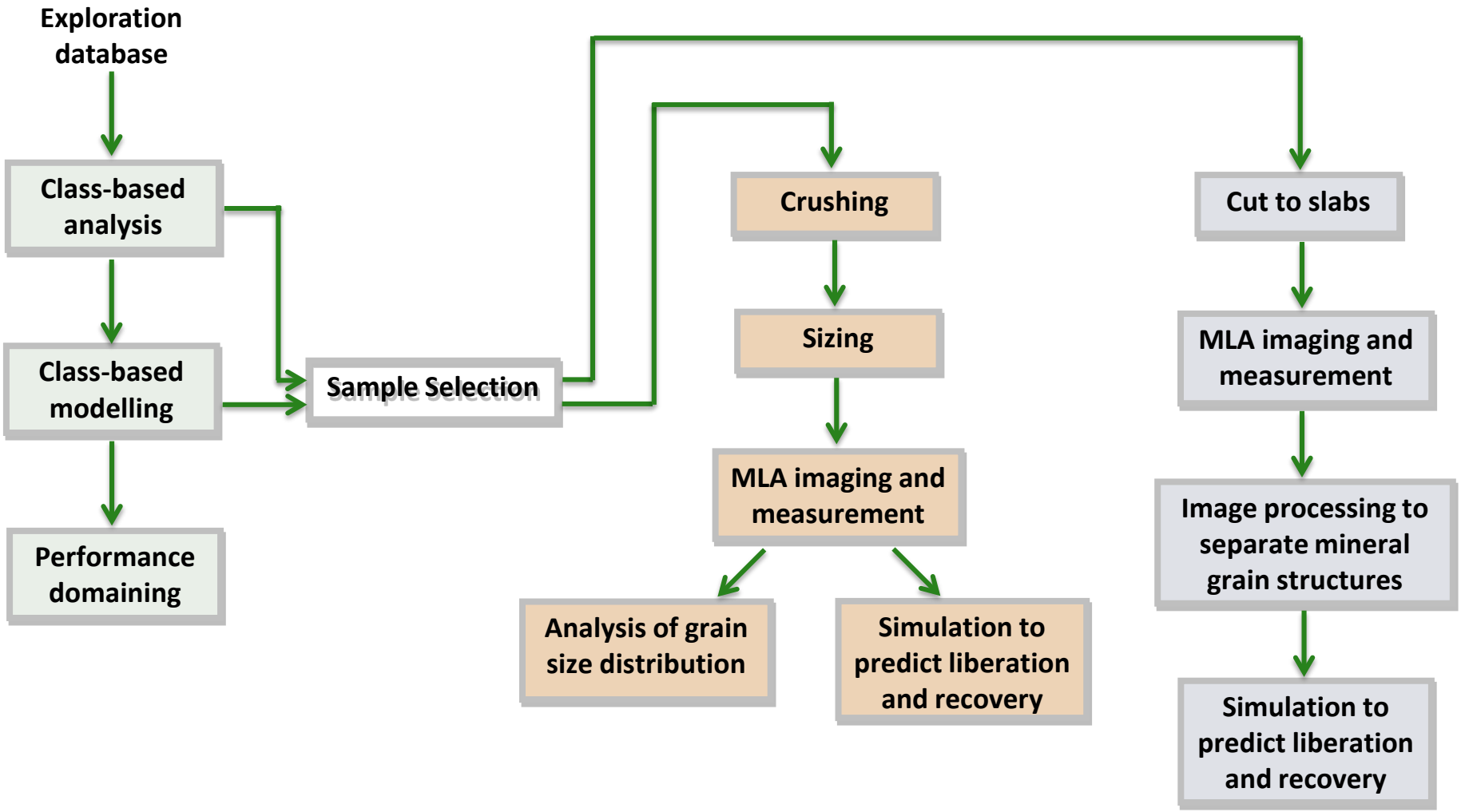
SMI JKMRC
Julius Kruttschnitt Mineral Research Centre

Dr Kate Tungpalan (Awarded 2016)

