

# Application of EDA to Domaining and

## Use of the Variogram for DHSA

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# Aims of the Study

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- Demonstrate the value of geostatistics to BMA as an input to mine planning and operations.
- Integrate geostatistics into the resource modelling procedures through improved domaining and use of variography.
- Effect integration of processes through the use of Isatis.

# Why South Walker Creek?

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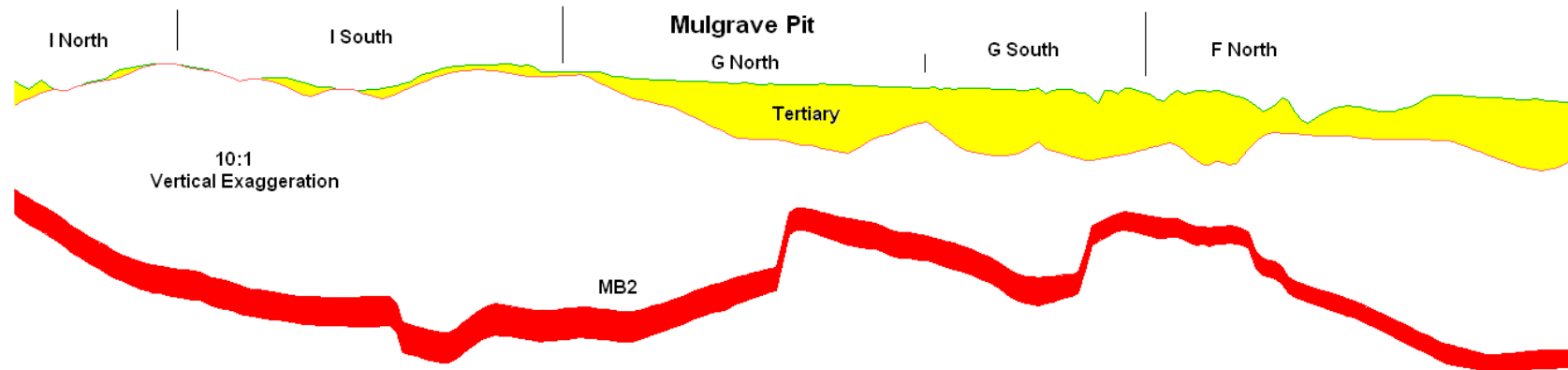
- South Walker Pit: problematic quality parameters – in particular Phosphorous.
- Phosphorous shown to have both lateral and vertical variability.
- Misallocation of mined coal as a result of unclear understanding of the phosphorous variability.
- In-pit sampling data used to control coal stockpiles.

# Location and Geological Setting

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- South Walker is located ~ 25km west of Nebo and 140km from Hay Point.
- Resources located on the eastern limb of Northern Bowen Basin.
- Deposit situated on the Western Margin of the Nebo Synclinorium, characterised by large and small scale folding with thrust and normal faulting throughout.
- South Walker is relatively free of compressional features.

