Remote Sensing Technologies for Long-Term Surveillance of DOE-LM Sites

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FIU Applied Research Center

Remote Sensing Technologies for Long-Term Surveillance of DOE-LM Sites

Overall Needs:

- The framework for this research effort aims to provide LM sites with current industry applications for remote sensing tailored to LM's needs and contributing to LM's mission to ensure long-term surveillance to ensure the public's safety and the environment. The topic investigated for LM's needs is the monitoring of erosional cell cover.

Objectives:

- Evaluate and deploy suitable remote sensing imagery techniques, to evaluate the different environmental characteristics present in current LM sites.
- Research site-specific commercially available technologies with the potential for addressing issues related to climate change and resilience
- Compile a matrix containing the appropriate remote sensing technology adequate to surveying each LM site

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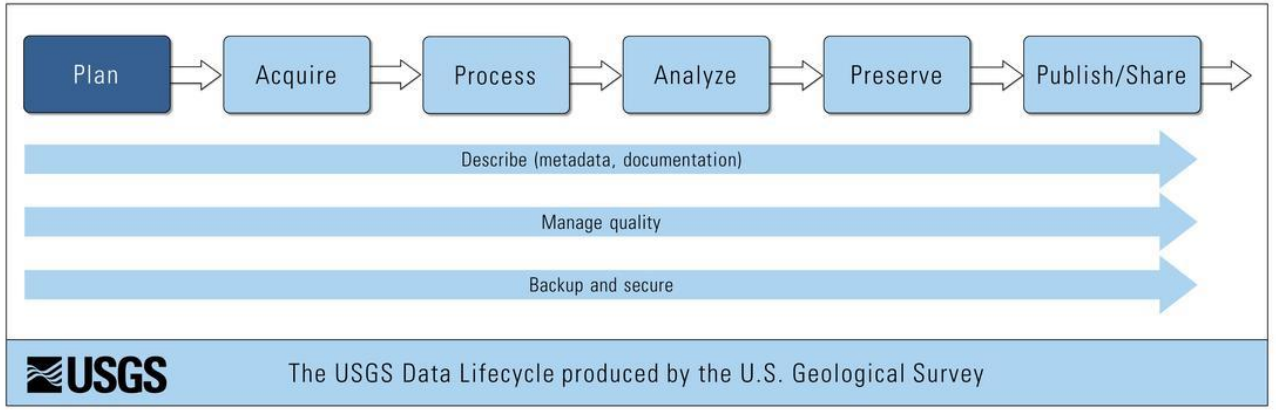
Overview

Delivery Platform + Sensory + Applications

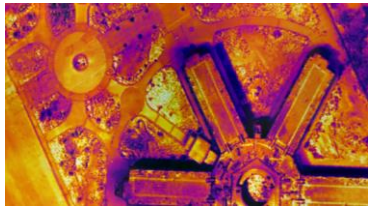
Onsite UAV surveys?

- Centimeter-level precision
- Cost effective
- Meaningful data at your disposal
- Broad custom-built sensory
- See beneath the surface
- Automated data collection
- Machine Learning historical change
- Data-driven decision-making

Eduardo's Study Plan → **Future Work**

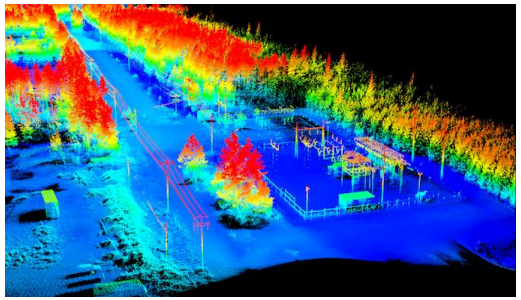


Multispectral



Thermal

RGB



LiDAR

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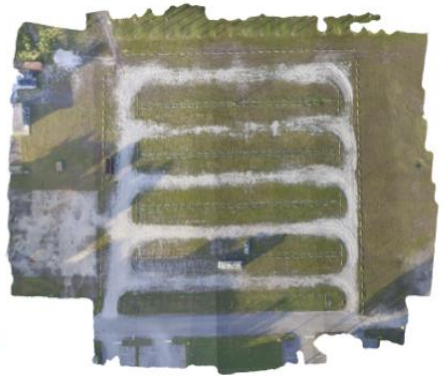
Plan

