



# Alaska Department of Transportation & Public Facilities

## Innovations in Autonomous and Uncrewed Systems

Ryan Marlow

Tuesday March 19th

Our mission is to *Keep Alaska Moving* through service and infrastructure.





# Response to Natural Disasters





# Dalton Highway MP403.5 Washout



# Day 1



## Day 4



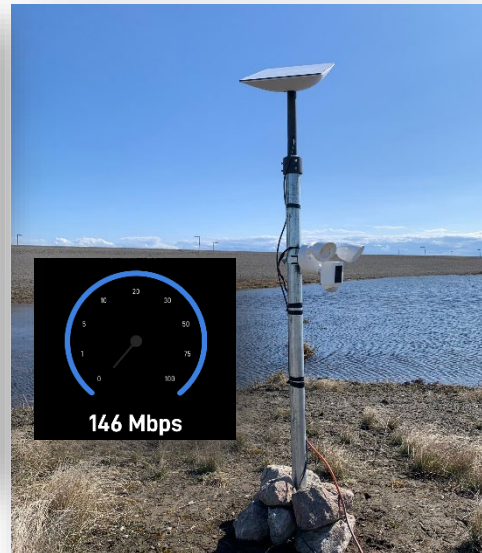
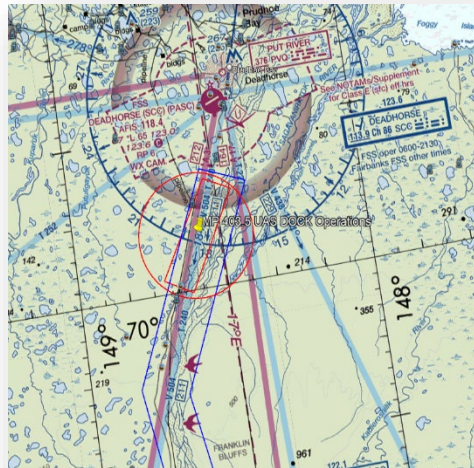
## Day 8