# Cross Section Through Mulgrave Pit



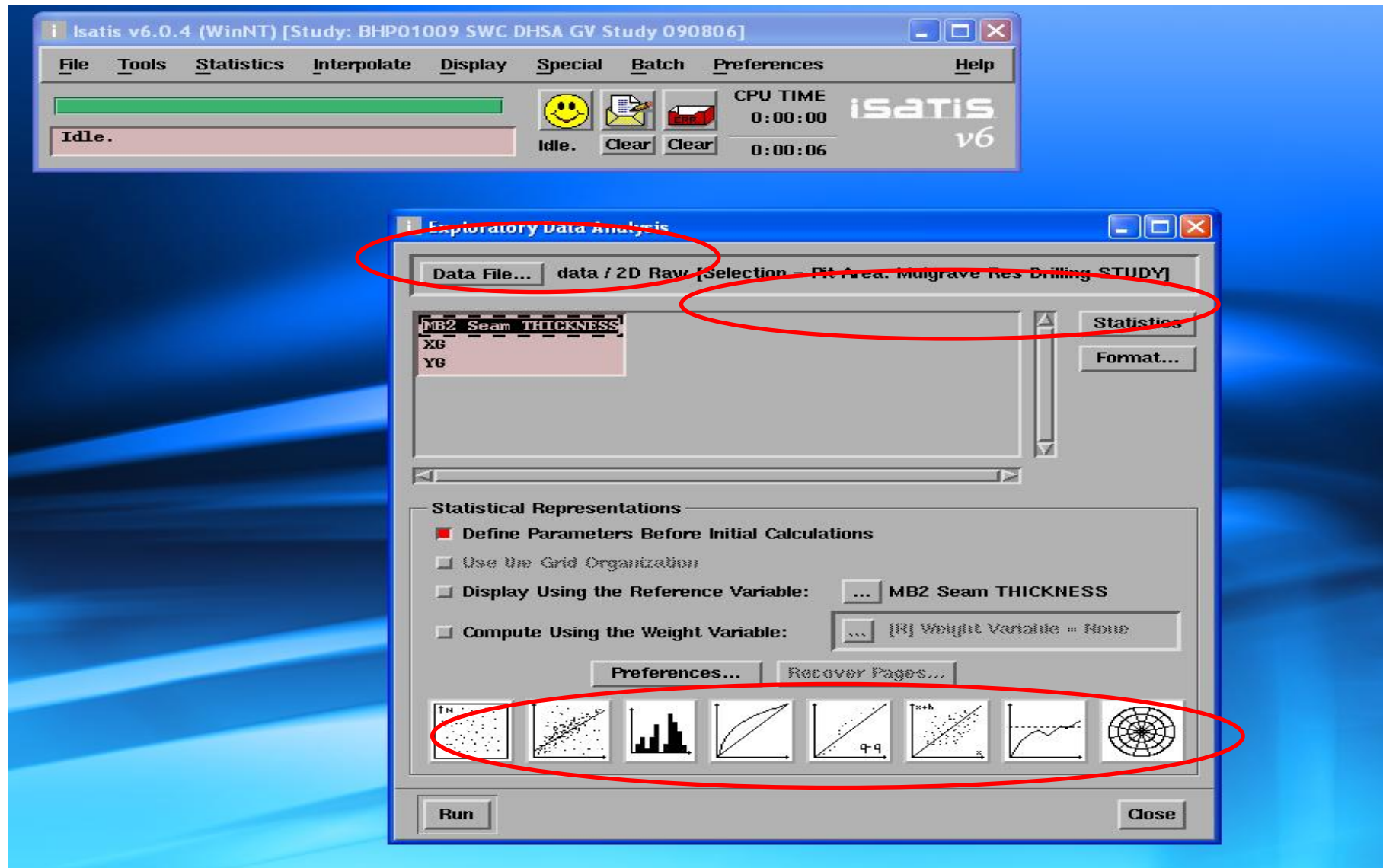
# Phosphorus within South Walker Creek

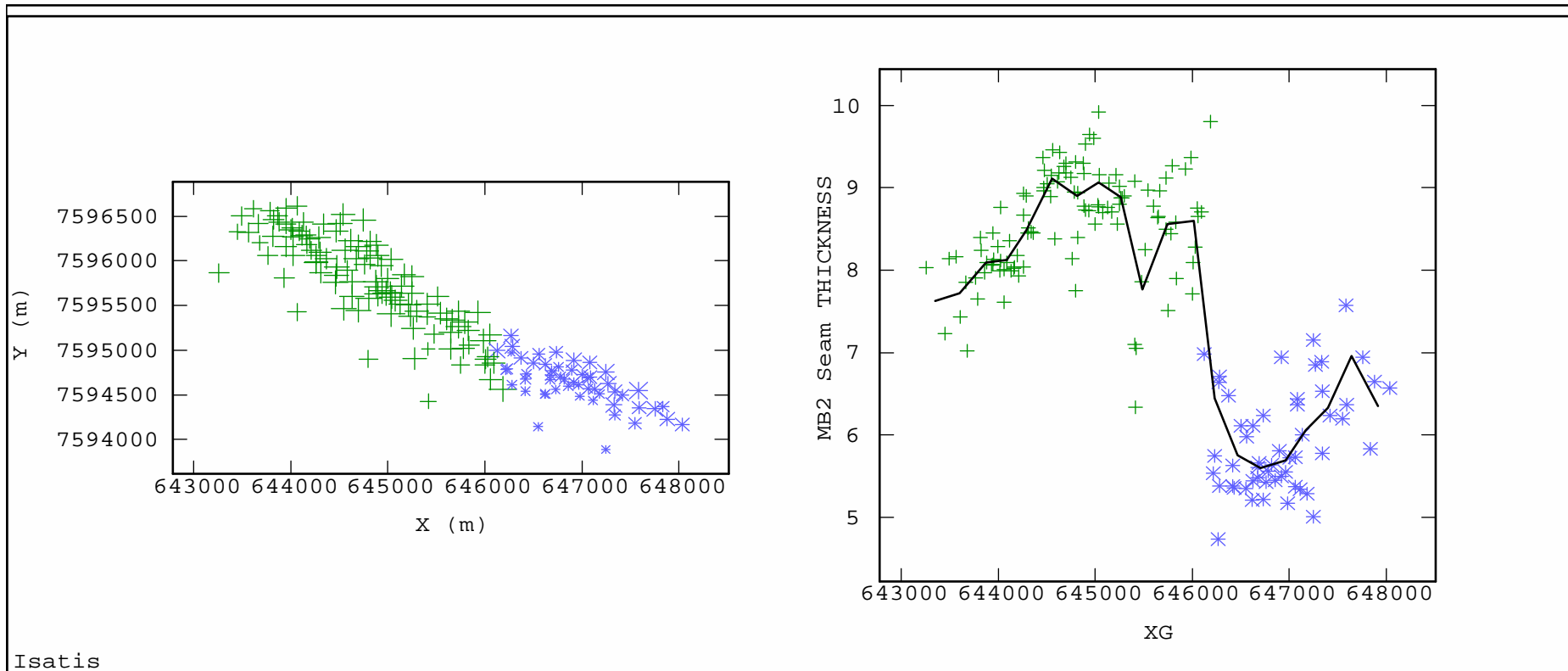
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- Affects mine development strategy.
- Selective mining of various splits required to manage phosphorous levels to meet market specifications.
- Phosphorous is highly variable both laterally and vertically.
- Require adequate modelling of these 'plies' to allow selective mining.
- High and low phosphorous can then be stockpiled with subsequent increased ability to meet specifications for product coal.

