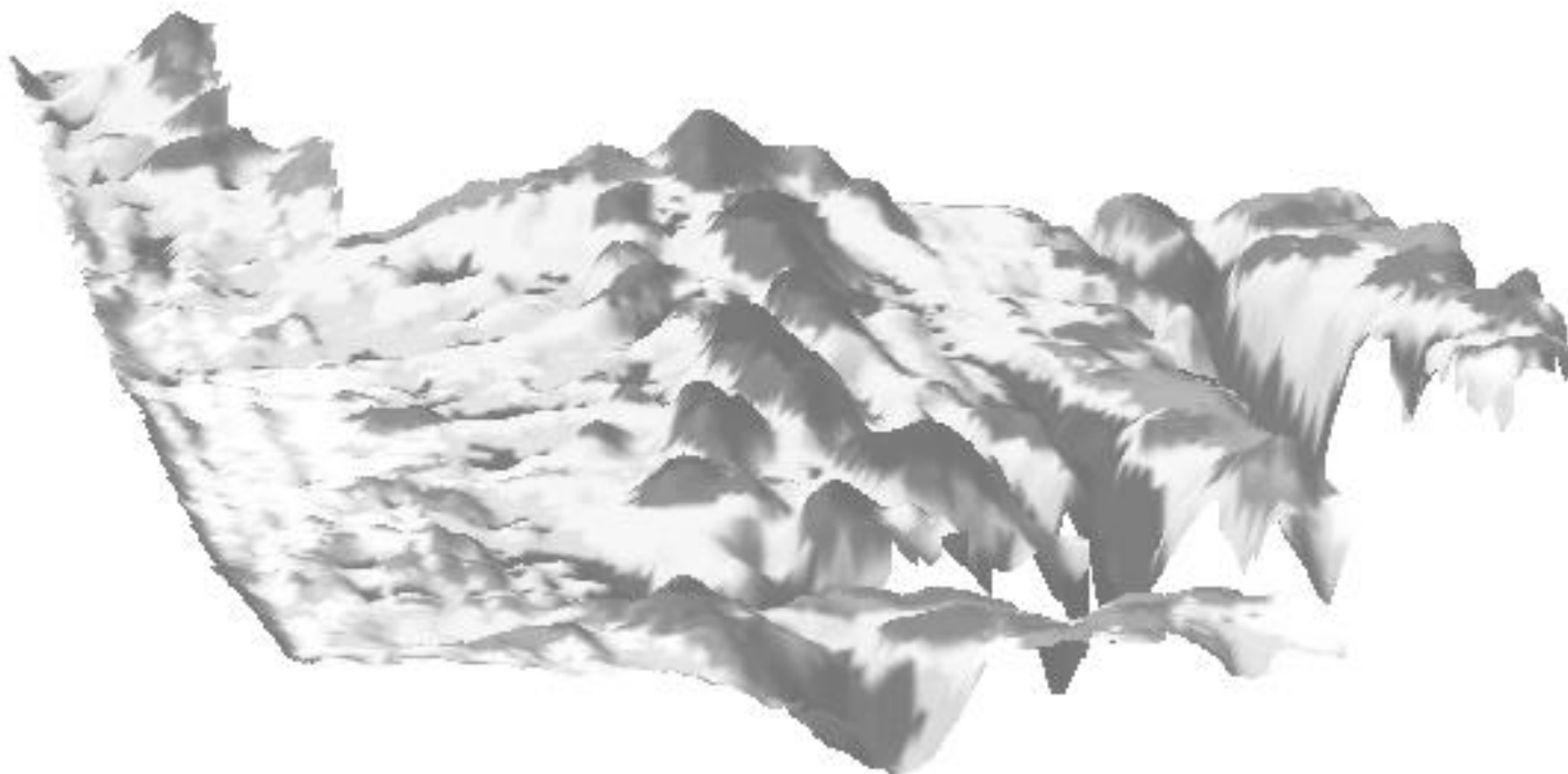


MARCH 31, 2016



# Accuracy of Geomorphologic Phonotypes (Geomorphons) Technique IN GRASSGIS

TRAVIS VANOS

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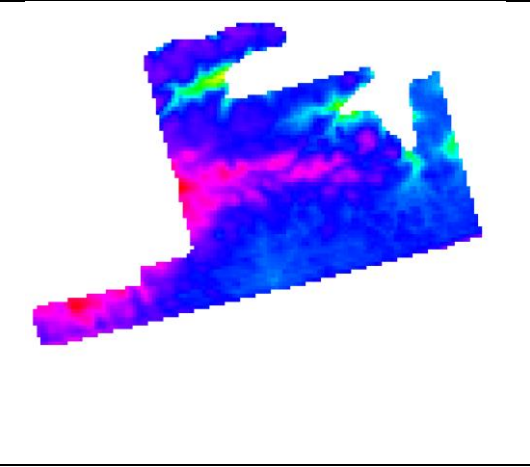
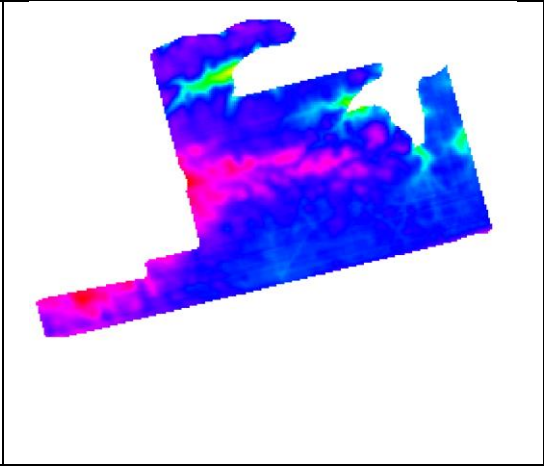
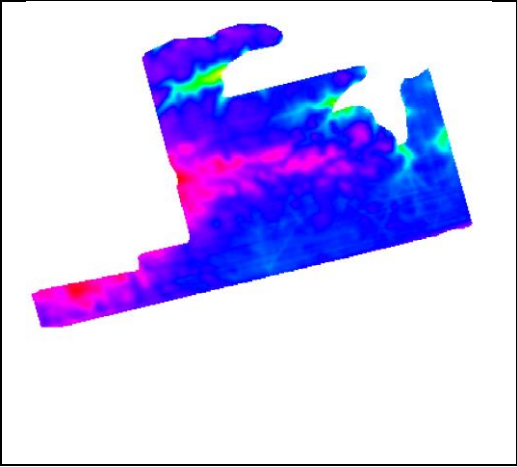
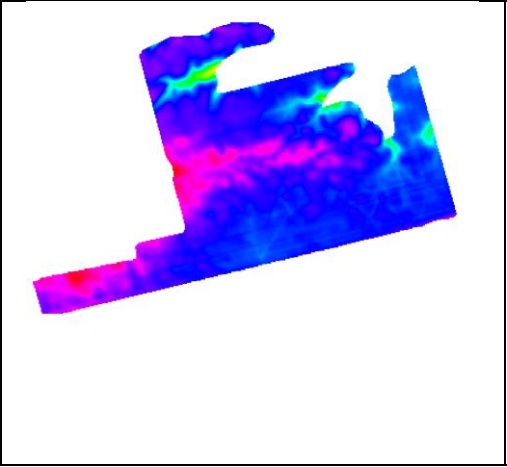
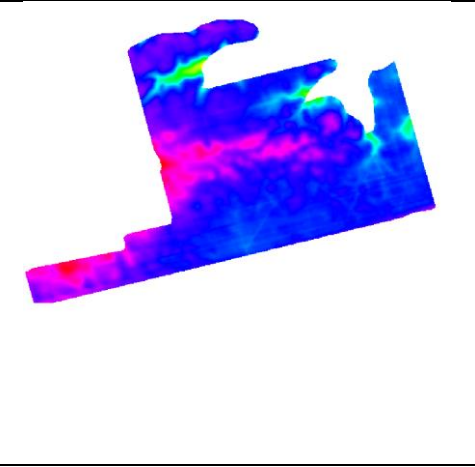
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# DEM model of Kriged data

Table 1 DEM model of Kriged data at different resolutions

Kriged 10m (25/50/25/250)	Kriged 5m (25/50/20/200)	Kriged 3m (25/50/25/250)	Kriged 5m (30/50/20/200)	Kriged 2m (25/50/20/200)
				

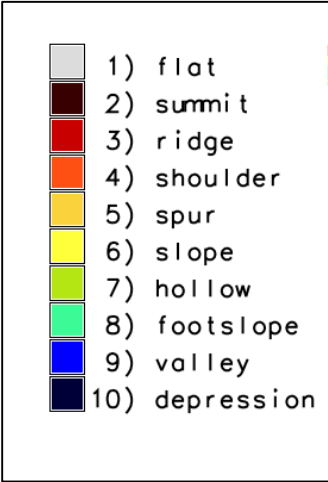


Figure 1 Symbology of Geomorphon classification (Default Grass)

