Supplementary Material

Supplementary Material I: Dimensionality reduction in SOM (modified after Kohonen, 1982)

Computational Layer

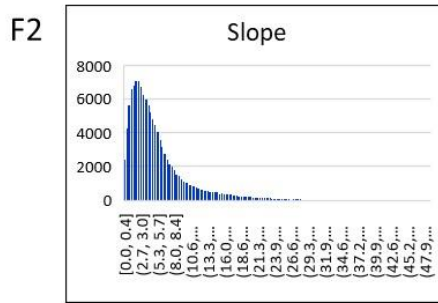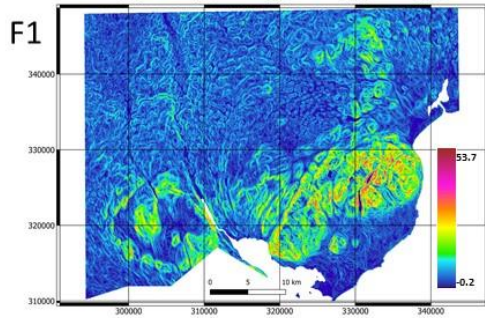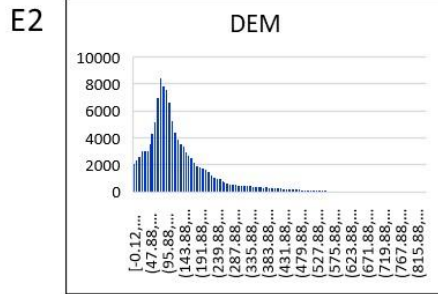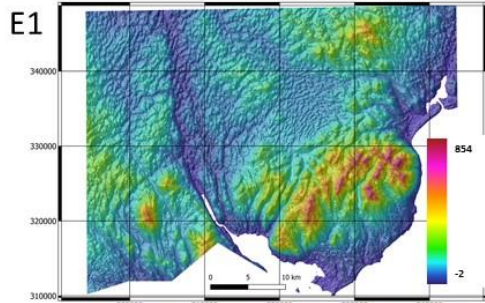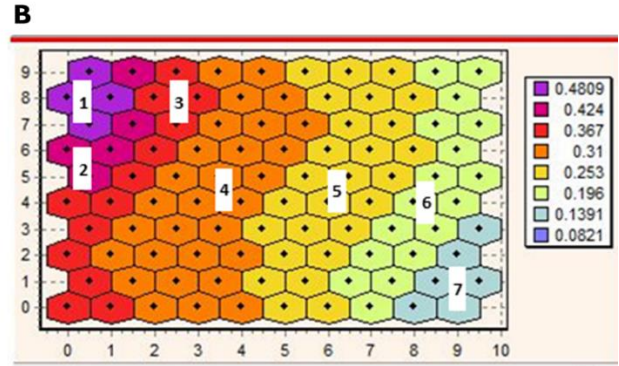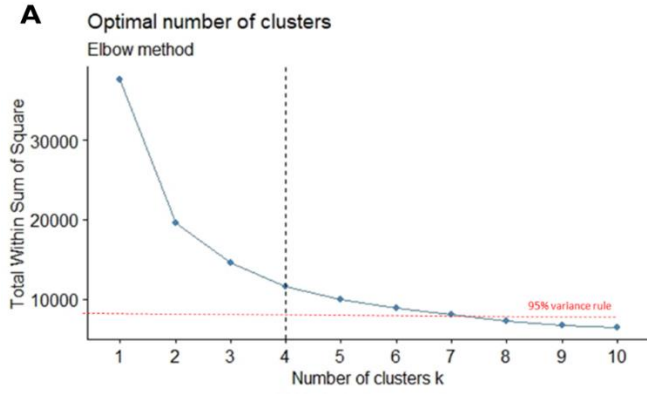Input Layer
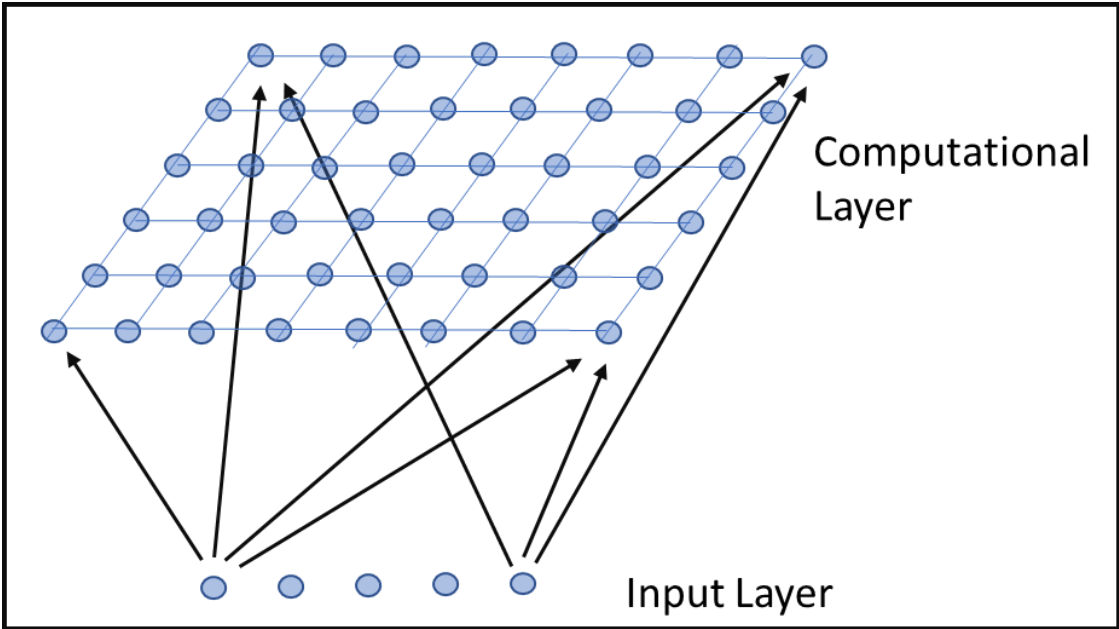
Supplementary Material II: The distribution of the radiometry (K: A1-2, U: B1-2, Th: C1-2, T-CPS: D1-2) and topographical features (Elevation: E1-2, Slope: F1-2, Terrain ruggedness index (TRI): G1-2).

