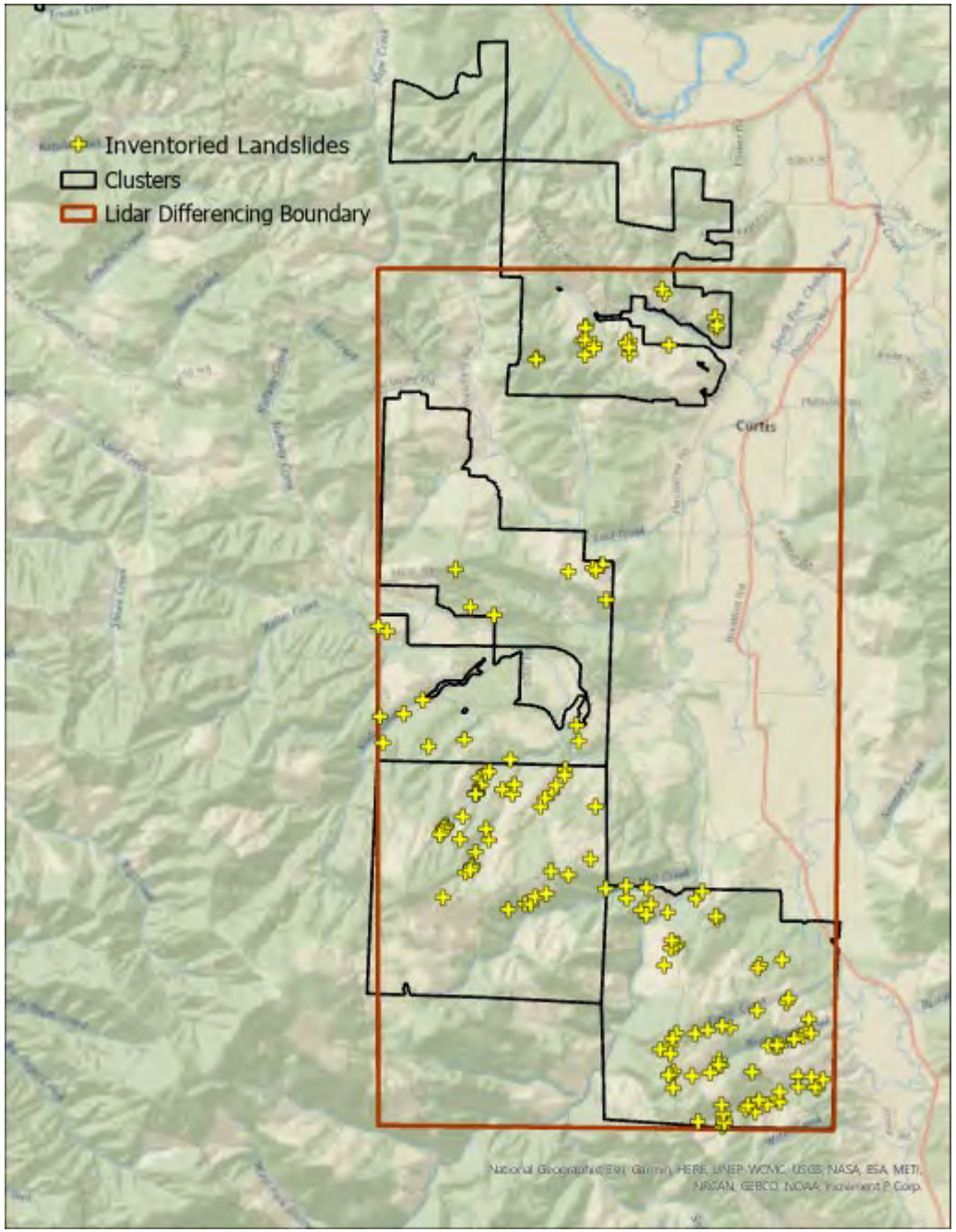
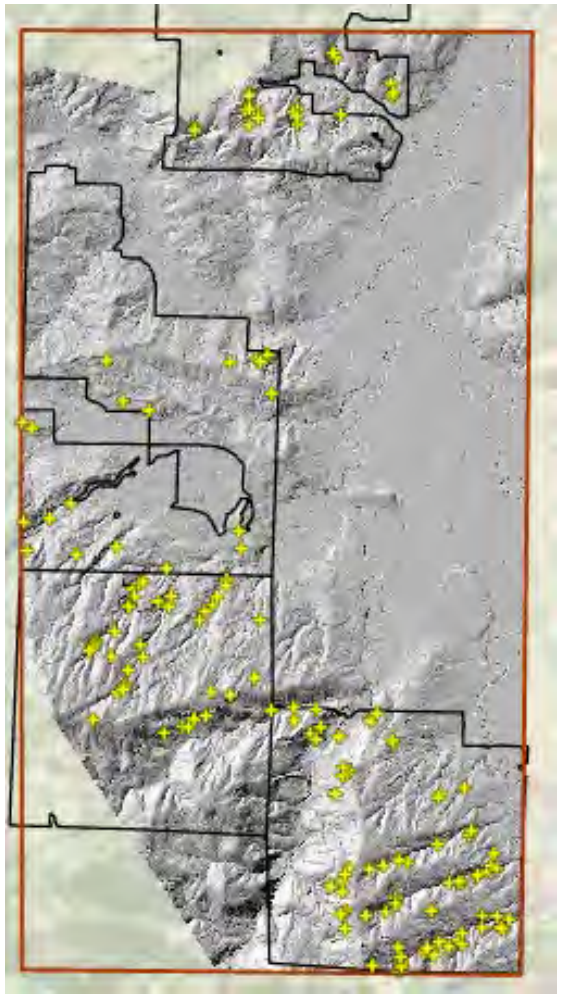
Post Mortem Study Sites
Field-based landslide inventory within a delineated set of 22 “clusters”.