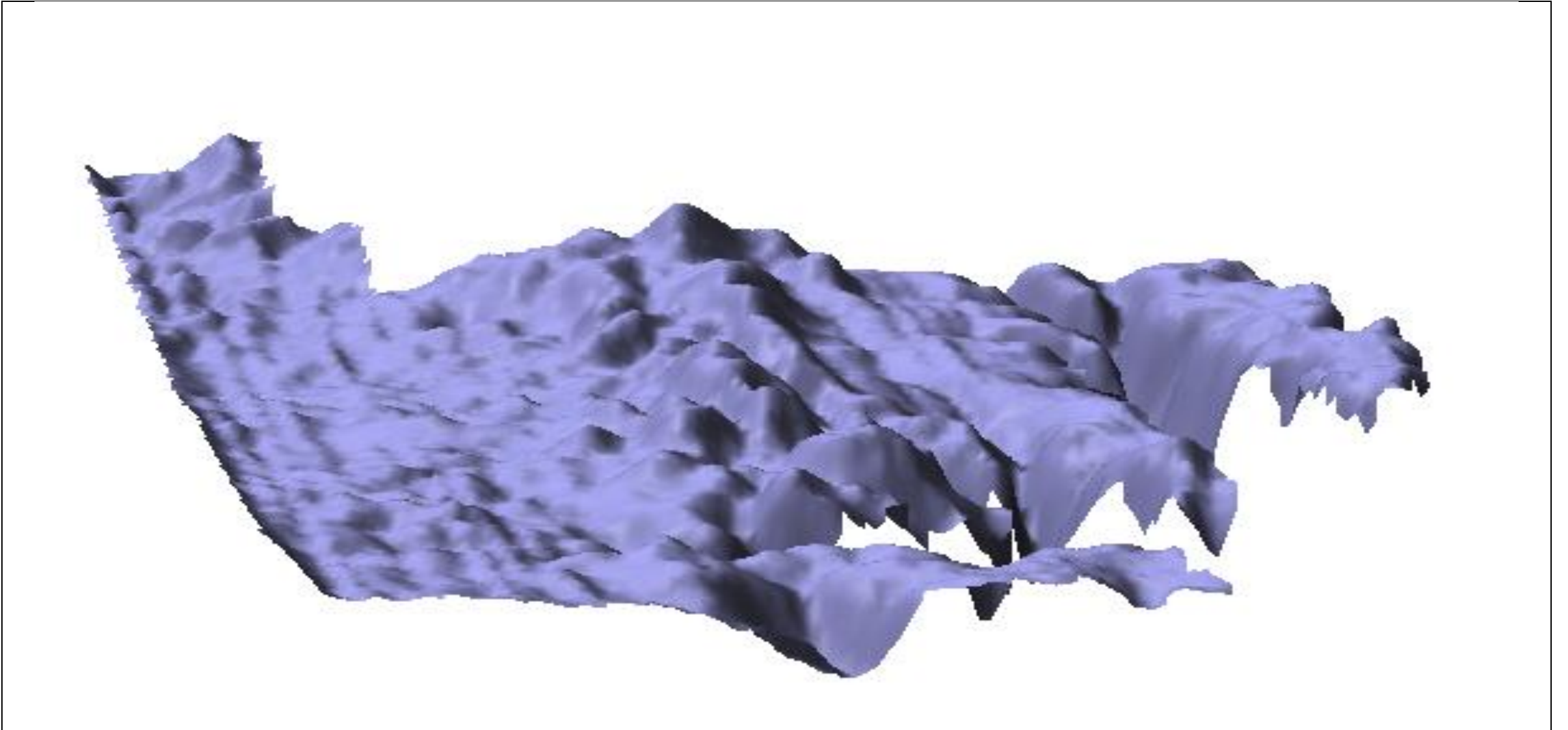


Figure 2 Exaggerated z Values Raw CulOwned 2011 Field DEM

## R.Geomorphon Computational settings (Outer Search, Inner Search, Flatness, Flatness distance)



The screenshot shows a dialog box titled 'R.Geomorphon Options in GrassGIS'. It contains four input fields, each with a red asterisk indicating it is required. The first field is 'Outer search radius:' with a value of 3 and a unit of '(search=integer)'. The second field is 'Inner search radius:' with a value of 0 and a unit of '(skip=integer)'. The third field is 'Flatness threshold (degrees):' with a value of 1 and a unit of '(flat=float)'. The fourth field is 'Flatness distance, zero for none:' with a value of 0 and a unit of '(dist=float)'.

Figure 3 R.Geomorphon Options in GrassGIS

### **DEM**

Input Digital Elevation Model. Data can be of any type and any projection. During calculation DEM is stored as floating point raster.

### **Search**

Determines length on the geodesic distances in all eight directions where line-of-sight is calculated. To speed up calculation is determines only these cells which centers falls into the distance

### **Skip**

Determines length on the geodesic distances at the beginning of calculation all eight directions where line-of-sight is yet calculated. To speed up calculation this distance is always recalculated into number of cell which are skipped at the begining of every line-of-sight and is equal in all direction. This parameter eliminates forms of very small extend, smaller than skip parameter.

### **Flat**

The difference (in degrees) between zenith and nadir line-of-sight which indicate flat direction. If higher threshold produce more flat maps. If resolution of the map is low (more than 1 km per cell) threshold should be very small (much smaller than 1 degree) because on such distance 1 degree of difference means several meters of high difference.

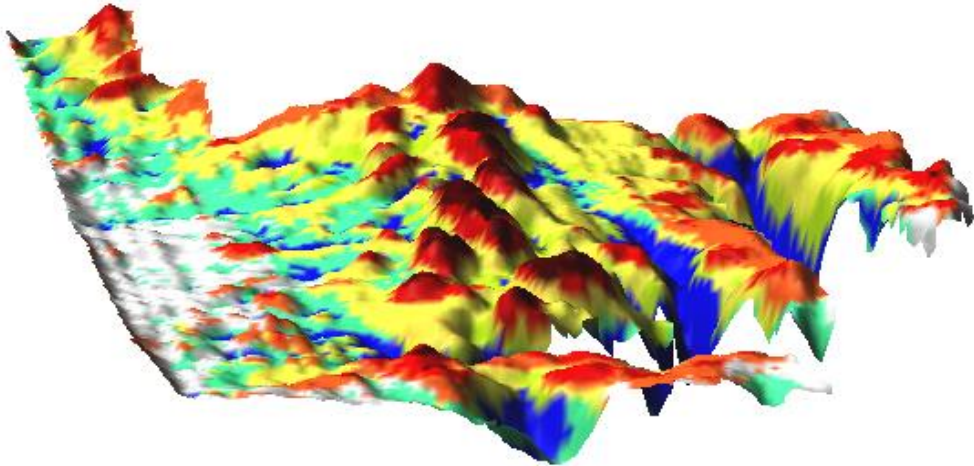
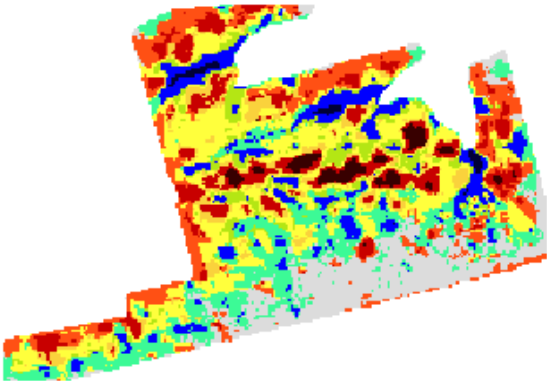
### **Distance**

>Flat distance. This is additional parameter defining the distance above which the threshold starts to decrease to avoid problems with pseudo-flat line-of-sights if real elevation difference appears on the distance where its value is higher DO POPRAWKI

# Accuracy of Geomorphon to Known Digital Elevation Model

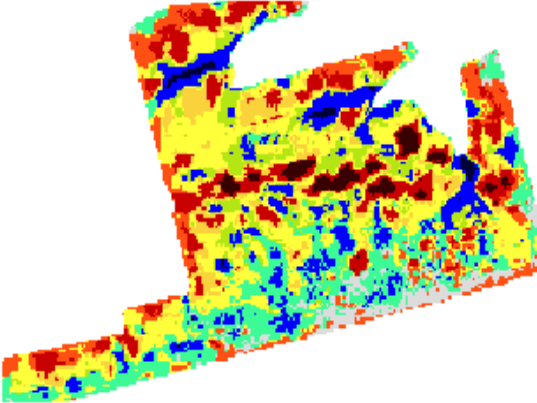
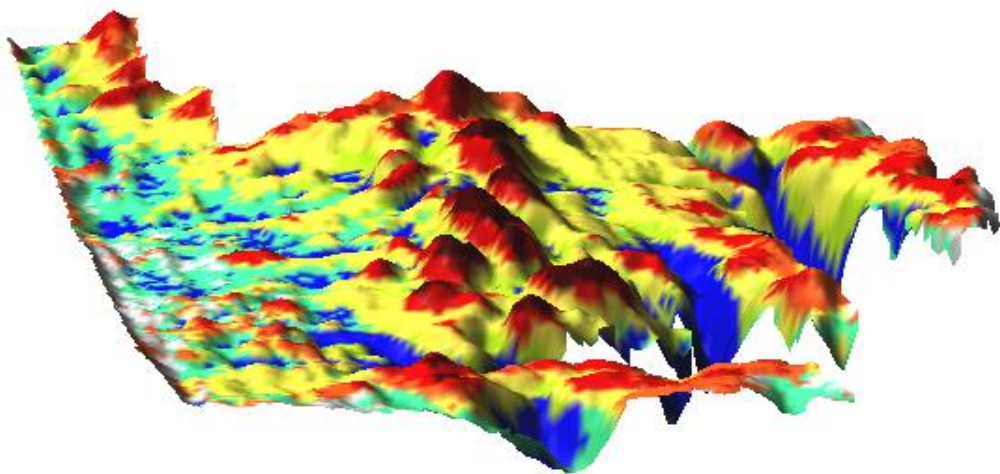
Kriged Data 2m resolution (Lag = 25, Lag Tolerance = 50, Min Neighbours = 20, Max Neighbours = 200)