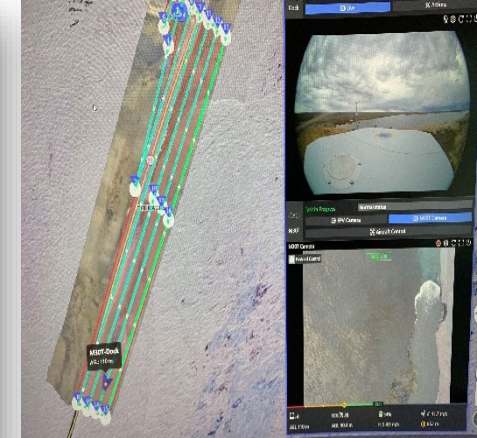
## Day 12



## Day 17



146 Mbps







# WHEN CRISIS HITS ALASKA'S INFRASTRUCTURE



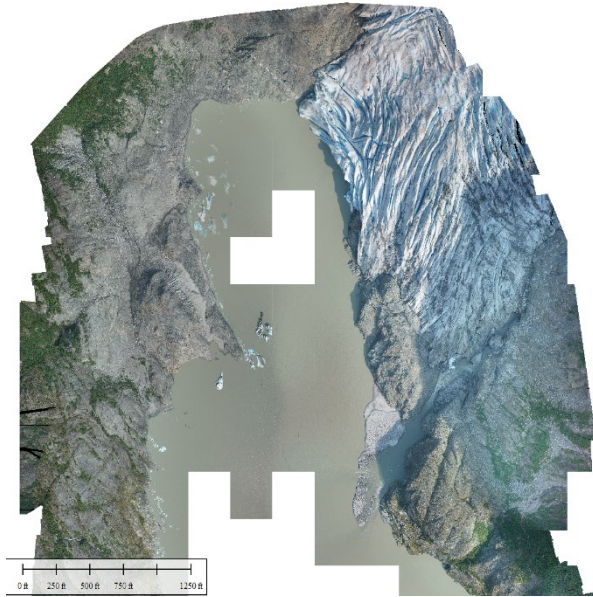




# Mendenhall Glacier Outburst



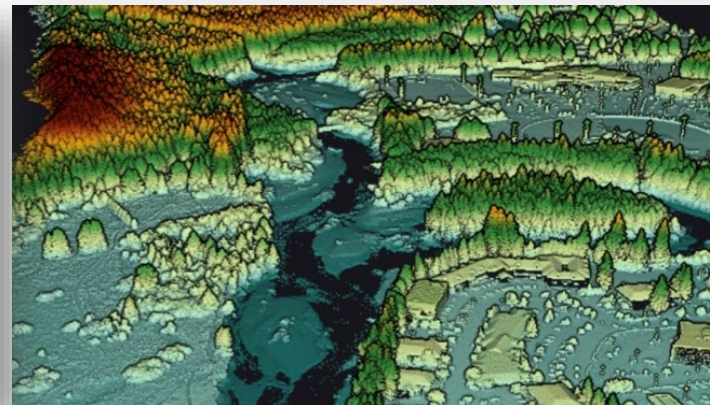
Juneau AOI



Ortho \*250GB



Imagery



LiDAR

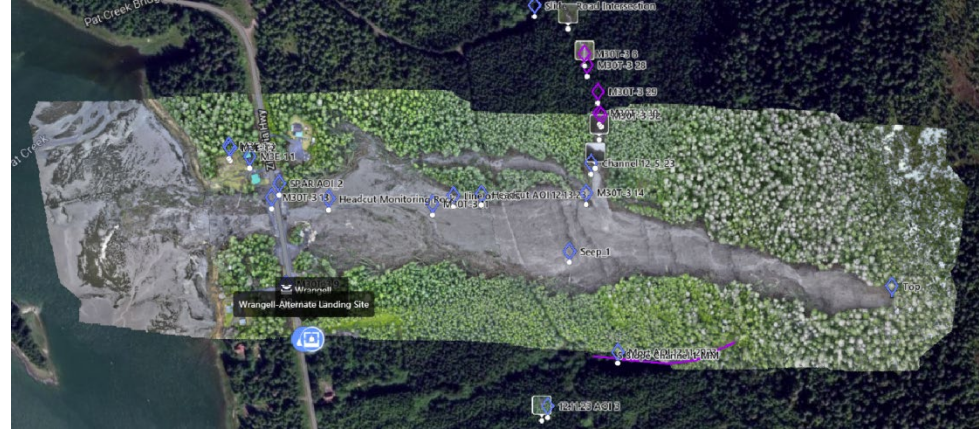


Aircraft



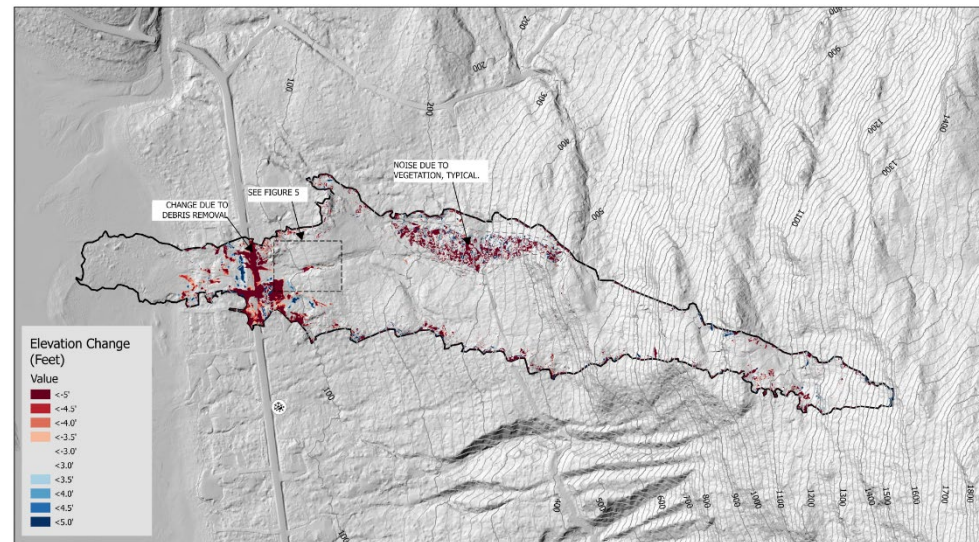


# Wrangell Zimovia MP 11.2 Landslide



11/22/2023 – 02/20/2024

## 90 DAY CHANGE DETECTION



## 65 REMOTE SCANS

| Mission |   |   |
|---------|---|---|
| ✓       | 📄 | ☆ <a href="#">20240220</a>                      |
| ✓       | 📄 | ☆ <a href="#">20240215 Full</a>                 |
| ✓       | 📄 | ☆ <a href="#">20240207 Full</a>                 |
| ◆       | 📄 | ☆ <a href="#">20240201 Full</a>                 |
| ✓       | 📄 | ☆ <a href="#">20240201 No GCP</a>               |
| ✓       | 📄 | ☆ <a href="#">2024130 Flight 5</a>              |
| ✓       | 📄 | ☆ <a href="#">20240111 Full</a>                 |
| ✓       | 📄 | ☆ <a href="#">20231222 Road PM (Dock Start)</a> |
| ✓       | 📄 | ☆ <a href="#">20231221 Road AM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231220 400' GCP Test</a>        |
| ✓       | 📄 | ☆ <a href="#">20231220 Road AM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231220 Road PM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231218 Road AM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231218 Road PM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231218 Slide North</a>          |
| ✓       | 📄 | ☆ <a href="#">20231217</a>                      |
| ✓       | 📄 | ☆ <a href="#">20231217 Road PM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231216 Road AM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231216 Road PM</a>              |
| ✓       | 📄 | ☆ <a href="#">20231215 Road 1200 PM</a>         |



