RIVER MAPPING IN REMOTE ALASKA: TOPOBATHYMETRIC LIDAR SOLUTIONS

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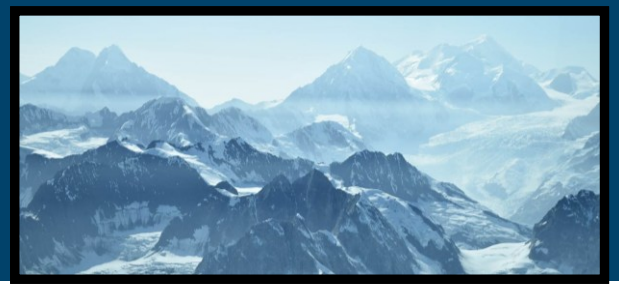
NV5

OUTLINE

- AK River Mapping Considerations
- Overcoming Challenges
  - Repeated Mapping
- Case study: Nuyakuk River Project
  - 2020 Collection
  - 2023 Collection
  - Data Integration
- Summary & Closing Thoughts

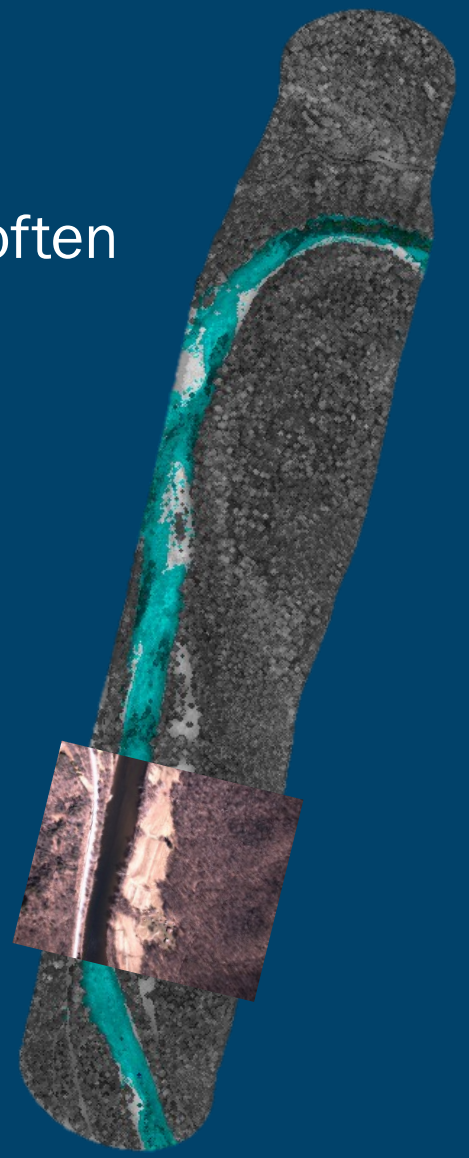
ALASKA RIVER MAPPING CONSIDERATIONS

- Safety and accessibility
  - Remoteness & scale
  - Terrain
  - Weather
- Optimal collection conditions
  - Weather
  - Flow rate & turbidity
  - Snow/vegetation cover