Table 2 2m Resolution 3D and 2D models

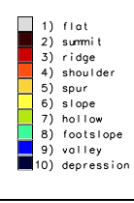
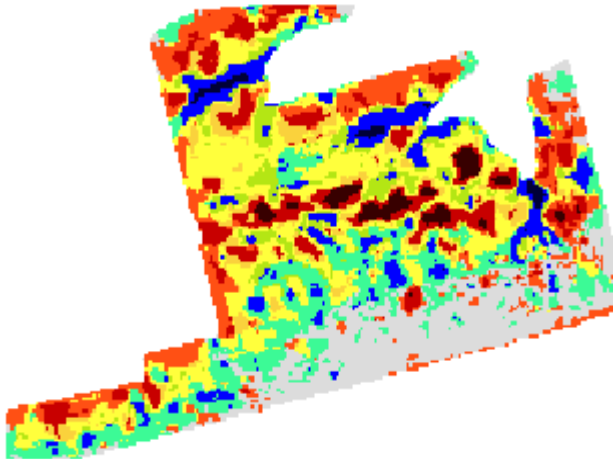
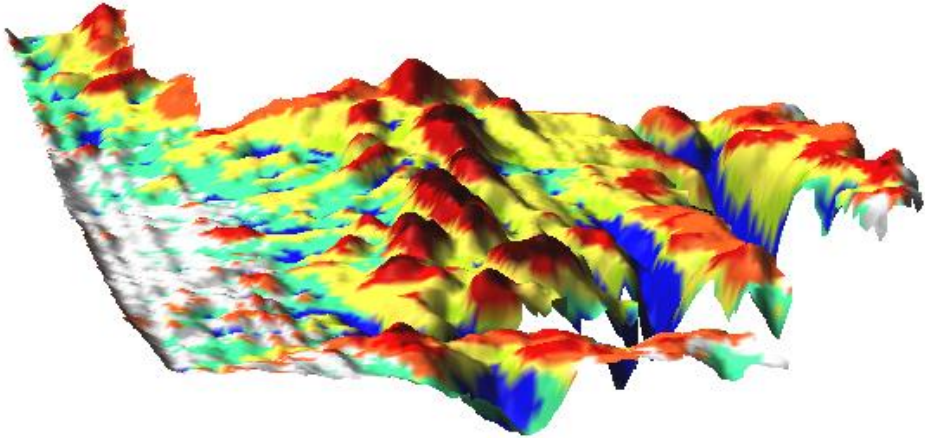
r.geomorphon Settings ( <i>Search, Skip, Flat, Distance</i> )	3D Model	Geomorphon 2D model
150 25 1 75		 <div><ul style="list-style-type: none"><li>1) flat</li><li>2) summit</li><li>3) ridge</li><li>4) shoulder</li><li>5) spur</li><li>6) slope</li><li>7) hollow</li><li>8) footslope</li><li>9) valley</li><li>10) depression</li></ul></div>



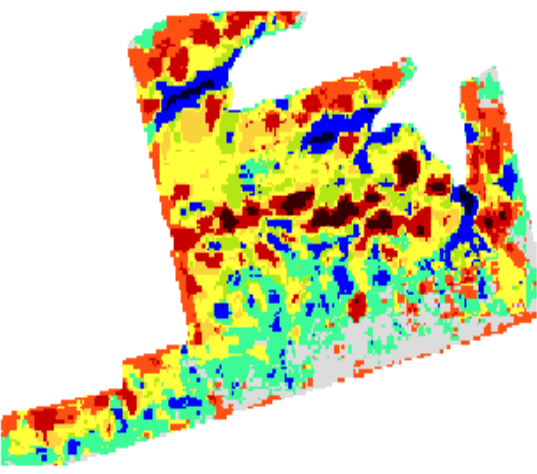
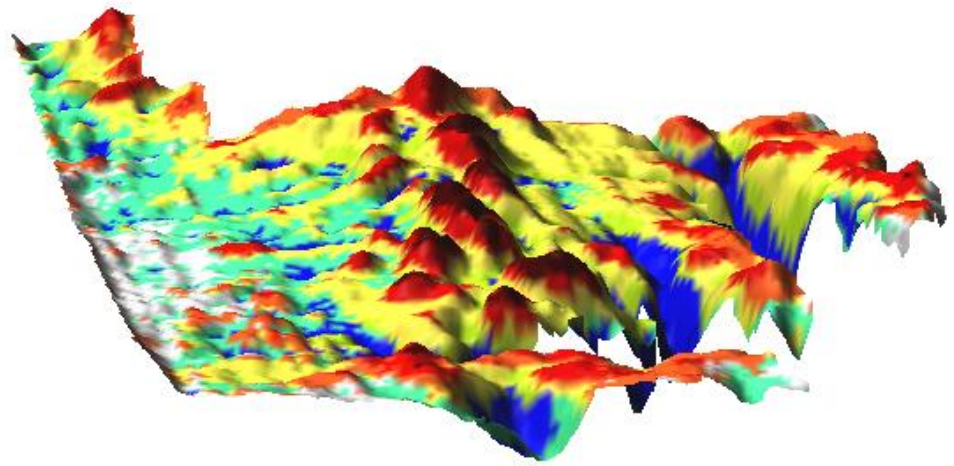
200  
25  
1  
50



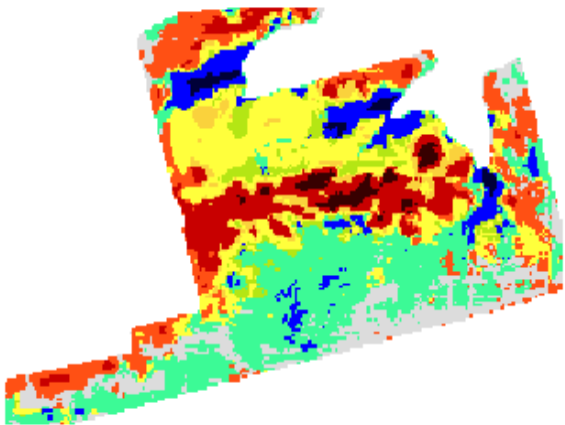
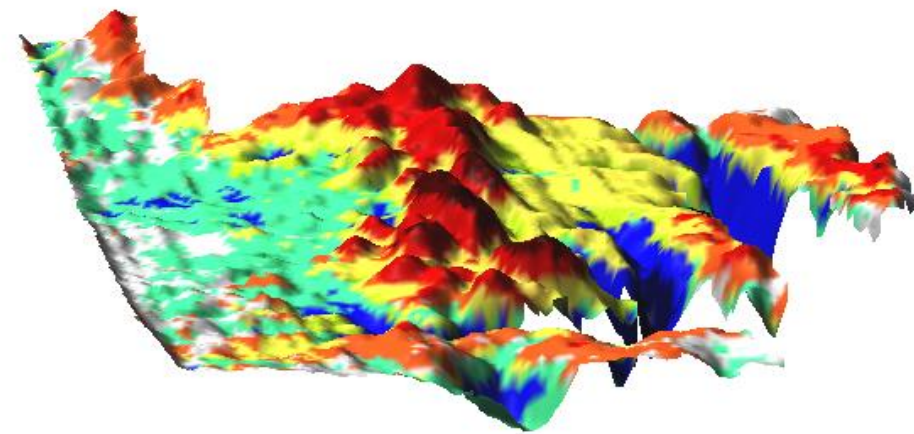
250  
25  
1  
25



250  
25  
1  
75

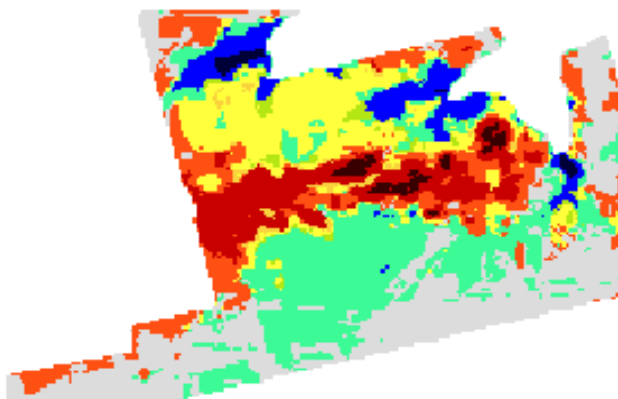
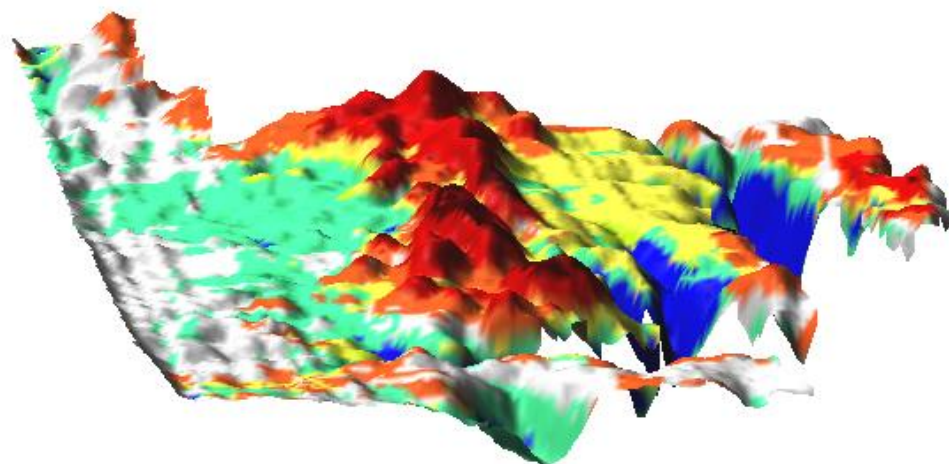