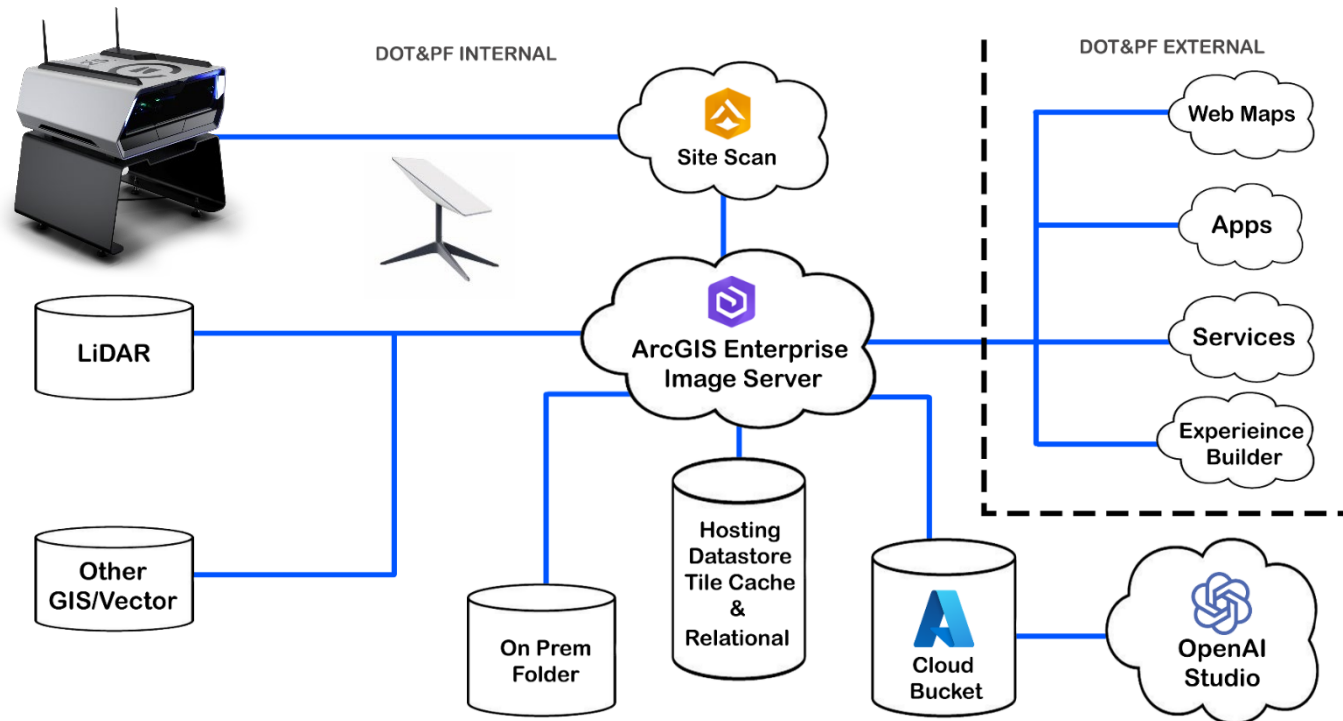


# Research and Development Initiatives

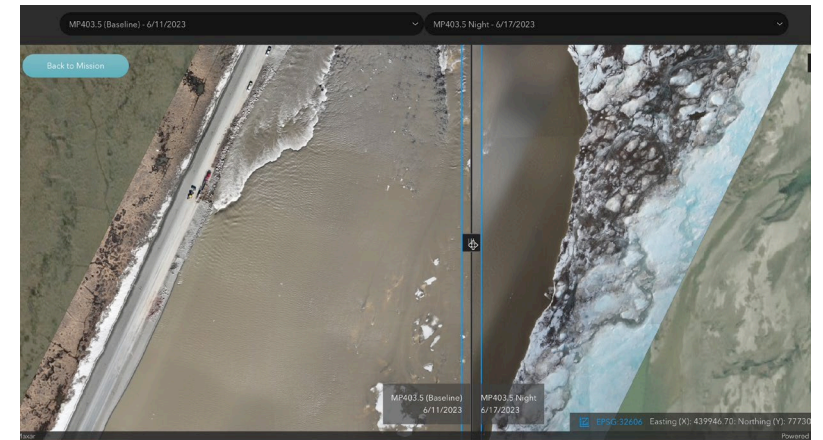




# Remote Data Workflows Into