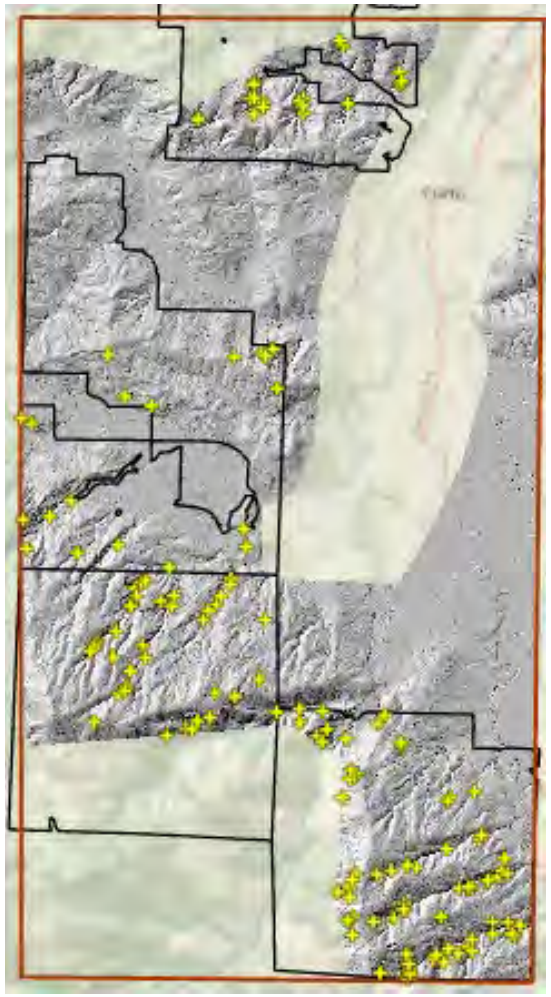


Lidar differencing, 2006 to 2017 area of overlap

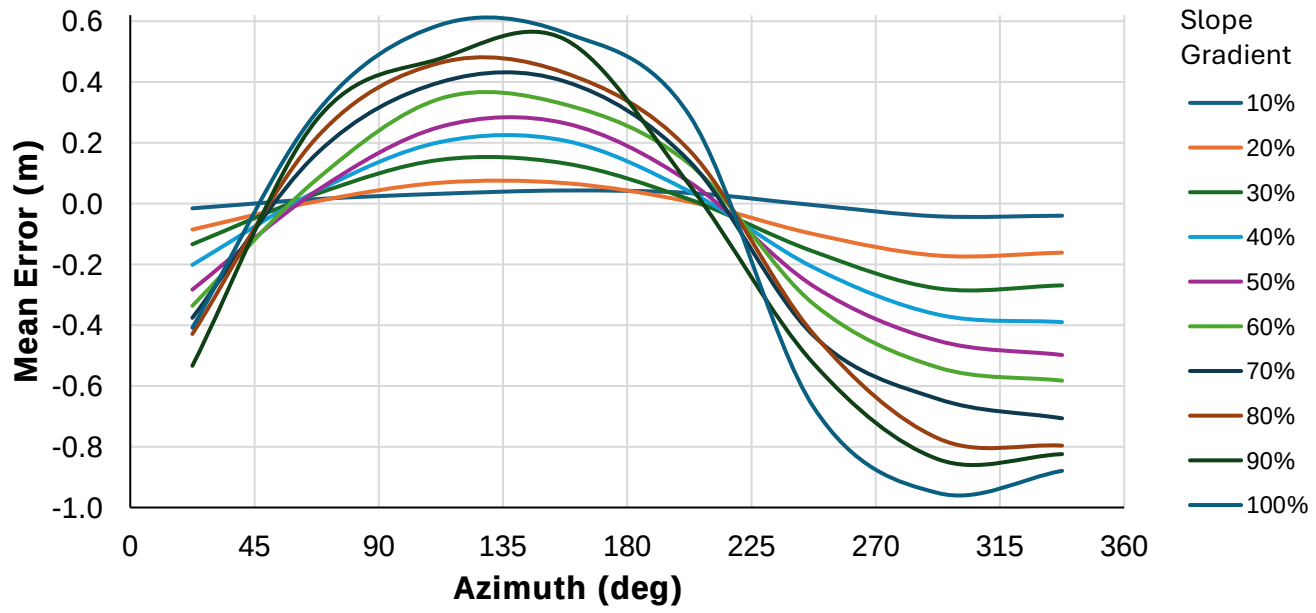
2006 lidar

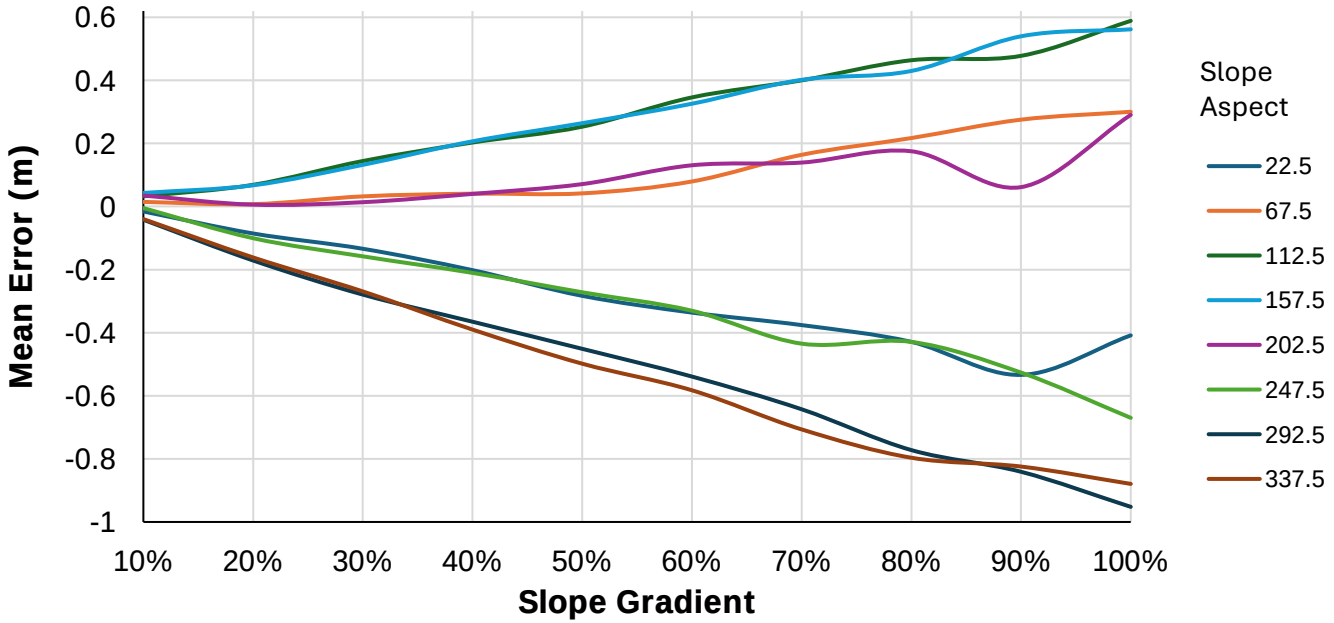