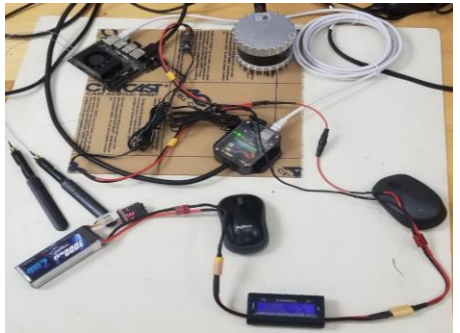
Plan → Acquire → Process → Analyze → Preserve/Share

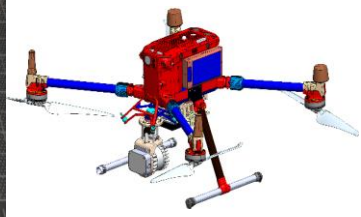
Trainings, Literature Review, etc.

Drone simulator training paired with a radio controller to emulate a similar experience of flying a physical drone



Conducted Photogrammetry surveys and data post processing of the surveyed testing area on FIU's Engineering campus





Integrated agnostic lidar remote sensing package

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Acquire

Plan → Acquire → Process → Analyze → Preserve/Share

Rifle Flyover: Preparation

Responsibilities

- Aviation Safety Plan Revisions
- Obtain Drone pilot license
- Perform safety briefings and flight checklists
- Flight Mission Inspections, Preflight checklist, Postflight checklist, and Debriefing
- As Remote Pilot in Command (RPIC), delegate and instruct flight crew to conduct the flyover