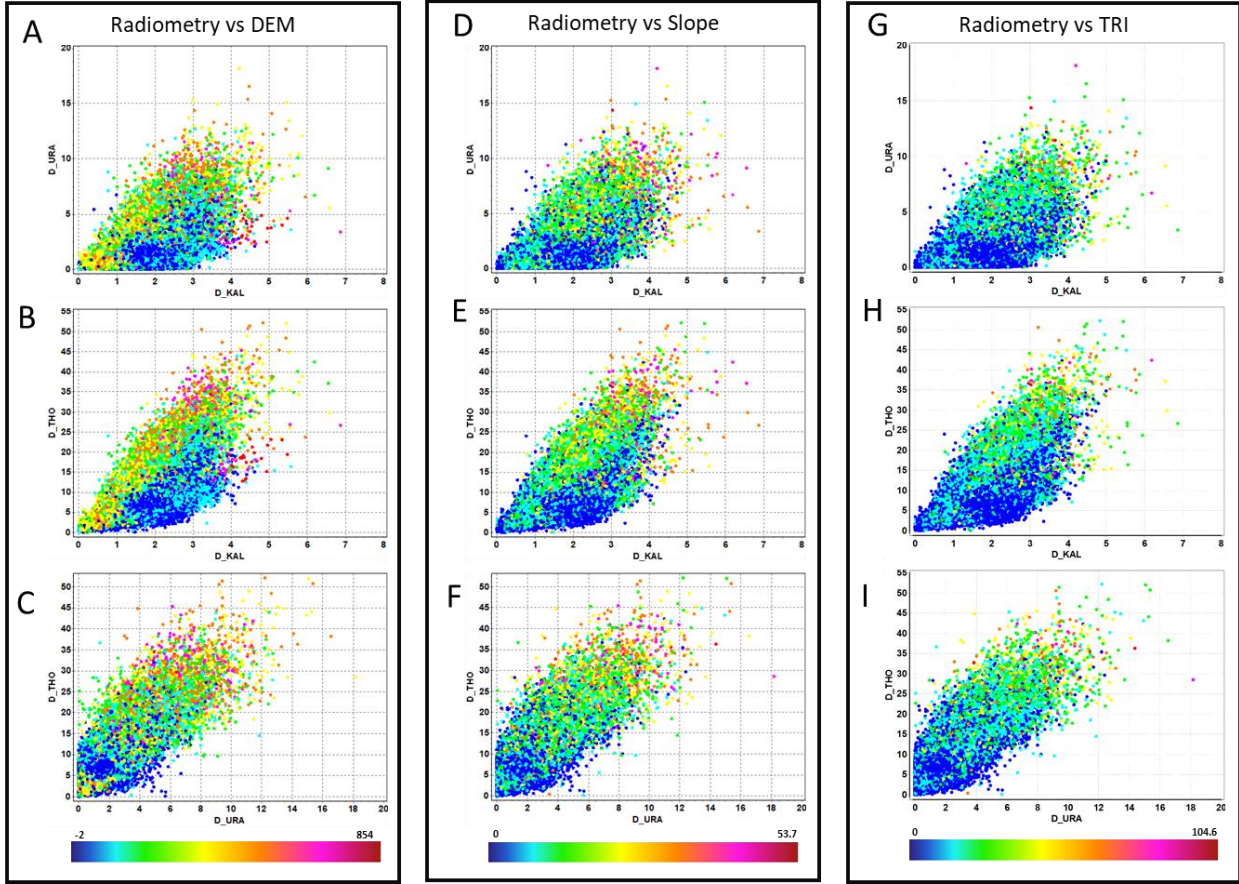E1

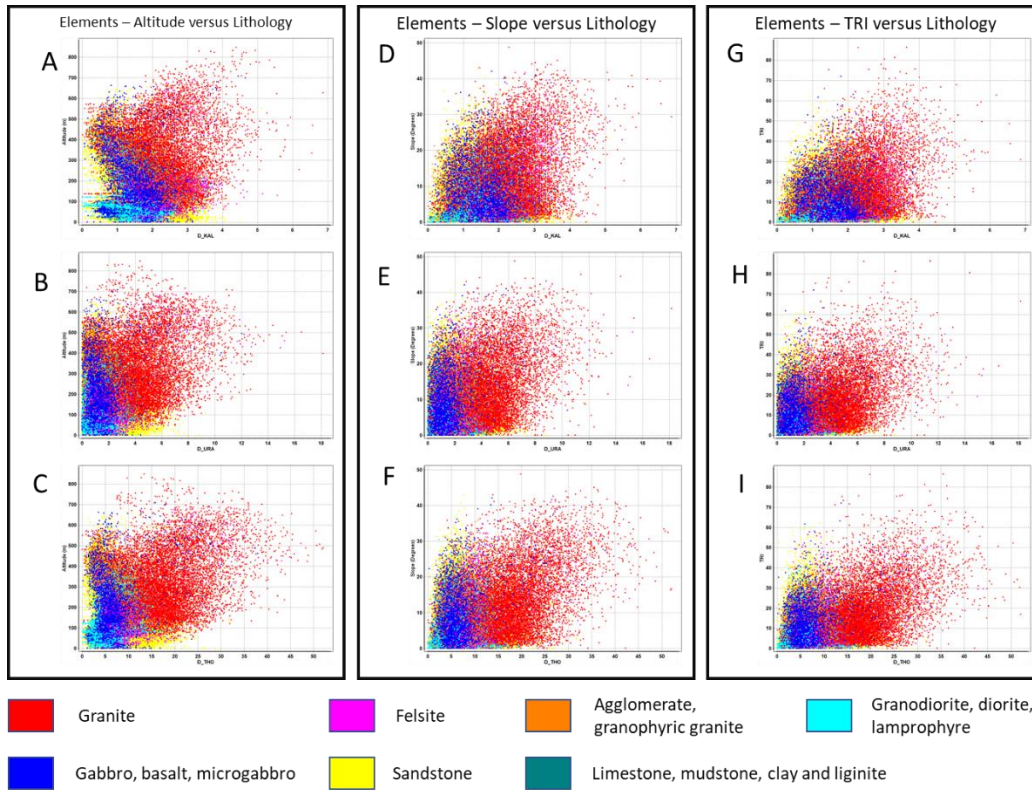E2 DEM

F1

F2 Slope

G1

G2 TRI
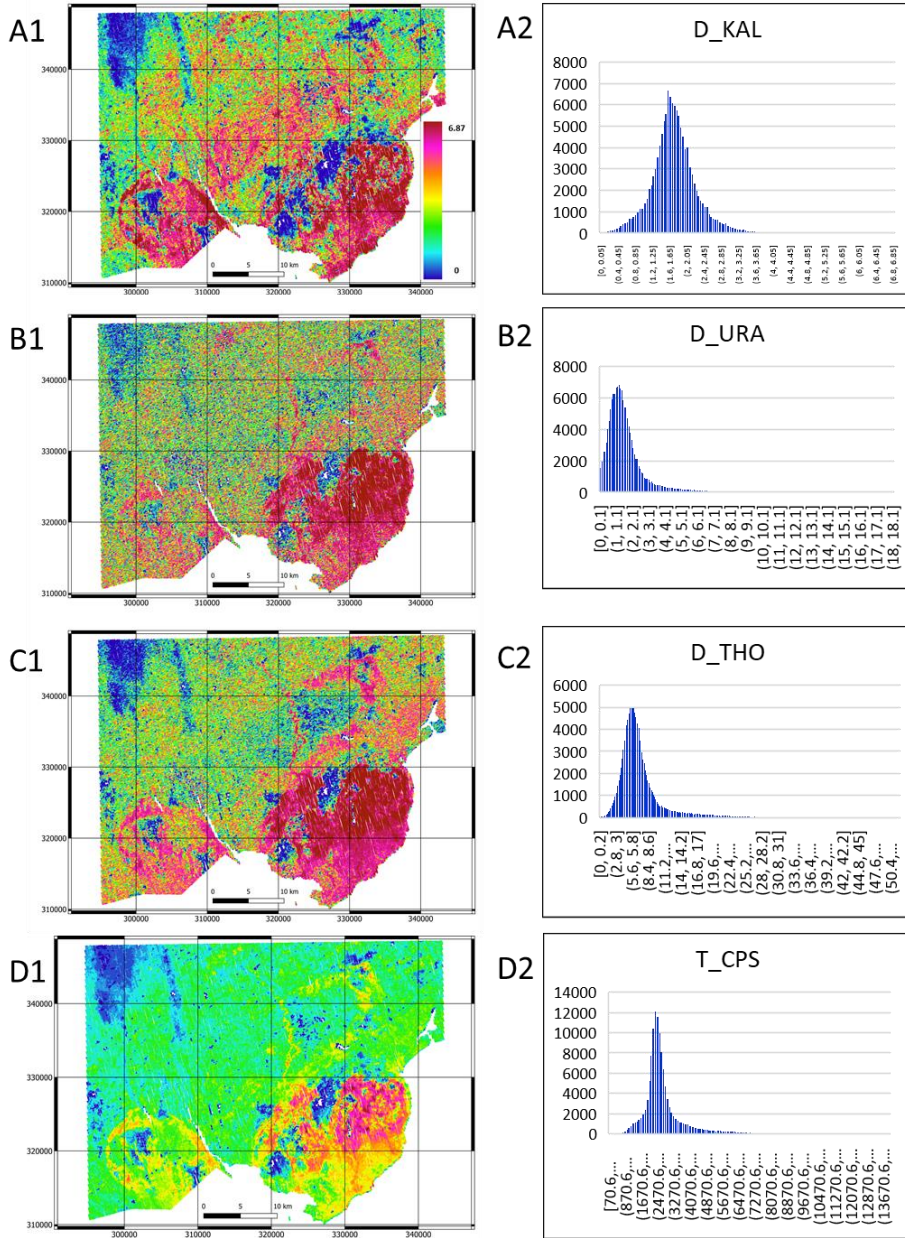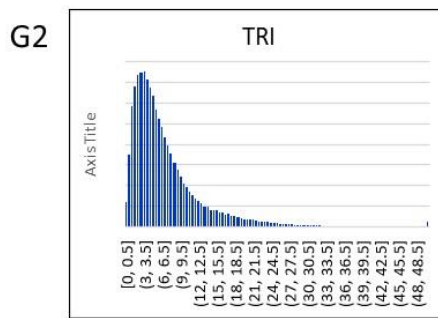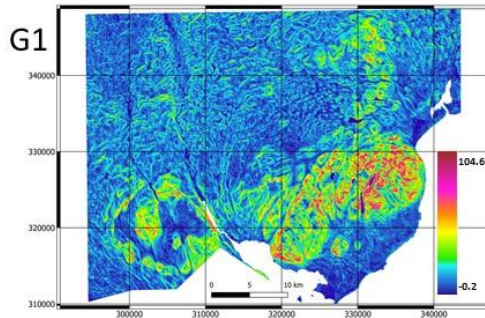
Supplementary Material III: a) Elbow method; b) data slices indicate possible 7 clusters.