"Investigating textural drivers for separation performance in a variable and complex ore body"

Method



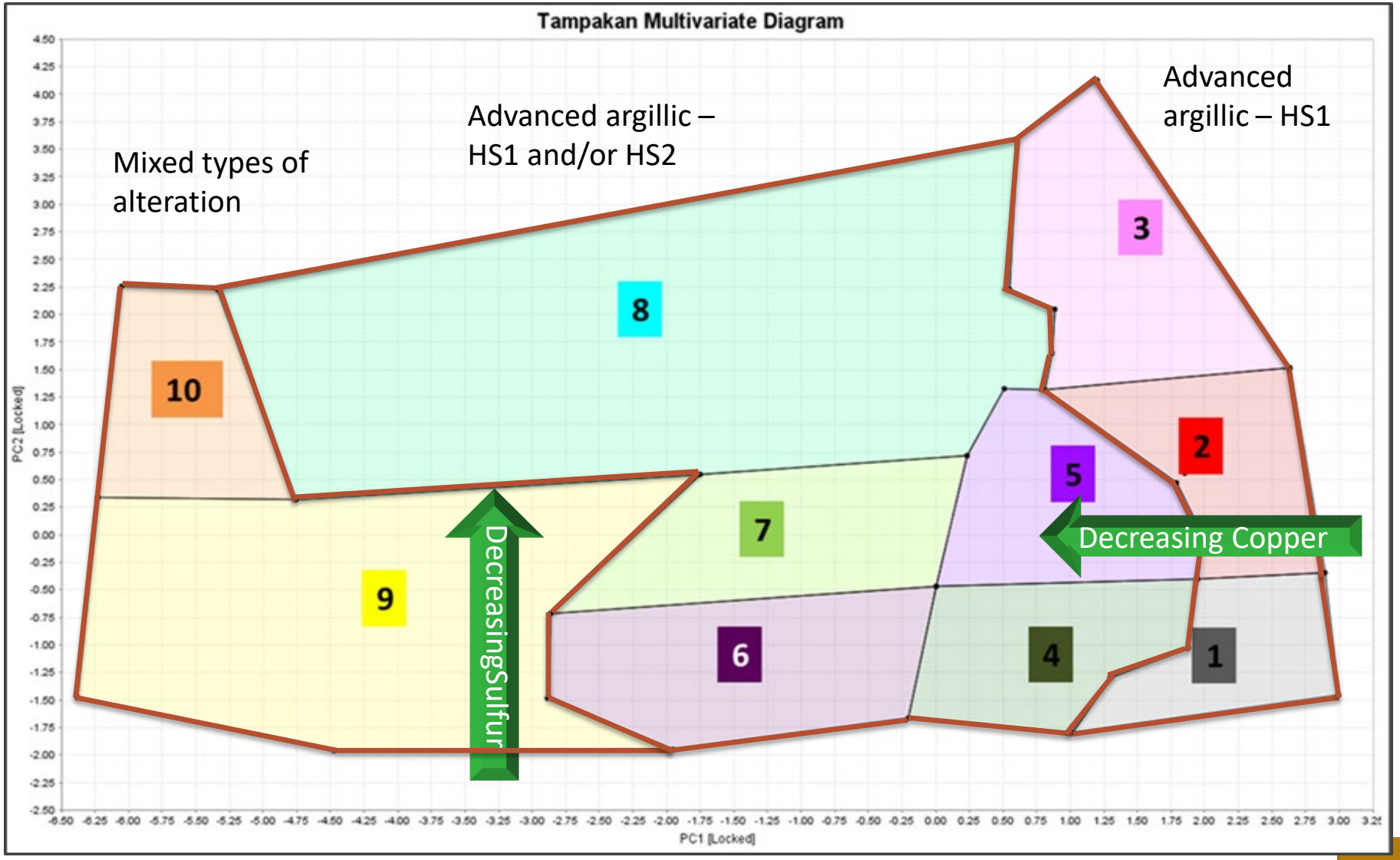
Geometallurgical characterisation

Sample selection

Grain size measurement at micro-scale

Mineral grain structure at meso-scale

Class-based Analysis

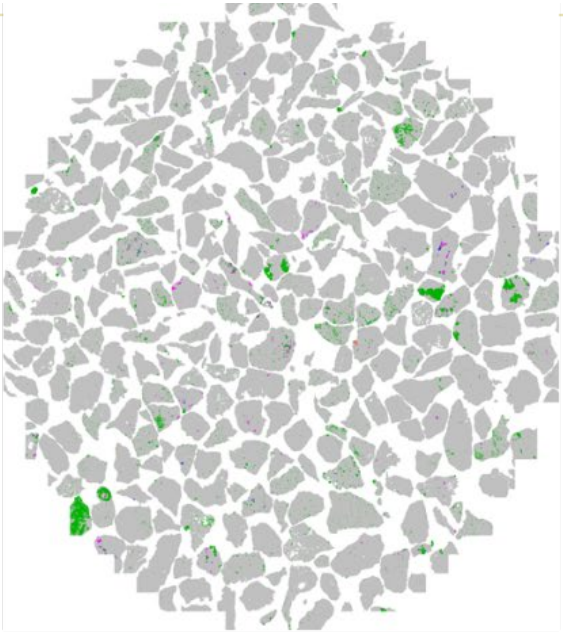


HS1 = silica > 50% HS2 = clay > 50%

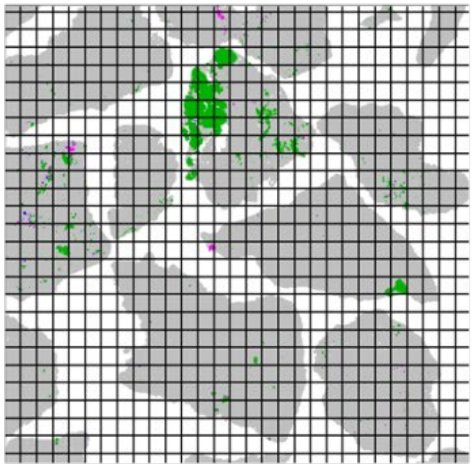
Class-based Modelling

Class	Model	Residual Error	Confidence Limit (90%)
2	Cu Recovery = 88.94 – 215.6(Mg) + 2.853(S)	3.90	±6.44%
4 (1) 4 (2)	Cu Recovery = 101.2 + 0.12(Mo) + 7.97 ln(Au/S) Cu Recovery = 81.41 + 28.45 (Cu/S)	6.76 2.61	±11.15% ±4.30%
5 (1) 5 (2)	Cu Recovery = 97.96 – 20.31(Au) – 0.006709(As) Cu Recovery = 86.78 – 6.658(dg) + 3.497(Cu)	3.33 3.96	±5.49% ±6.53%
6	Cu Recovery = 53.82 – 0.0967(PHSC) + 4.286 ln(Cu) – 0.05183 (py/Mg)	3.10	±5.12%
7	Cu Recovery = 77.06 + 8.245 (Cu) + 52.68 (Cp/S)	2.66	±4.40%

