UNAVCO TLS Support Resources:

- What support does UNAVCO provide?
- How do I request support?
- Priorities and scheduling?
- Cost?
- Other resources to be aware of
- Online data access?
- Future trends & technology

TLS Community Support

Support Resources

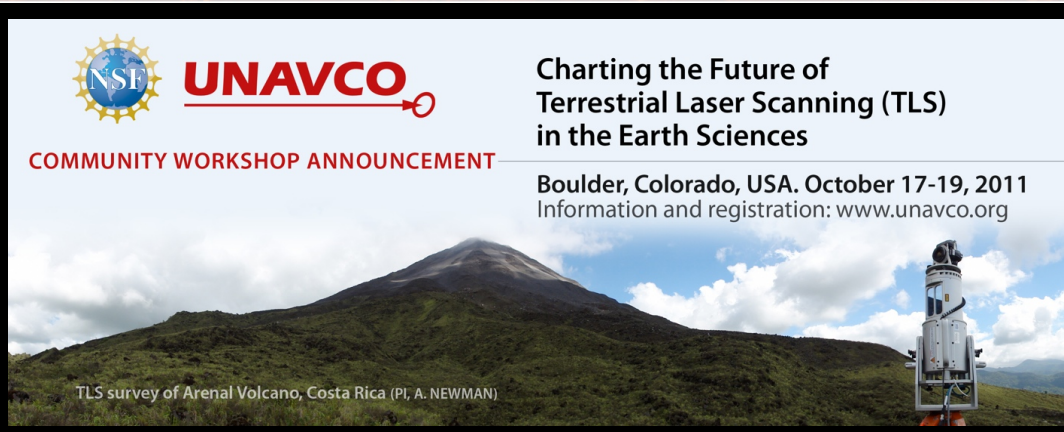
- Instrumentation (6 scanners)
- Field engineering
- Data processing
- Training
- Data archiving & dissemination

Community Building

- Workshops
- Inter-Agency collaborations & partnerships

Education and Outreach

- Training courses
- Field camps (~90 students in 2013)



GSA 2012 UNAVCO TLS short course, Charlotte, NC

UNAVCO TLS Instrument Pool

Scanners funded by the National Science Foundation

- TLS instrument pool = 6 scanners
  - 3x Riegl VZ400
  - 1x Riegl VZ1000 (full waveform) *NEW!*
  - 1x Riegl Z620
  - 1x Leica C10
- Campaign and RTK GPS, tripods, various power supply options
- Instrument validation range
- License server w/ access to RiScan Pro, Cyclone, Polyworks, ArcGIS, Quick Terrain Modeler, MatLab, etc

	 **Riegl VZ-1000**	 **Riegl VZ-400**	 **Riegl Z620**	 **Leica C10**
Laser Wavelength	1550 nm (near IR)	1550 nm (near IR)	1550 nm (near IR)	532 nm (green)
Effective Range (max)	1400 m	500 m	2000 m	150 m
High-speed meas. rate	122,000 points/sec	125,000 points/sec	11,000 points/sec	50,000 points/sec
Precision	5 mm	5 mm	10 mm	4 mm
Accuracy	8 mm	5 mm	10 mm	6 mm
Field of View	100° x 360°	100° x 360°	80° x 360°	270° x 360°
Dimensions	308mm x 180mm	308mm x 180mm	463mm x 210mm	238mm x 395mm
Weight	9.8kg	9.8kg	16kg	13 kg

Education and Community Engagement:

- Short courses and workshops
  - *Partners wanted*
- Growing online knowledgebase of TLS tutorials, documentation, best practices.
- Incorporation of TLS into teaching – K-12, undergraduate
  - Geology field camps have momentum