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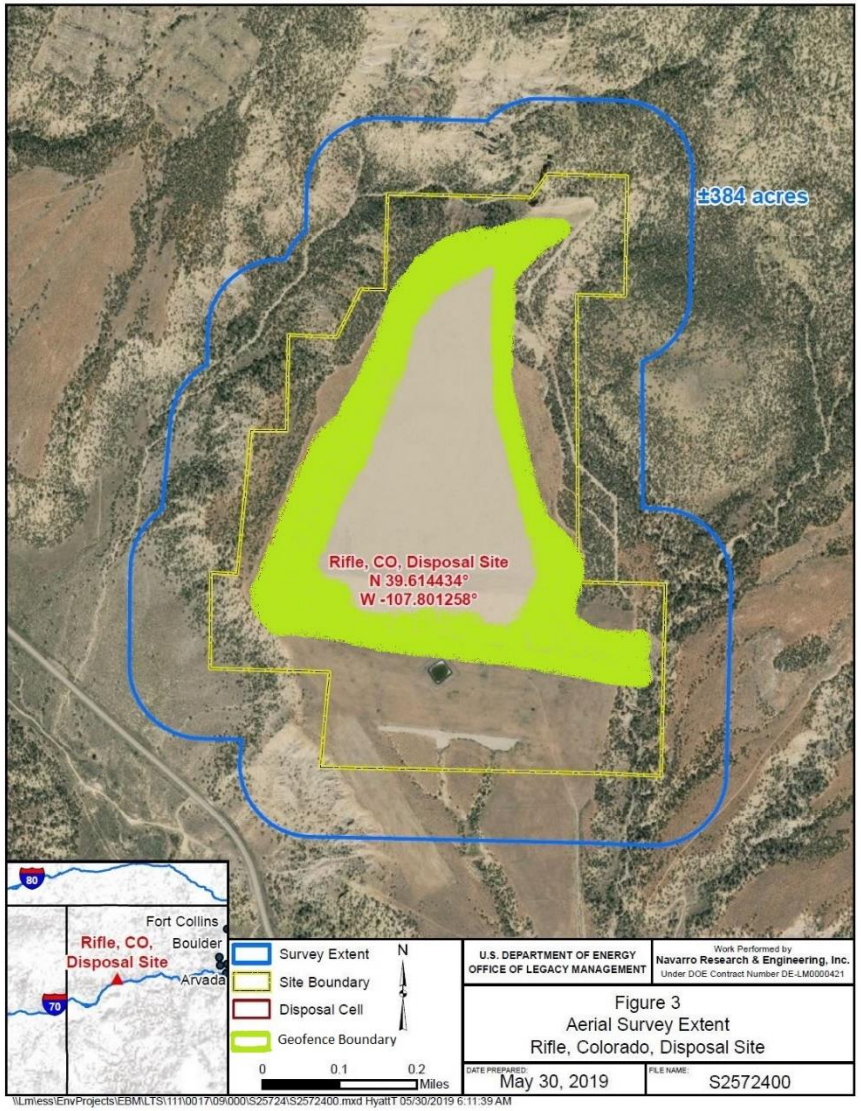
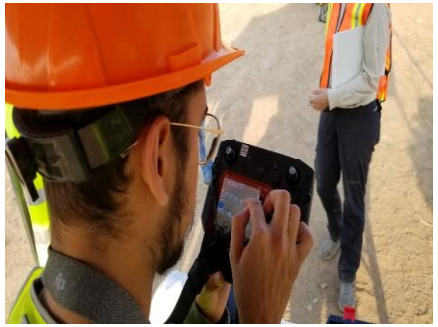
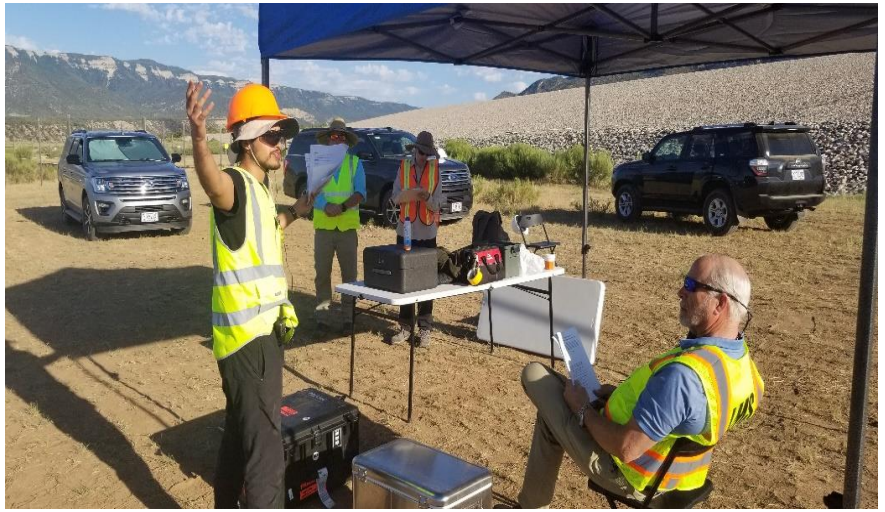
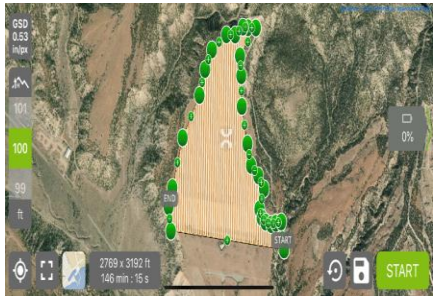
Acquire