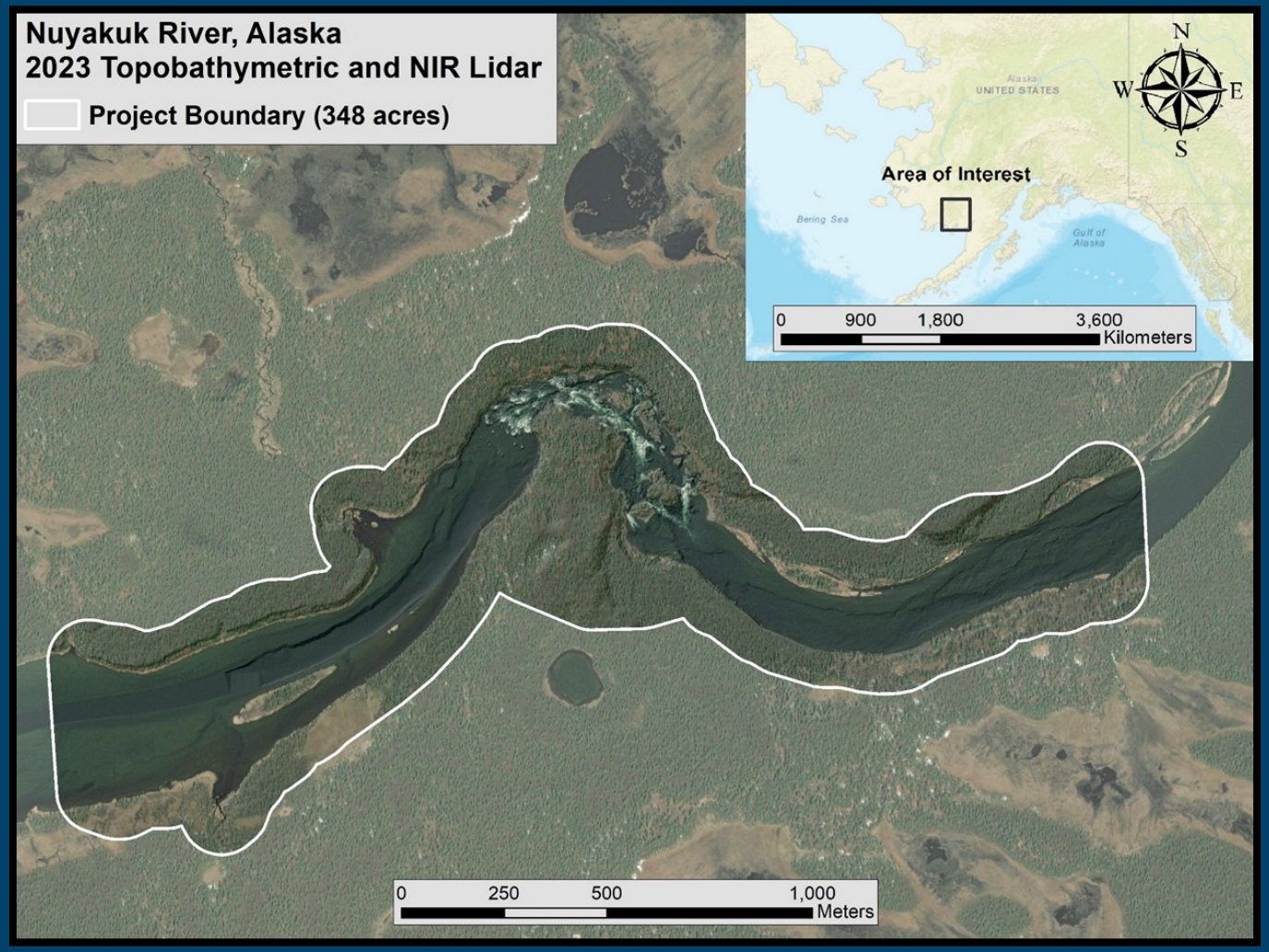
OVERCOMING CHALLENGES

- Leverage local knowledge & strategic planning
  - Communicate with stakeholders and locals early and often
  - Stage resources accordingly for rapid acquisition
- Select appropriate tools and project timing
  - Topobathymetric lidar and imagery
    - Platform and sensor system
  - Multiple acquisitions
- Data processing must meet the project needs
  - Accuracy
    - Control, trajectory processing
  - Data integration
    - Temporal changes



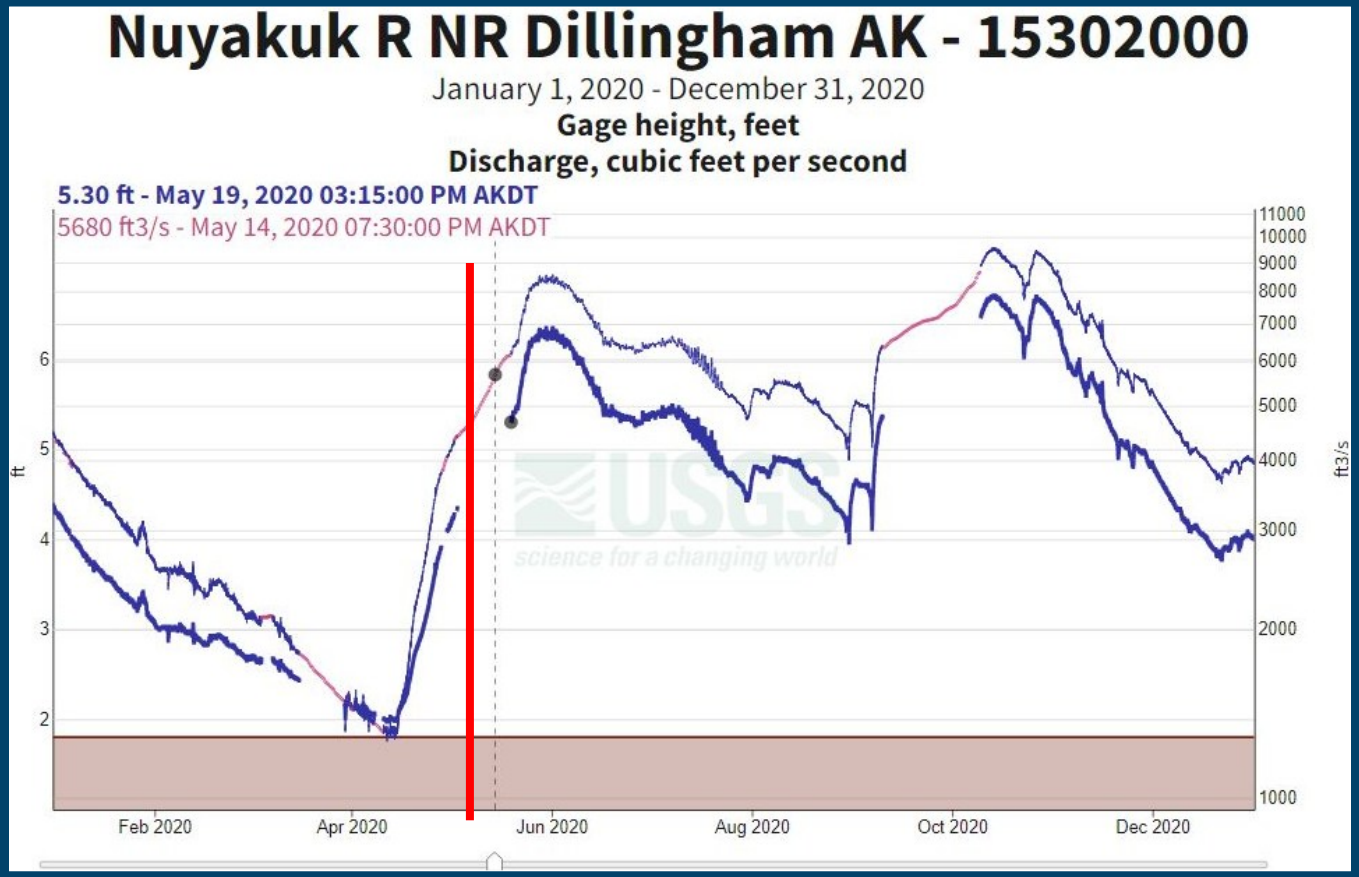
CASE STUDY: NUYAKUK RIVER PROJECT

- Remote
  - ~300 miles WSW of Anchorage
- Snow/ice cover - late April/May
- High flow conditions in summer
- Rapids of particular interest