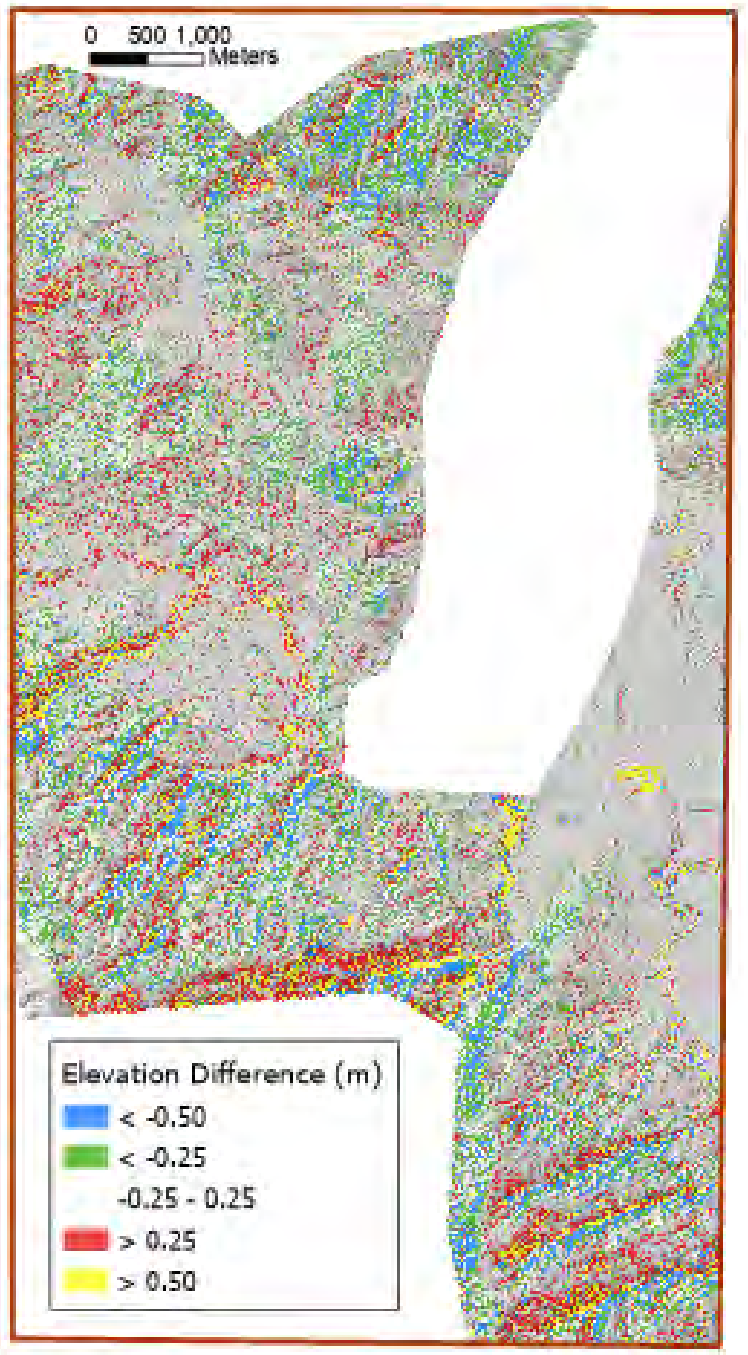
2017 lidar



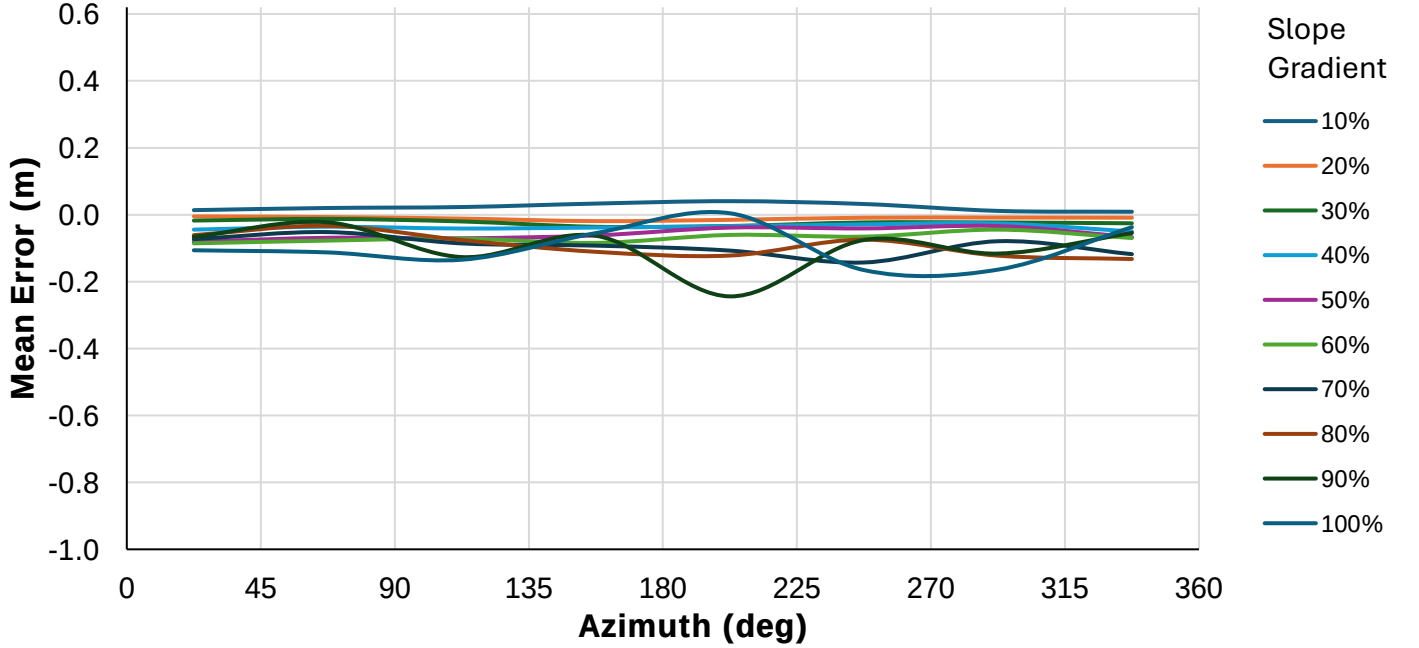
DEMs from WA Lidar Portal

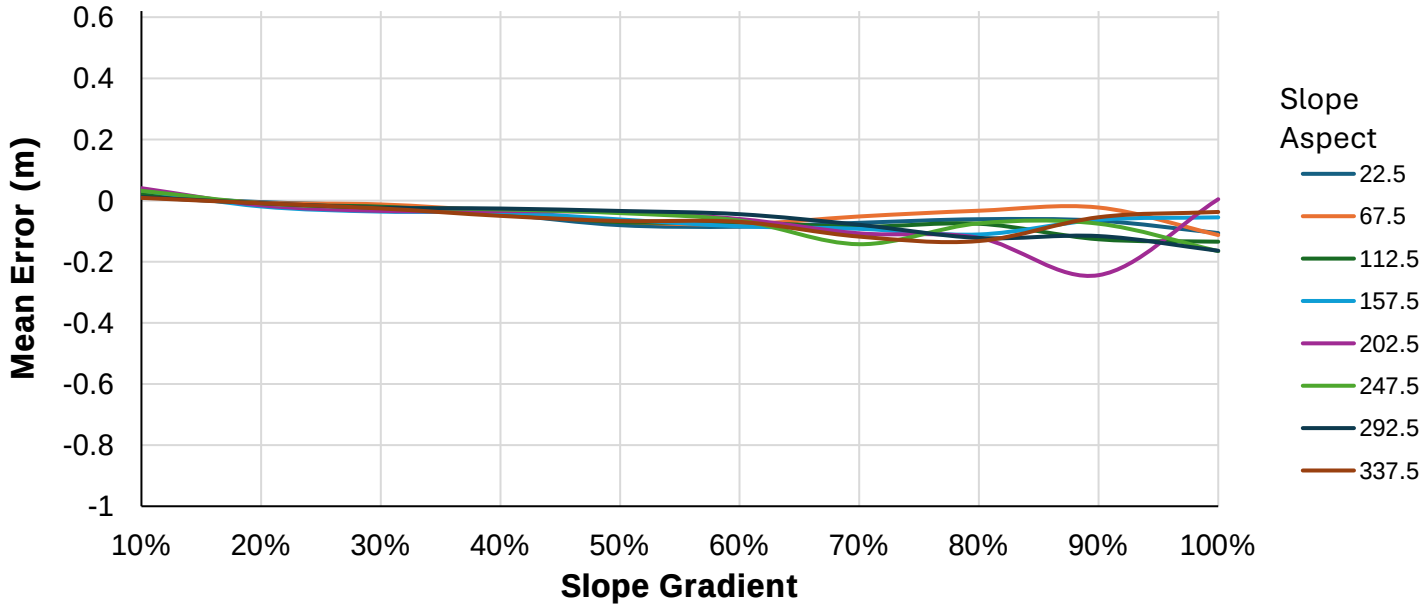