# EDA: reminder

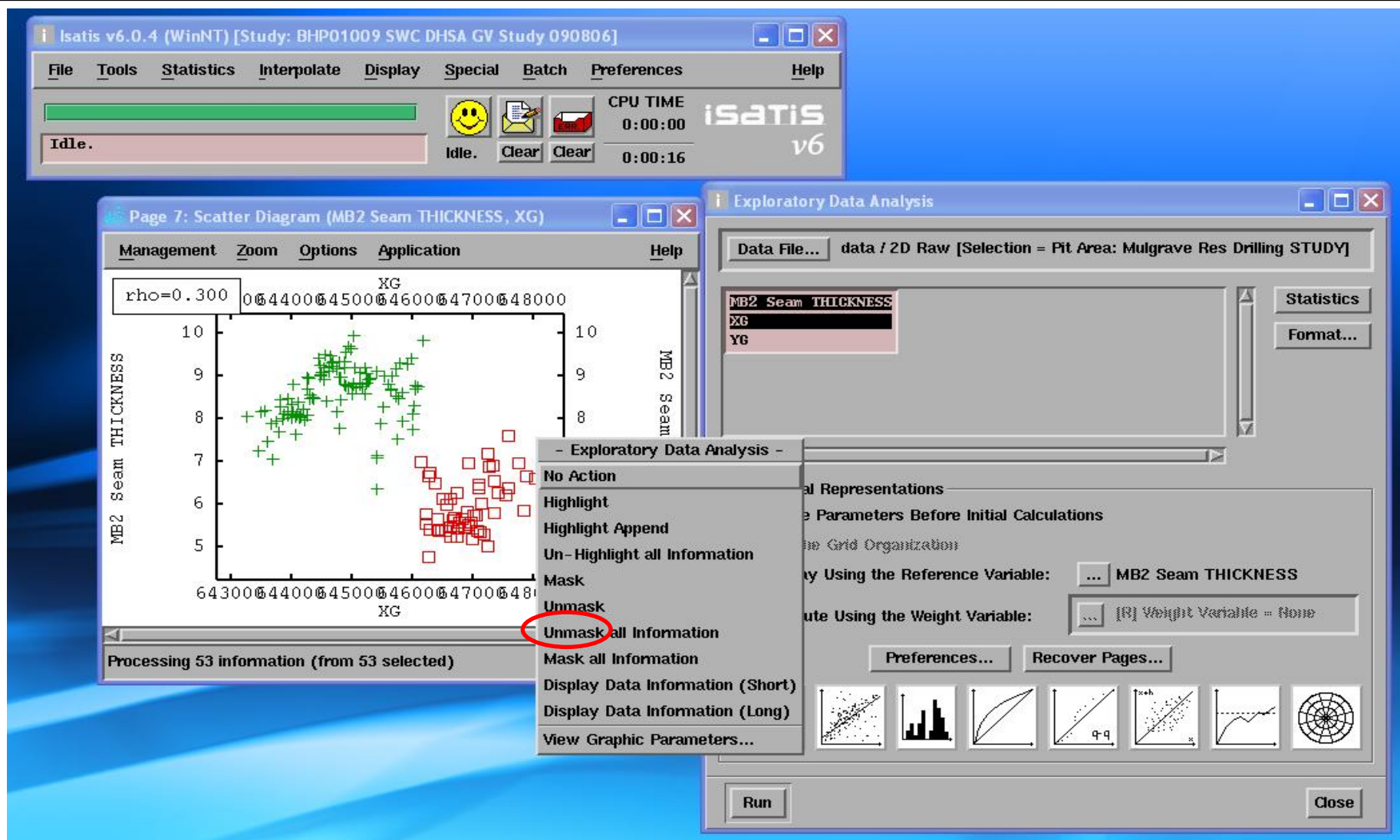


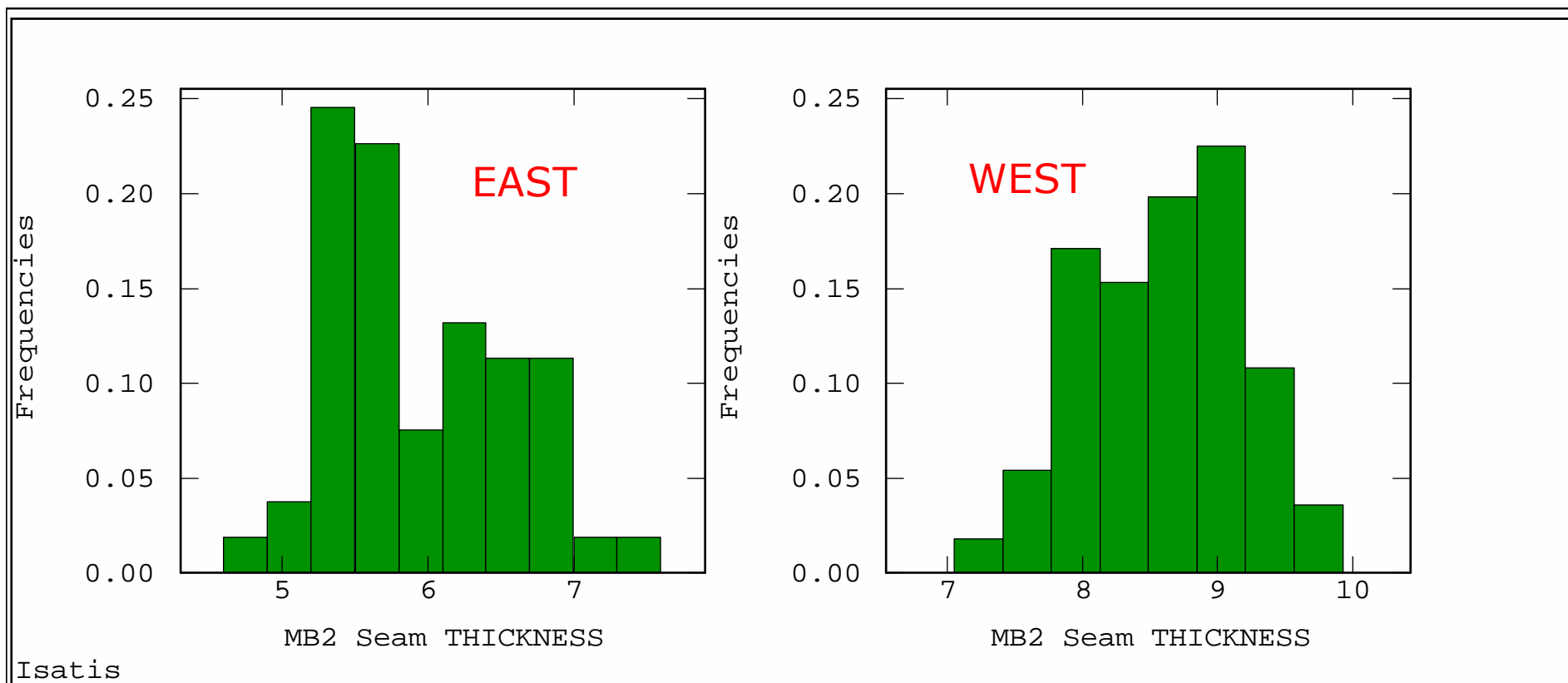


- Use of linked windows to investigate the spatial distribution of variables



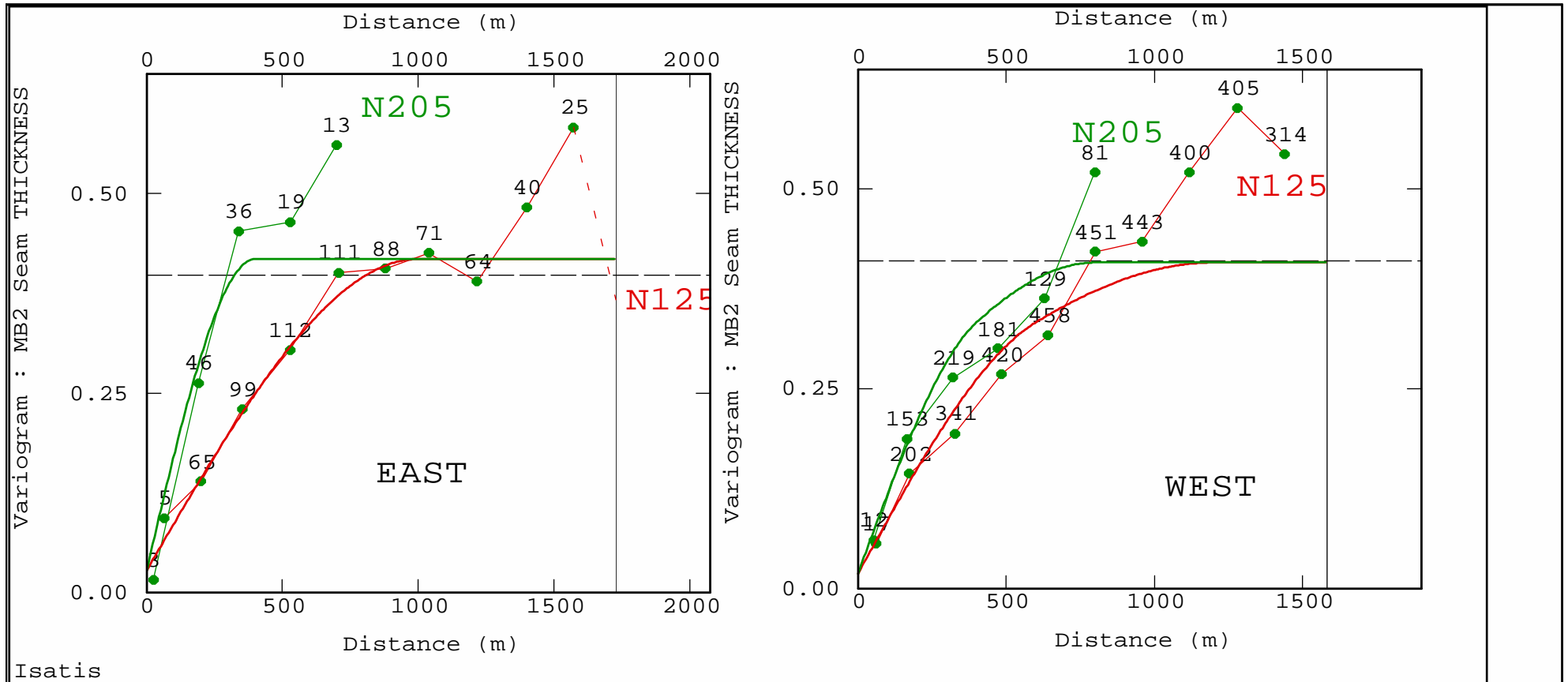
# EDA





# EDA

- Evaluation of variables is quite rapid.
- Visual analysis of the spatial distribution.
- Creation of selections is instantaneous.
- Impact on geostatistical characteristics can be assessed immediately.