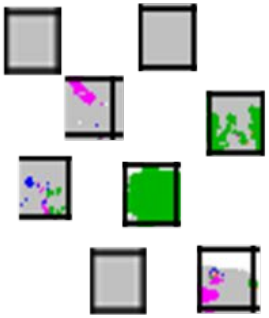
Simulated Breakage by Random Masking



MLA image of a block of particles



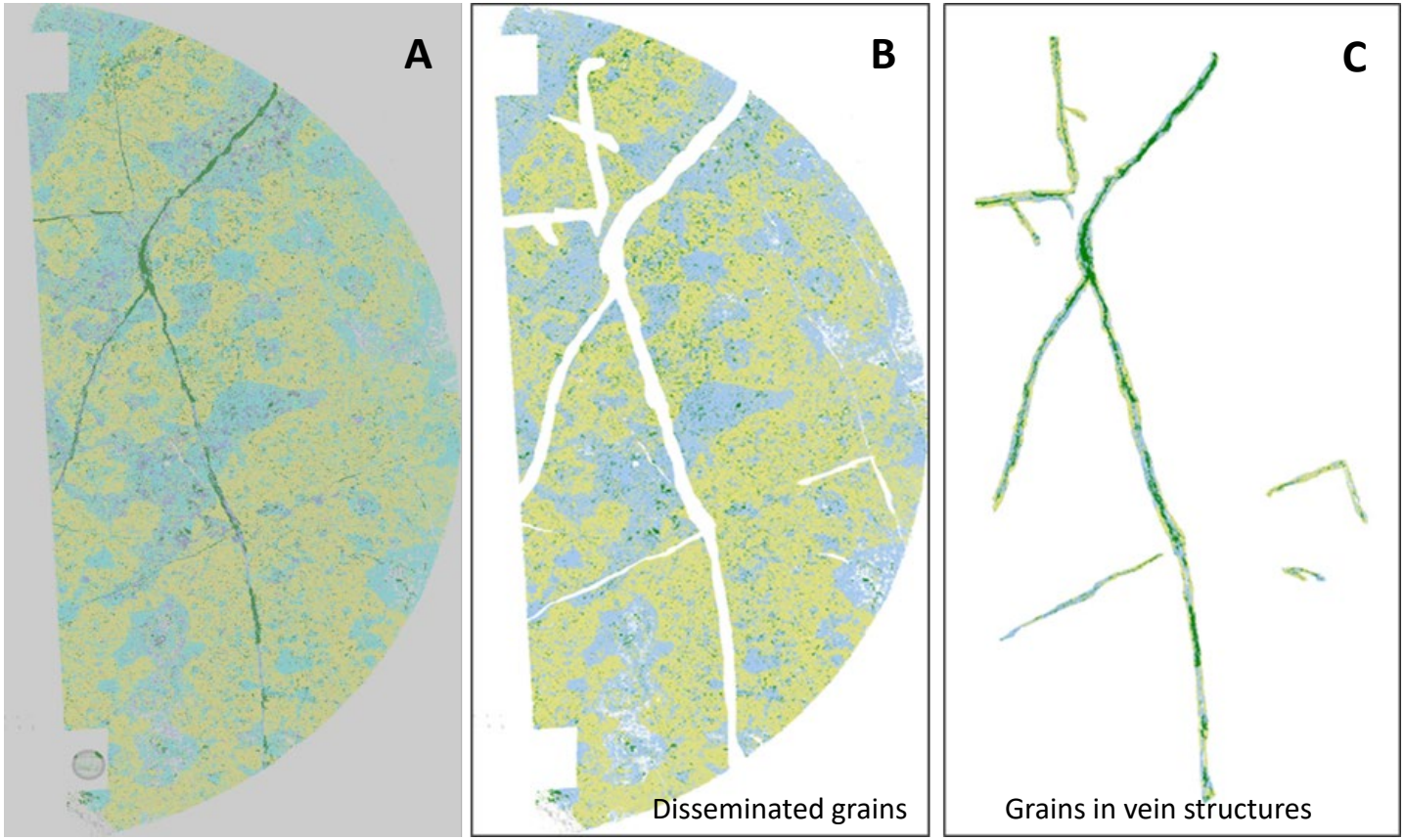
Masking with square grids of known size



Simulated progeny particles will undertake compositional analysis

	Cu Recovery (%)	
Class	Predicted from particle composition	Batch flotation test
S41	86.1	89.5±1
S43	85.8	80.0±4
S61	88.8	89.8±1
S63	83.1	85.3±3

