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Improving the positional and vertical accuracy of named summits above 13,000 feet in the United States

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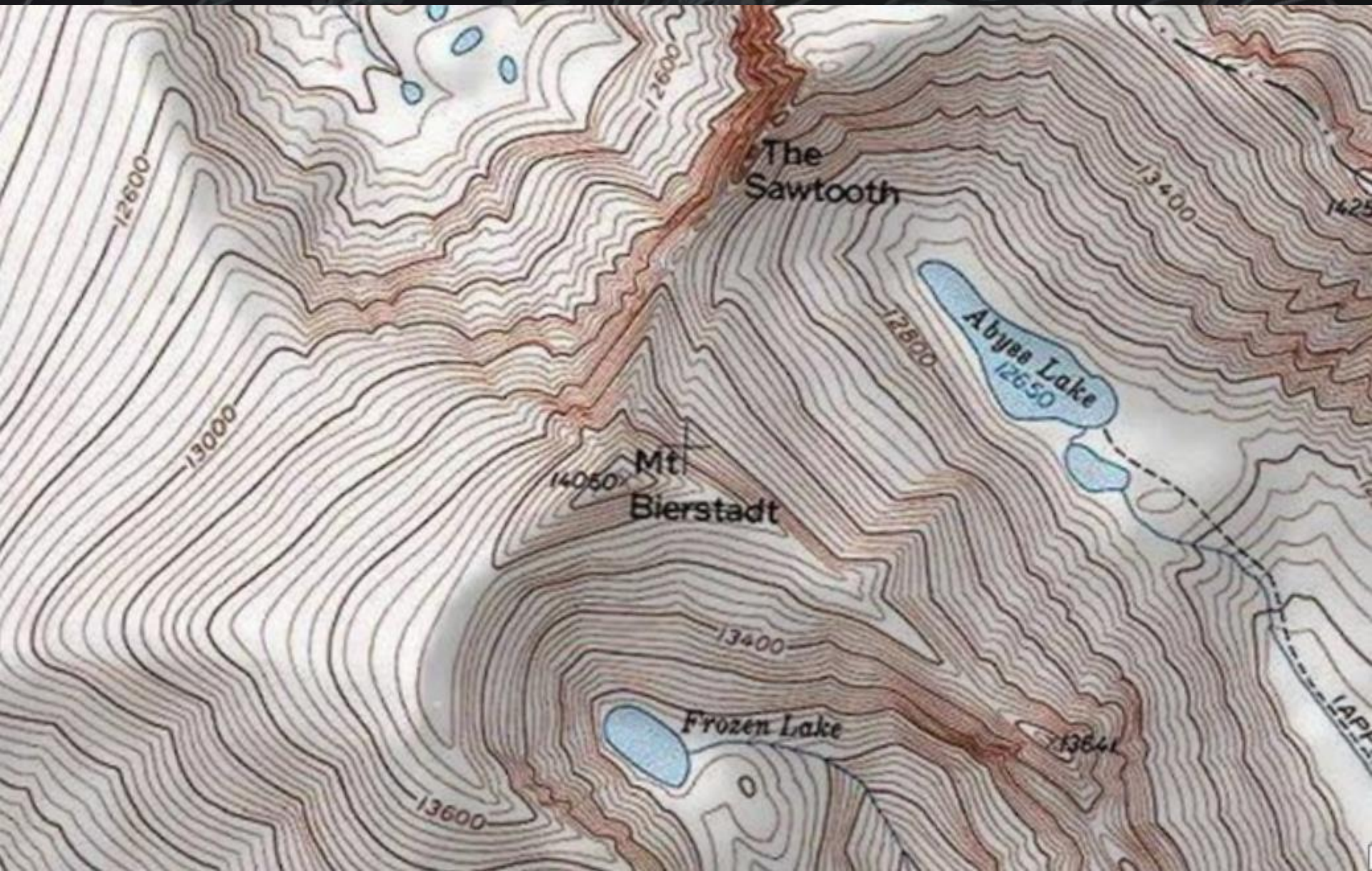
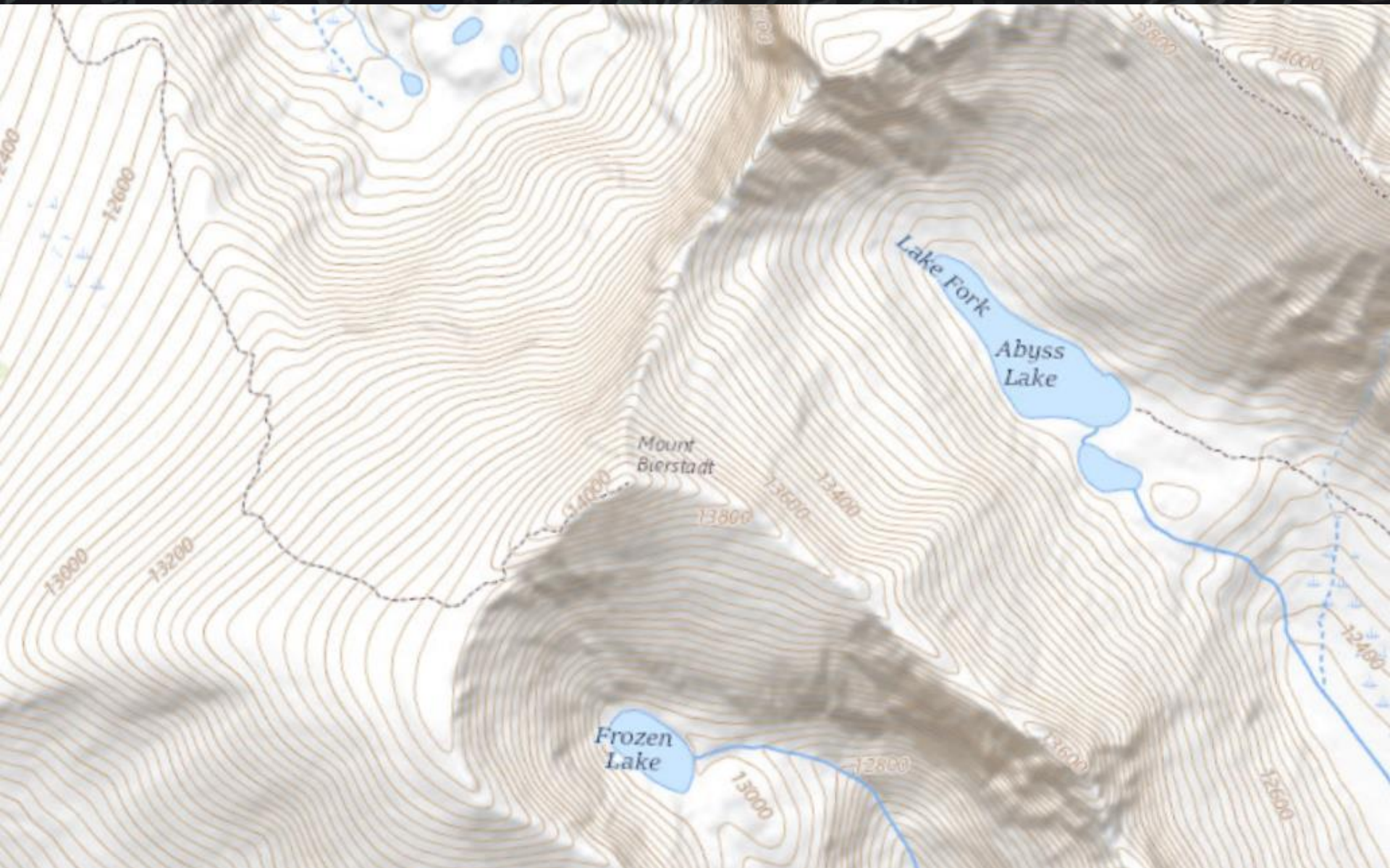
Introduction