250  
55  
1  
75

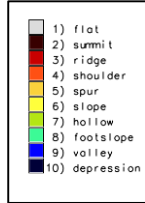
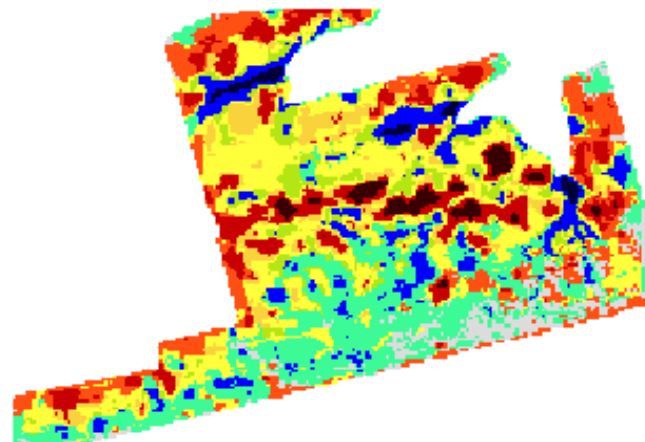
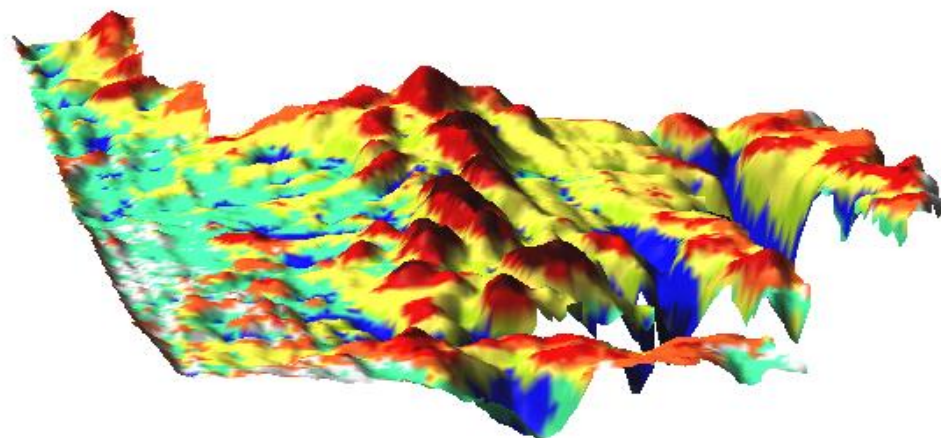




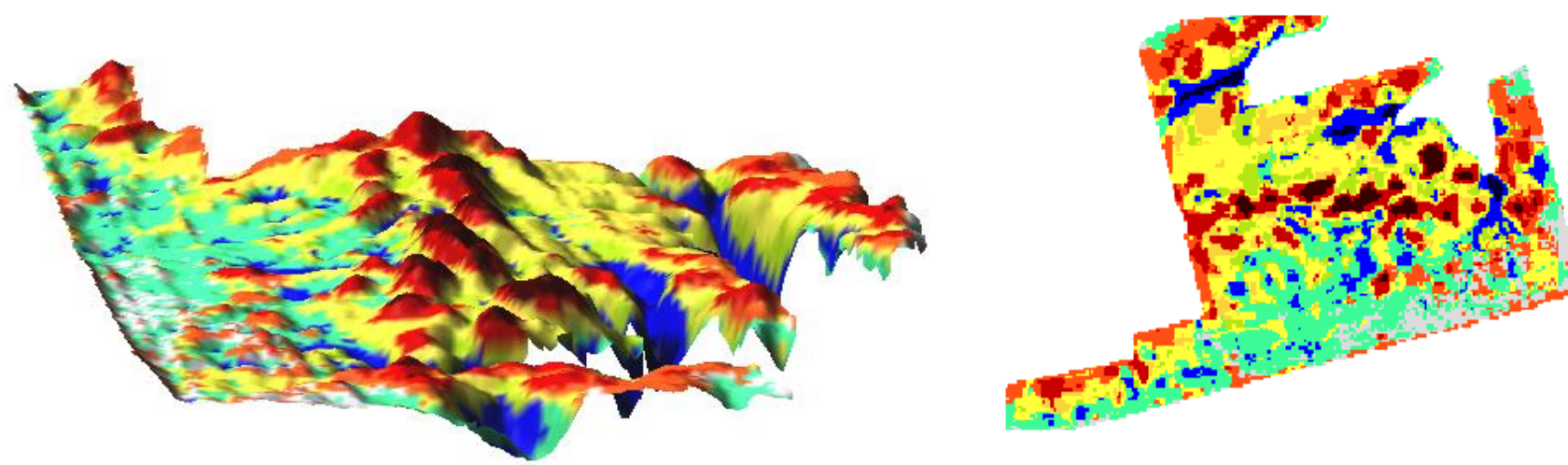
250  
75  
1  
105



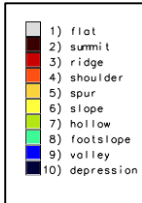
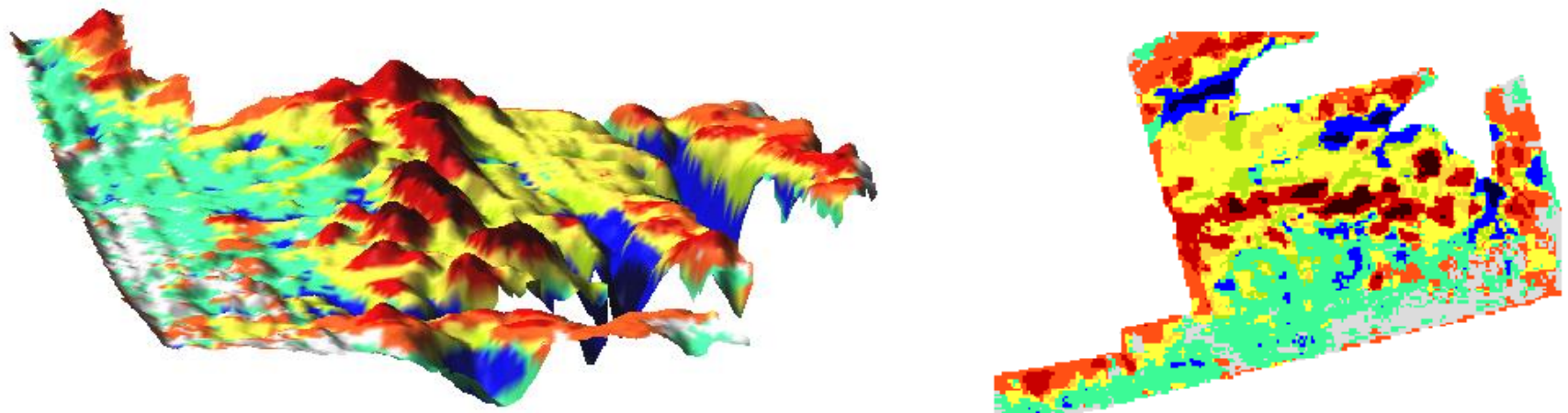
250  
75  
1  
125



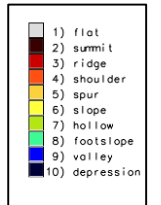
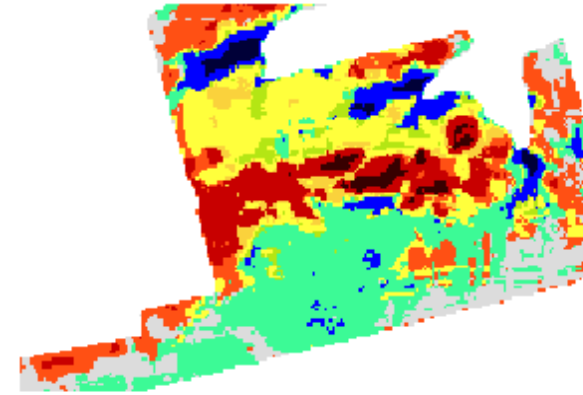
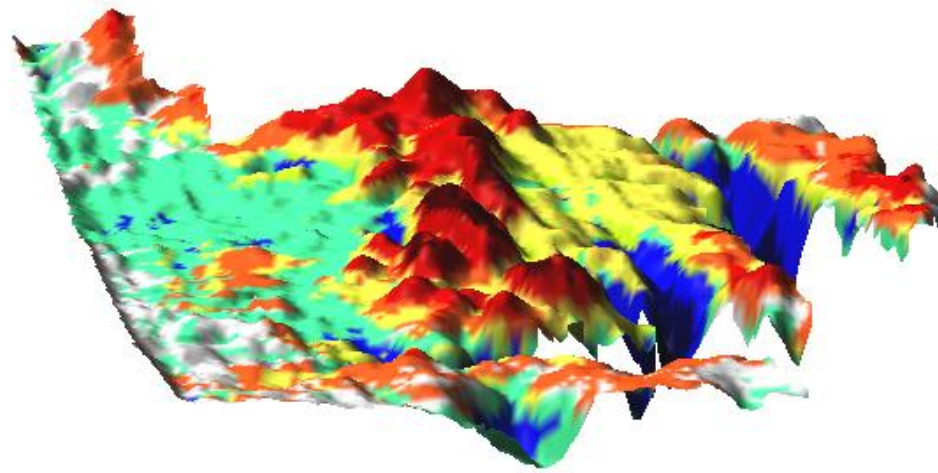
300  
25  
1  
100



