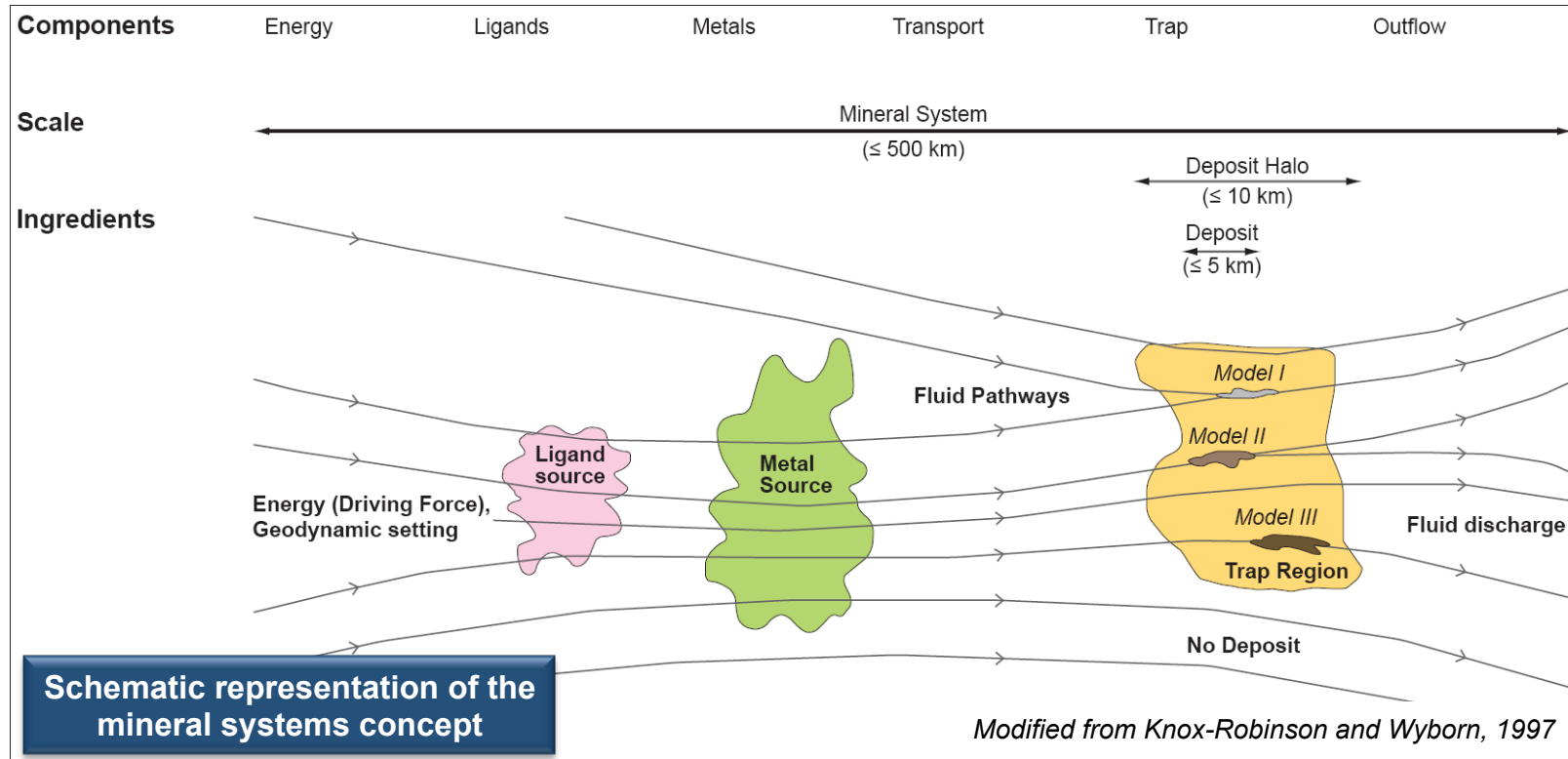
→ Published U deposit classification schemes are **invaluable for communication of scientific concepts, reference and learning**

→ But they comprise a large number of U deposit types and sub-types, which translates into a **large number of geological variables**

→ Working with too many variables is **impractical for a continent-wide prospectivity analysis** because of potential introduction of bias and reduction of efficiency

→ Many geological variables are only evident at the deposit-scale, whereas **at larger scales many types of U deposits illustrate fundamental similarities** in terms of source, transport and depositional processes

PROSPECTIVITY STUDY – *Uranium Systems Models*



- Focuses on the critical processes that must occur to form a mineral deposit
- Mineral deposit formation is precluded where a particular system lacks one or more of the essential components
- Regards mineral deposits as focal points of much larger systems of energy and mass flux that control deposit size and location
- Requires identification of genetic processes and their mappable criteria at all scales of the system
- Is not restricted to a particular geological setting / deposit type
- It can be linked to concepts of probability that allow for more meaningful and robust relative ranking

Woodall, 1983; Wyborn et al., 1994; Lord et al., 2001; Hronsky, 2004; McCuaig et al., 2007; Hronsky and Groves, 2008; Kreuzer et al., 2008

PROSPECTIVITY STUDY – *Uranium Systems Models*

Template for data compilation structured according to the mineral systems concept

Uranium Deposit Type A, B, C

Figures

Brief description

Subclasses

Deposit Examples

Examples X, Y, Z

Critical Processes

Extraction from source

Migration to trap

Formation of trap

Deposition of metal

Outflow

Upgrading

Preservation of metal

Mappable Ingredients

Tectonics

Geology

Structure

Mineralization

Geochemistry

Geophysics

Remote Sensing

Economic Aspects

Examples X, Y, Z

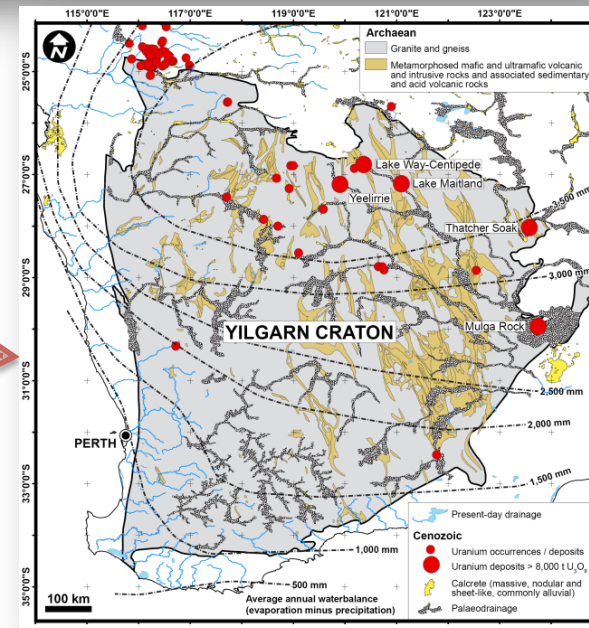
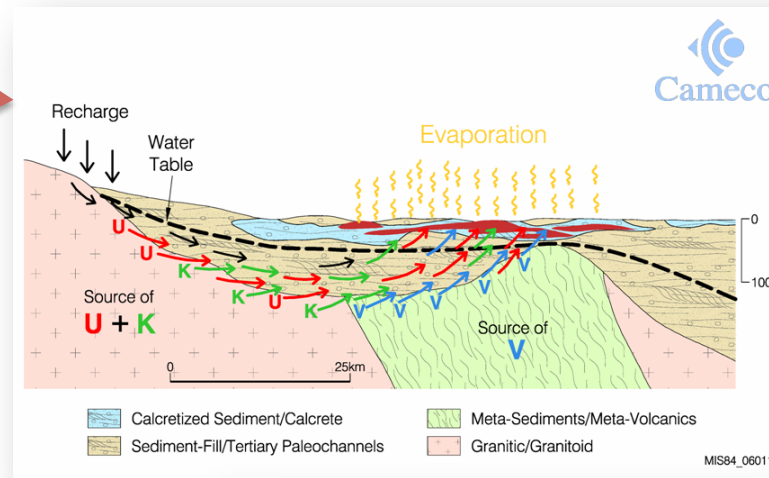
Grade