Introduction



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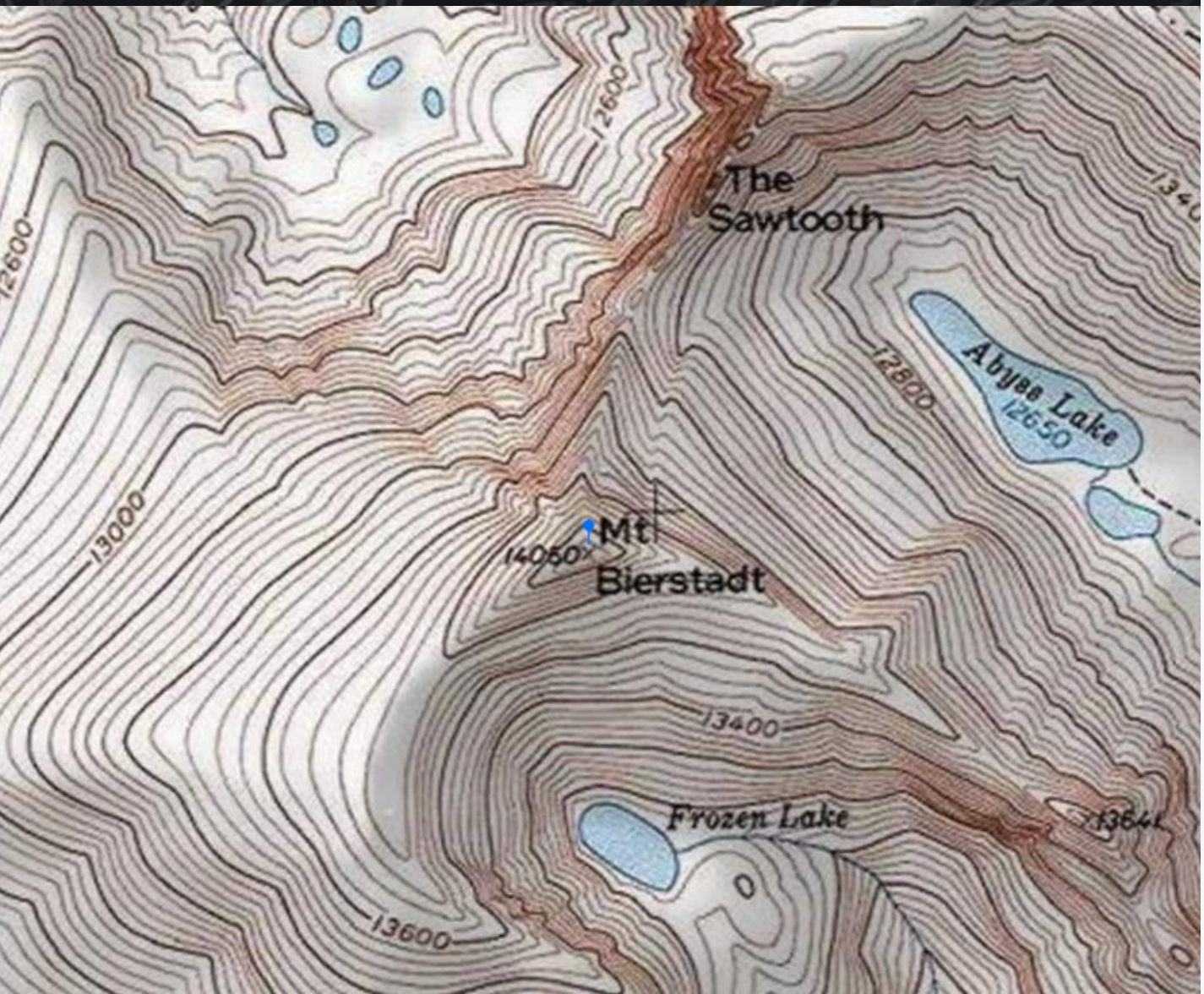
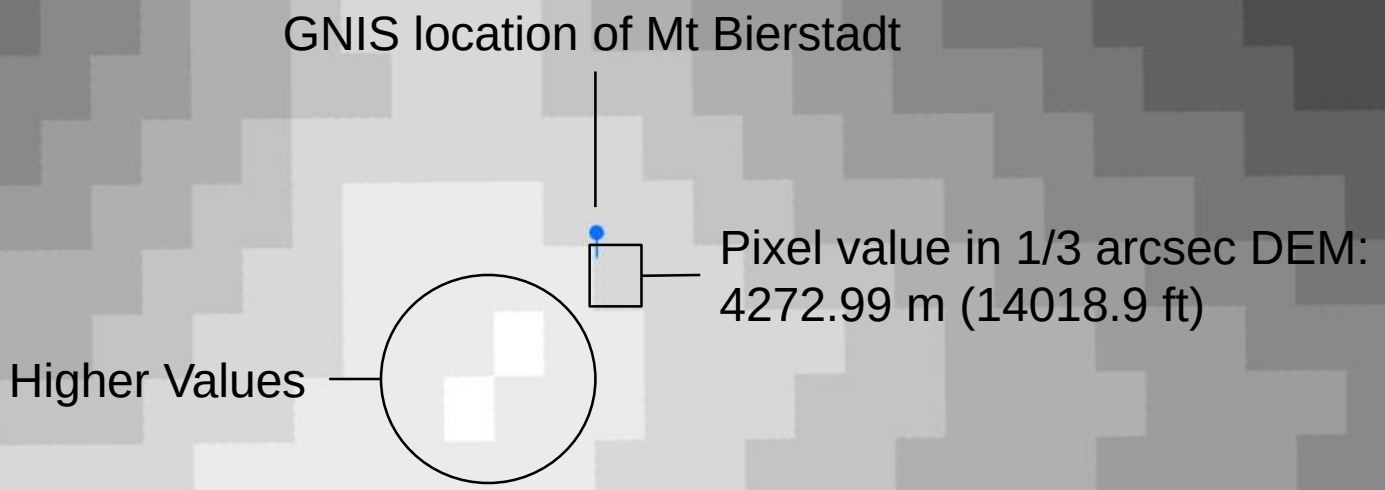