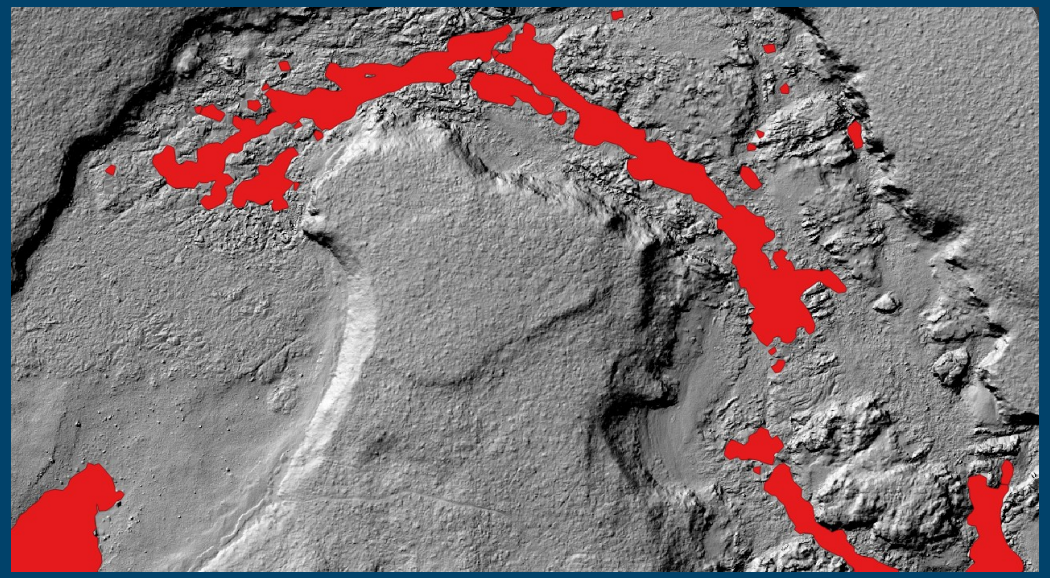
2020 TOPOBATHYMETRIC LIDAR ACQUISITION

- Goal: target ice/snow-free conditions
- Acquired May 14, 2020
- Riegl VQ-880-G II
- Pandemic!
- 83% bathymetric coverage



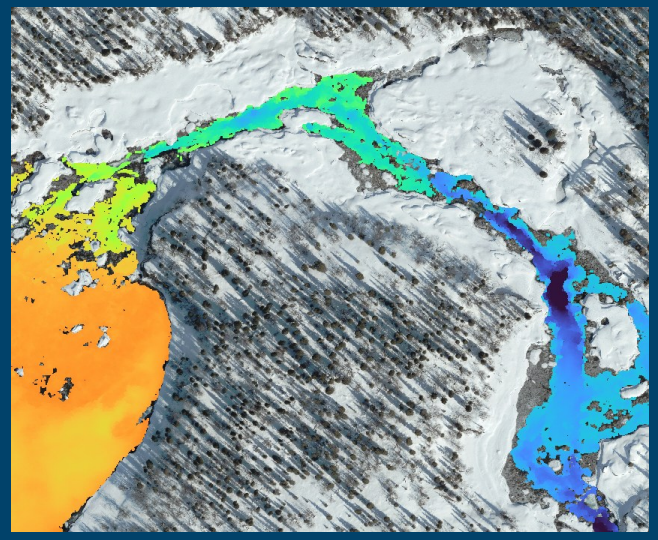
RAPID VOIDS

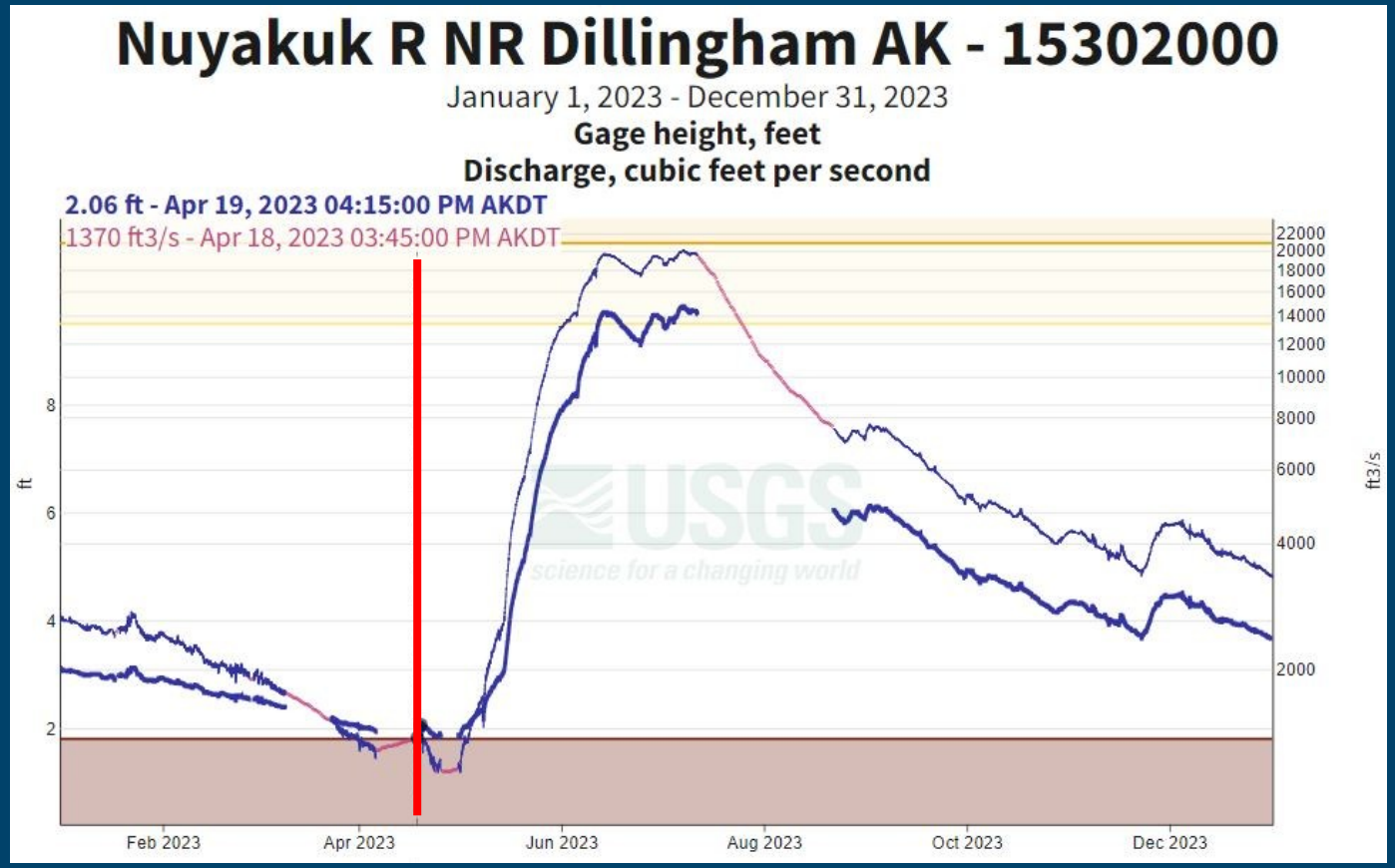
- Rapids of high interest
- Client still in need of data
- Target earlier collection