Tonnage

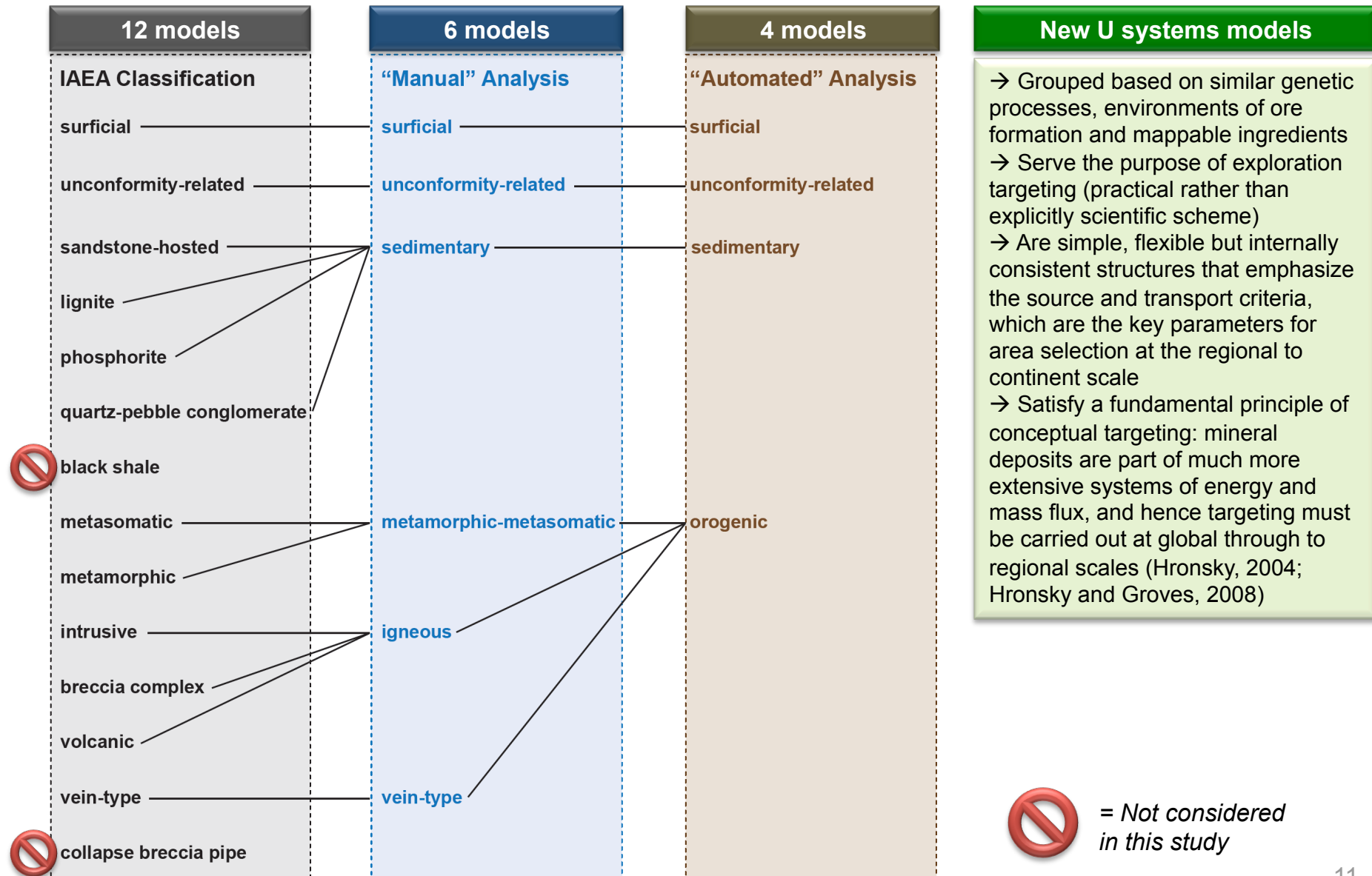
Mining Techniques

Notes

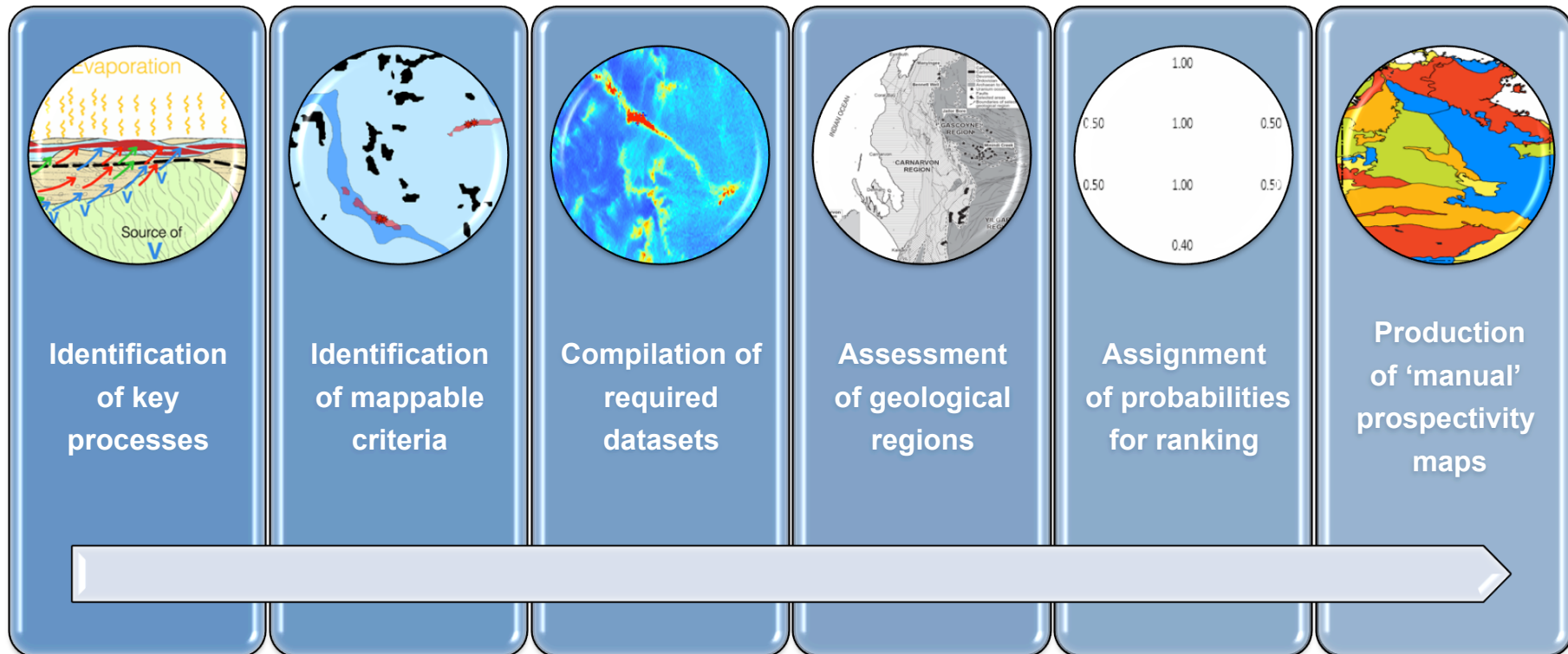
References



PROSPECTIVITY STUDY – *Uranium Systems Models*



‘MANUAL’ ANALYSIS – Approach



'MANUAL' ANALYSIS – Approach

Extract from the prospectivity matrix using the Carnarvon Region as an example

Uranium System	P1 (Source)	P2 (Transport)	P3 (Deposition)	P _{total} = P1 x P2 x P3 (Technical Ranking)	Rationale for Assignment of P1 to P3	Quality Factor (Q)	Overall Ranking (= P _{total} x Q)
Sedimentary	1.00	1.00	1.00	1.00	Uranium-rich hinterland (Yilgarn and Gascoyne Regions); Known paleochannels; Known redox boundaries; Known hydrocarbon occurrences; Known sandstone-hosted uranium occurrences and deposits	5.00	5.00
Unconformity-related	0.75	0.75	0.50	0.28	Some unconformities present; Known sandstone-hosted uranium occurrences and deposits	10.00	2.81
Igneous	0.50	1.00	0.50	0.25	Ignorance about degree of fractionation; Crustal breaks; High fracture density; No information about occurrence of pegmatite or magmatic breccia bodies	2.00	0.50
Metamorphic / Metasomatic	0.50	1.00	0.50	0.25	Small area of metamorphic basement exposed within the basin; Uranium content of basement and faults present; No obvious V sources	1.00	0.25
Vein	0.50	1.00	0.50	0.25	Small area of vein-hosted uranium occurrences and faults present; No obvious V sources	0.10	0.03