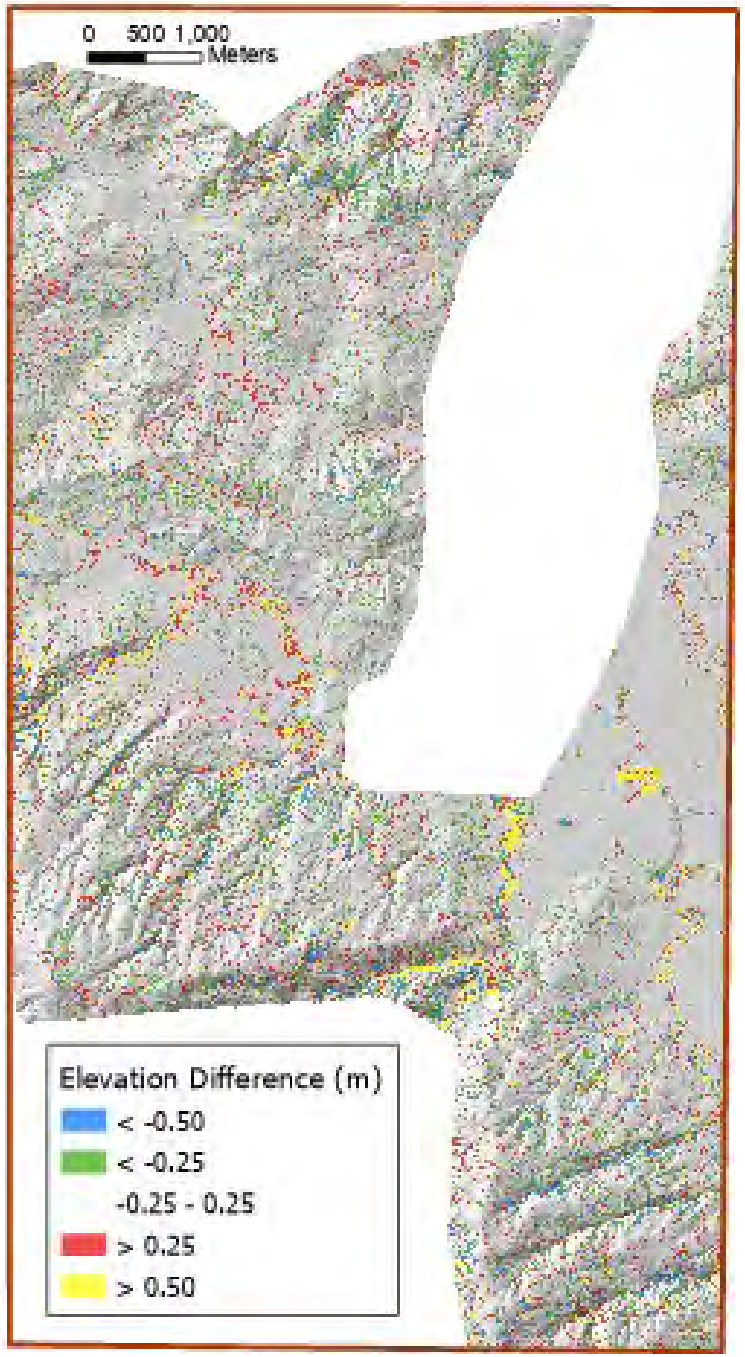


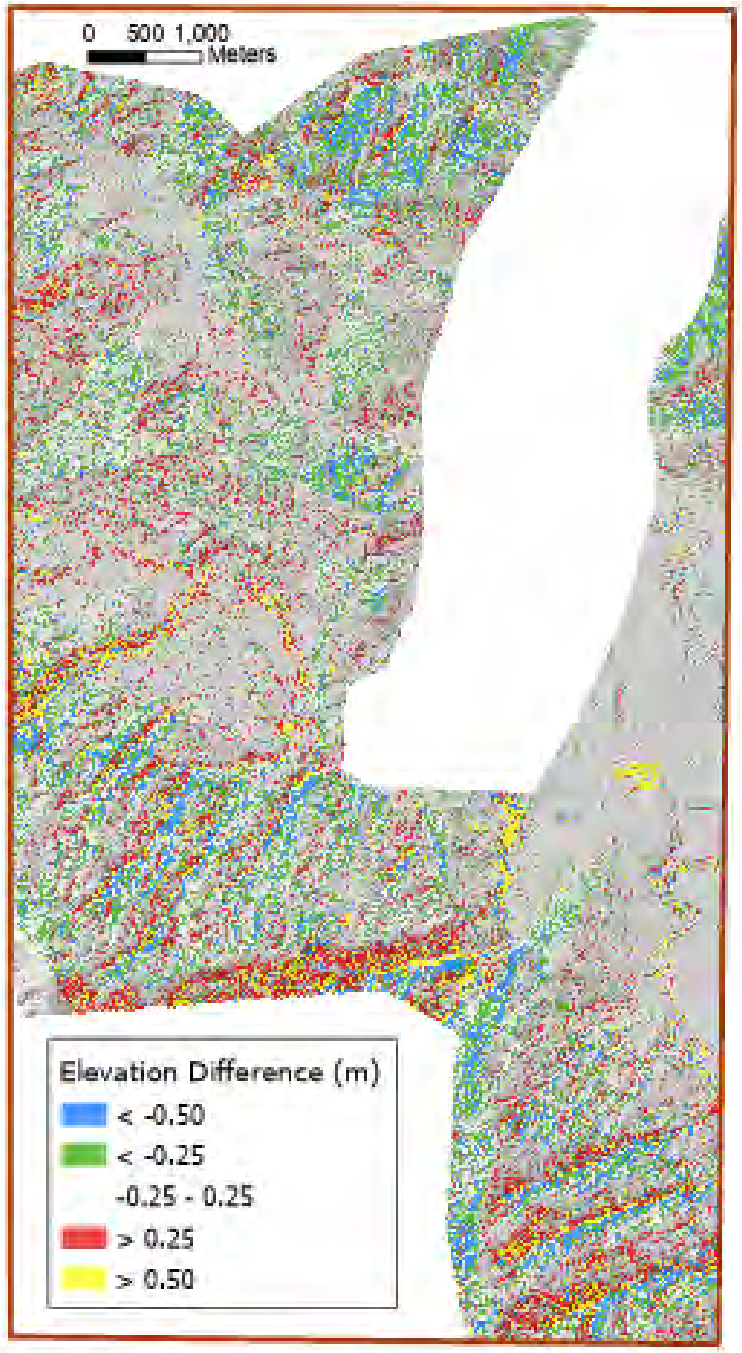


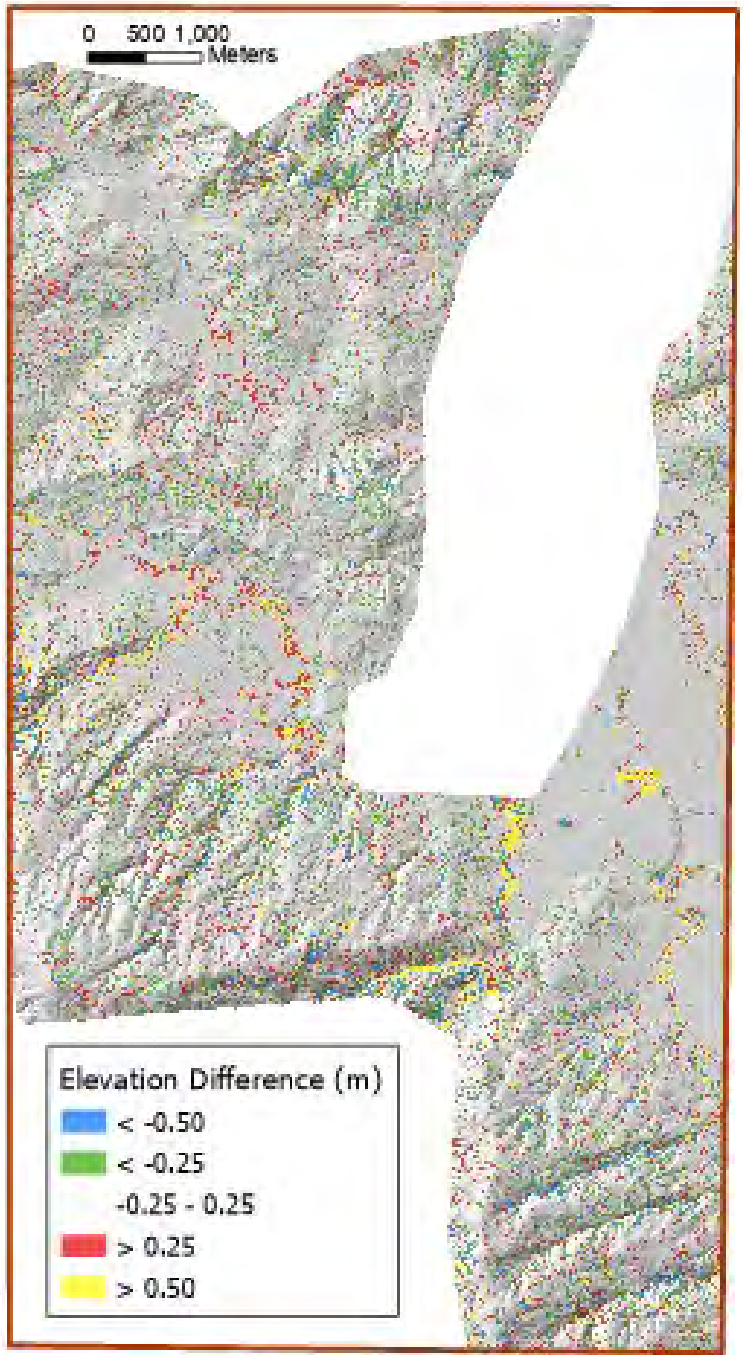
After Coregistration