GIS



**15Tb**  
PER YEAR

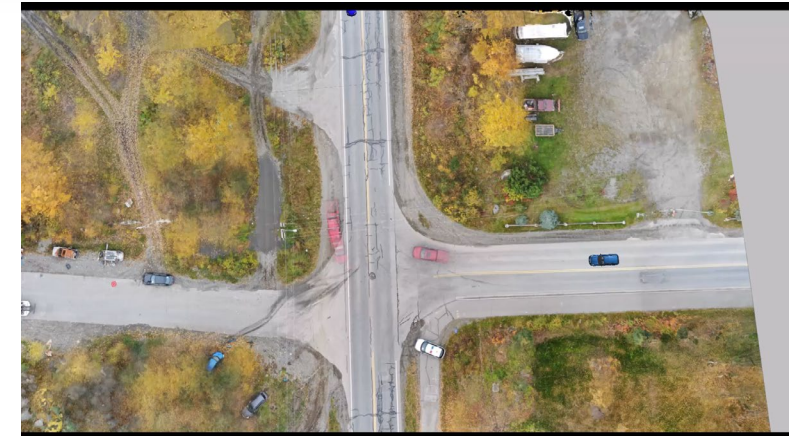
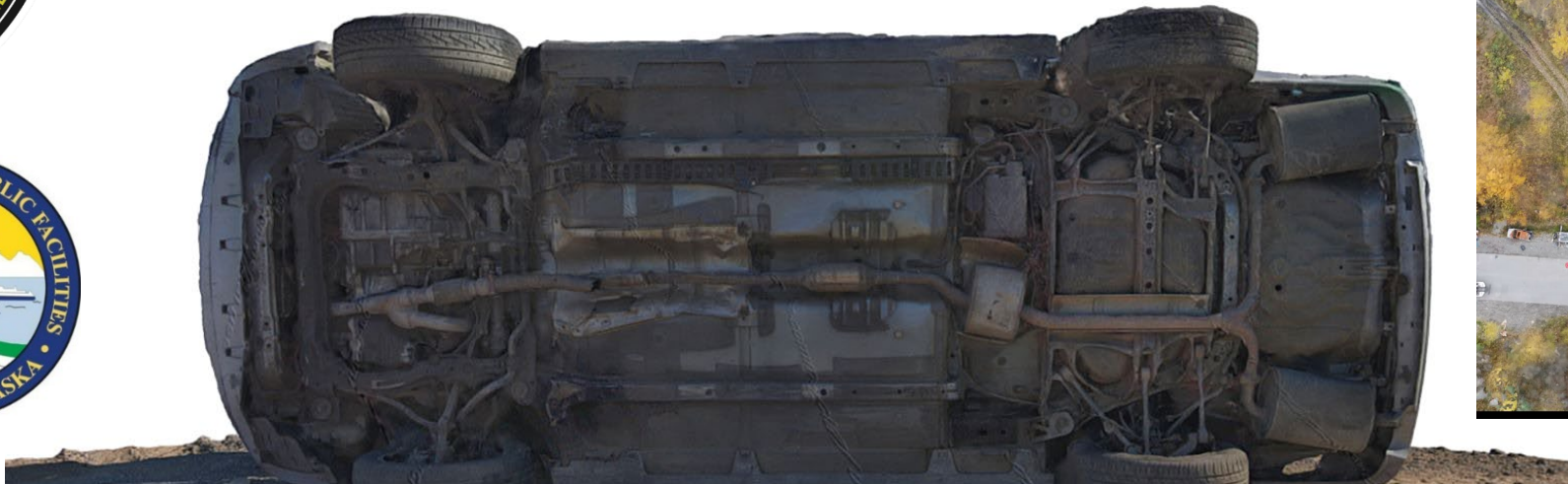
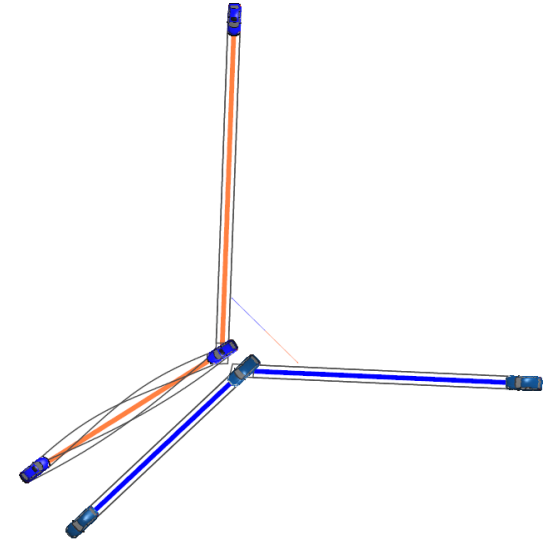