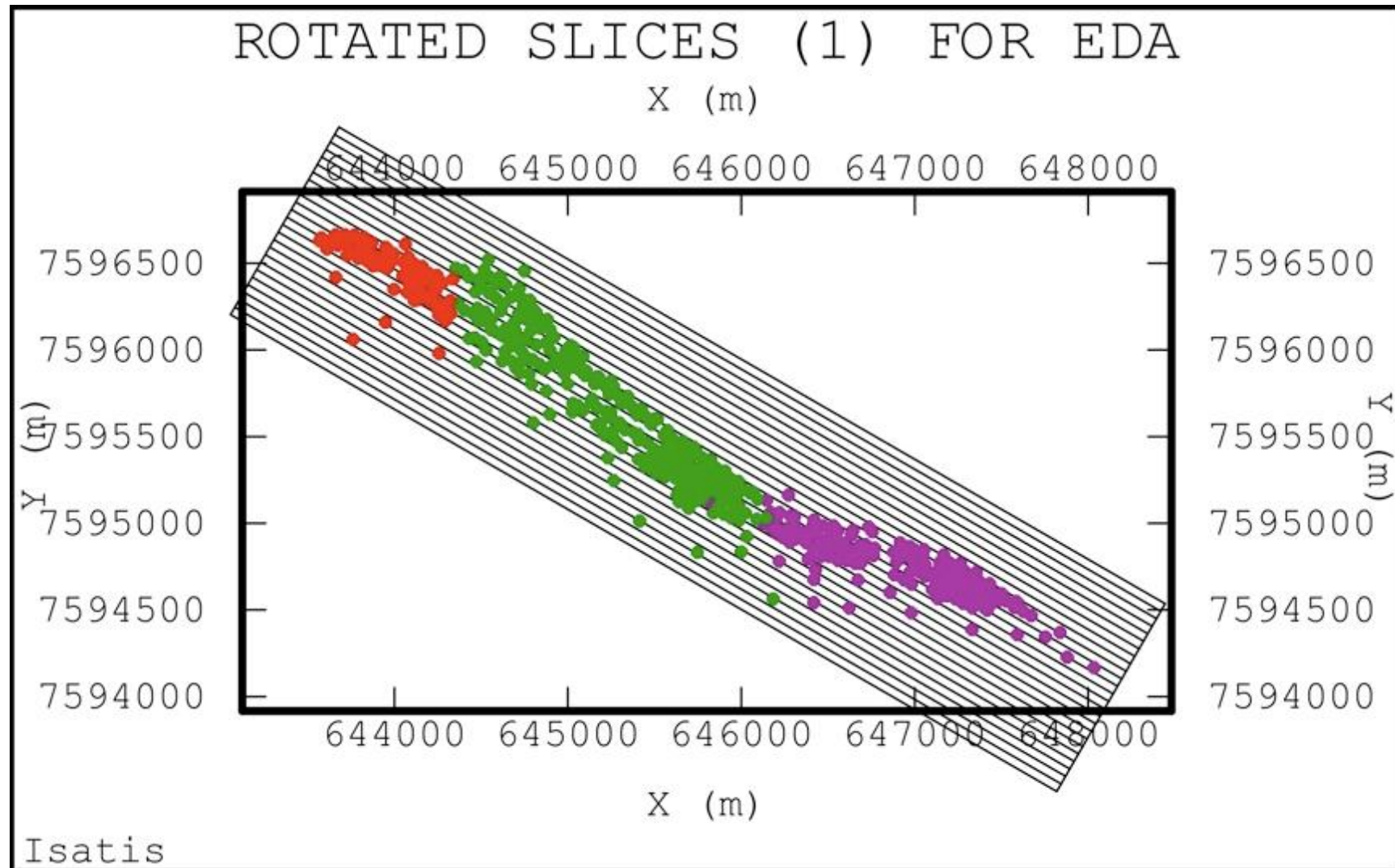


# EDA

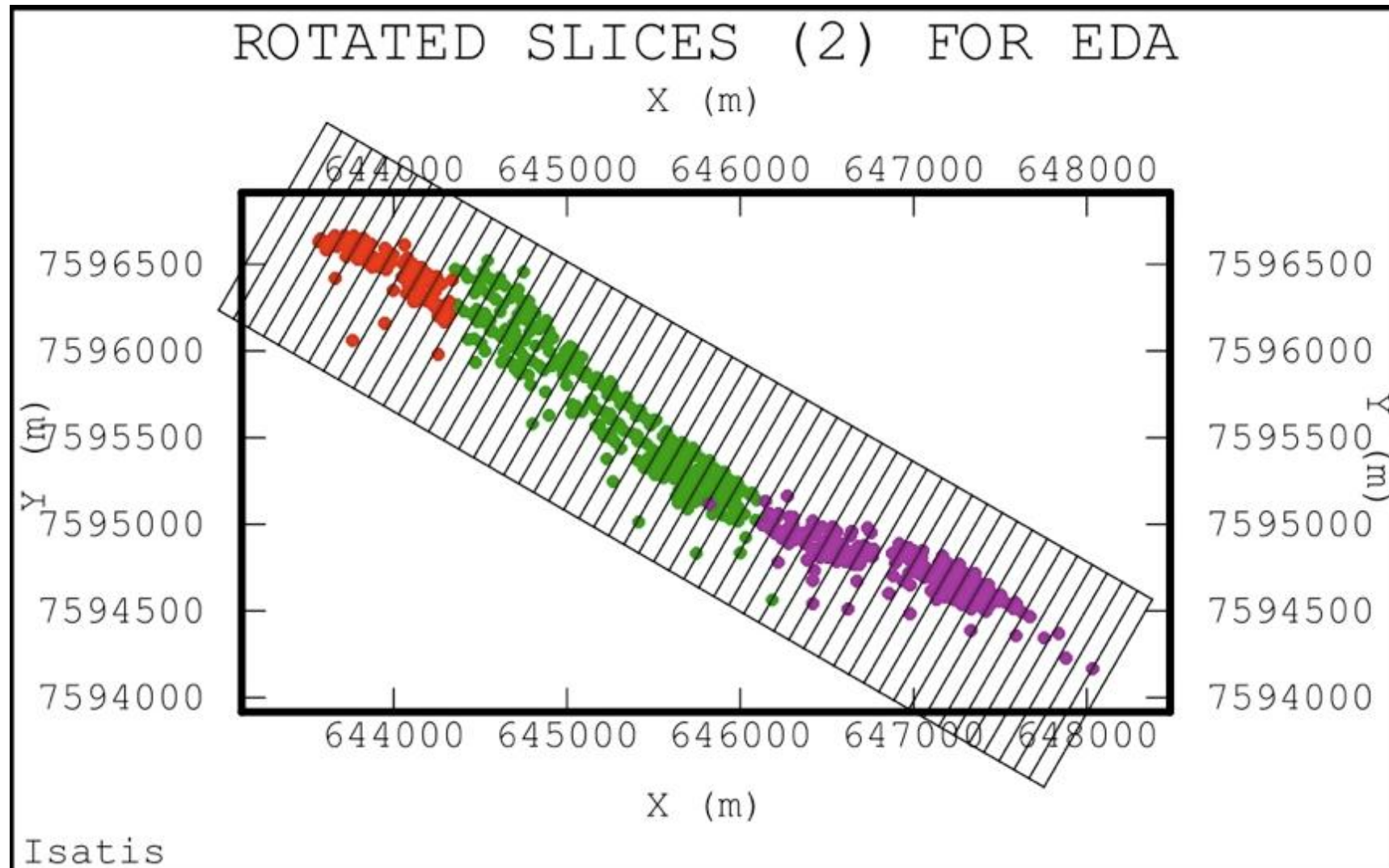
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- Use of EDA to produce preliminary domains.
- Incorporation of geological knowledge to improve definition.
- Validation of domaining through investigation of sliced statistical profiles.
- Feedback process.