Surface			0.40	0.16	Uranium-rich hinterland (Yilgarn and Gascoyne Regions); Known paleochannels; No valley calcrete or playa lake occurrences although terrace calcrete may be present in places; Flow direction of drainage systems is towards the sea rather than inland; Evaporation rates much lower than those in the Yilgarn calcrete uranium province; No obvious V sources	3.00	0.48
Overall Ranking (Highest Q)	Most likely style of uranium mineralisation: sandstone-hosted uranium deposits in rollfronts and paleochannels with medium tonnages (= highest Q)					5.00	
Opportunity Ranking	Region is heavily tenemented, although certain parcels of ground are still available that cover paleochannels and rollfronts					1.00	

Quality Ranking Scheme → based on grade-tonnage data, mineability and company preference (scale 0.1 to 10)

Technical Ranking Scheme → numbers feed into prospectivity maps for each U system

Assignment of probabilities using Sherman-Kent scale

Highest Q factor → number feeds into an overall quality map

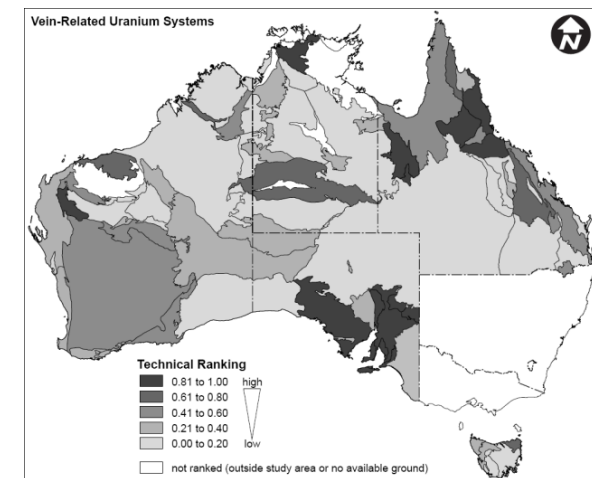
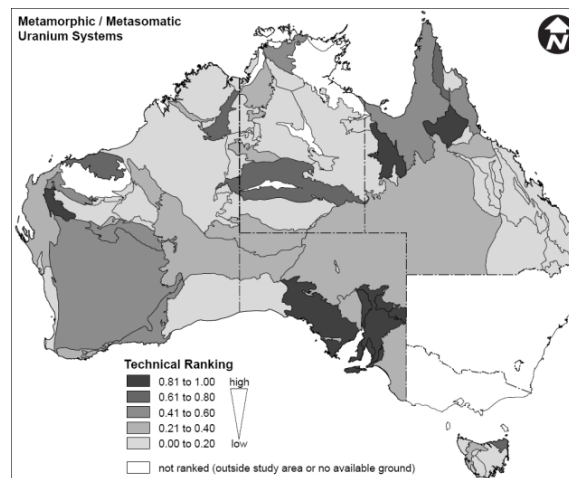
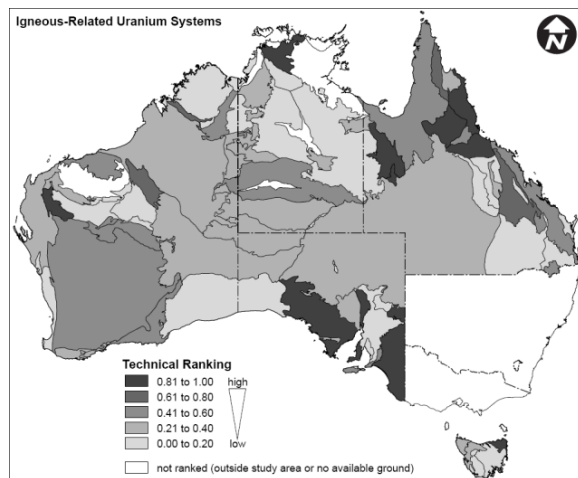
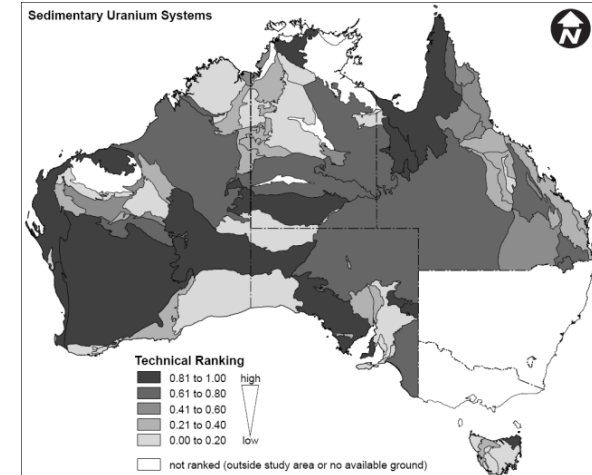
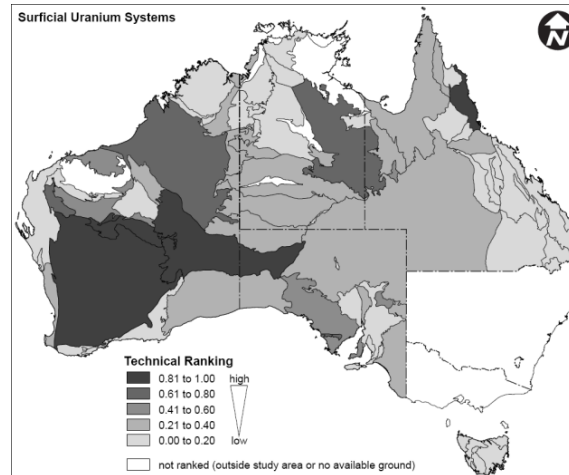
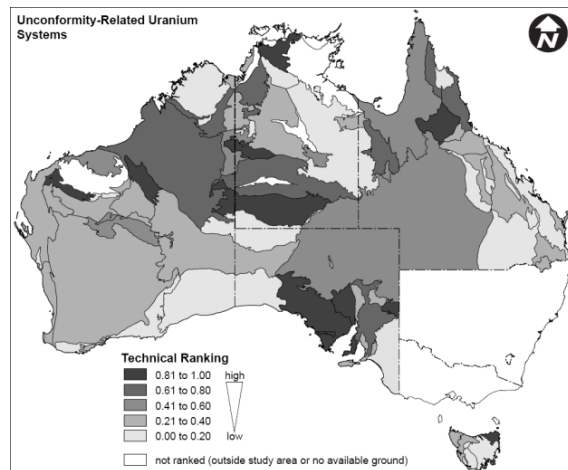
Opportunity Ranking Scheme → based on ground availability (scale 1 to 4)