2023 TOPOBATHYMETRIC LIDAR ACQUISITION

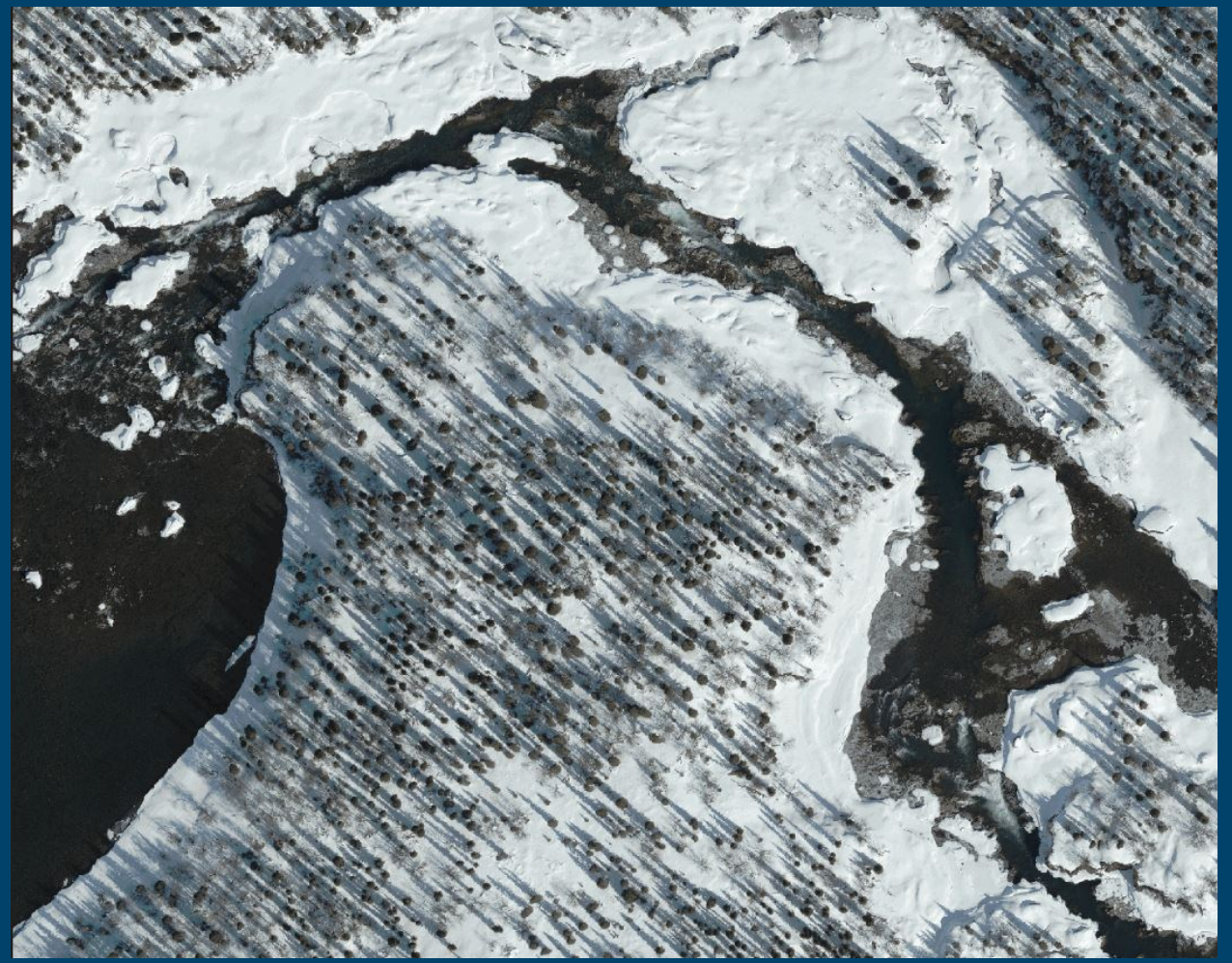
- Goal: Capture rapids at low flow
- Acquired April 18, 2023
- Leica Chiroptera 4X
- Snow/ice present
- 85% bathymetric coverage