Rifle Flyover: Mission Planning









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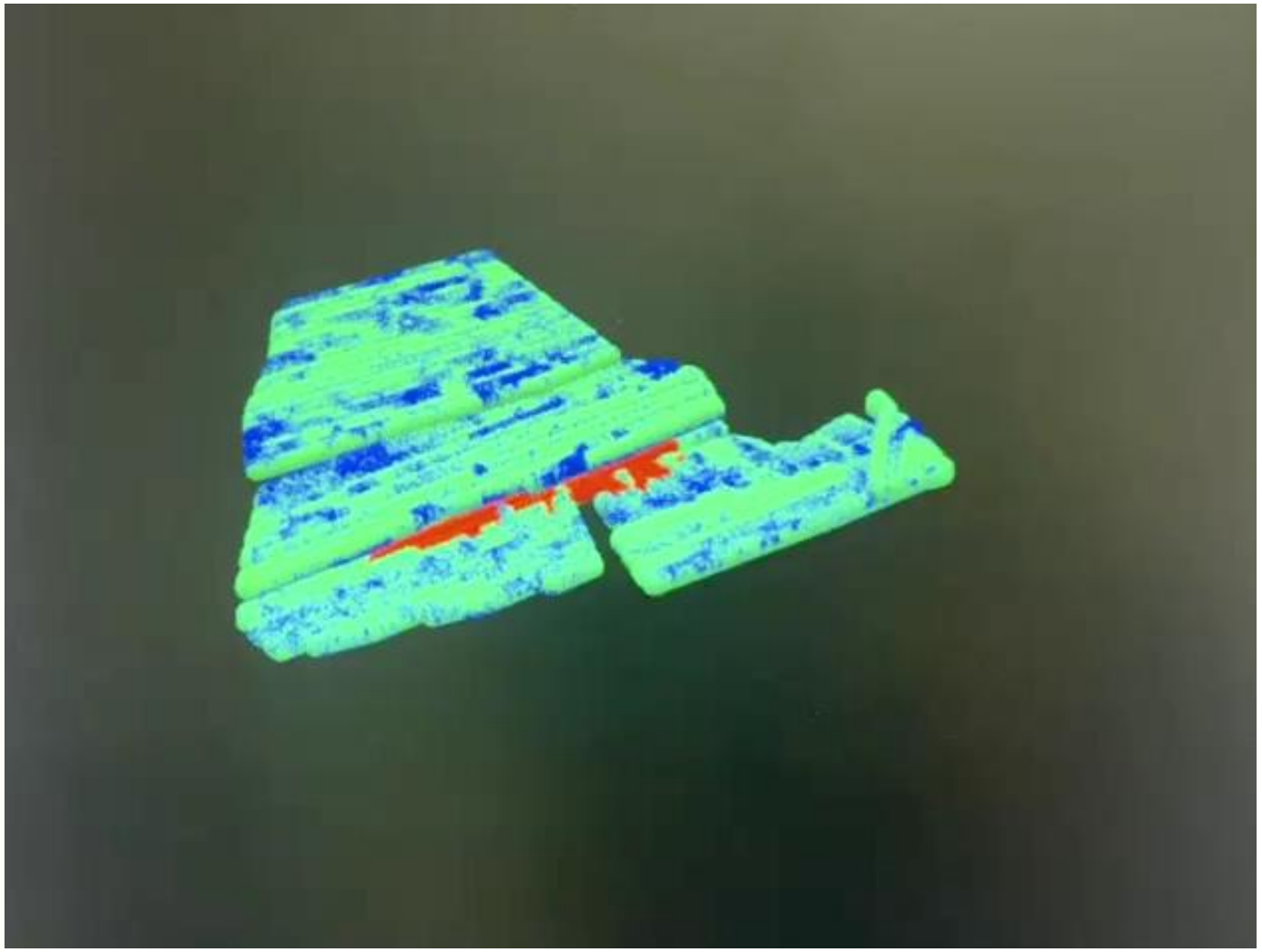
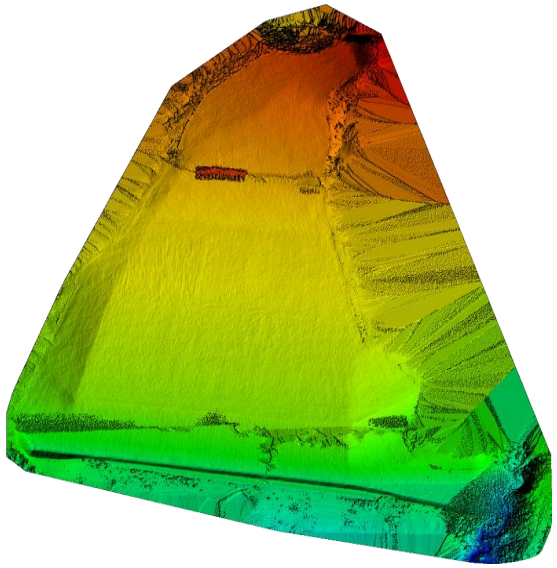
Process