Opportunity factor → number feeds into an opportunity map

‘MANUAL’ ANALYSIS – *Prospectivity Maps*

Technical ranking scheme

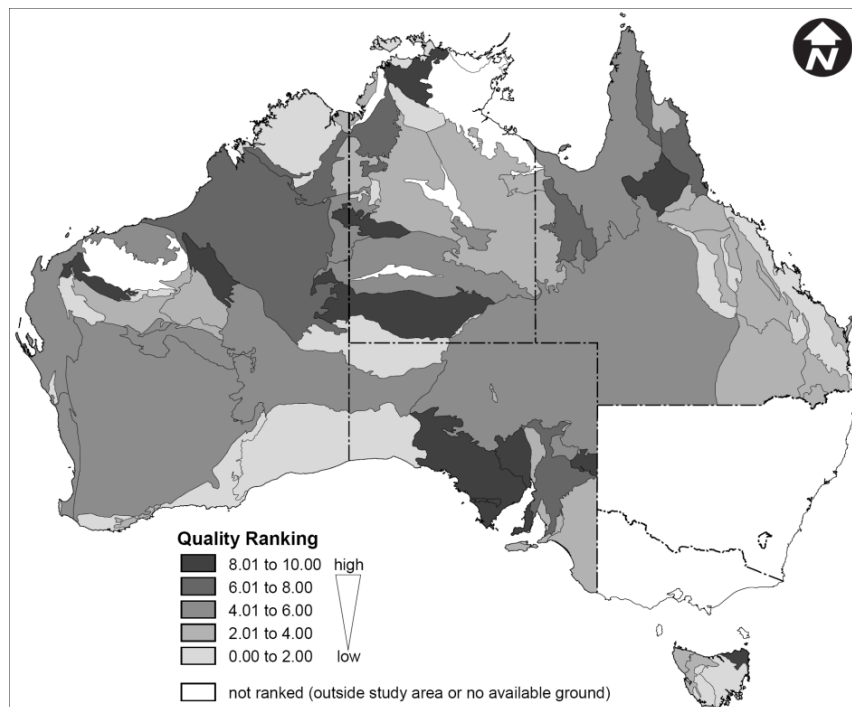
Which regions have the highest relative probability of occurrence of a particular U mineralising system?



'MANUAL' ANALYSIS – *Prospectivity Maps*

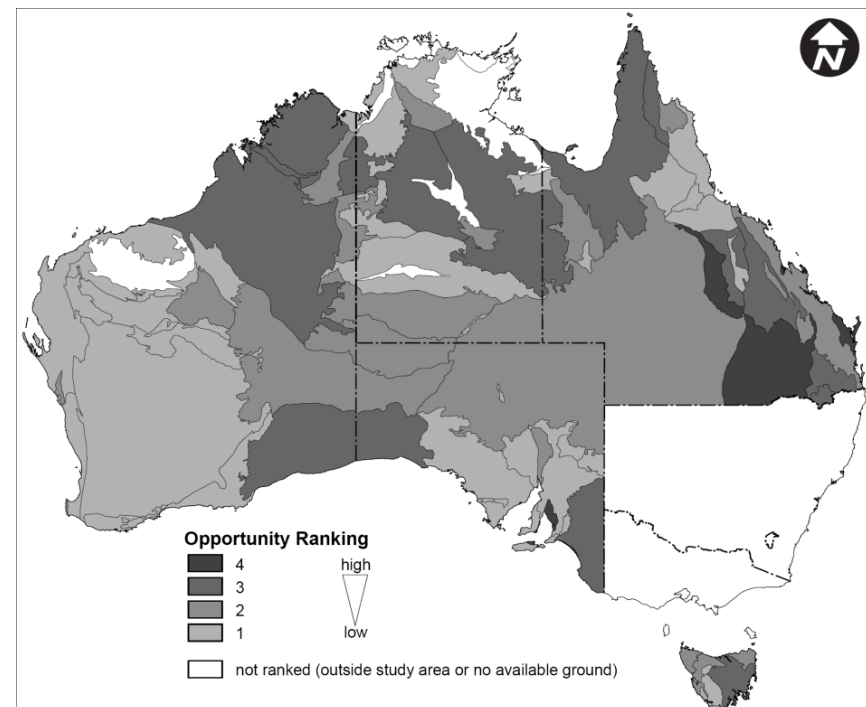
Quality ranking scheme

Which geological regions are most likely to host high-quality uranium deposits?