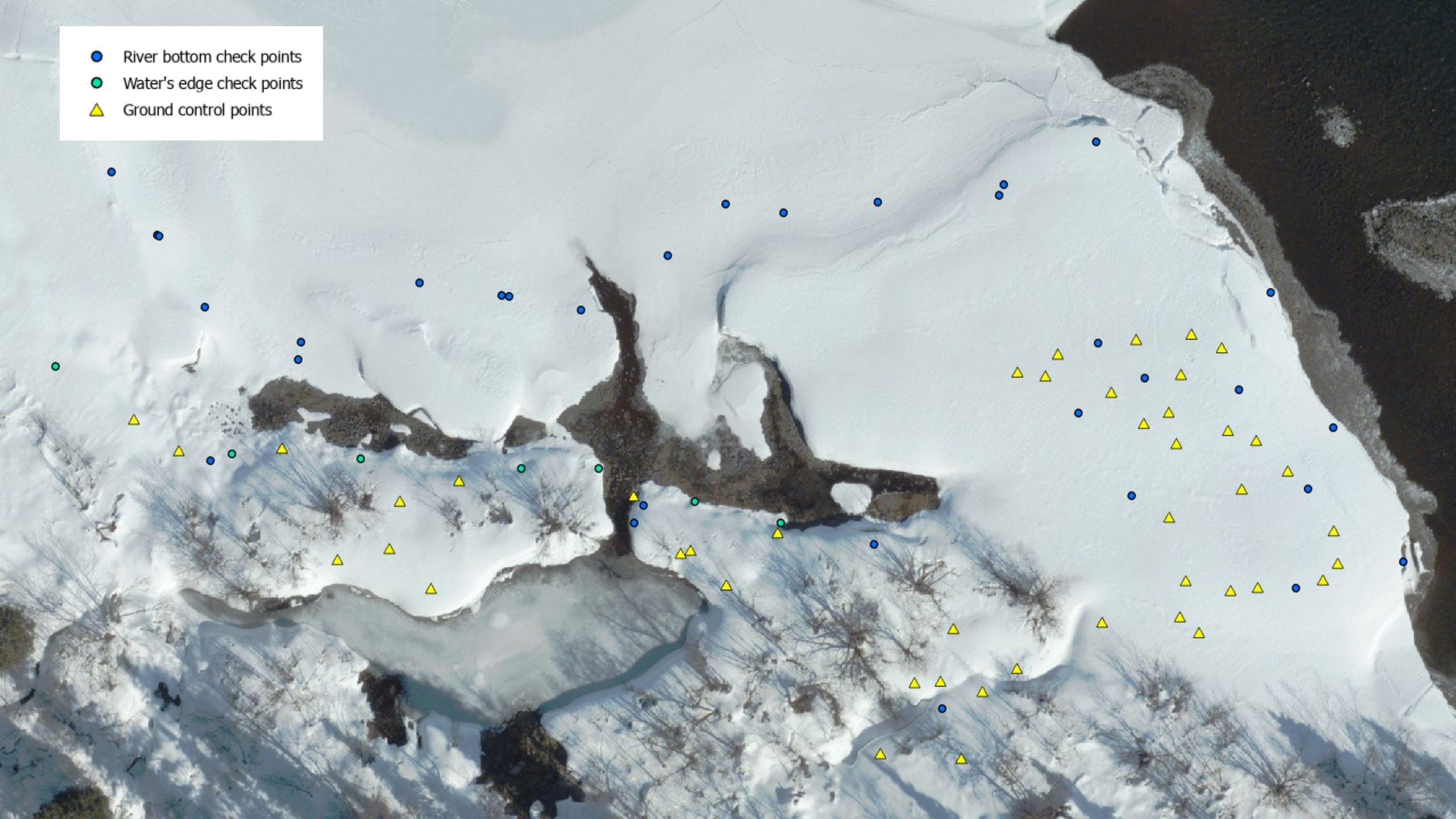
SITE CONDITIONS

MAY 2020



APRIL 2023


River bottom check points
Water's edge check points
Ground control points