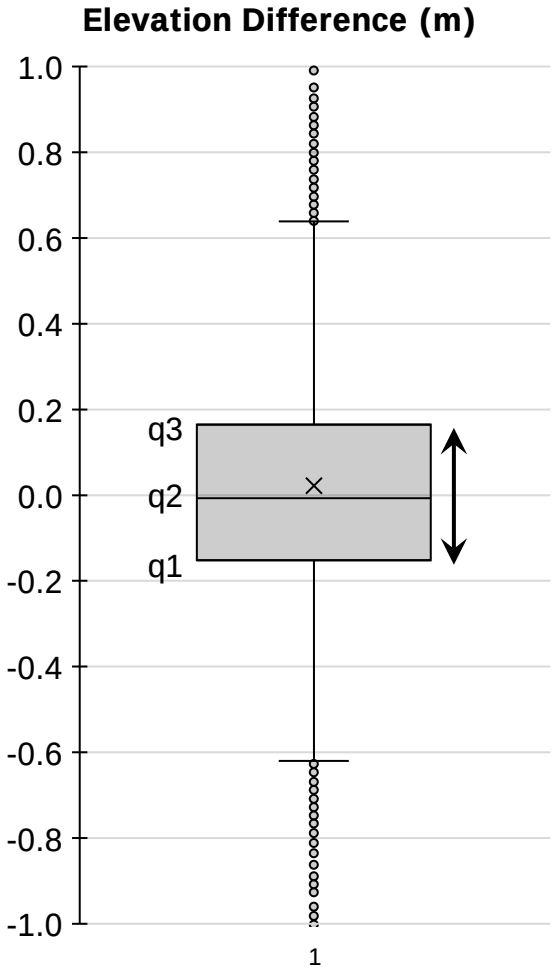


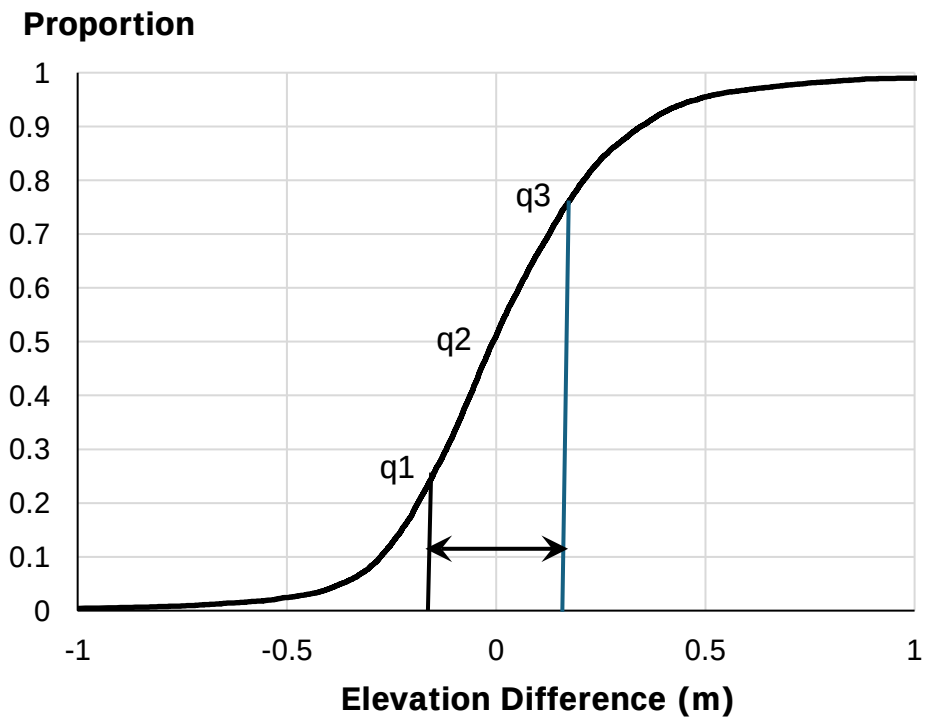

0 500 1,000
Meters
Elevation Difference (m)
< -0.50
< -0.25
-0.25 - 0.25
> 0.25
> 0.50