300  
35  
1  
100

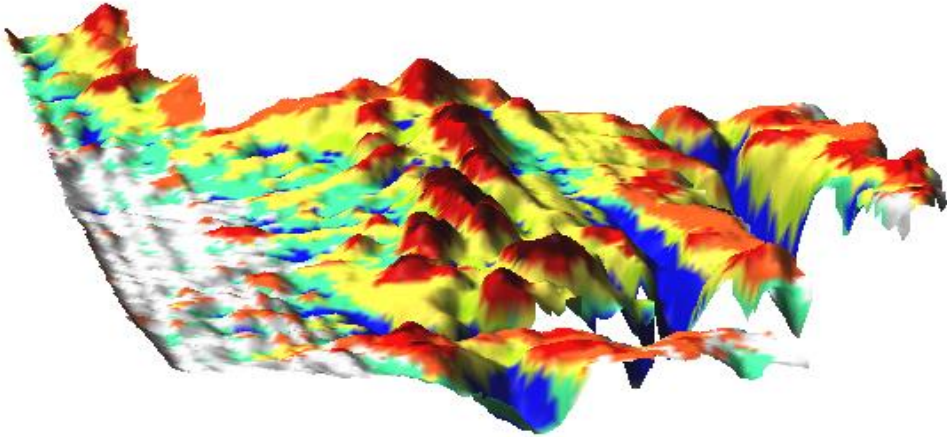
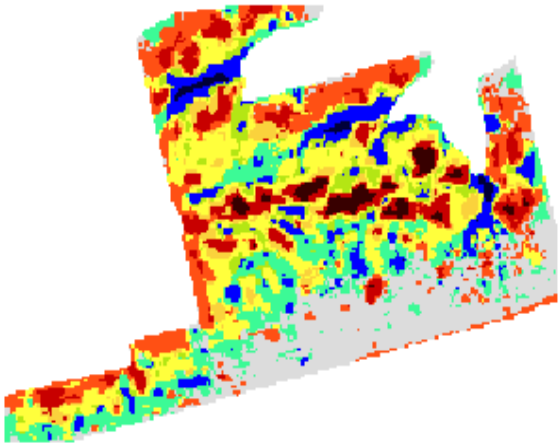


350  
55  
1  
100



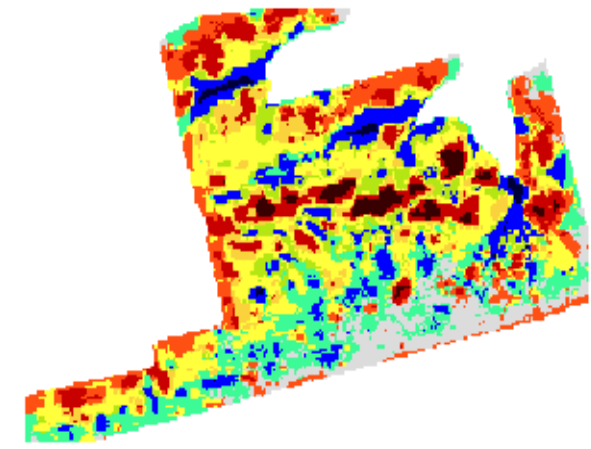
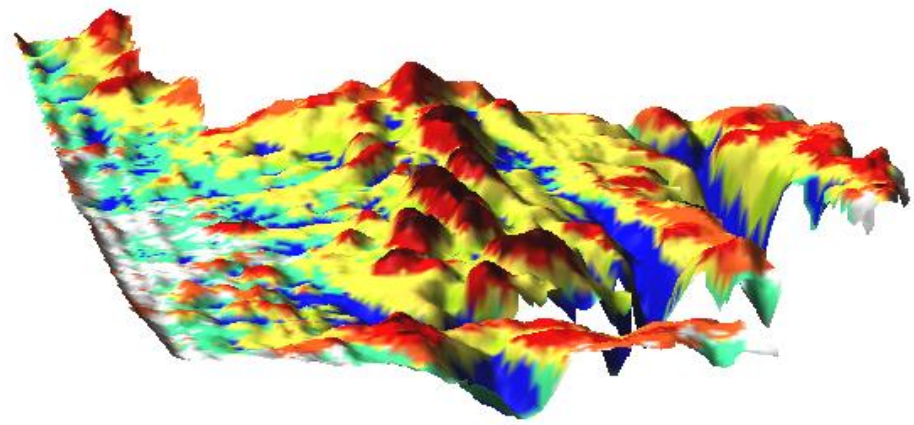
Kriged Data 3m resolution(Lag = 30, Lag Tolerance = 50, Min Neighbours = 20, Max Neighbours = 200)

Table 3 3m Resolution 3D and 2D models

r.geomorphon Settings ( <i>Search, Skip, Flat, Distance</i> )	3D Model	Geomorphon 2D model
150 25 1 15		 <div><ul style="list-style-type: none"><li>1) flat</li><li>2) summit</li><li>3) ridge</li><li>4) shoulder</li><li>5) spur</li><li>6) slope</li><li>7) hollow</li><li>8) footslope</li><li>9) valley</li><li>10) depression</li></ul></div>

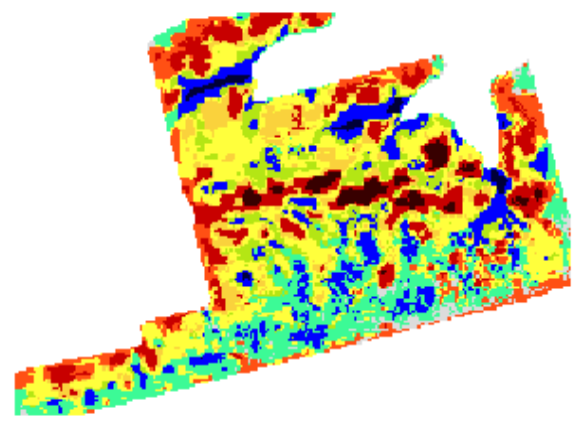
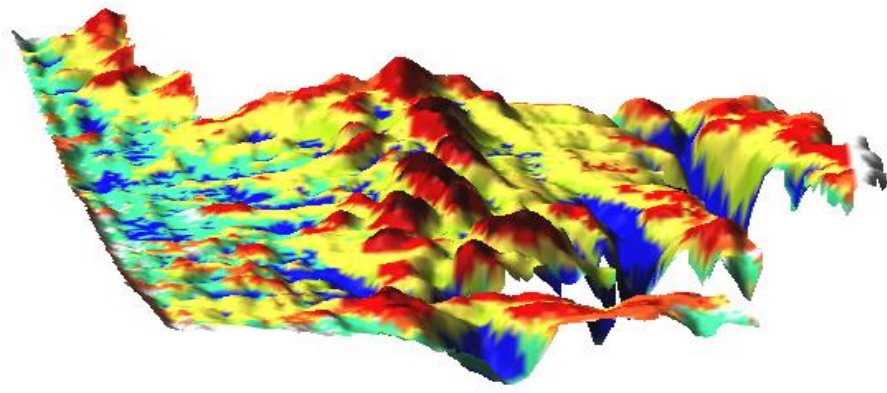


150  
25  
1  
50



- 1) flat
- 2) summit
- 3) ridge
- 4) shoulder
- 5) spur
- 6) slope
- 7) hollow
- 8) footslope
- 9) valley
- 10) depression