Plan → Acquire → Process → Analyze → Preserve/Share

Post processing of 5,266 high resolution aerial images





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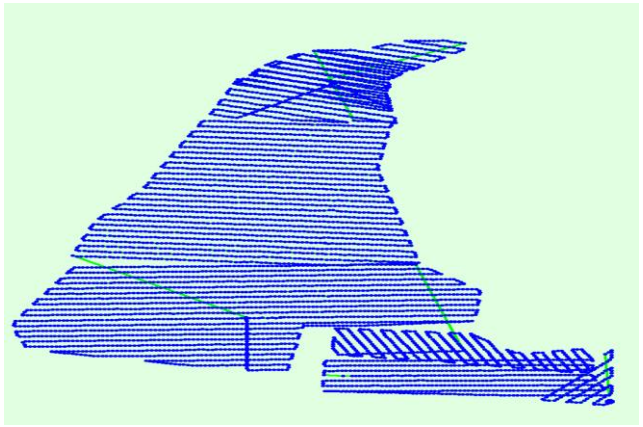
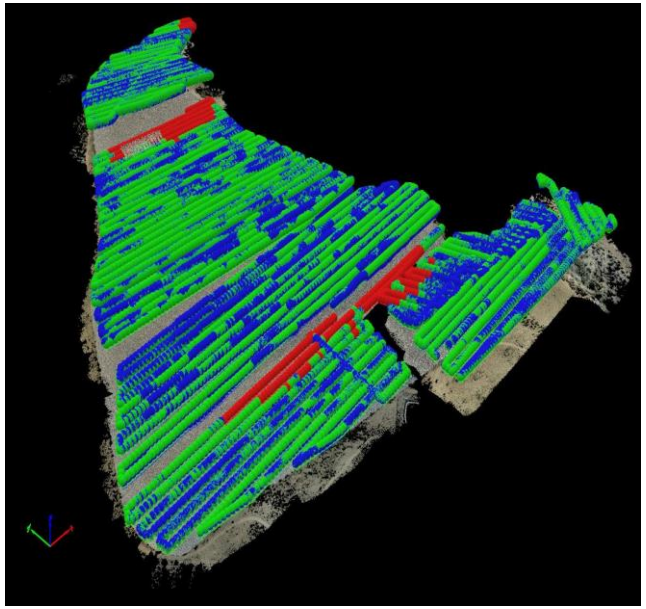
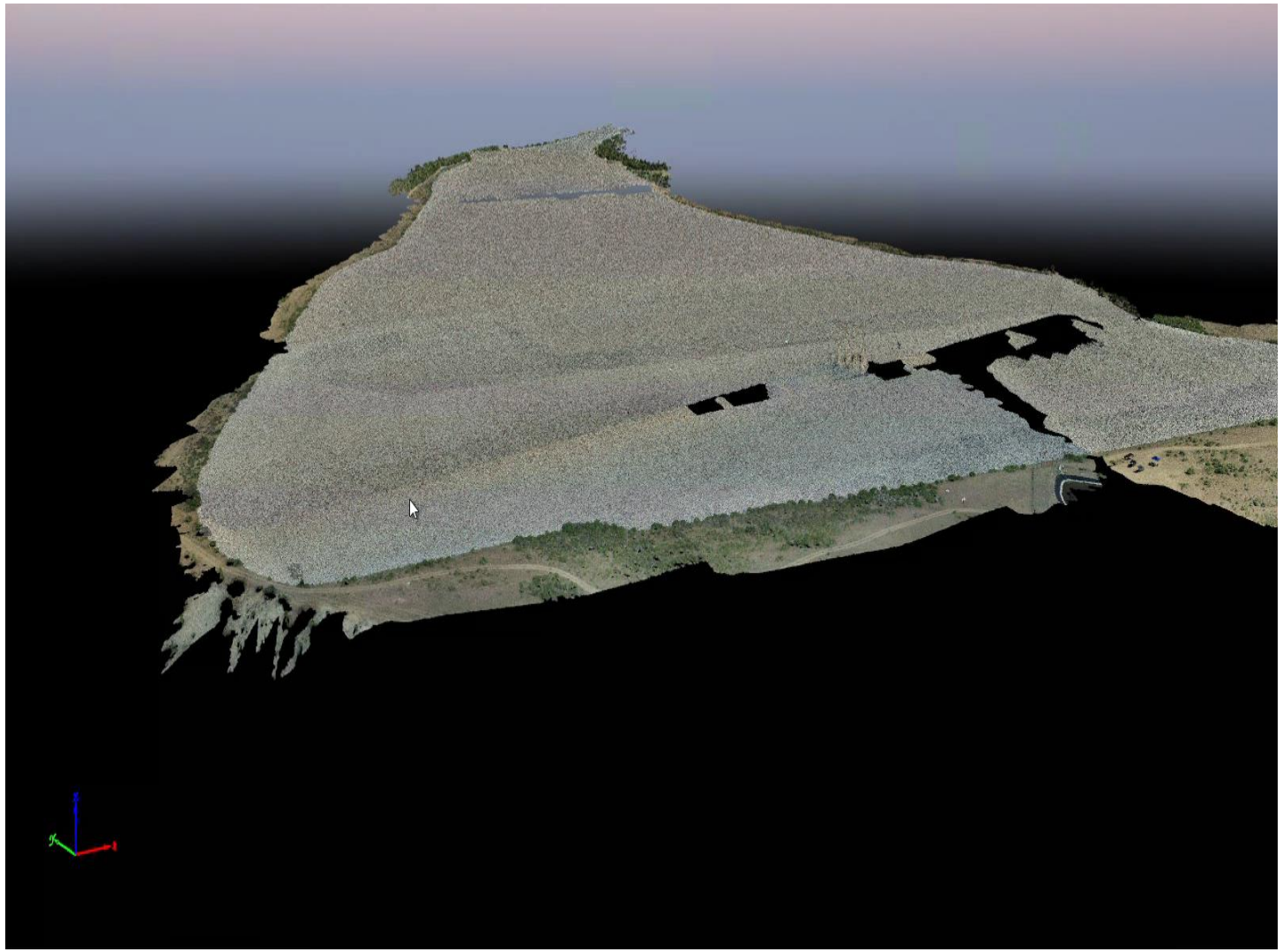
Analyze

Plan → Acquire → Process → Analyze → Preserve/Share

Aerial images positions and transects, Rendered 3D digital surface model







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Preserve/Share

Plan → Acquire → Process → Analyze → Preserve/Share

- Aerial survey data has been requested by LM Rifle Site Manager Nicole Keller for a presentation with a National laboratory
- Collected data and research will be showcased at WM22
- The study is preparing the foundation for using geospatial data analysis framework assisted by machine learning algorithms to potentially detect climate effects over time

Acknowledgments

FIU-ARC Mentor

Mr. Anthony Abrahao

DOE-FIU Science and Technology Workforce Development Program

Dr. Leonel Lagos

Dr. Ravi Gudavalli

DOE-LM Office of Legacy Management

Dr. David S. Shafer

Ms. Jalena Dayvault

DOE-FIU Science and Technology Workforce Development Program

Sponsored by the U.S. Department of Energy, Office of Environmental Management, under Cooperative Agreement #DE-EM00005213.


Thank You. Questions?