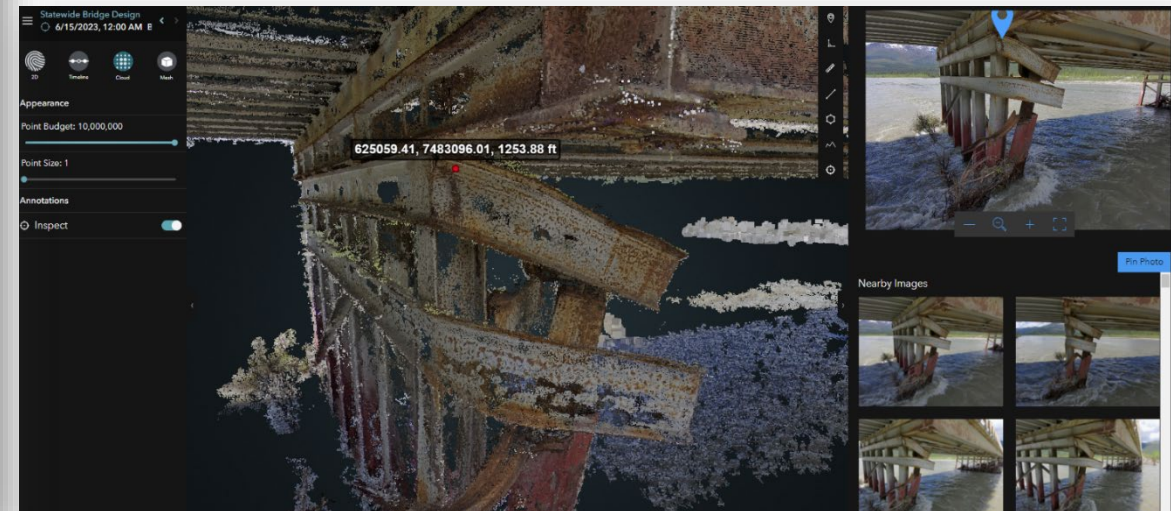
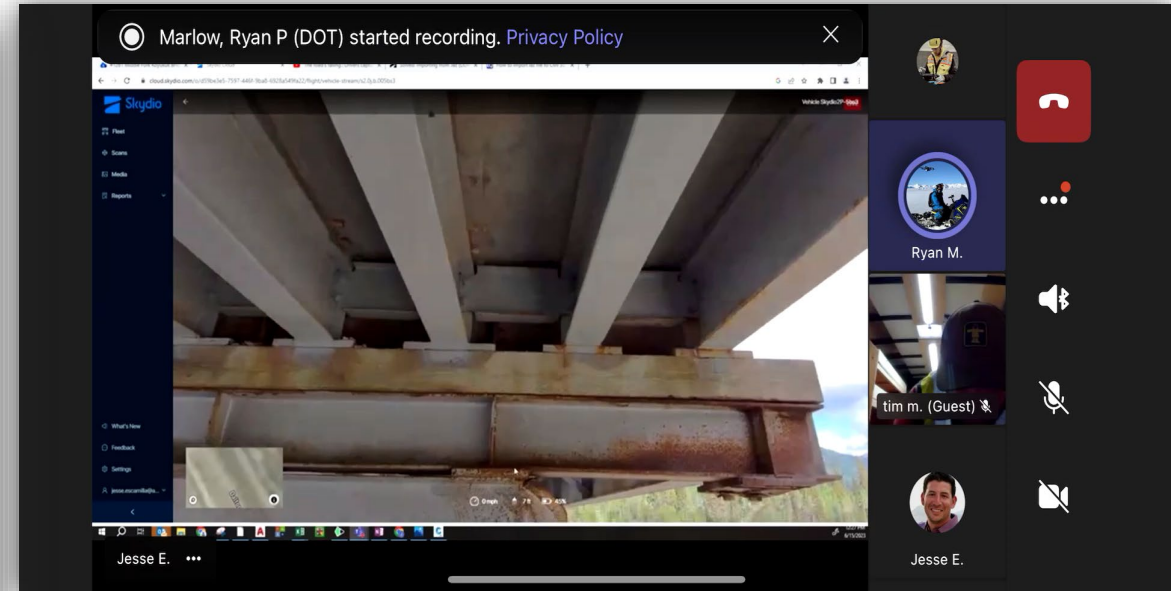