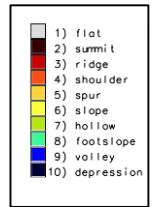
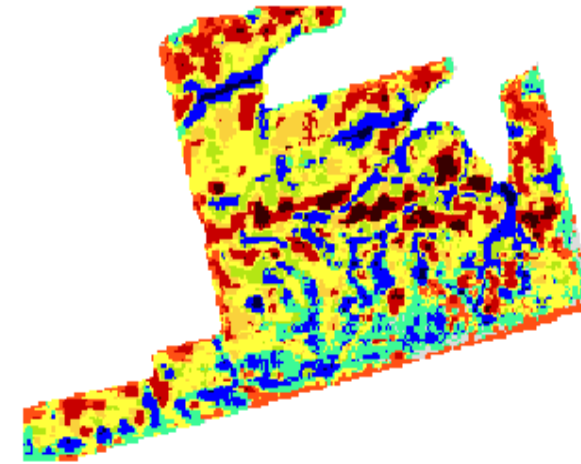
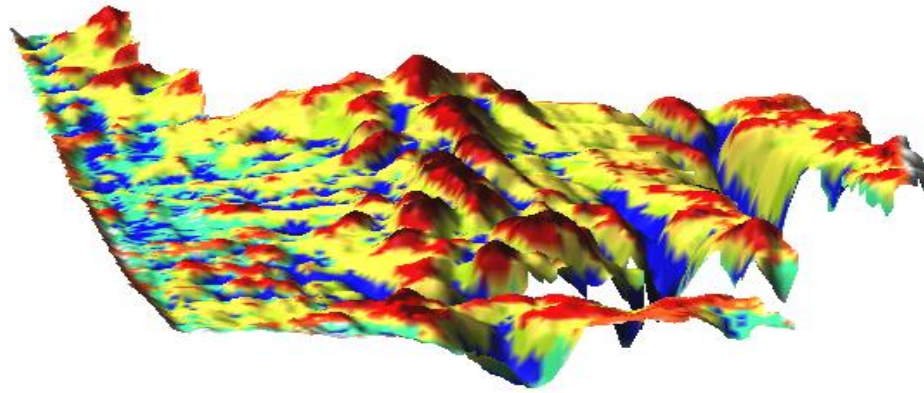
250  
25  
1  
50



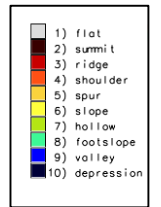
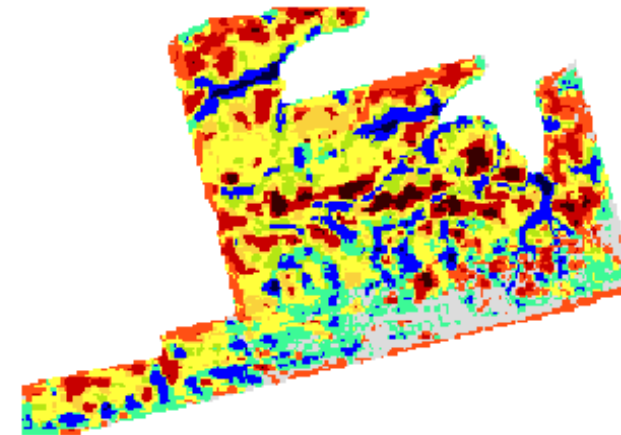
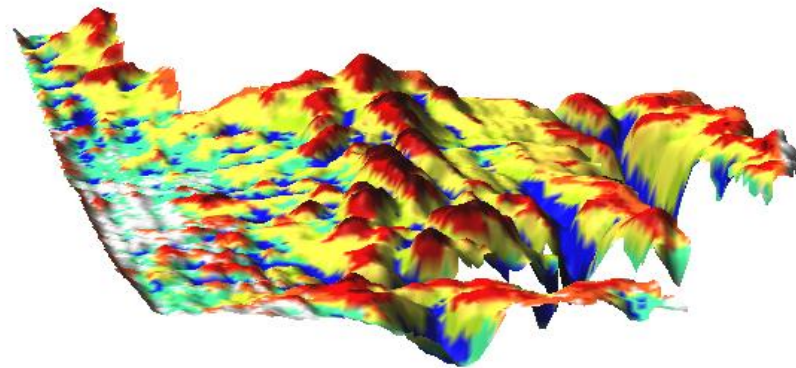
- 1) flat
- 2) summit
- 3) ridge
- 4) shoulder
- 5) spur
- 6) slope
- 7) hollow
- 8) footslope
- 9) valley
- 10) depression



250  
5  
1  
25

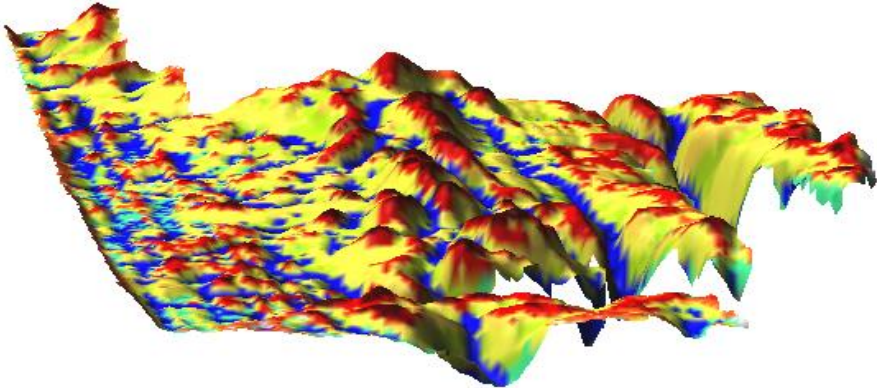
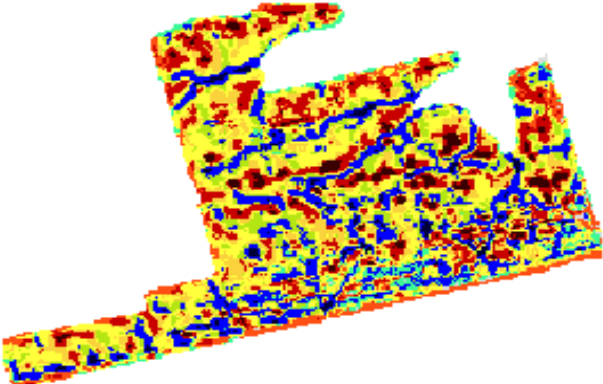


350  
15  
1  
15

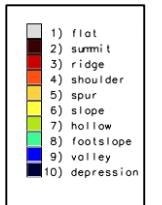
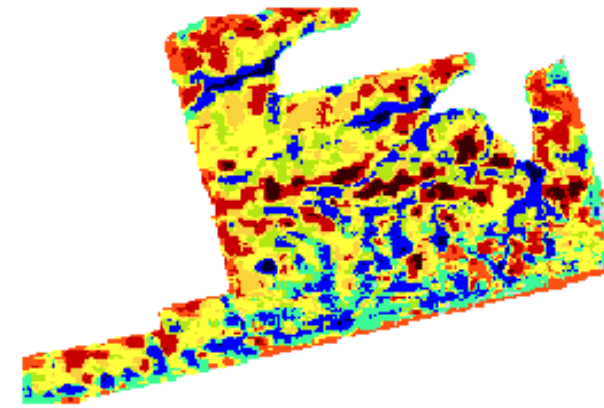
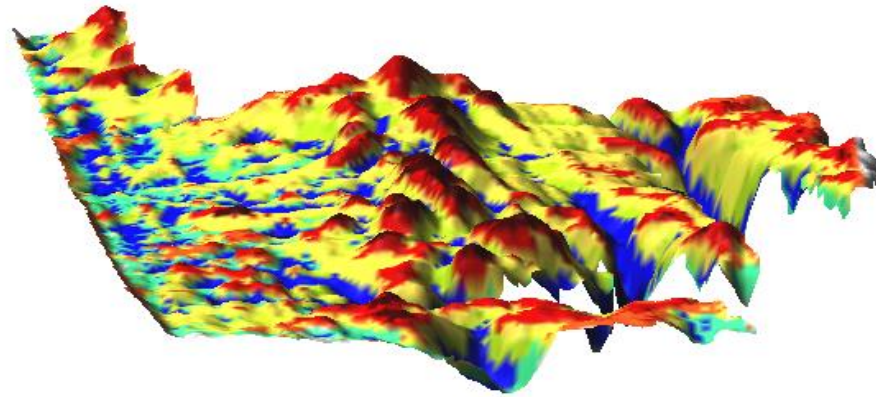


Kriged Data 3m resolution (Lag = 25, Lag Tolerance = 50, Min Neighbours = 25, Max Neighbours = 250)

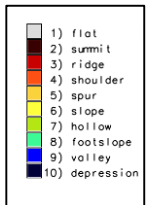
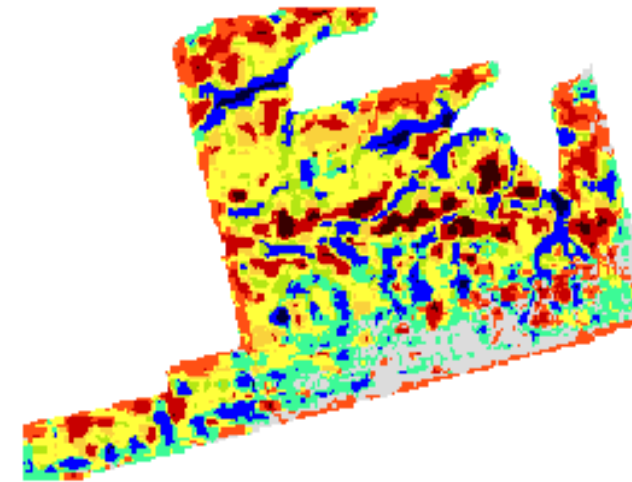
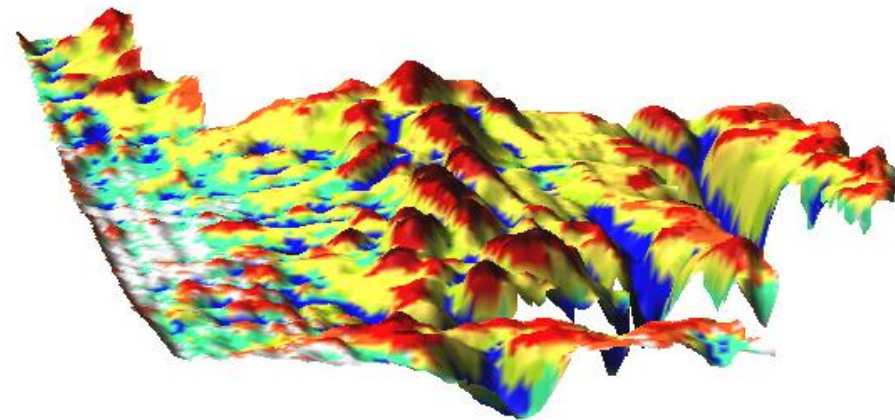
Table 4 3m (25,50,25,250) Resolution 3D and 2D models

r.geomorphon Settings ( <i>Search, Skip, Flat, Distance</i> )	3D Model	Geomorphon 2D model
100 5 1 25		 <div><ul style="list-style-type: none"><li>1) flat</li><li>2) summit</li><li>3) ridge</li><li>4) shoulder</li><li>5) spur</li><li>6) slope</li><li>7) hollow</li><li>8) footslope</li><li>9) valley</li><li>10) depression</li></ul></div>