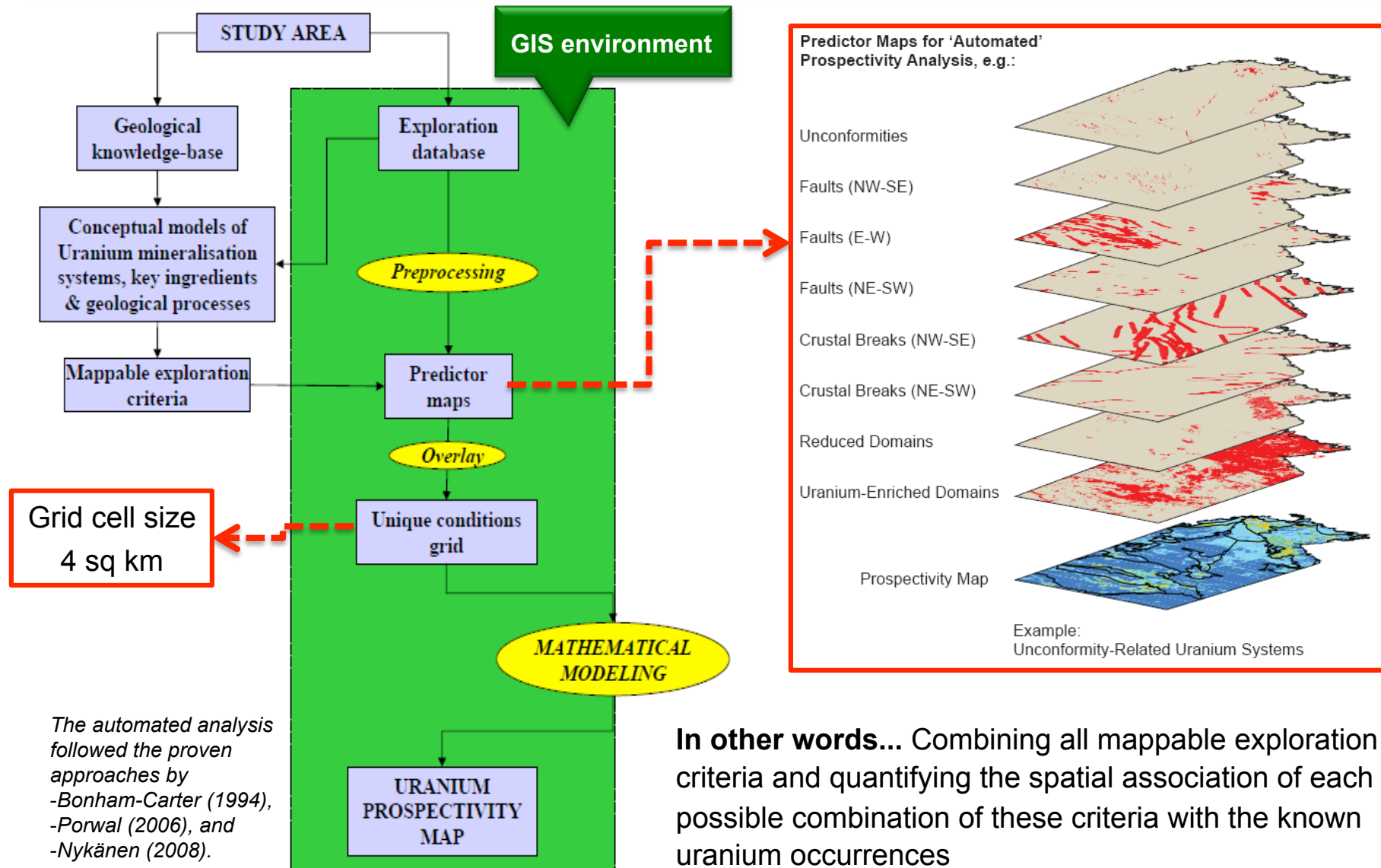
Opportunity ranking scheme

Where should we focus our time and resources?