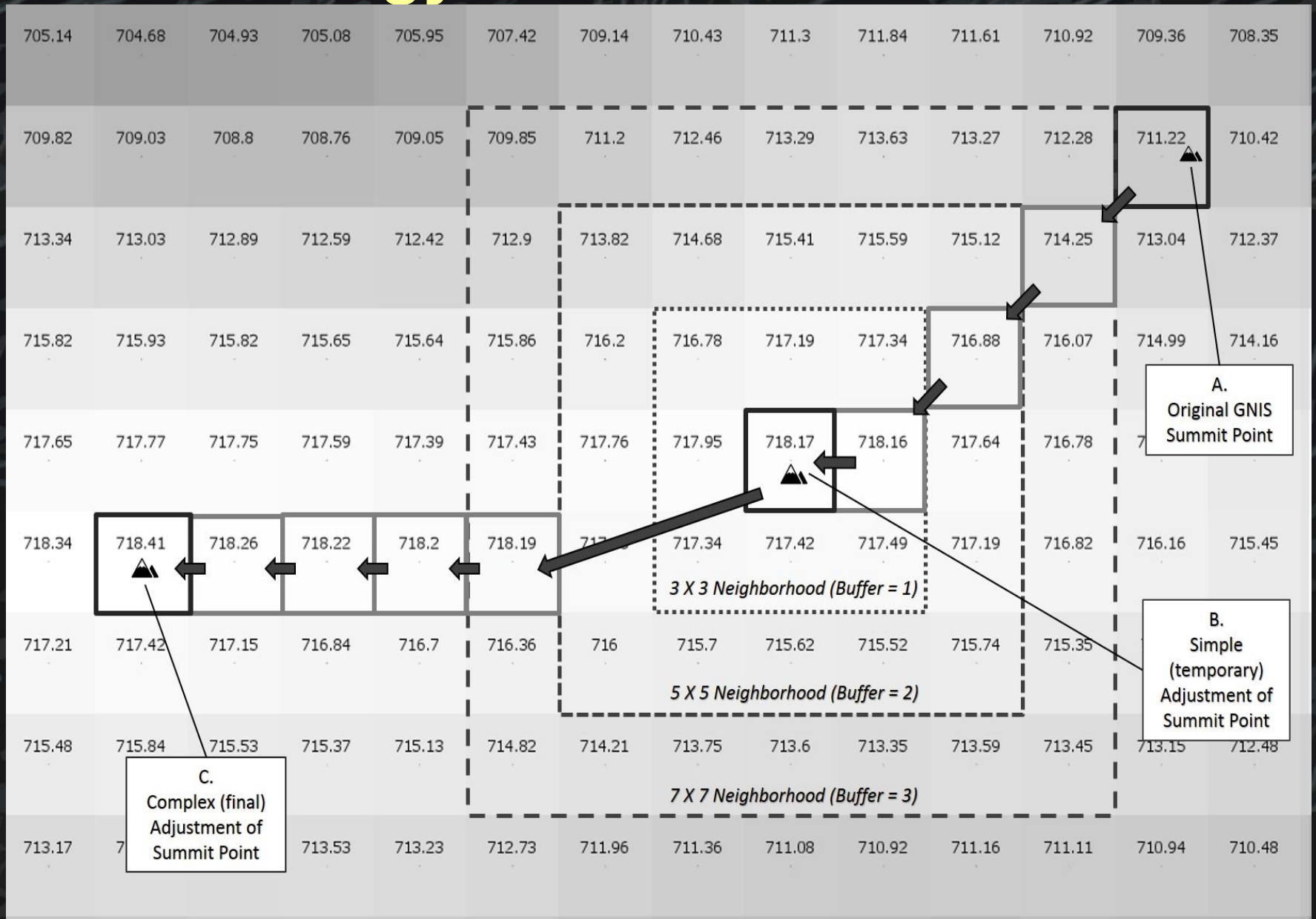
FID	32
FEATURE_ID	182467
FEATURE_NA	Mount Bierstadt
FEATURE_CL	Summit
STATE_ALPH	CO
STATE_NUME	8
COUNTY_NAM	Clear Creek
COUNTY_NUM	19
PRIMARY_LA	393458N
PRIM_LONG_	1054007W
PRIMARY__1	39.582778
PRIM_LONG1	-105.668611
PRIM_LAT_D	39.582765
PRIM_LON_1	-105.668615
SOURCE_LAT	
SOURCE_LON	
SOURCE_L_1	0
SOURCE_L_2	0
SOURCE_L_3	0
SOURCE_L_4	0
ELEV_IN_M	4282
ELEV_IN_FT	14048
MAP_NAME	Mount Evans
DATE_CREAT	10/13/1978
DATE_EDITE	4/1/2011