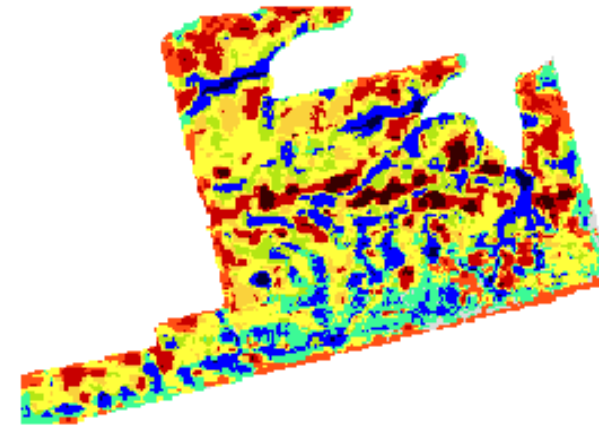
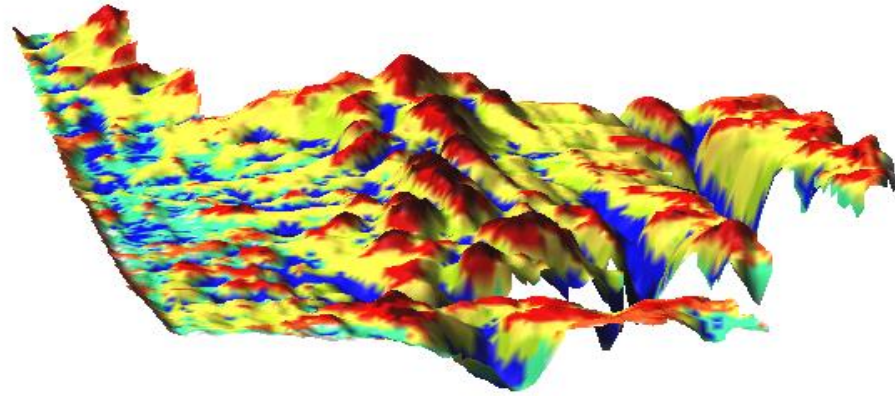
350  
15  
1  
50



250  
15  
1  
10



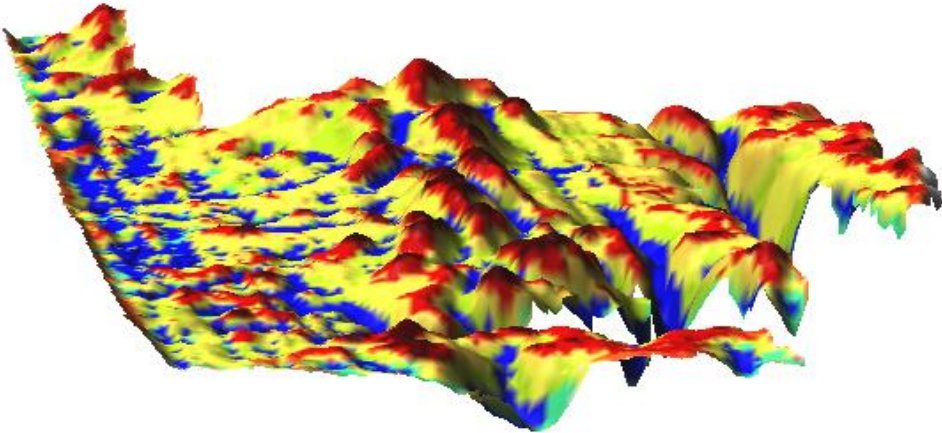
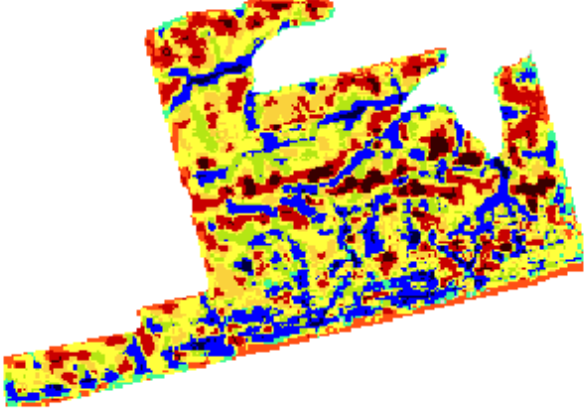
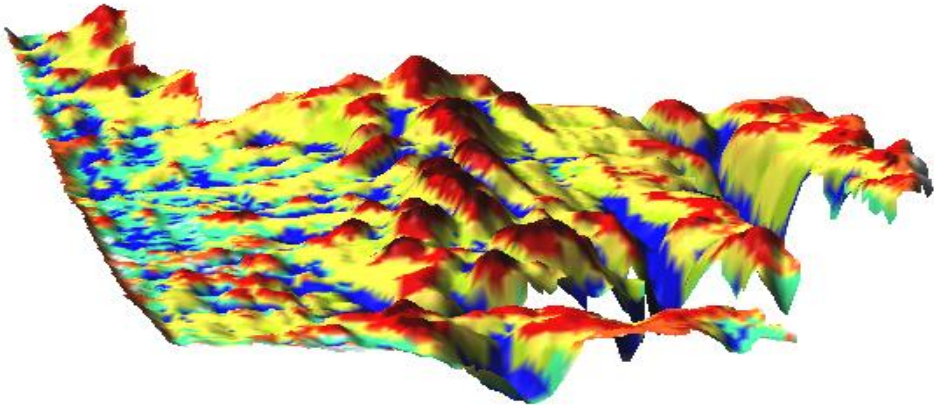
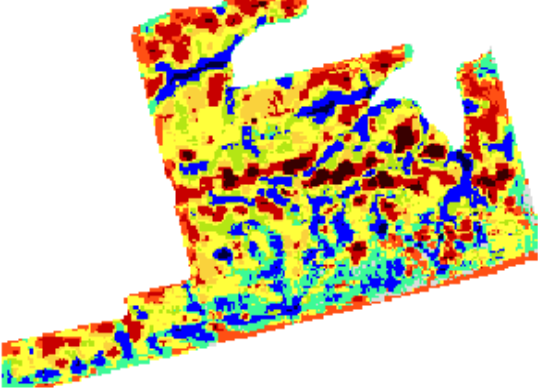
250  
15  
1  
50





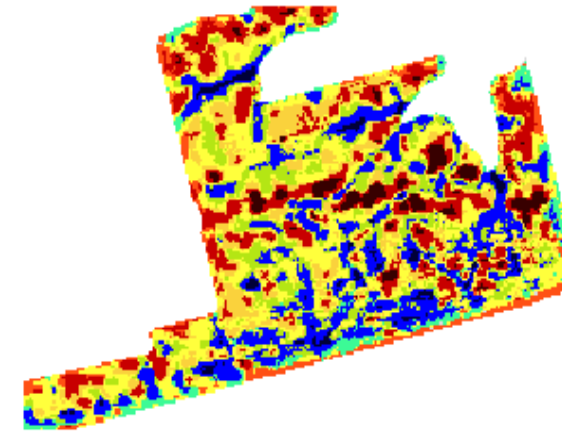
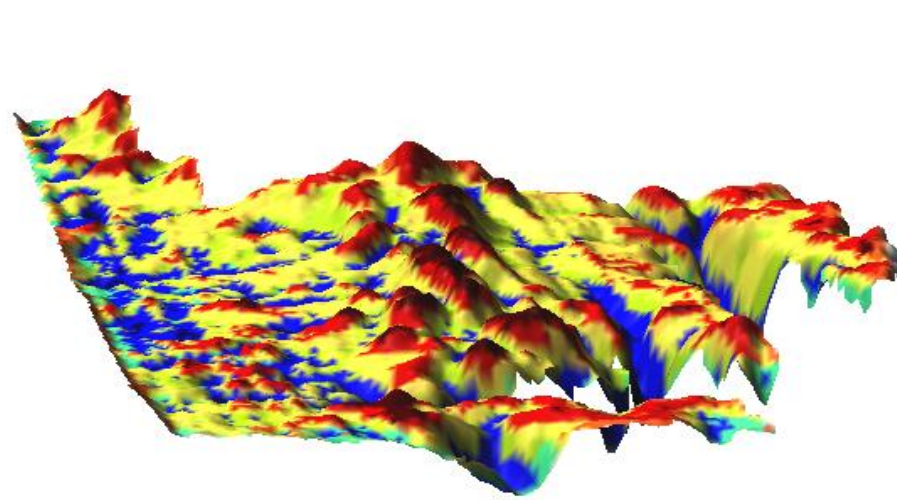
Kriged Data 5m resolution (Lag = 25, Lag Tolerance = 50, Min Neighbours = 20, Max Neighbours = 200)