Supplementary Material IV: Binary plots of the radiometric elements versus the elevation data.
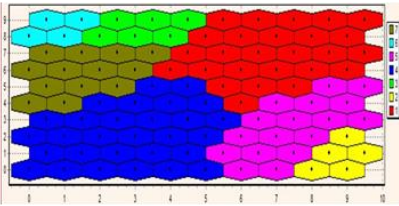
Supplementary Material V: Binary plots of the radiometric elements and topographic data versus the bedrock lithology.

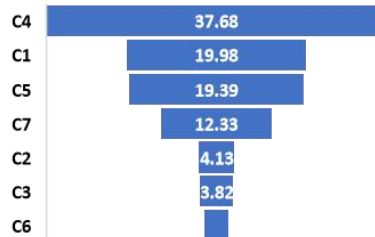|					
🟥	Granite	🟪	Felsite	🟧	Agglomerate, granophyric granite
🟦	Gabbro, basalt, microgabbro	🟨	Sandstone	🟩	Limestone, mudstone, clay and liginite

🟦 Granodiorite, diorite, lamprophyre

Supplementary Material VI: Clusters distribution using SOM (left) compared to their spatial distribution (right). An inverted pyramid of number (middle) shows the hierarchy of the cluster based on their relative percentages. Generally, a similar pattern is observed among the various experiments, although some experiments were relatively better in capturing the variations in bedrock geology.
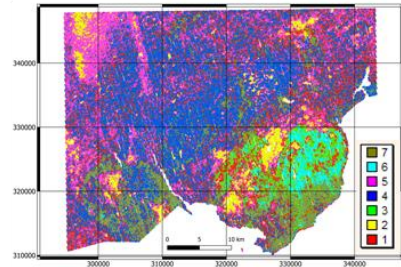
Input: Radiometry Only

D_KAL + D_URA

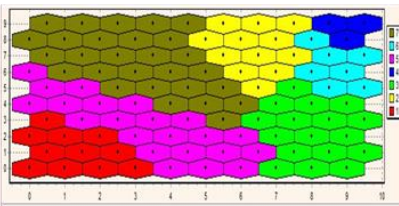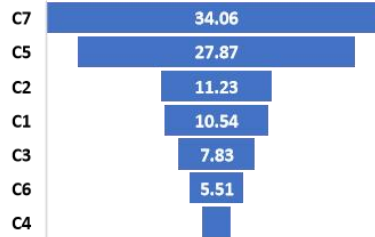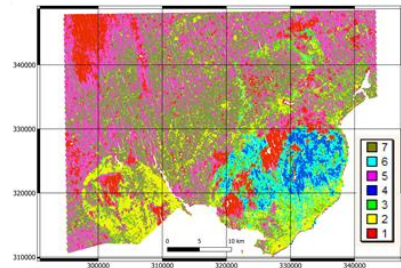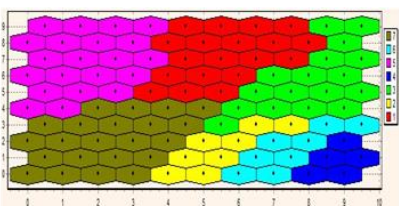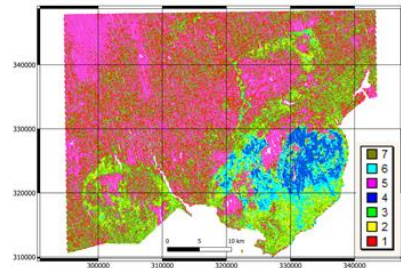D_KAL + D_THO
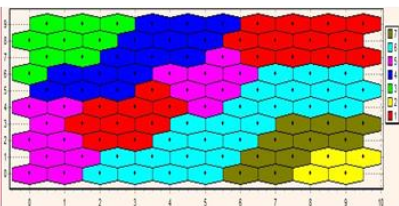
D_URA + D_THO
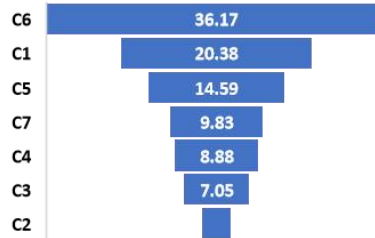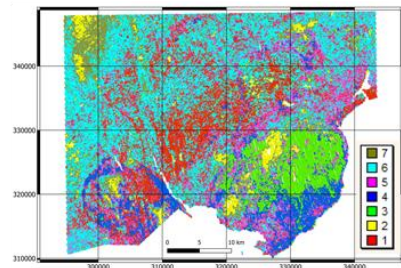
D_KAL + D_URA + D_THO

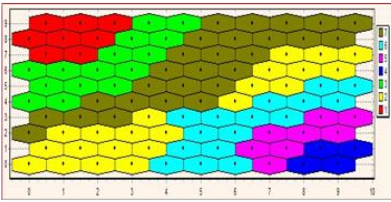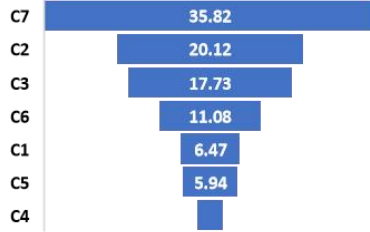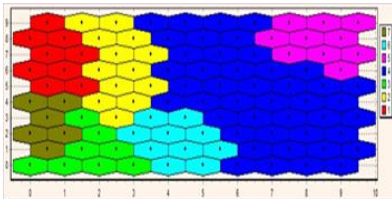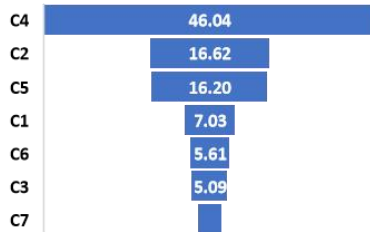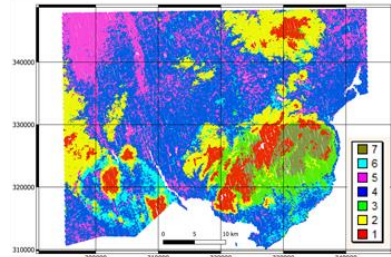## Input: Radiometry + 1 Feature