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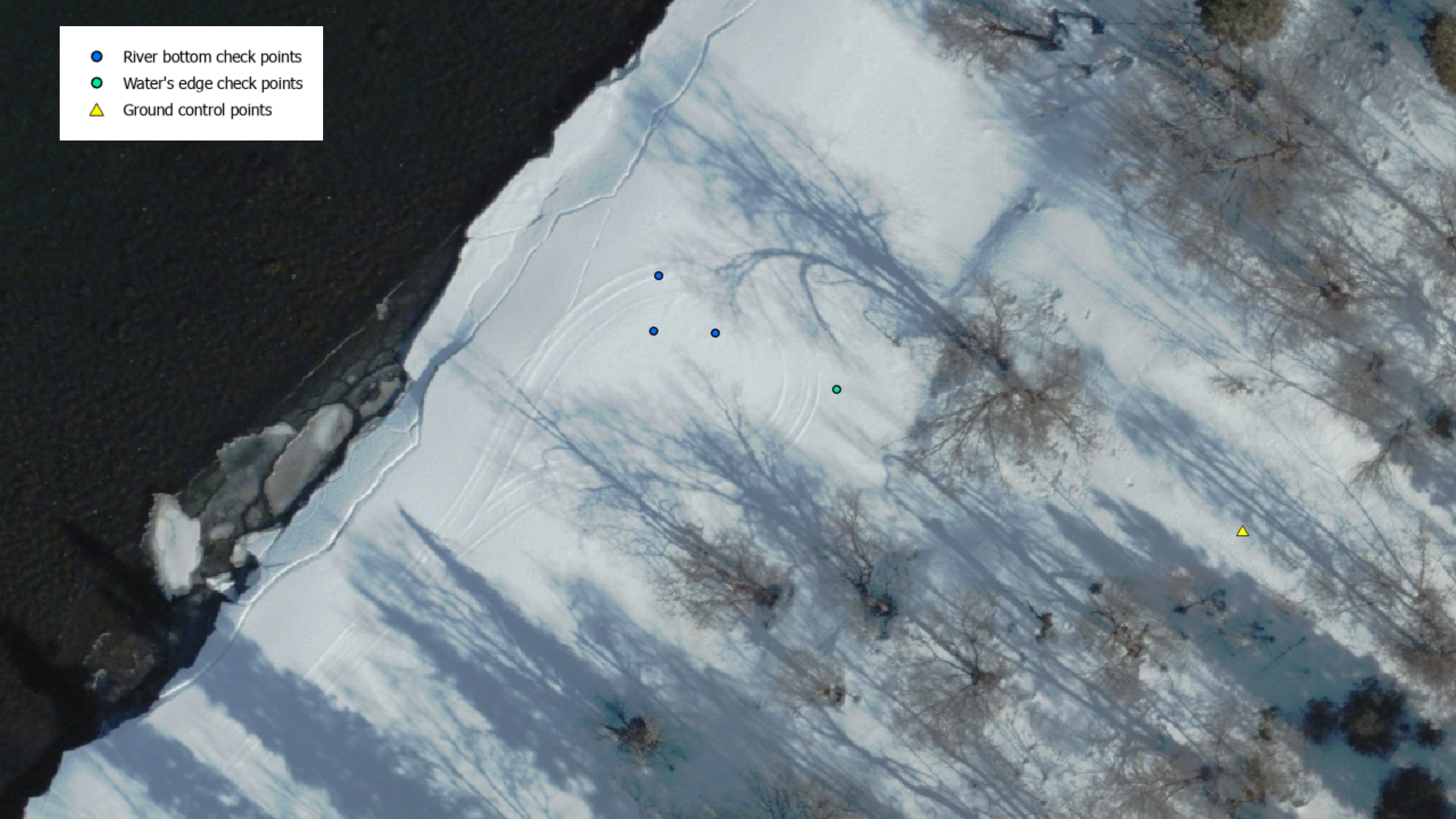
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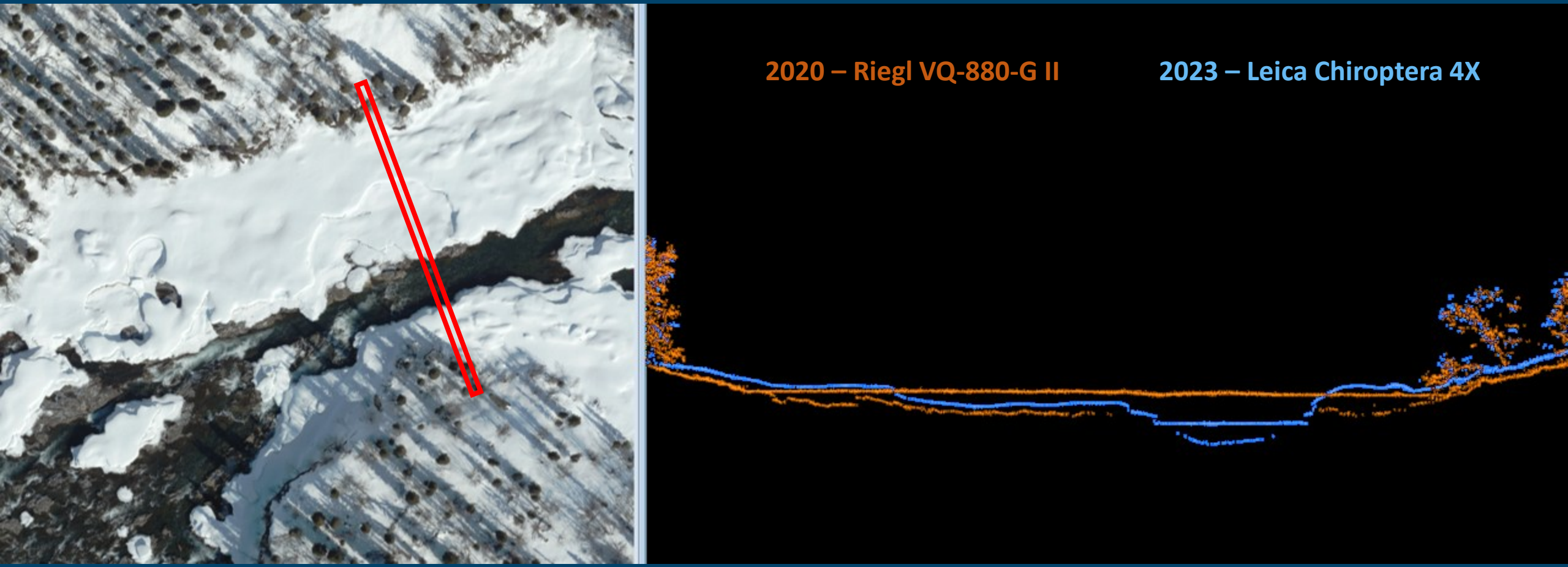
DATA INTEGRATION