# Fatal Traffic Accident Reconstruction





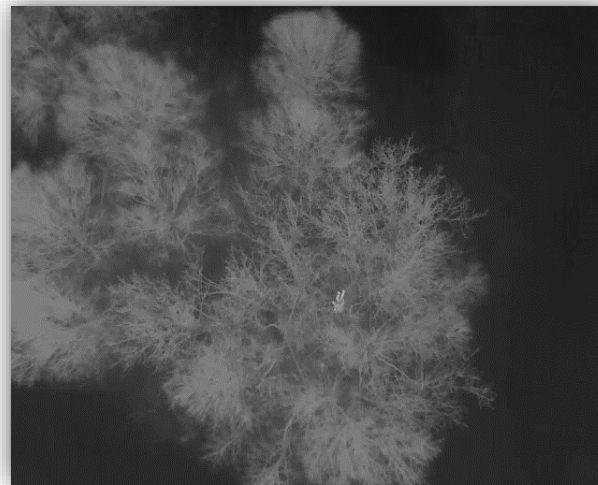
# Koyukuk River Bridge Ice Damage







# Search & Rescue



## 49 U.S.C. § 40125



10862



12814



**Operational Authority  
& Training**

**Aircraft Maintenance  
& Reporting**



(State Owned UAS)



**Public Search & Rescue  
& Training**



(State Owned UAS)