Table 5 5m Resolution 3D and 2D models

r.geomorphon Settings ( <i>Search, Skip, Flat, Distance</i> )	3D Model	Geomorphon 2D model
150 10 1 20		 <div><ul style="list-style-type: none"><li>1) flat</li><li>2) summit</li><li>3) ridge</li><li>4) shoulder</li><li>5) spur</li><li>6) slope</li><li>7) hollow</li><li>8) footslope</li><li>9) valley</li><li>10) depression</li></ul></div>
250 15 1 50		 <div><ul style="list-style-type: none"><li>1) flat</li><li>2) summit</li><li>3) ridge</li><li>4) shoulder</li><li>5) spur</li><li>6) slope</li><li>7) hollow</li><li>8) footslope</li><li>9) valley</li><li>10) depression</li></ul></div>

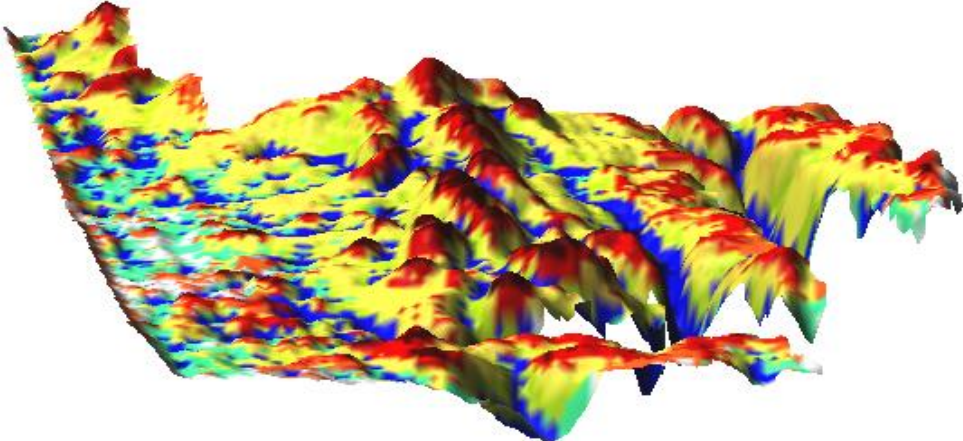
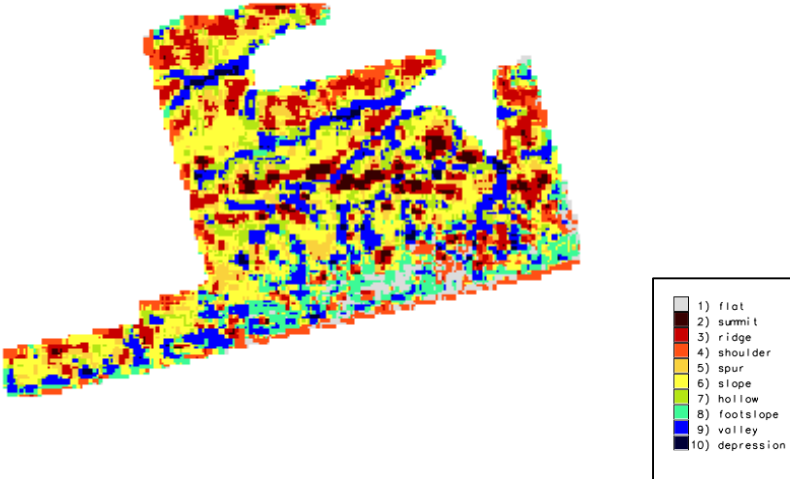


300  
15  
1  
25

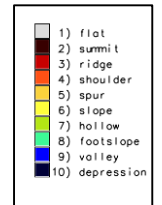
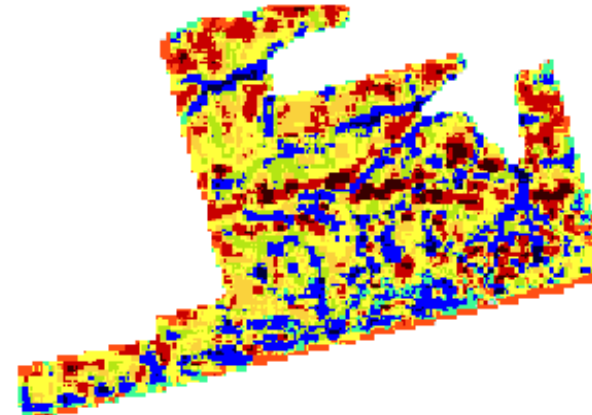
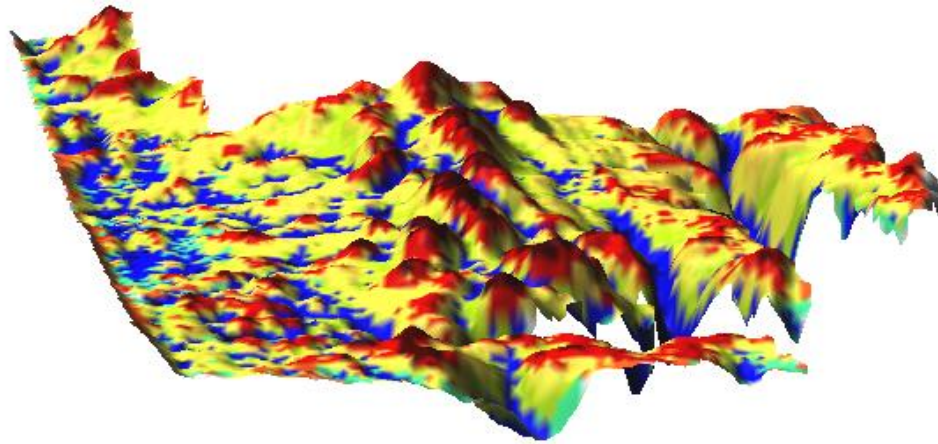


Kriged Data 10m resolution (Lag = 25, Lag Tolerance = 50, Min Neighbours = 25, Max Neighbours = 250)

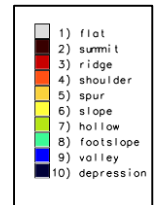
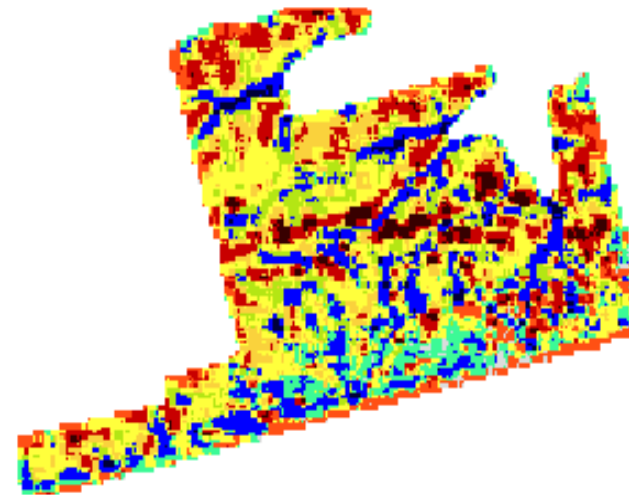
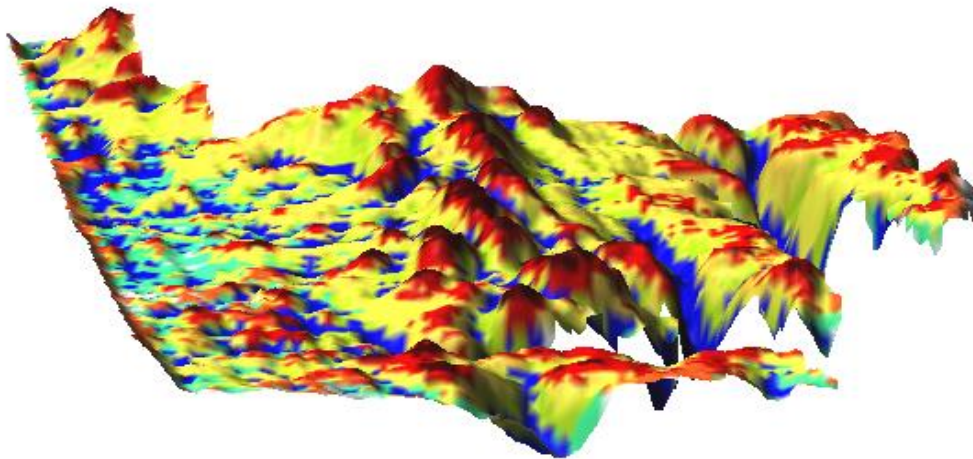
Table 6 10m Resolution 3D and 2D models

r.geomorphon Settings ( <i>Search, Skip, Flat, Distance</i> )	3D Model	Geomorphon 2D model
150 10 1 50		

250  
10  
1  
25



250  
10  
1  
50



350  
10  
1  
25