D_KAL + D_URA + D_THO + T_CPS

5A

5B

C7	35.82
C2	20.12
C3	17.73
C6	11.08
C1	6.47
C5	5.94
C4	

5C

D_KAL + D_URA + D_THO + DEM

6A

6B

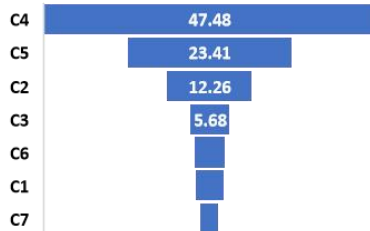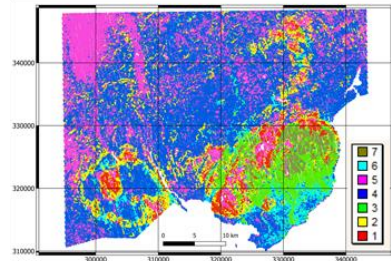|	
C4	46.04
C2	16.62
C5	16.20
C1	7.03
C6	5.61
C3	5.09
C7	

6C

D_KAL + D_URA + D_THO + Slope

7A

7B

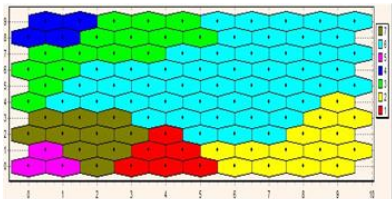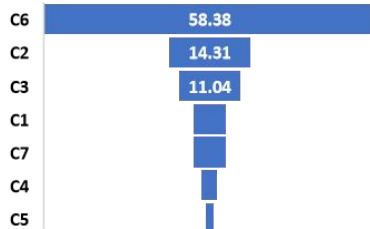|	
C4	47.48
C5	23.41
C2	12.26
C3	5.68
C6	
C1	
C7	

7C

D_KAL + D_URA + D_THO + TRI

8A

8B

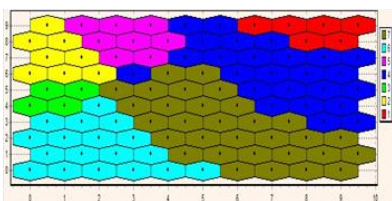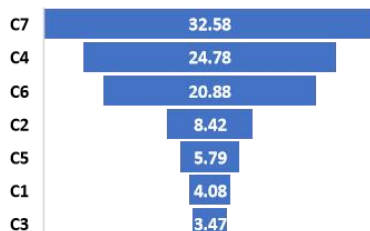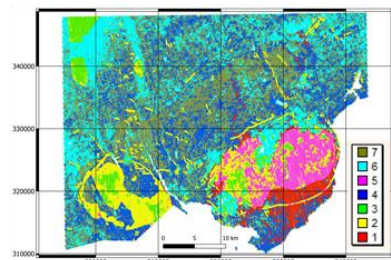|	
C6	58.38
C2	14.31
C3	11.04
C1	
C7	
C4	
C5	
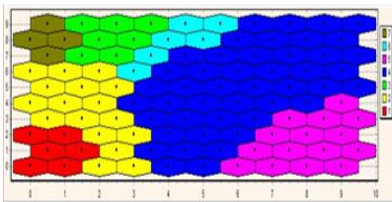
8C
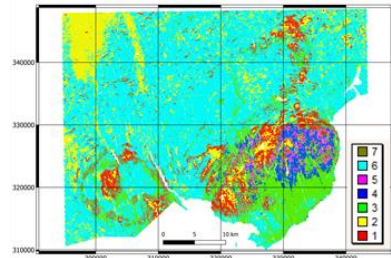
D_KAL + D_URA + D_THO + Bedrock Age

9A

9B

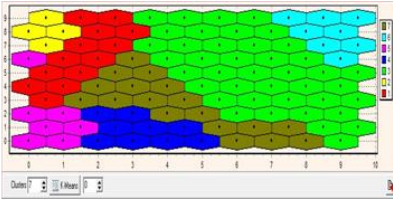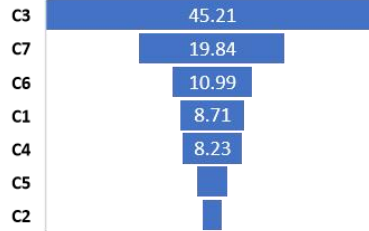|	
C7	32.58
C4	24.78
C6	20.88
C2	8.42
C5	5.79
C1	4.08
C3	3.47

9C

Input: Radiometry + 2 Feature

D_KAL + D_URA + D_THO + TCPS + DEM

10A

10B

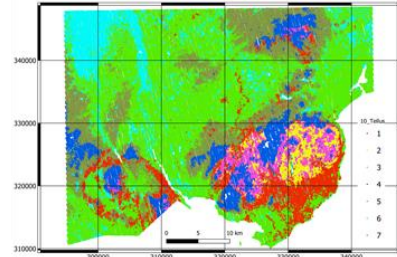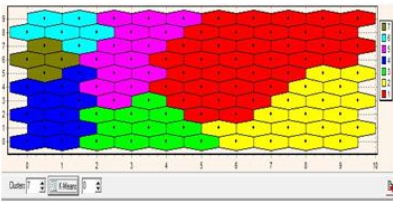|	
C3	45.21
C7	19.84
C6	10.99
C1	8.71
C4	8.23
C5	
C2	