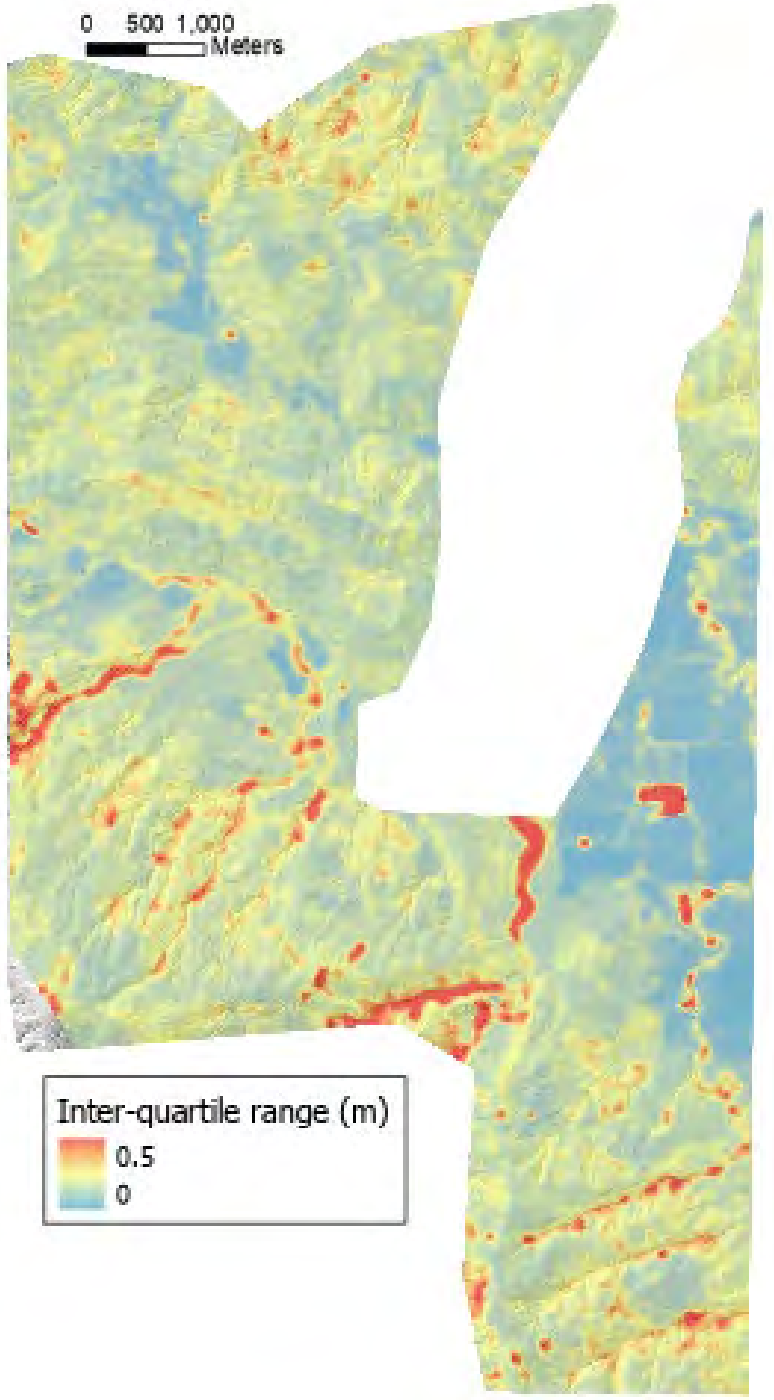

0 500 1,000
Meters
Elevation Difference (m)
< -0.50
< -0.25
-0.25 - 0.25
> 0.25
> 0.50

How to distinguish signal from noise? For circular moving window of 100-m diameter, get the frequency distribution of elevation differences between the 2006 and co-registered 2017 DEMs. Use the inter-quartile range (q3-q1) as a measure of variation.