**TFR**



**BVLOS COA**



**BVLOS  
SGI COA**







# Modernizing Fleet Vehicles





# SMART Project Stage 1 Award

## Alaska Rural Remote Operations Workplan

**Project Name:** ARROW

**Project Start:** July 15, 2023

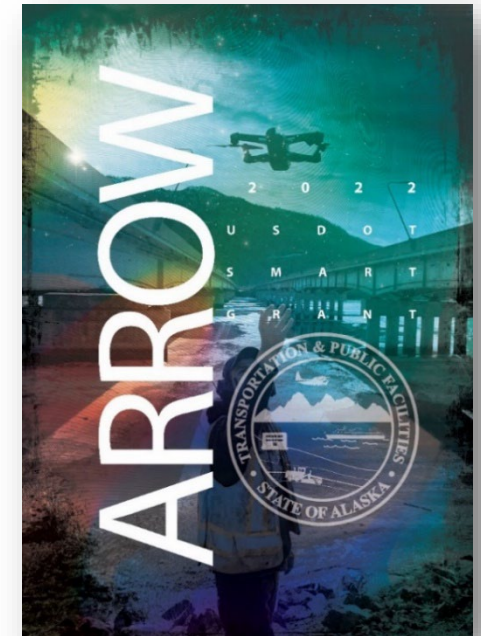
**Project Delivery:** 18 Months

**Recipient:** Alaska Department of Transportation & Public Facilities

**Funding:** \$1,944,563

**Project Type:** UAS

**Project Summary:** Use drone technology to conduct infrastructure inspections and gather situational awareness data essential to Rural Alaska's way of life on snow, ice, and overland trails, partnering with Alaska Native and Rural Villages.







U.S. Department of Transportation

# SMART



# PROJECT: ARROW





# Future Directions & Opportunities

BETHEL

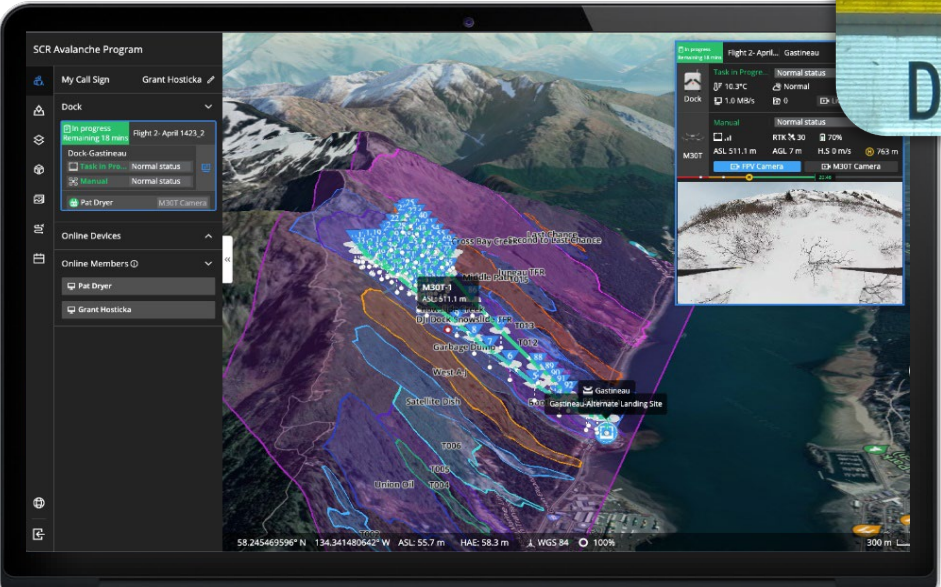




# Avalanche Hazard Monitoring

SCHEDULED, EVENT TRIGGERED & REMOTE

## DRONE DOCKS





Project List



All Statuses ▾

Joined ▾

New-Old ▾



Ongoing Juneau Glacier Flooding ...

Under authority of the State Disaster Declaration  
for the 2023 August Juneau Glacial Outburst Flo...



Created: 2023/08/14

Ryan M | Pat Dryer

Ongoing Middle Fork Koyukuk Bridge... ...