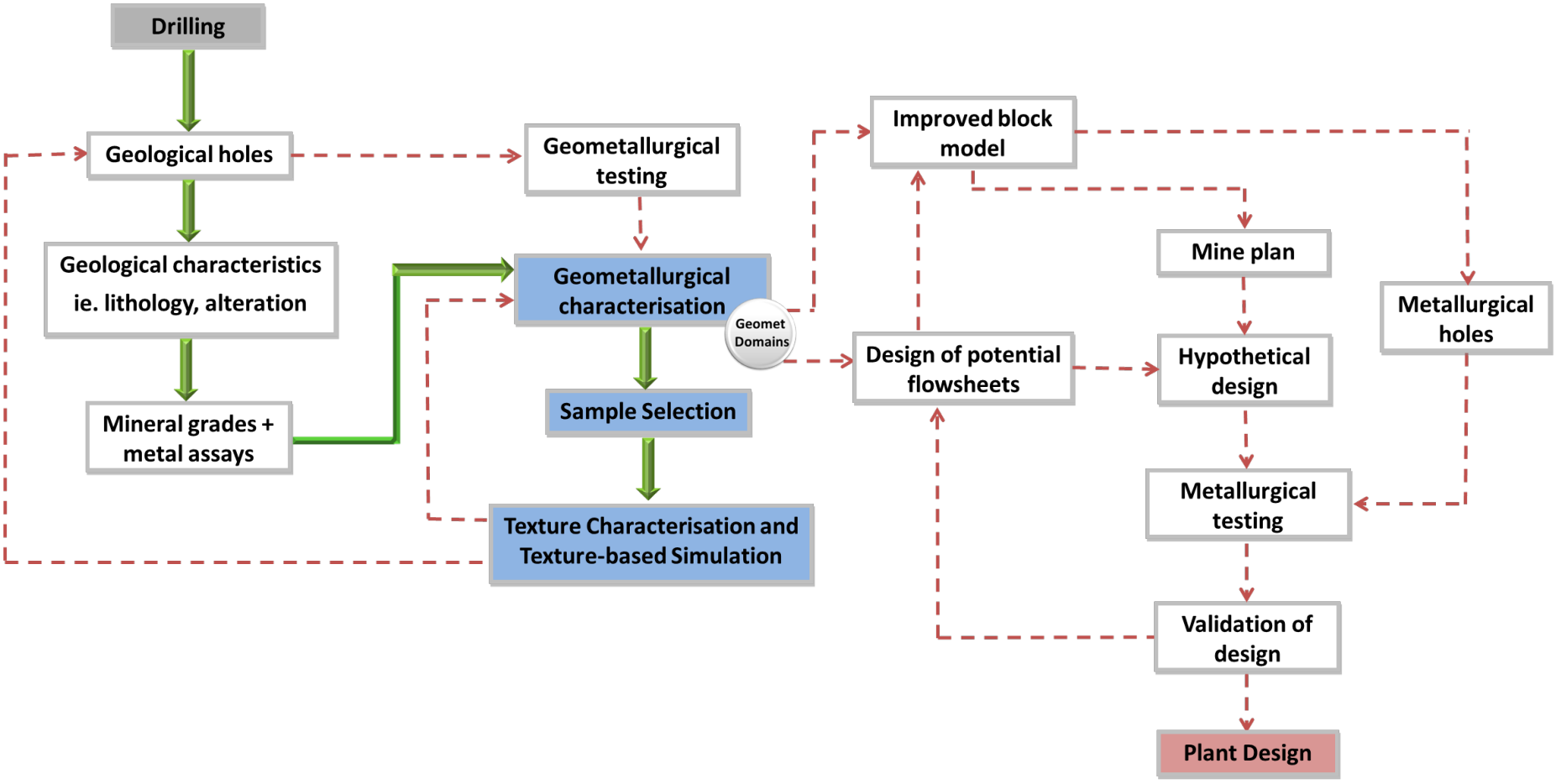
Mineral Grain Structures



Relative Contribution to the Overall Liberation (%)				
	150	100	75	50
Veins	97	93	85	68
Disseminated Grains	3	7	15	32