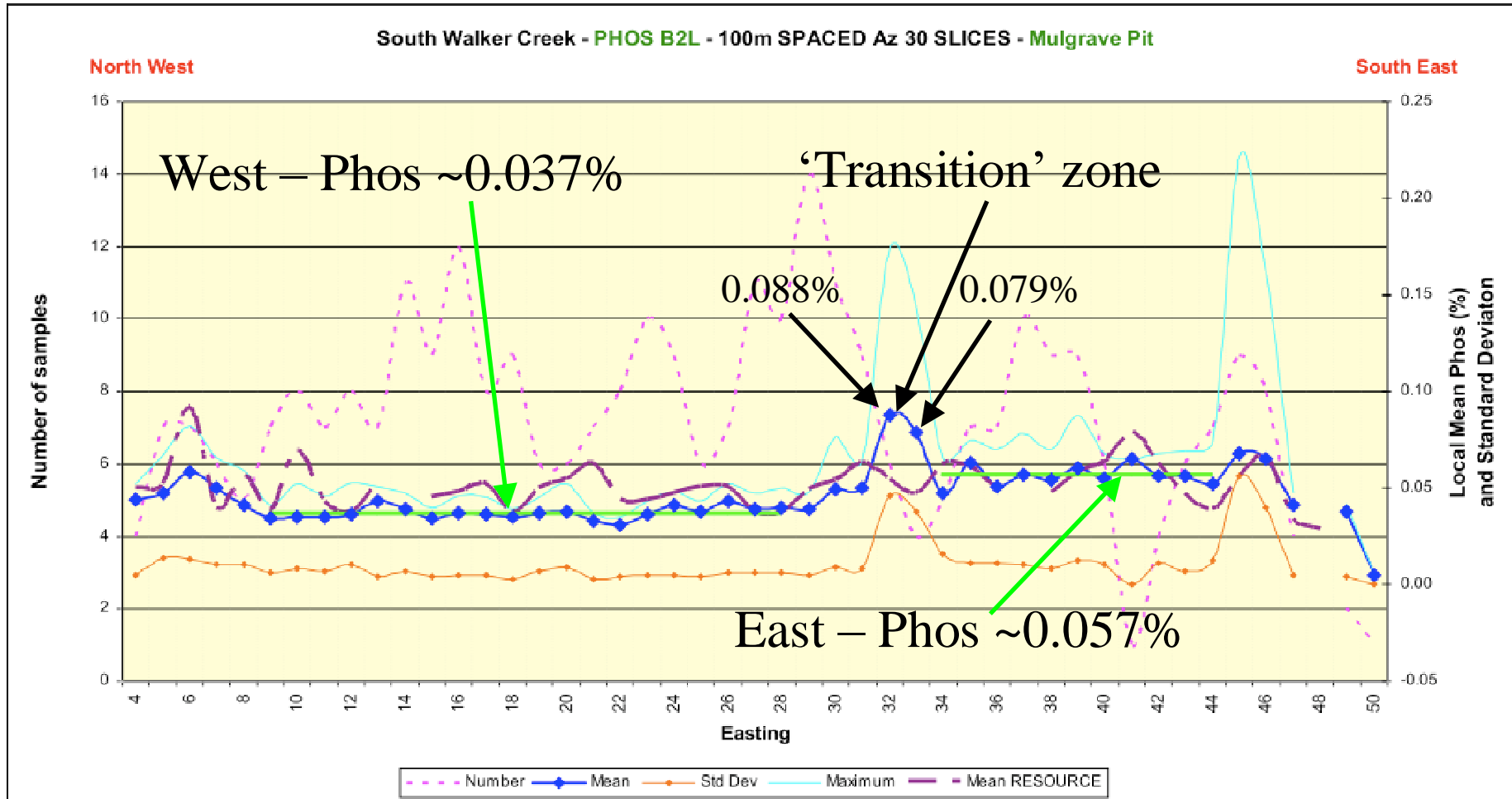
# South Walker Creek - EDA Analysis



# South Walker Creek - EDA Analysis

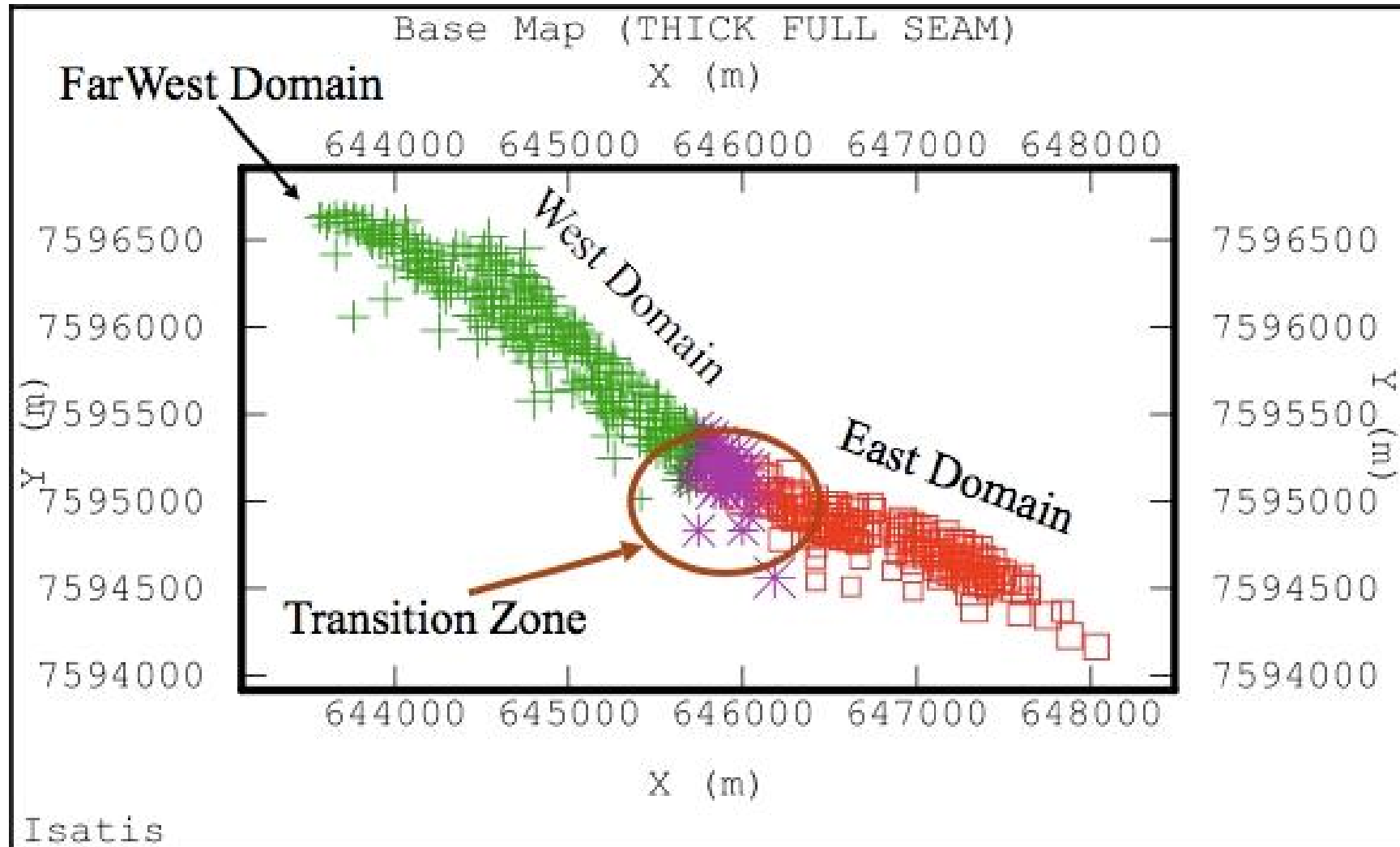


# Slice Statistics

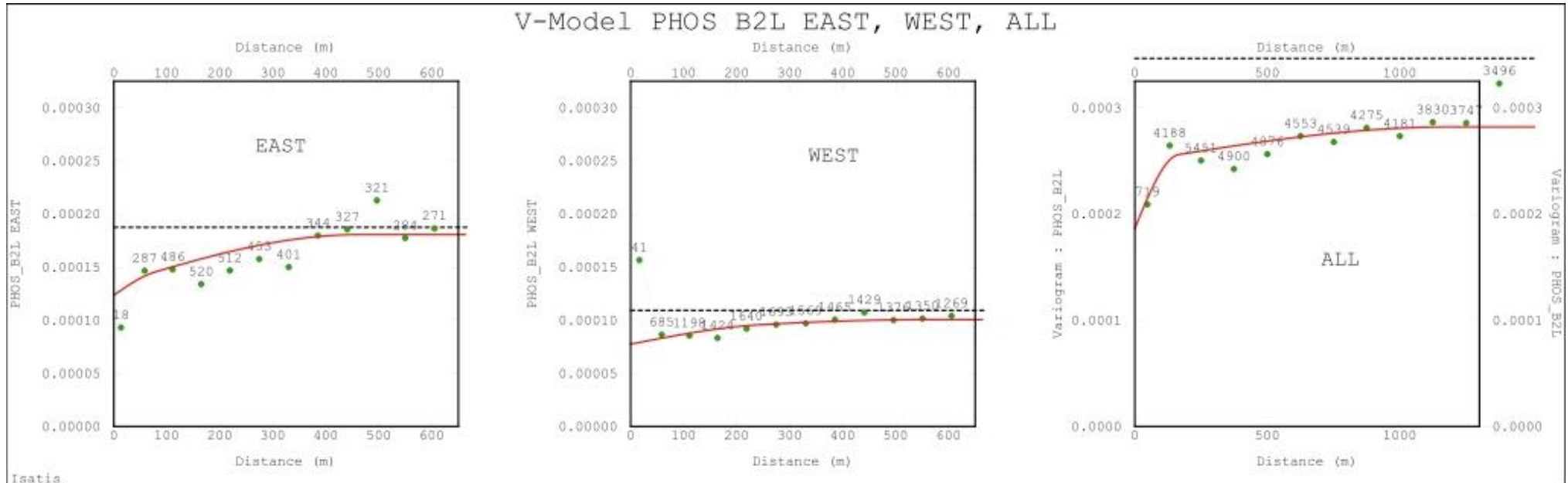




# SWC Domains



# Effect of Domaining on Variography



- Impact of domaining is marked.
- East/West distinction produces better structured, lower silled variograms.