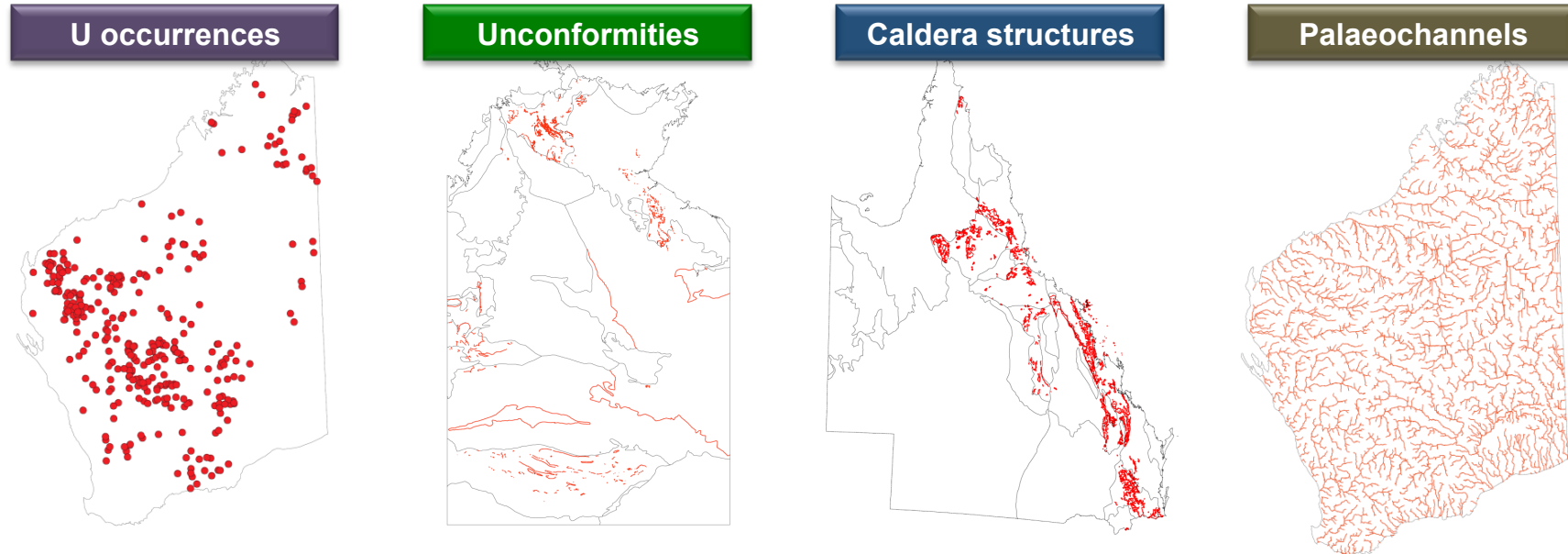


Note: This figure is based on land availability in early 2007

'AUTOMATED' ANALYSIS – Approach

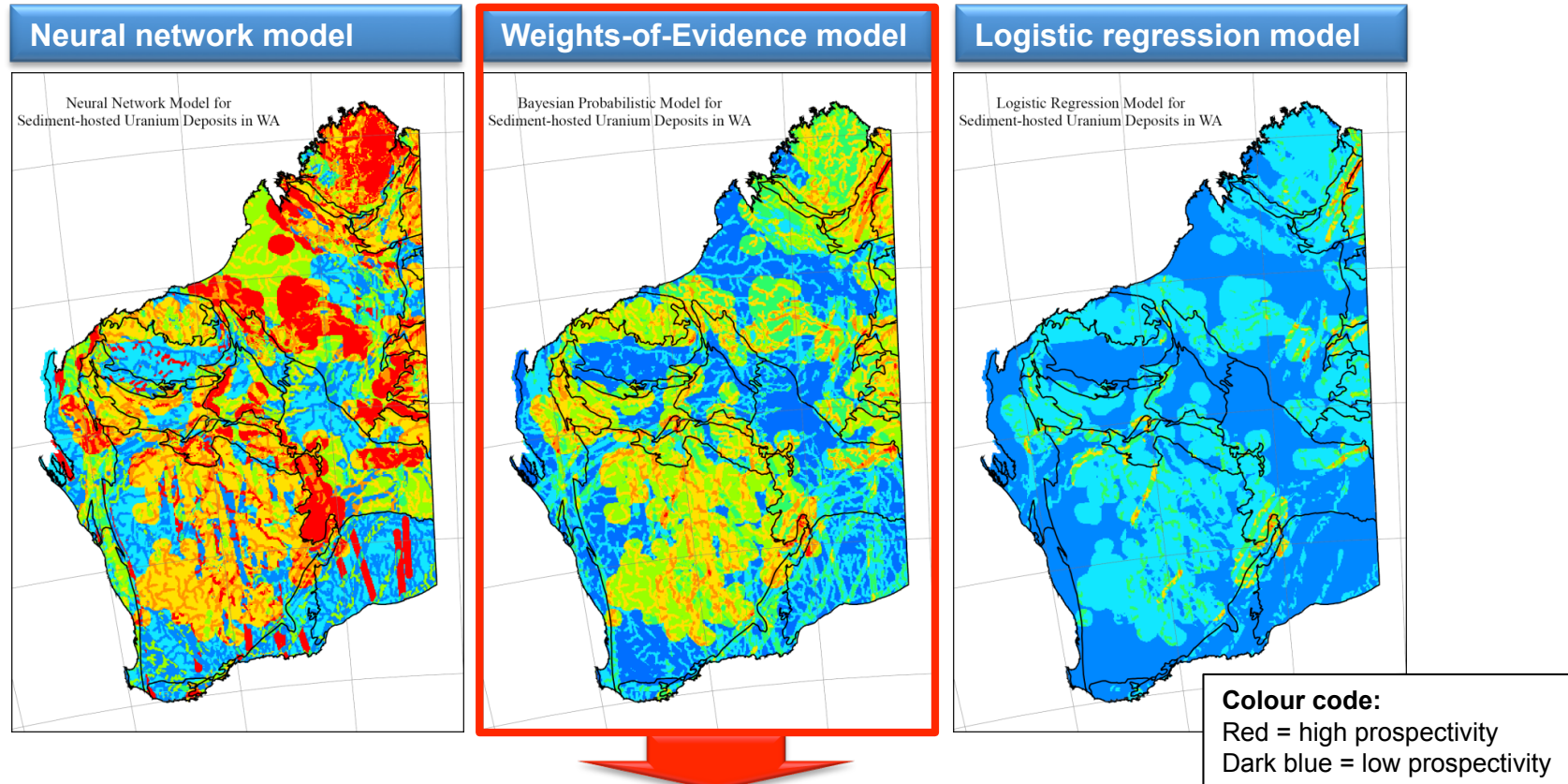


‘AUTOMATED’ ANALYSIS – *New / Derivative Data Layers*



- **Creation of critical new / derivative data sets, e.g.:**
 - U occurrence data with genetic classification scheme
 - critical for the entire modelling approach
 - Unconformity surfaces
 - critical for modelling unconformity-related (and other) U systems
 - Caldera structures
 - critical for modelling volcanic-hosted U systems
 - Palaeochannels
 - critical for modelling surficial and some sediment-hosted U systems

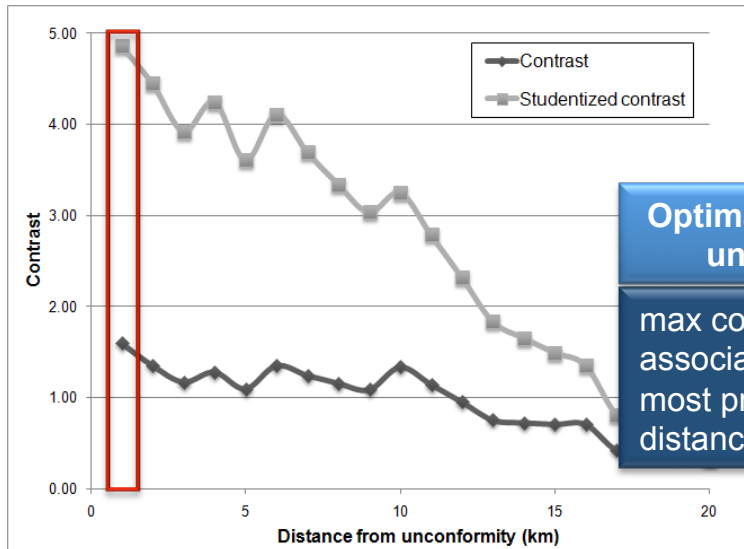
‘AUTOMATED’ ANALYSIS – *Mathematical Modelling*



- **After initial tests the WOE model was selected as the model of choice**
 - The distribution of relative prospectivity is similar to that obtained from the other models
 - Robust and well-documented approach to modelling that is intuitive and easier to implement
 - Purely data driven: greater objectivity + complementary to the conceptual ‘manual’ analysis
 - Provides estimates of stochastic uncertainties and relative importance of predictor maps

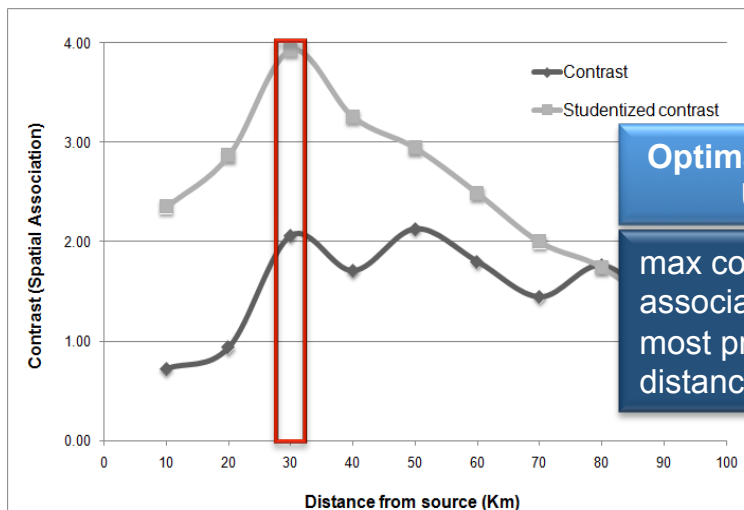
'AUTOMATED' ANALYSIS – *Spatial Statistics*

Examples: Sedimentary and unconformity-related U systems (WA)