10C

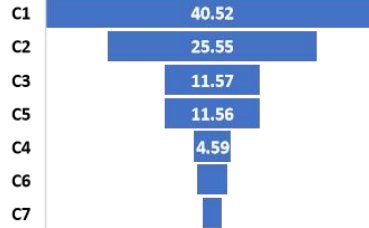**D_KAL + D_URA + D_THO + TCPS + Slope**

11A

11B

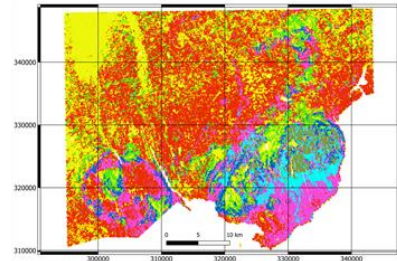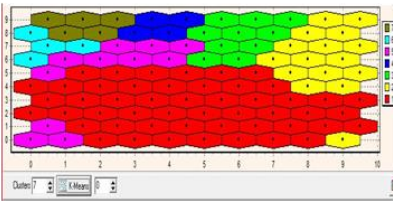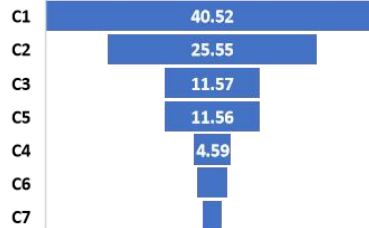|	
C1	40.52
C2	25.55
C3	11.57
C5	11.56
C4	4.59
C6	
C7	

11C

D_KAL + D_URA + D_THO + TCPS + TRI

12A

12B

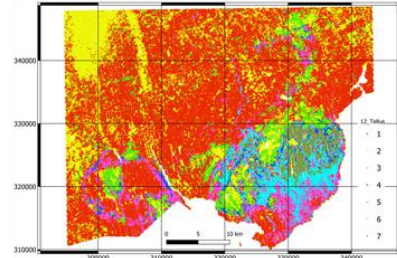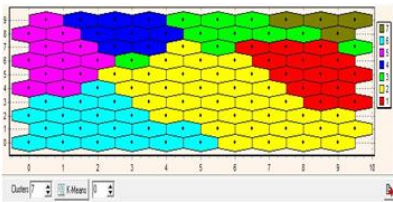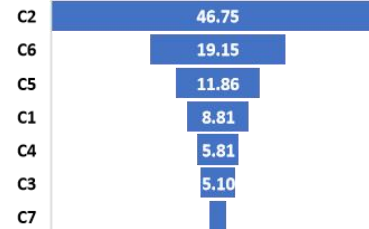|	
C1	40.52
C2	25.55
C3	11.57
C5	11.56
C4	4.59
C6	
C7	

12C

D_KAL + D_URA + D_THO + TCPS + Age

13A

13B

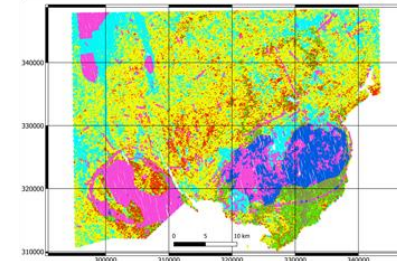|	
C2	46.75
C6	19.15
C5	11.86
C1	8.81
C4	5.81
C3	5.10
C7	

13C

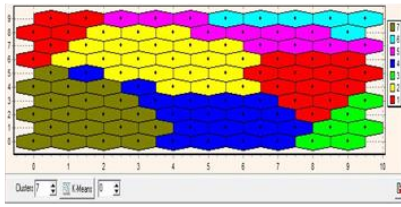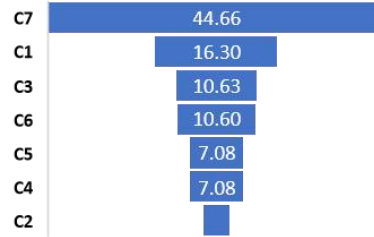## Input: Radiometry + 2 Feature (Continued)

D_KAL + D_URA + D_THO + DEM + Age

14A

14B

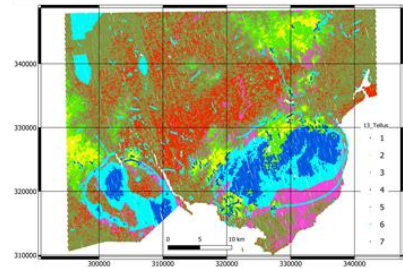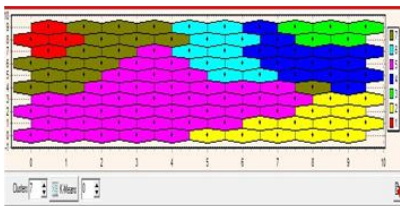|	
C7	44.66
C1	16.30
C3	10.63
C6	10.60
C5	7.08
C4	7.08
C2	

14C

D_KAL + D_URA + D_THO + TRI + Age

15A

15B

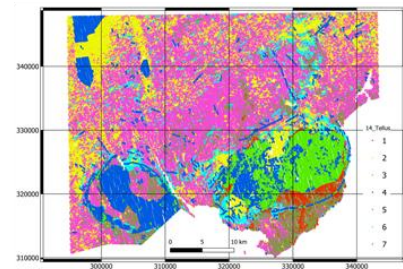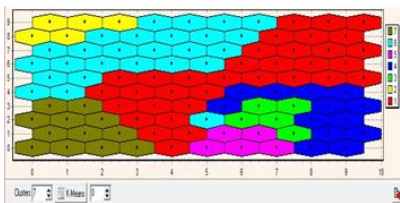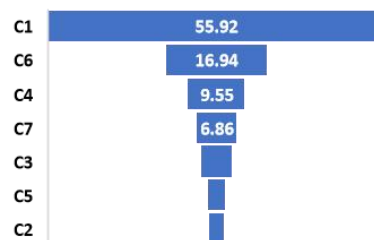|	
C5	42.34
C2	19.72
C4	11.12
C7	10.24
C6	8.09
C3	6.56
C1	