**Relative contributions to the liberation of sulphides at the 90% composition*

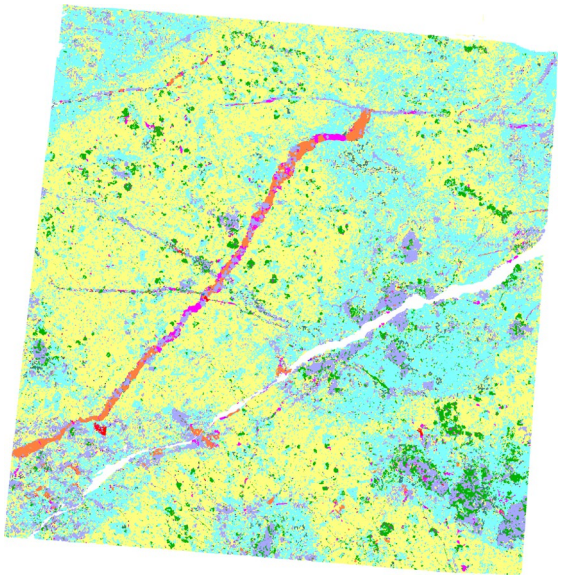
Where this fits in geometallurgical characterisation



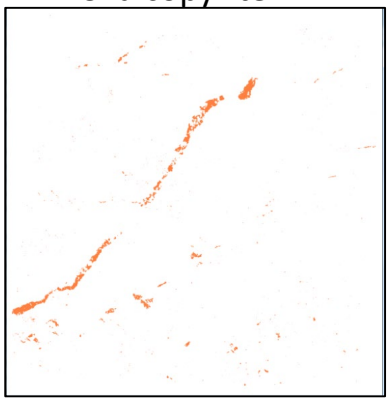
Continuing from Kate's work

- Winter Research Scholar (2017) – Joyce Siong

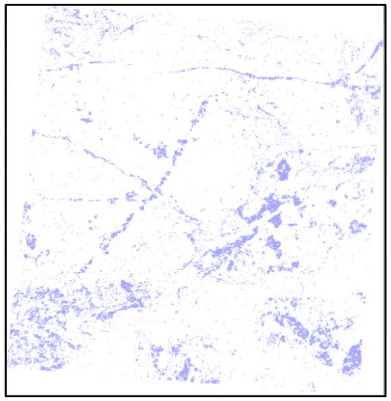
  "Veins, grains and voids – developing image processing routines to quantify ore textural features"



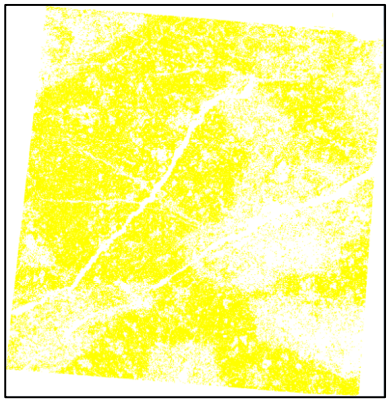
Chalcopyrite



Diaspore

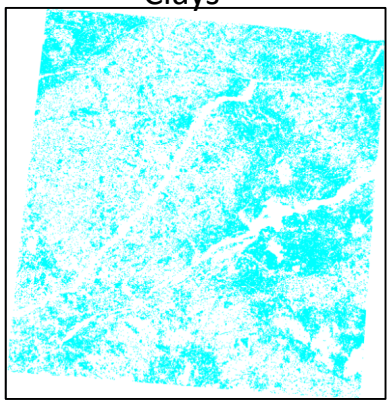


Silicates



Pyrite

Clays



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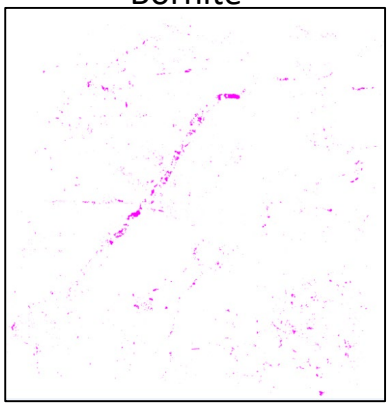

- Summer Research Scholar (2017/18) – Chong He

  "Veins, grains and voids – linking particle liberation to meso scale texture"