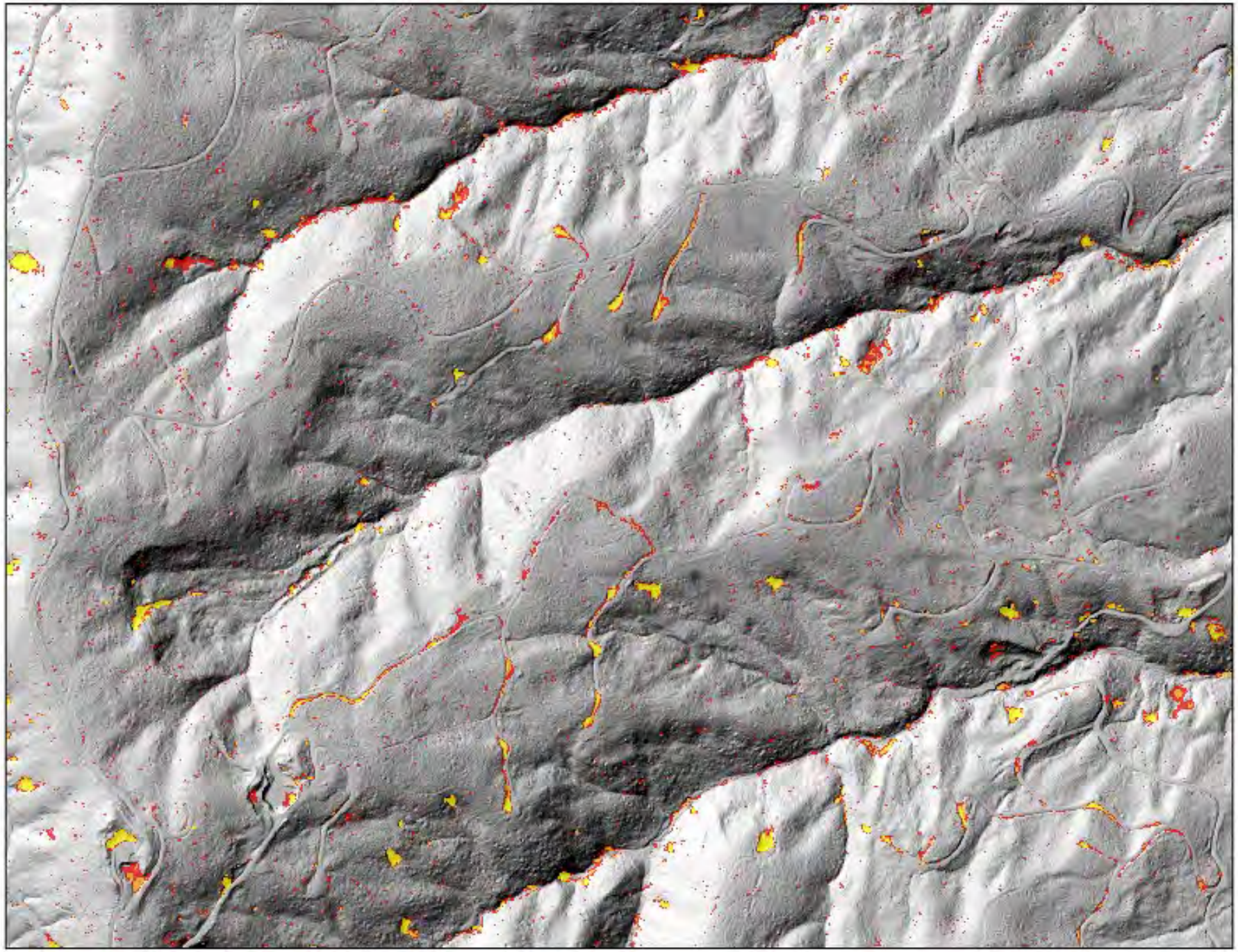
Example from one 100-m diameter window







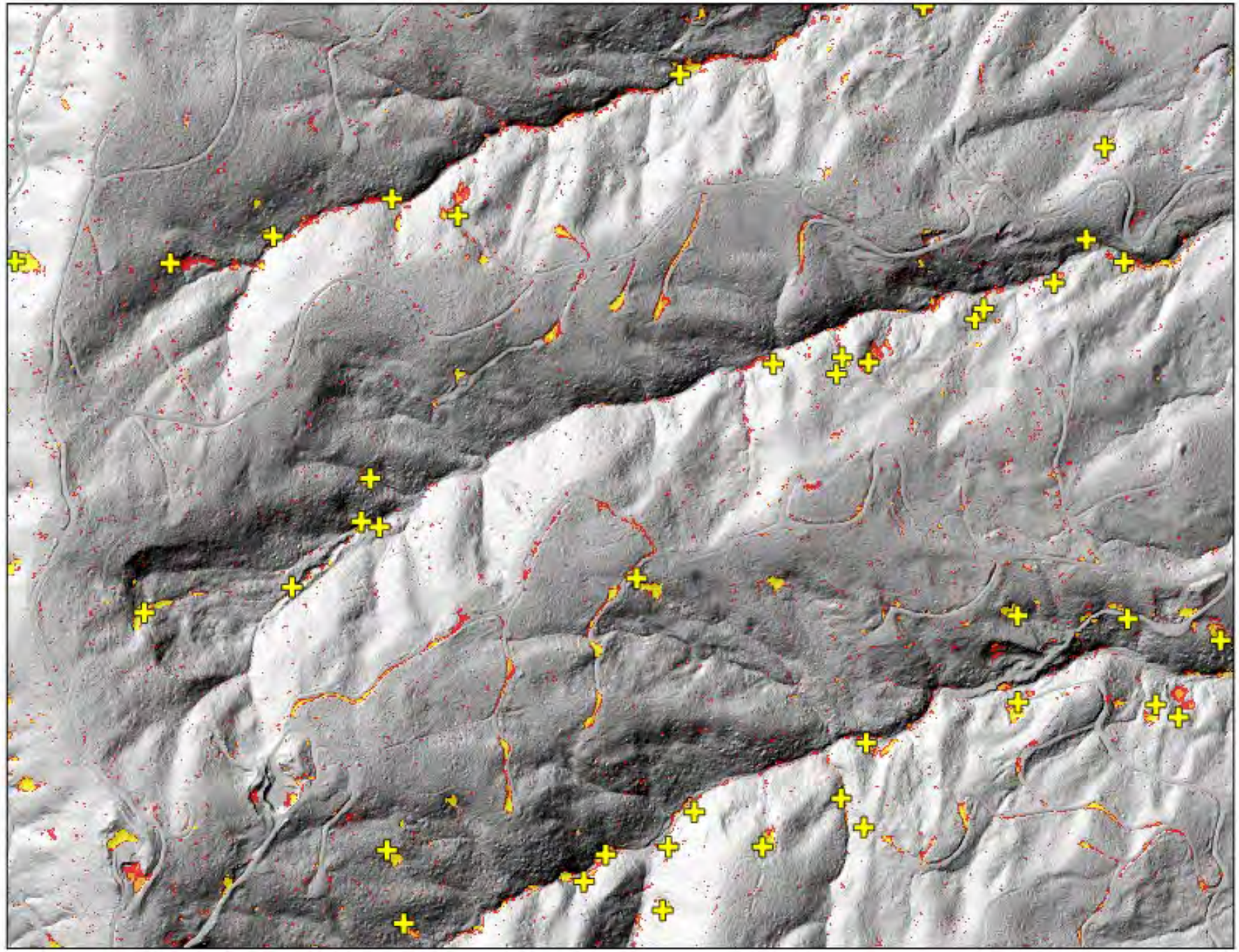
Map areas of elevation loss in terms of the number of inter-quartile ranges they fall below the q1 value. The larger the (negative) magnitude, the greater the mapped zone deviates from the average level of noise in the vicinity.



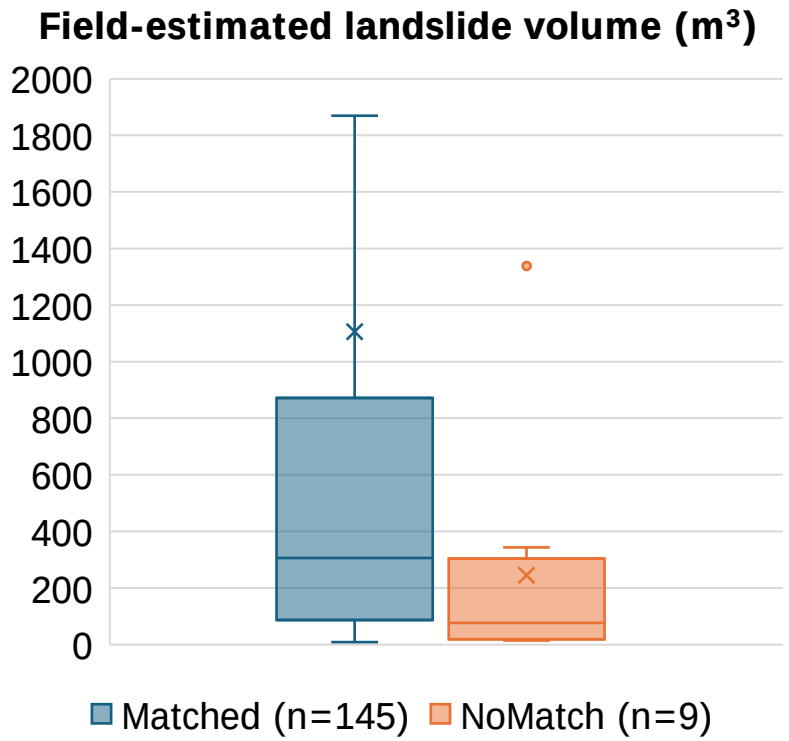
Inventoried landslides tend to align with “outlier” zones.

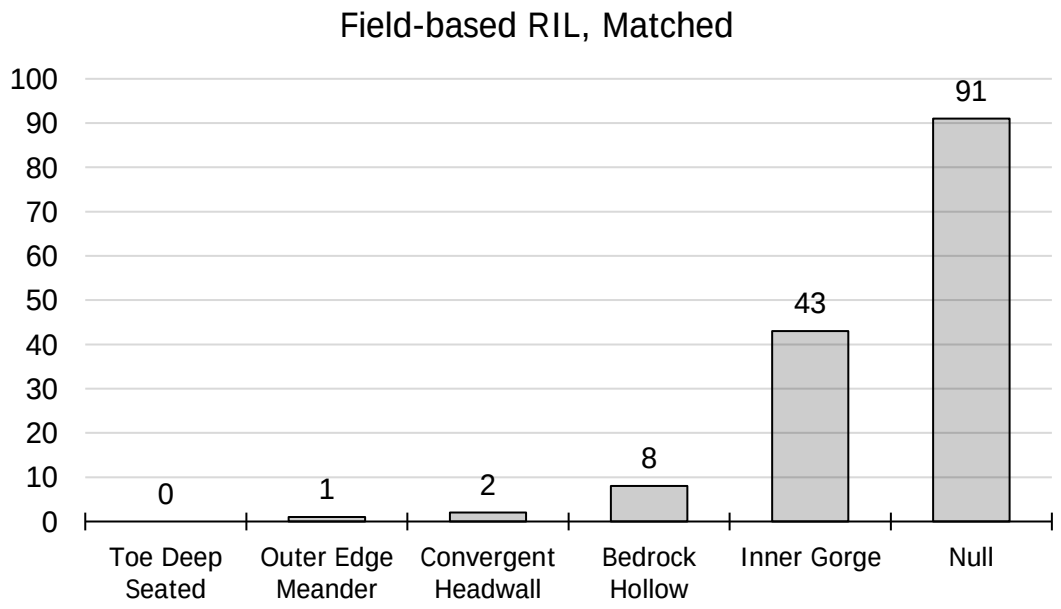
Questions:

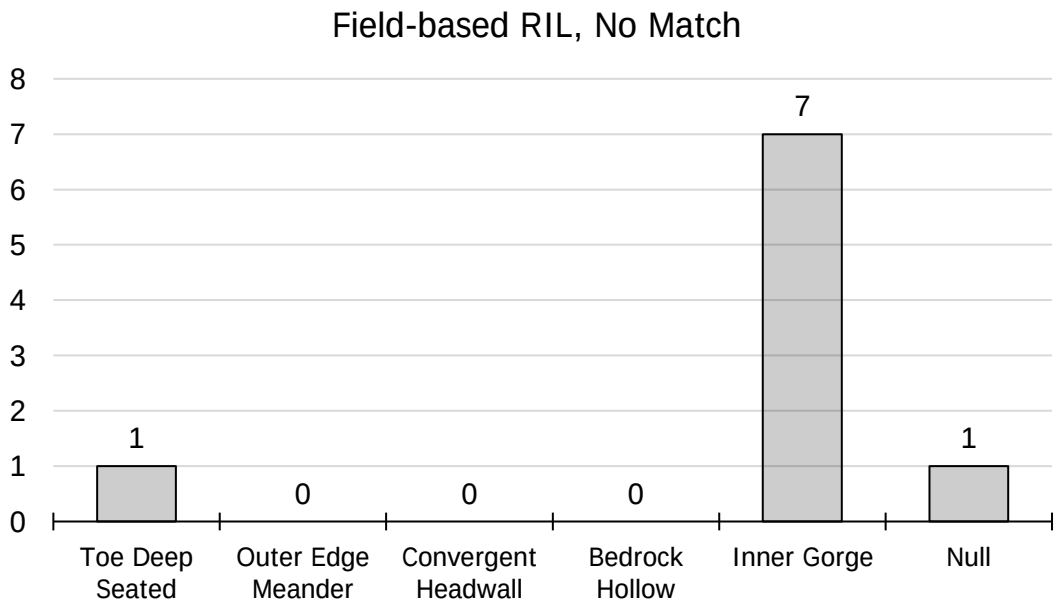
1. What length scale for measuring the magnitude of “noise”?
2. What value to consider an “outlier”?

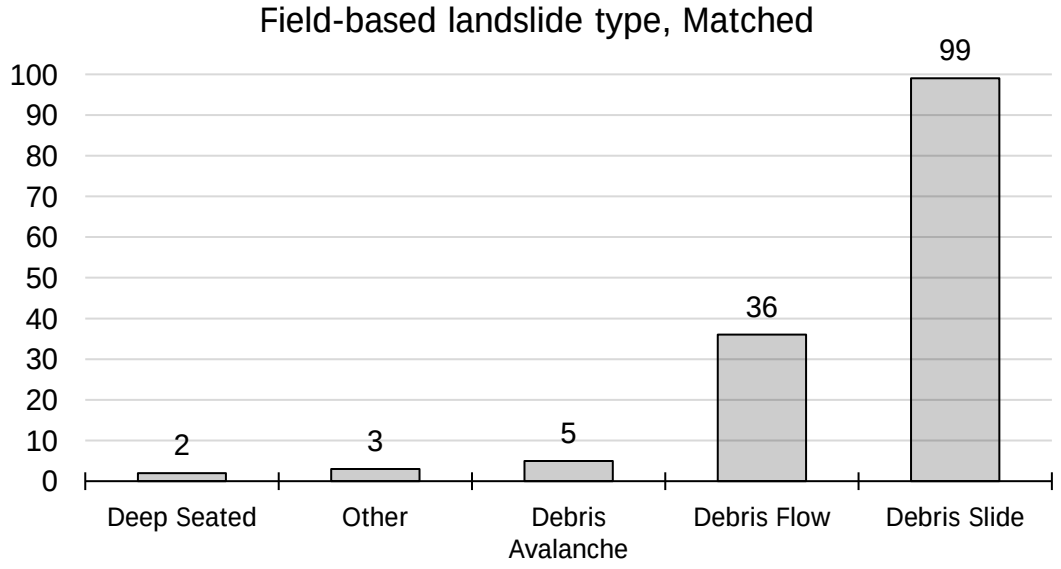


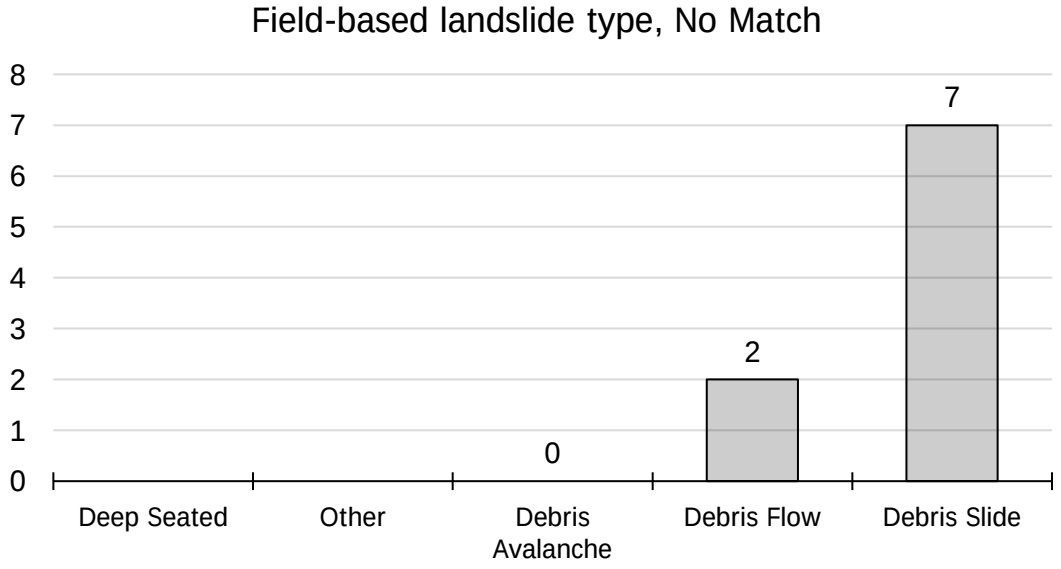
We can use these results to estimate the minimum landslide size that can be resolved with lidar differencing. This minimum size varies with the inter-quartile range of elevation differences and with the degree to which a landslide site deviates from the lower end of that range. I'm still working on determining that relationship.




Field-based RIL, Matched
100
90
80
70
60
50
40
30
20
10
0
0
1
2
8
43
91
Toe Deep Seated
Outer Edge Meander
Convergent Headwall
Bedrock Hollow
Inner Gorge
Null


Field-based RIL, No Match
8
7
6
5
4
3
2
1
0
1
0
0
0
7
1
Toe Deep Seated
Outer Edge Meander
Convergent Headwall
Bedrock Hollow
Inner Gorge
Null


Field-based landslide type, Matched
100
90
80
70
60
50
40
30
20
10
0
2
3
5
36
99
Deep Seated
Other
Debris Avalanche
Debris Flow
Debris Slide


Field-based landslide type, No Match
8
7
6
5
4
3
2
1
0
0
2
7
Deep Seated
Other
Debris Avalanche
Debris Flow
Debris Slide

We can use the pre-landslide DEM to calculate topographic indices to relate to landslide locations.