EO Ice Damage



Created: 2023/06/14

Ryan M

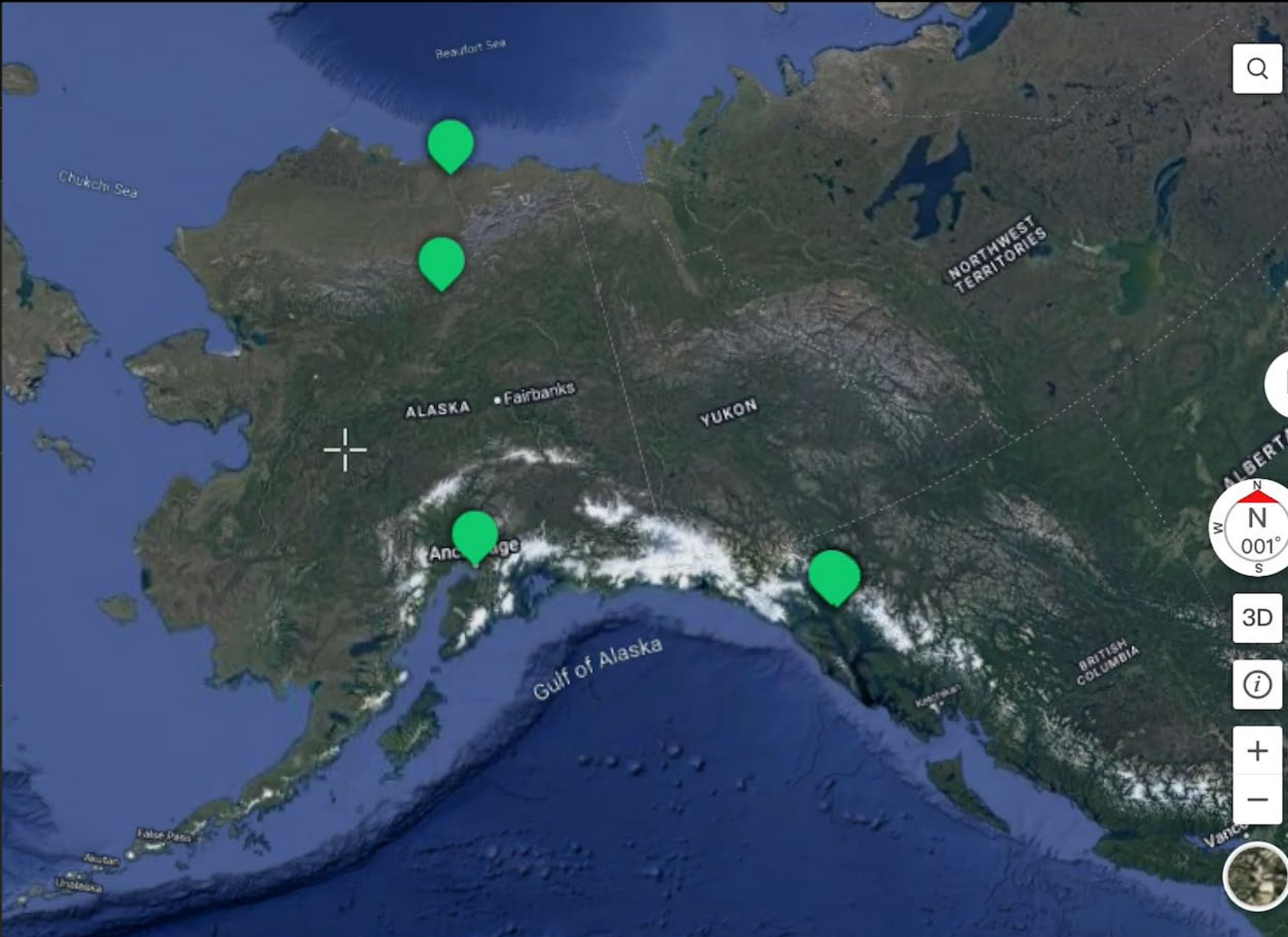
Ongoing Dalton Highway MP403.5 ...

Flooding and Erosion Monitoring Public Aircraft  
Operations COA 2022-WSA-11502



Created: 2023/06/10

Ryan M | Pat Dryer





# Rapid Compact Deployable & Emergency Communications





# Wildlife Hazard Reduction



**360 PERCEPTION**  
use 360° perception to map terrain  
and avoid obstacles as they appear.

**BALANCE DYNAMICALLY**  
Balance dynamically in uncertain  
surroundings.

**MOBILE**  
Cruise over loose gravel, grass,  
curbs and stairs.

**STRONG**  
Carry and power up to 14 kg  
of inspection equipment.

**EASY TO CONTROL**  
Control the robot from afar using an  
intuitive tablet application and  
built-in stereo cameras.

**SMART**  
Integrate software solutions to perform  
autonomous missions to gather  
consistent data.







# UAS Resources



Visit  
[dot.alaska.gov/uas/](https://dot.alaska.gov/uas/)  
for all things UAS



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