# South Walker Creek, Mulgrave Pit – Domain Conclusions

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## Summary of Domaining Strategy

- East-West distinction mandatory;
- Phos Plies geostatistically sensible;
- B1H also a ‘High Ash-Low Yield’ ply;
- B2L-B3H-B4L ‘Low Ash-High Yield’ ply.

# The Variogram - Uses

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## Variogram: Adjunct to Geological Study

- Validity of East/West distinction confirmed for Phos B2L.
- Poor spatial continuity: ~70% Nugget. Indicator that a high degree of smoothing will be required for estimation. ID<sup>2</sup> or ID<sup>3</sup> simply not adapted.
- Re-focus investigation on Transitional Zone (West-East).

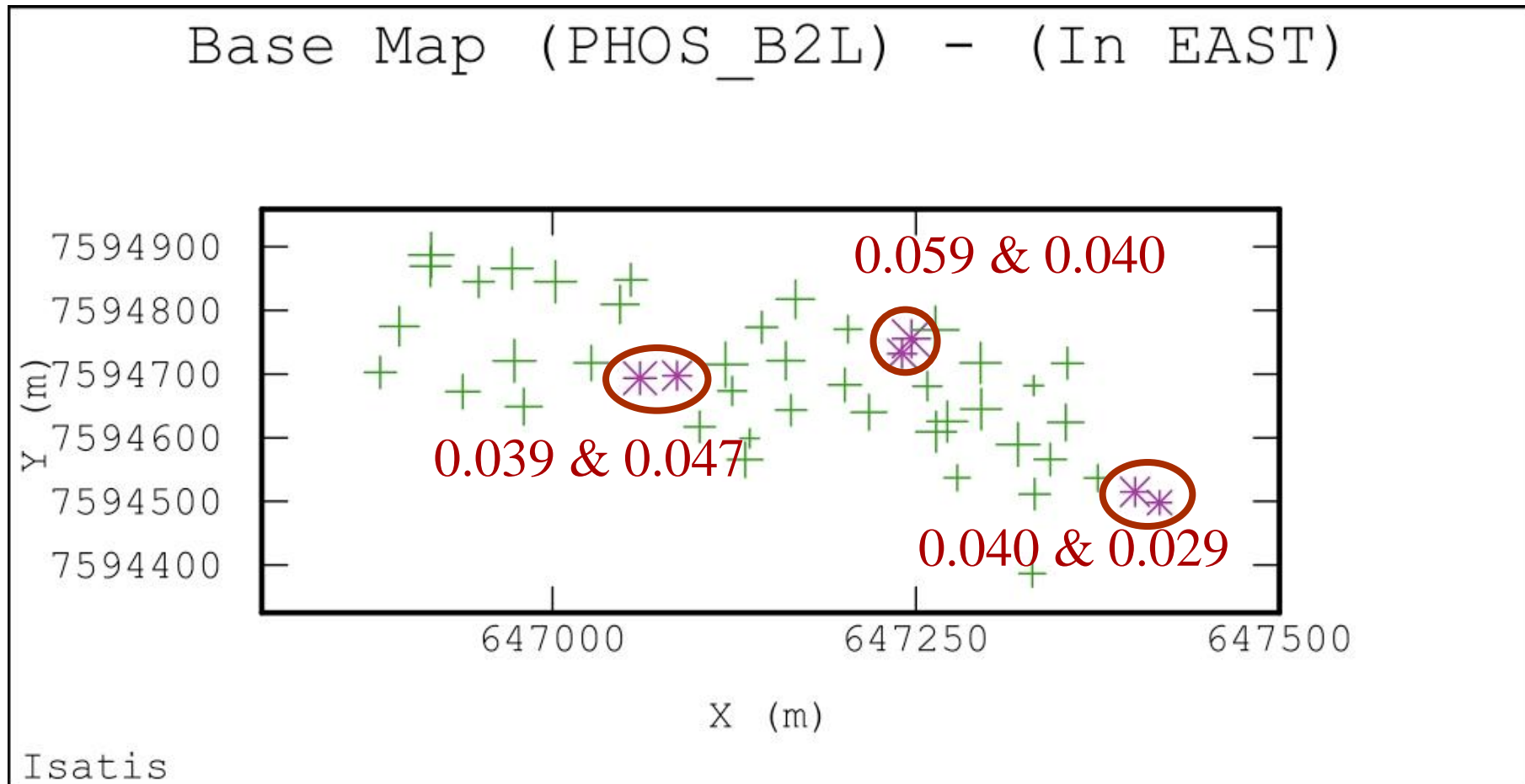
# Nugget Effect

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## Nugget Interpretation

- Overall  $\sim 0.0002 \Rightarrow$  nugget stdev (0.0141).
- Find nearby pairs (quality-quality; resource-resource; quality-resource).
- Assess if nearby samples can vary by as much as 0.015% Phos.

# Nugget Effect - what does it mean?



# DHSA

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- Application (reminder OB's demo).
- Batch processing allows rapid production of DHSA results.
- Use for classification purposes.

## PHOS - MB2 Seam over a Nominal 1, 2, 5 & 8 years based on 4.0Mt per annum - MULGRAVE PIT WEST