15C

D_KAL + D_URA + D_THO + Slope + Age

16A

16B

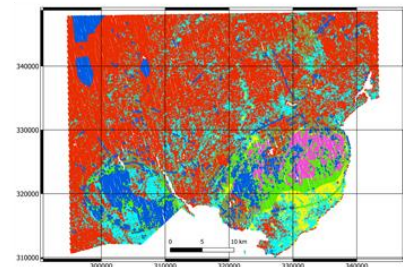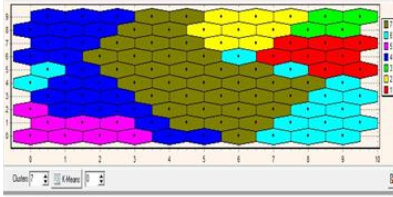|	
C1	55.92
C6	16.94
C4	9.55
C7	6.86
C3	
C5	
C2	

16C

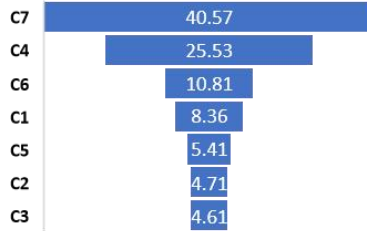## Input: Radiometry + 3 or 4 Feature

D_KAL + D_URA + D_THO + TCPS + DEM + Age

17A

17B

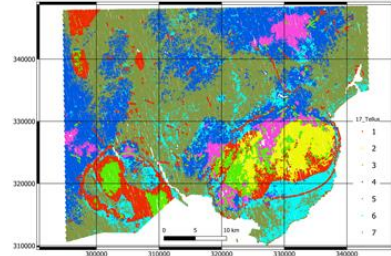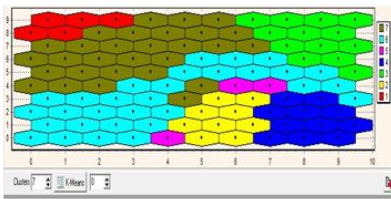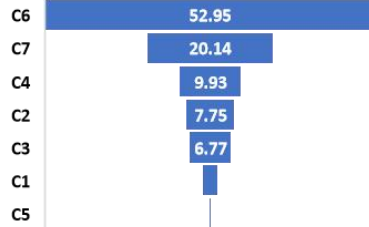|	
C7	40.57
C4	25.53
C6	10.81
C1	8.36
C5	5.41
C2	4.71
C3	4.61

17C

D_KAL + D_URA + D_THO + TCPS + Slope + Age

18A

18B

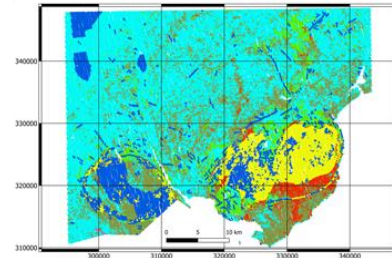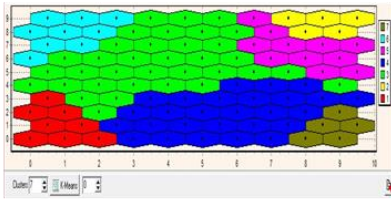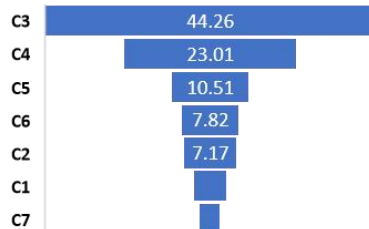|	
C6	52.95
C7	20.14
C4	9.93
C2	7.75
C3	6.77
C1	
C5	

18C

D_KAL + D_URA + D_THO + TCPS + TRI + Age

19A

19B

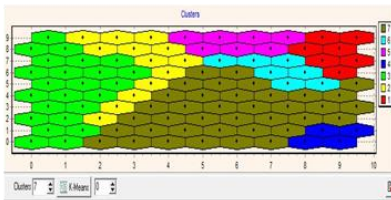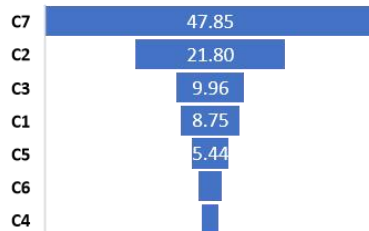|	
C3	44.26
C4	23.01
C5	10.51
C6	7.82
C2	7.17
C1	
C7	

19C
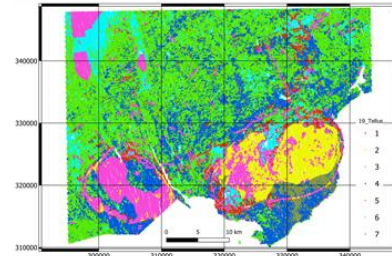
D_KAL + D_URA + D_THO + TCPS + DEM + Slope + Age

20A

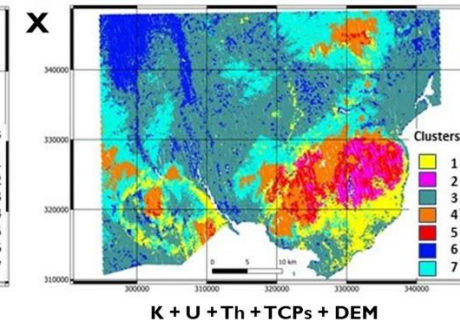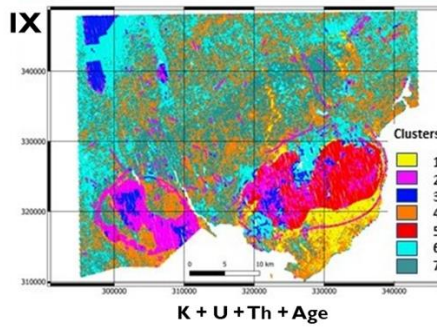20B