Introduction



Methodology

Arundel, S. T. and Sinha, G. 2020. Automated location correction and spot height generation for named summits in the coterminous United States. *International Journal of Digital Earth* 0 (0): 1–15. https://doi.org/10.1080/17538947.2020.1754936.



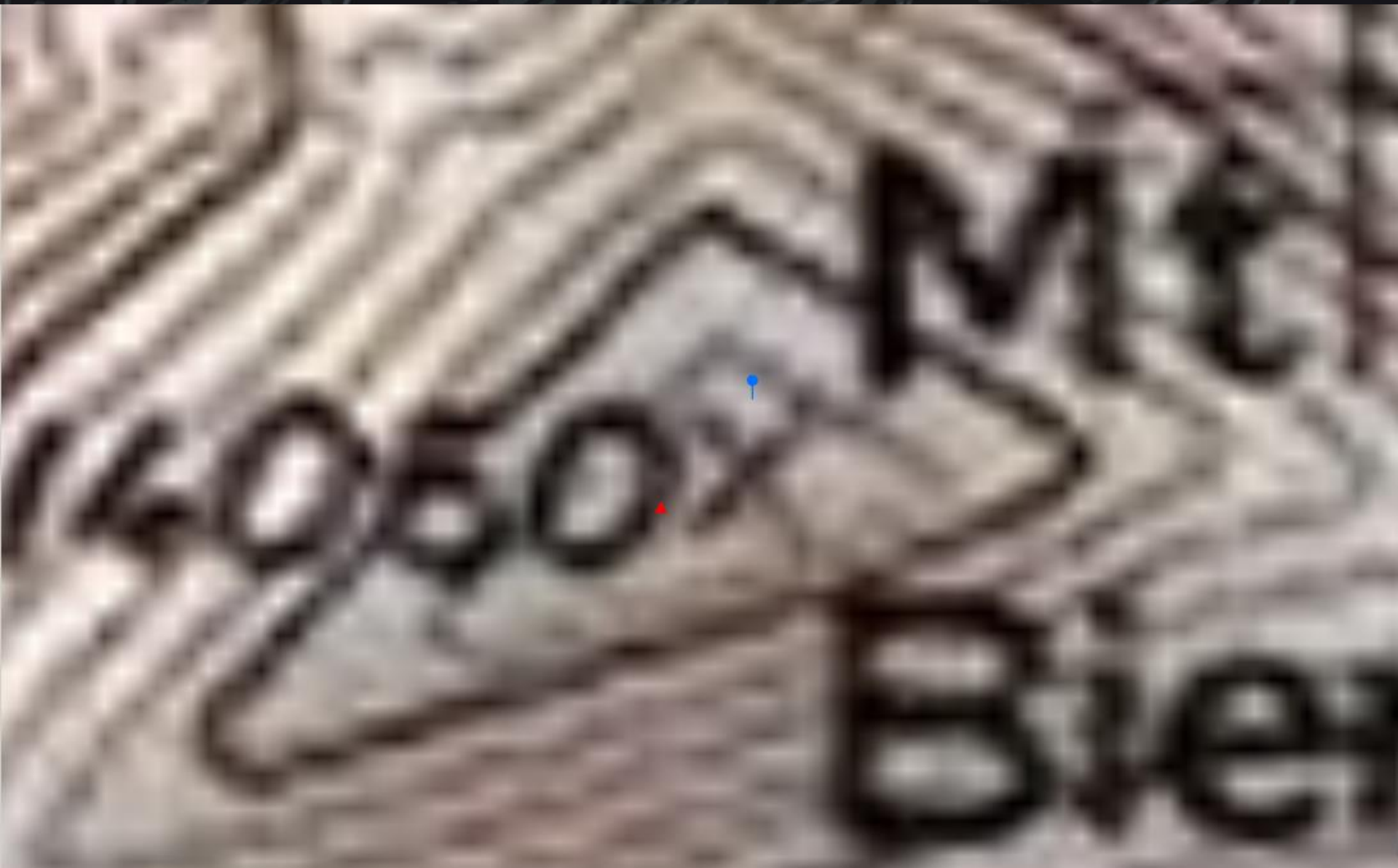
Methodology

Results

GNIS record value = 4282 m (14048)
Original 1/3” = 4272.99 m (14019 ft)
Historical topo = 14050 ft

Corrected location
of Mt Bierstadt:
1/3” = 4286.4 m (14063 ft)
1 m = 4286.6 m (14064 ft)
LPC= 4286.9 m (14065 ft)

Results



Results

- Most points (97.5%) processed automatically to correct peak
- Data source:
  - 1/3 arcsec = 88.4%
  - 1-m = 4%
  - LPC = 7.5%

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Results

Statistic	1/3 arcsec	1-m	LPC
Count	176	8	15
Spot height (our method) > spot elevation (HTMC) (%)	64.8	87.5	86.7
Spot height < spot elevation (%)	35.2	12.5	13.3
Average height above (m)	3.23	2.00	3.96
Average height below (m)	-3.82	-0.97	-2.01
Average absolute difference (m)	0.57	0.06	3.71
Average difference (m)	0.74	1.63	3.17

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Differences between corrected spot heights and summit spot elevations labeled on historical topographic maps

Discussion

- 1/3 arcsec seamless DEM originally created from contours resulted in smoothing, which results in lower high values
- This will improve as more lidar/ifsar processed and incorporated into 1/3.
- Smoothing of elevation values has reduced US elevation by ~3 m.
- Impacts models relying on terrain as base model

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Conclusion

- Positional and vertical accuracy of 199 named summits over 13,000 ft improved
- As hoped, higher resolution data increases height of most summits.
- Corrected summit location/elevations will lead to greater accuracy on USTopo
- Leads to automated production of spot height for delivery and display

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