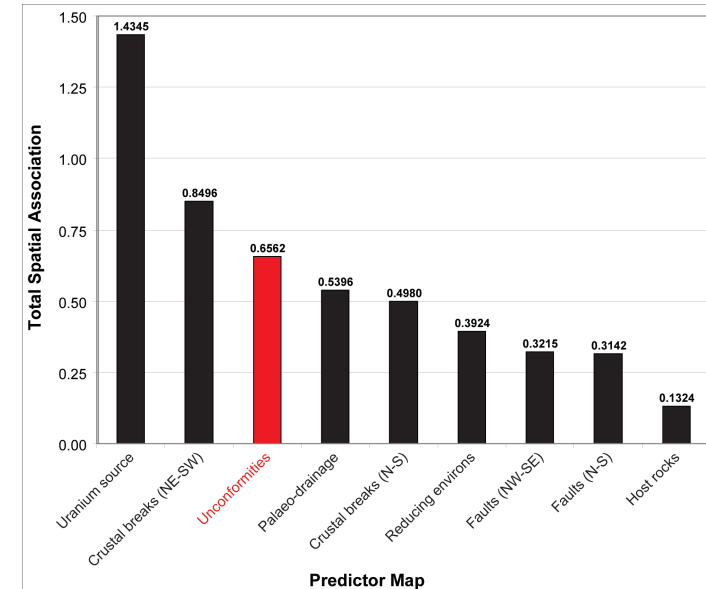
Optimal distance from unconformity?

max contrast (spatial association) at 1 km → most prospective distance is 0 to 1 km



Optimal distance from U source?

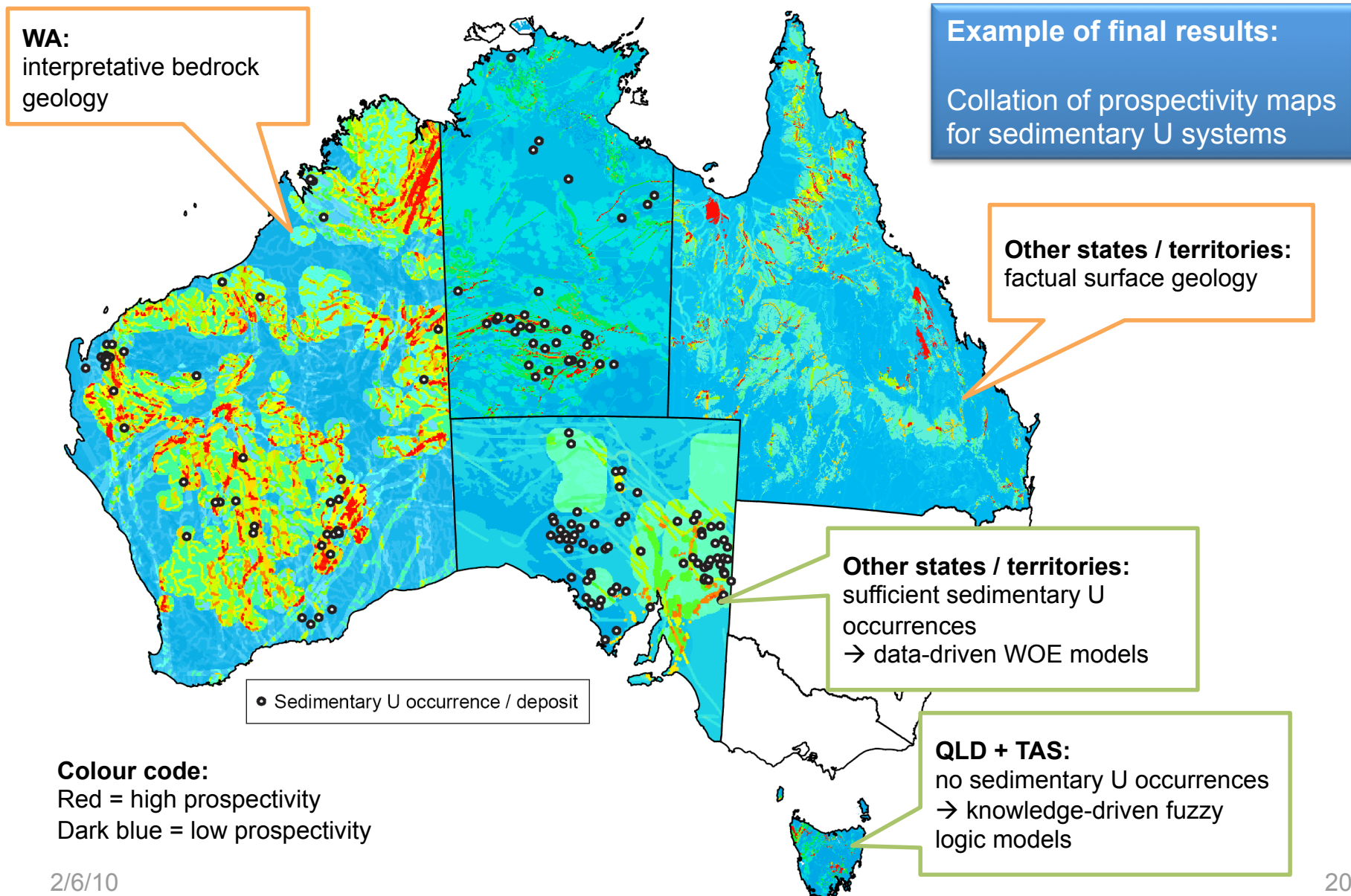
max contrast (spatial association) at 30 km → most prospective distance is 0 to 30 km