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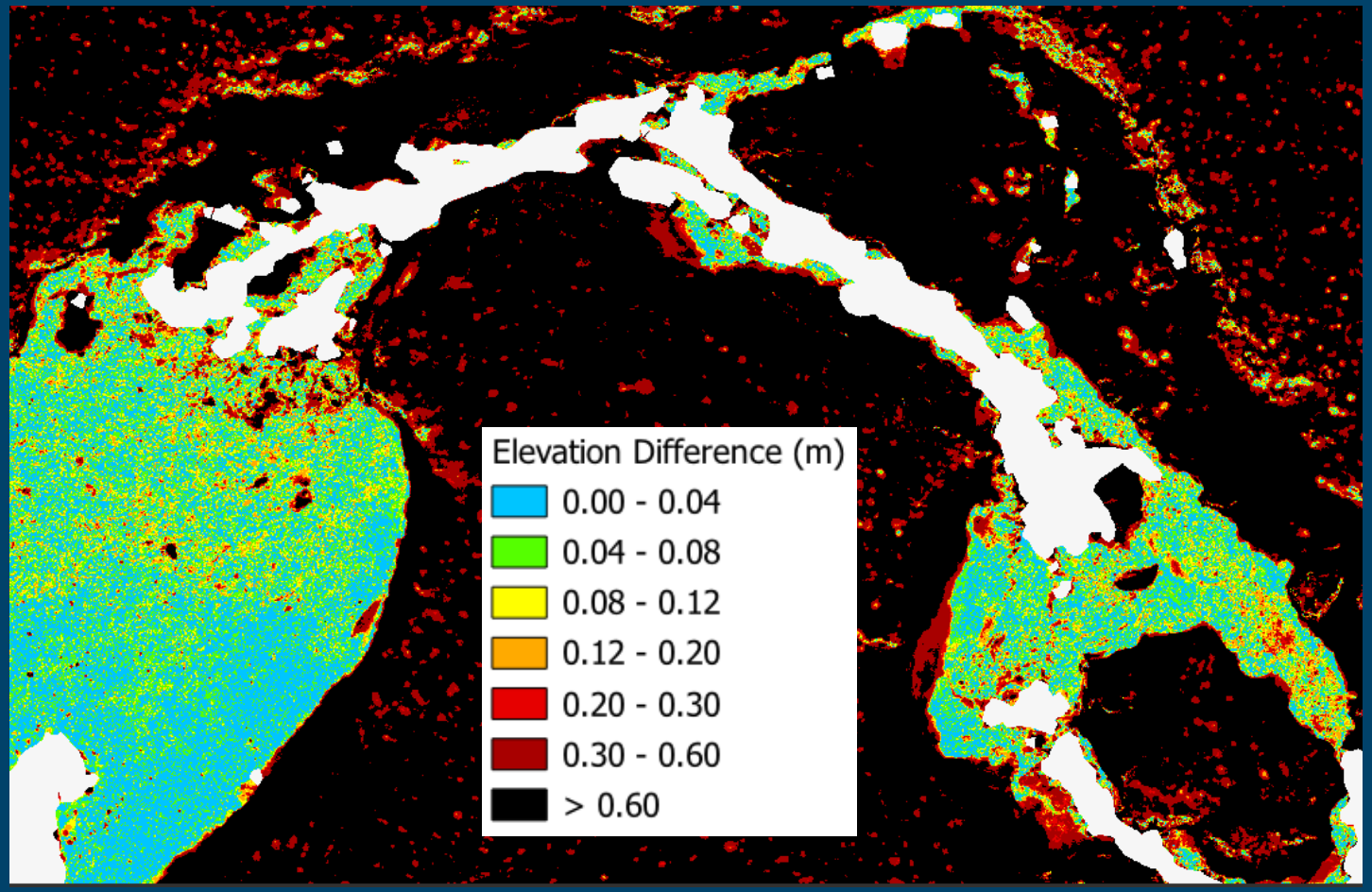