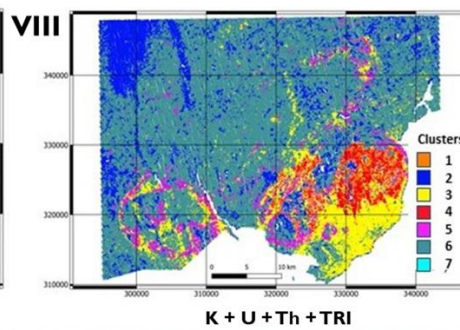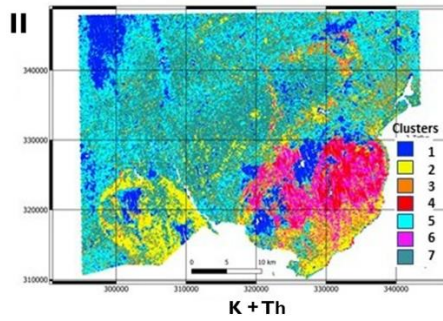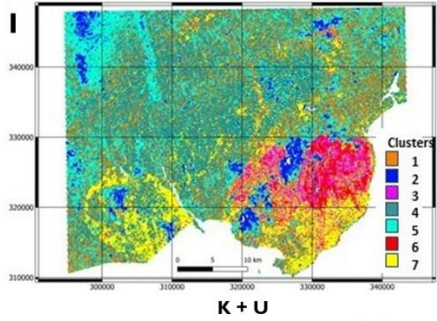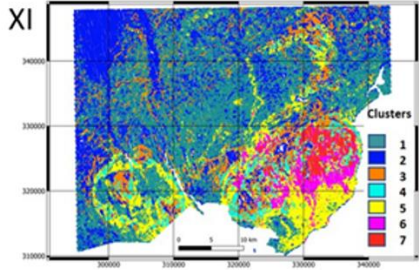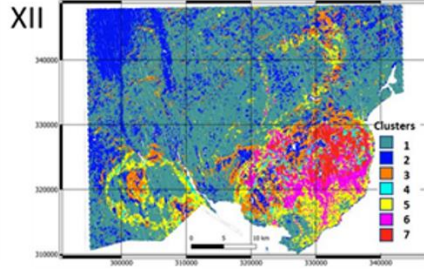|	
C7	47.85
C2	21.80
C3	9.96
C1	8.75
C5	5.44
C6	
C4	

20C
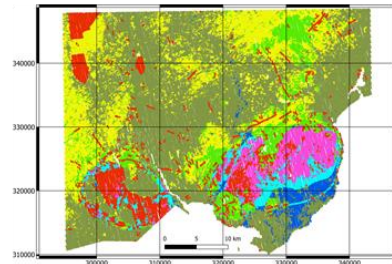
Supplementary Material VII: Experiments I-XX, using various combinations of the radiometry data and geological features. Colours are designed to be consistent as much as possible and to match bedrock and superficial rock features.
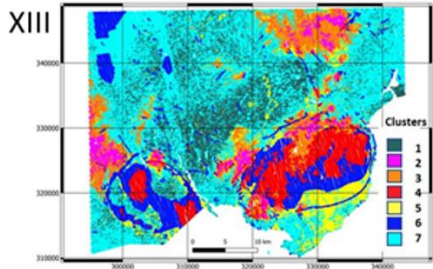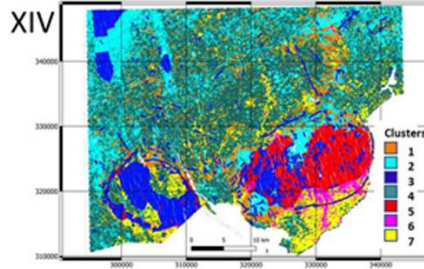
I — K + U

II — K + Th

III — U + Th

IV — K + U + Th

V — K + U + Th + TCPs

VI — K + U + Th + DEM

VII — K + U + Th + Slope

VIII — K + U + Th + TRI

IX — K + U + Th + Age

X — K + U + Th + TCPs + DEM

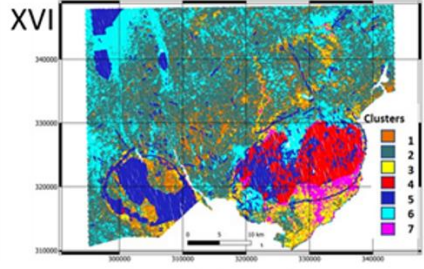XI — K + U + TCPs + Slope

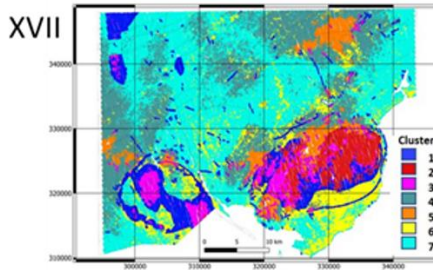XII — K + U + Th + TCPs + TRI

XIII — K + U + Th + DEM + Age

XIV — K + U + Th + TRI + Age

XV — K + U + Th + Slope + Age

XVI — K + U + Th + TCPs + Age

XVII — K + U + Th + TCPs + DEM + Age

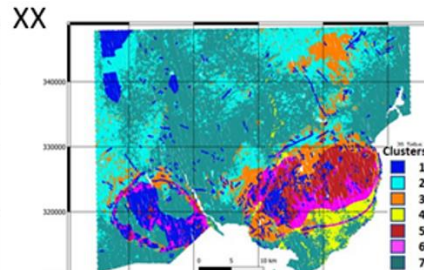XVIII — K + U + TCPs + TCPs + Slope + Age

XIX — K + U + Th + TCPs + TRI + Age

XX — K + U + Th + TCPs + DEM + Slope + Age