Hierarchy of potential controls on U deposition

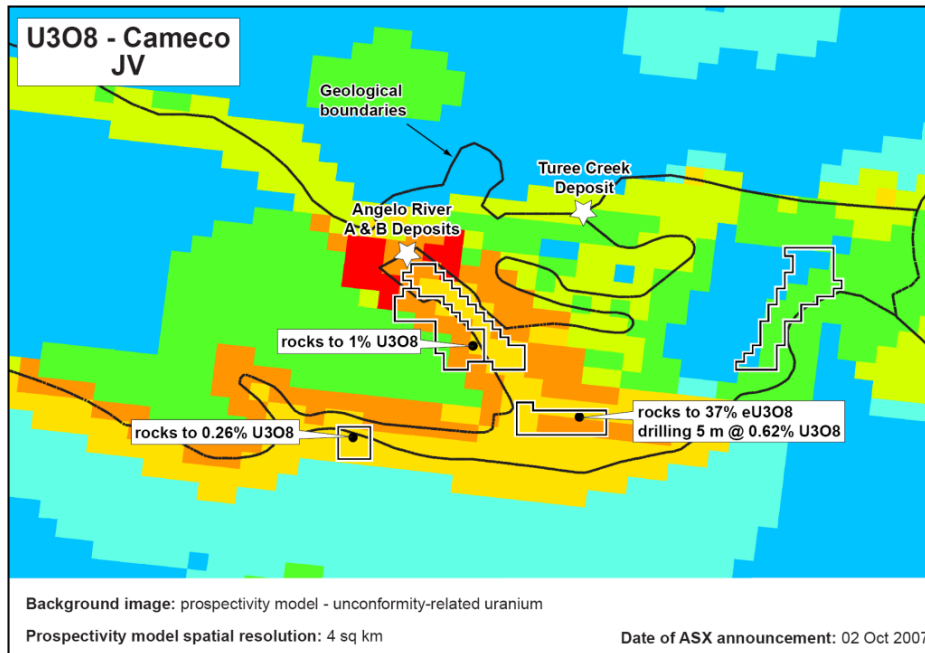
Feedback into U models / targeting

'AUTOMATED' ANALYSIS – *Prospectivity Maps*

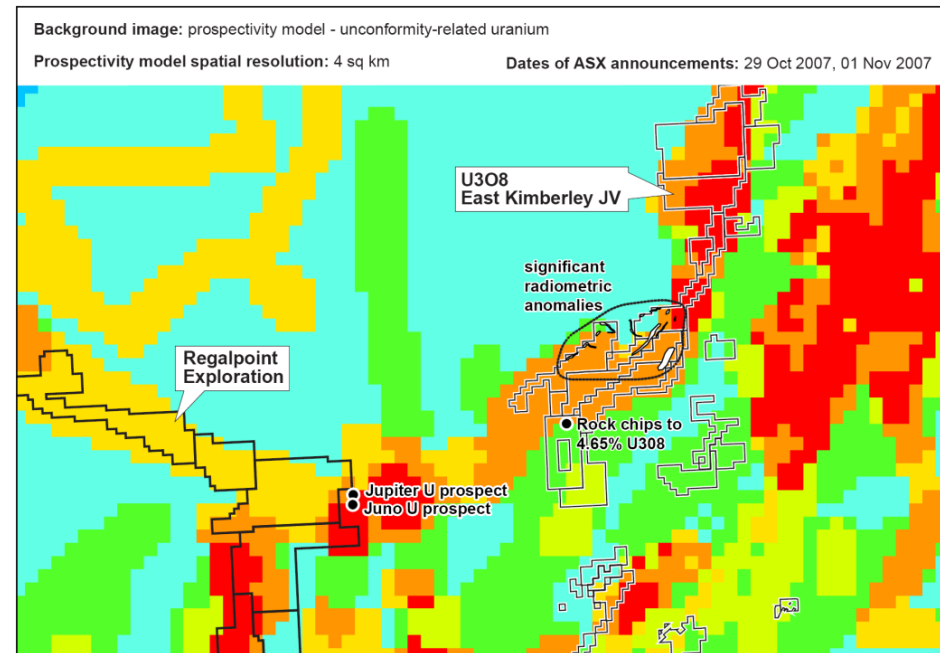


‘AUTOMATED’ ANALYSIS – *Testing the Models*

Ashburton / Hamersley Basin (WA)



King Leopold / Halls Creek Orogen (WA)

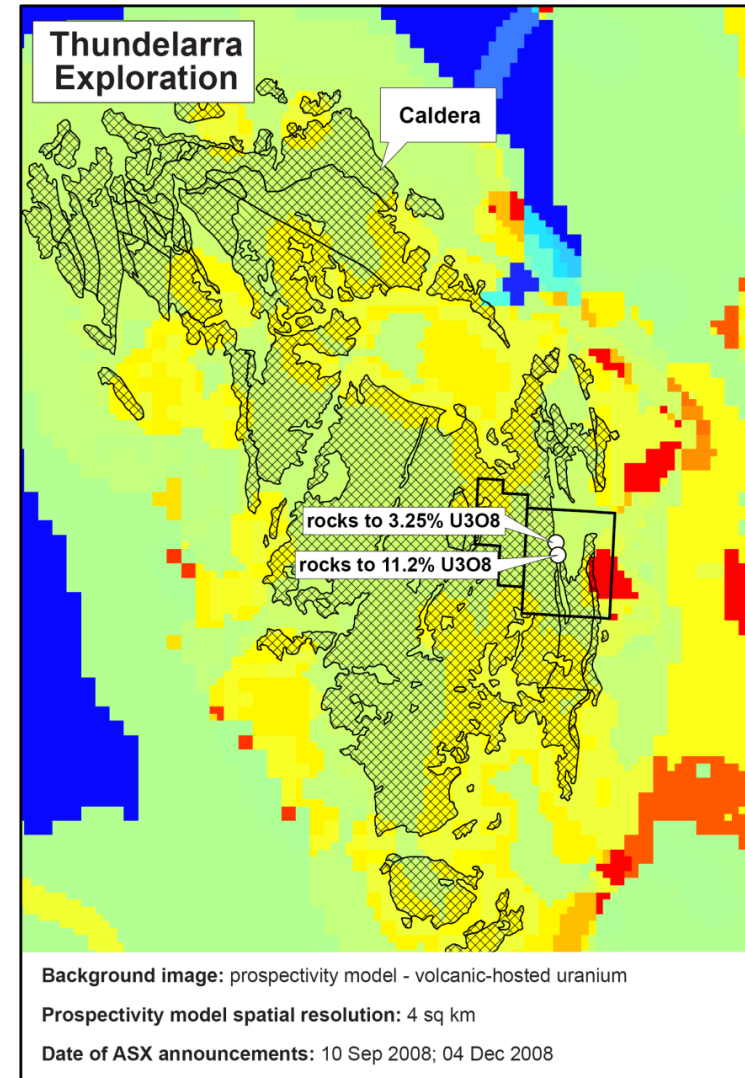


- **Testing of model performance**

- Against new significant exploration results that became available after the mathematical modelling was completed
- Independent corroboration of model results
- Get a feel for relative accuracy and robustness of the models

‘AUTOMATED’ ANALYSIS – *Testing the Models*

- **Croydon Province (QLD)**
 - No known U occurrences
 - mathematical model not influenced by proximity to known U occurrences
 - Models predicts potential for ‘orogenic’ U deposits at the margin of a large caldera structure
 - only 6 km distance between area of high relative U potential and location of significant U assay results
 - from highly weathered microgranite dykes
 - model grid resolution = 4 sq km
- **‘Automated’ prospectivity models appear to work well**
 - At the scales appropriate for project generation
 - In terms of U targeting at the continent to regional-scale



SUMMARY

- **Continent-wide U prospectivity analysis**
 - Two-pronged ‘manual’ and ‘automated’ approach
 - complementary knowledge- and data-driven methodologies that informed each other
 - helped to reduce bias and error
 - Models are structured according to proven, published approaches
 - Model templates are flexible and transparent
 - templates can easily be updated and / or modified to suit specific purposes
 - Delivered a fresh look at the U prospectivity of the Australian continent
 - novel: covered regions that were not previously assessed for their U potential
 - comprehensive: considered all states and territories that allow U exploration
 - inclusive: considered all U deposit types that are known in Australia
 - Delivered valuable tools and databases for project generation / evaluation
- **Regalpoint Exploration Ltd**
 - Secured the most prospective available ground delineated in this study
 - Is focusing on the search for high-value U deposit types
 - Has now begun to actively explore its U projects

CONTACT PERSONS

Oliver Kreuzer

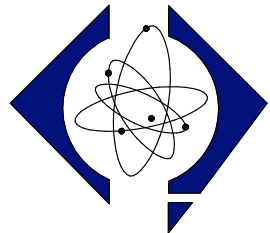
Exploration Manager

okreuzer@regalpointexploration.com

Matt Gauci

Managing Director

mgauci@regalpointexploration.com



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Exploration Ltd***

www.regalpointexploration.com