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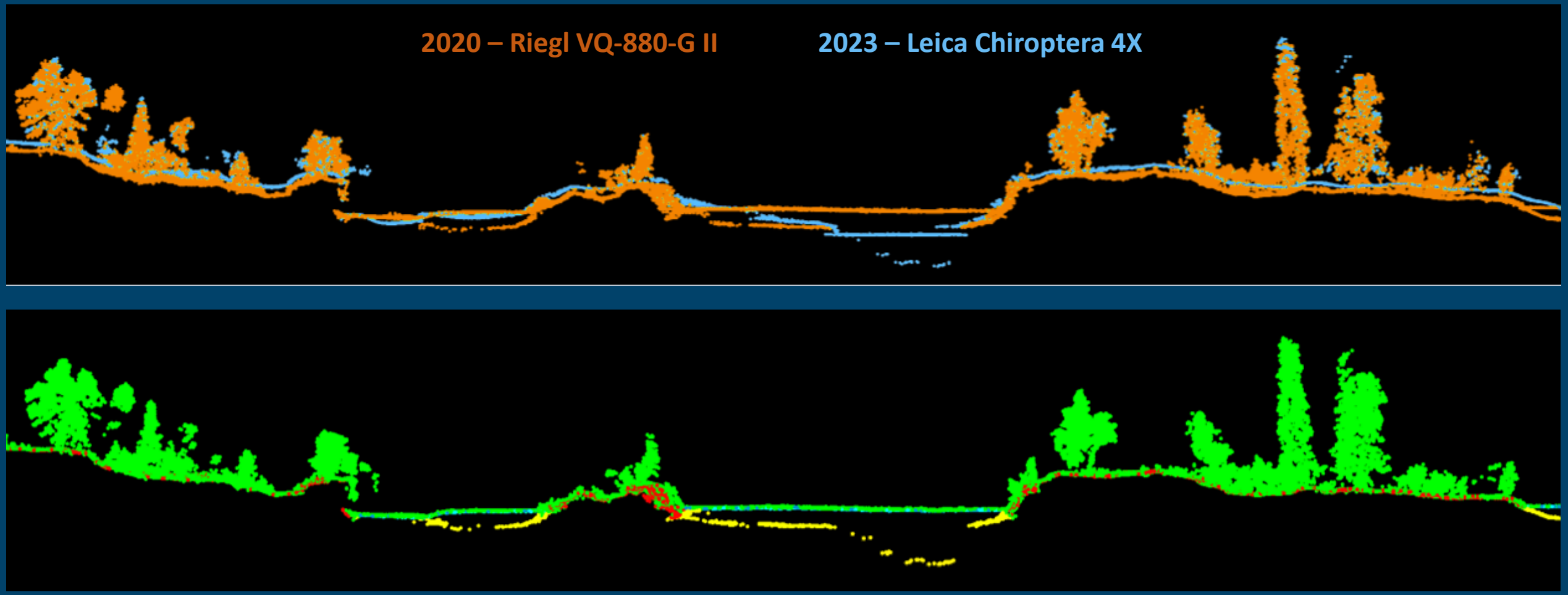
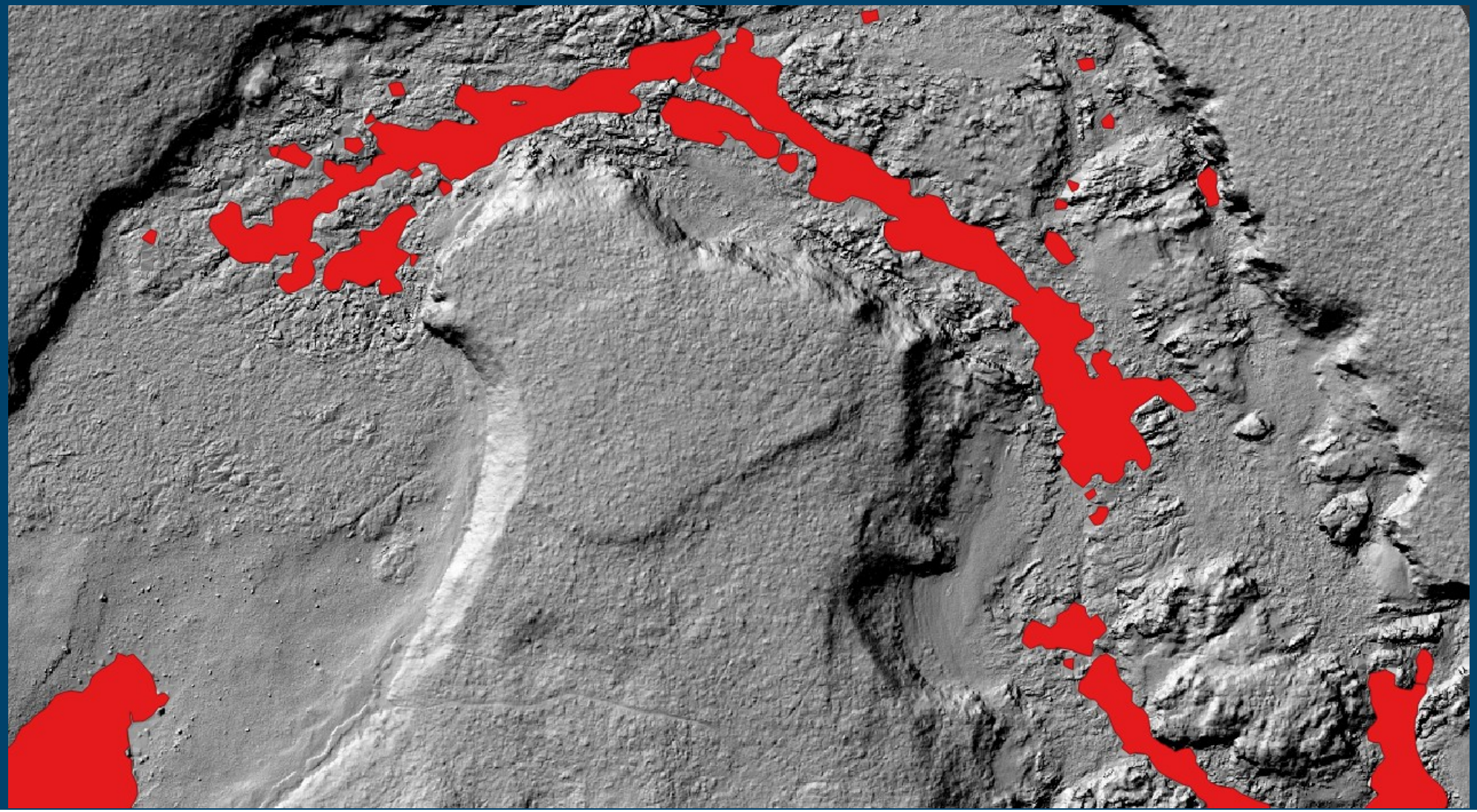


FILLING IN THE VOIDS



SUMMARY AND CLOSING THOUGHTS

- Topobathymetric lidar can provide seamless river mapping
  - Ideal condition windows may be rare or at odds with each other
- Planning and communication are key
  - Prioritize areas or features of interest
- Data capture is just the beginning
  - Processing methodologies must support the required product
- Data fusion and change detection
  - Repeat surveys capture changes across varying landscape conditions, seasonal changes, and flow regimes
  - Properly aligning datasets is essential for accurate comparisons, trend analysis, and data fusion

QUESTIONS?

Thank you!

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