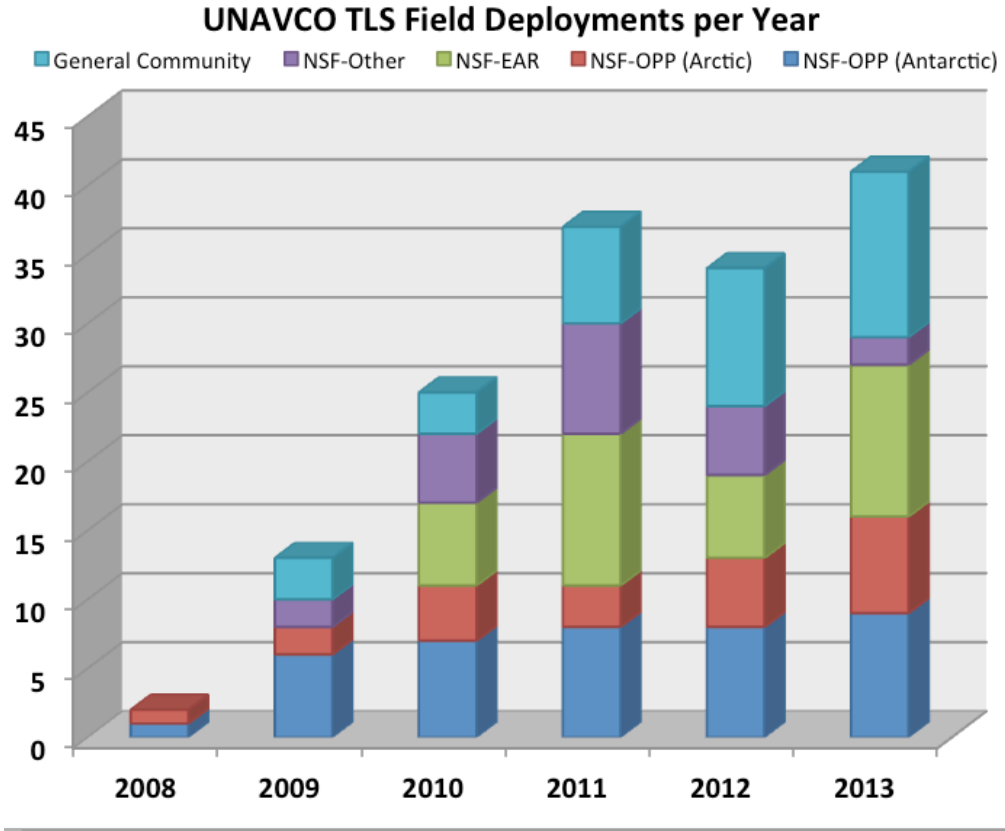
UNAVCO TLS PI Support – Costs & Prioritization

UNAVCO TLS Support Costs:

- For NSF-supported projects, PI pays field engineer travel and equipment shipping.
- For non-NSF supported work, full cost recovery required.

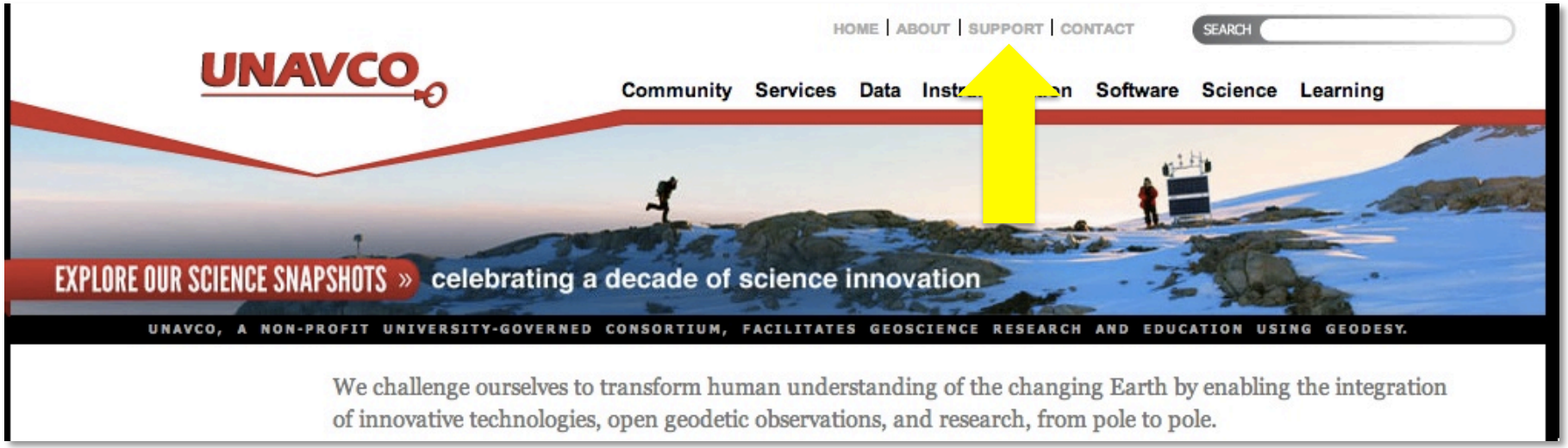
Project Prioritization:

- UNAVCO sponsors = NSF-EAR and NSF-OPP = highest priority.
- NSF-other and non-NSF = projects supported as resources allow.
  - ➢ *Schedule flexibility helps*



UNAVCO TLS PI Support – Request Support

All support requests must be formally logged through UNAVCO support request system.



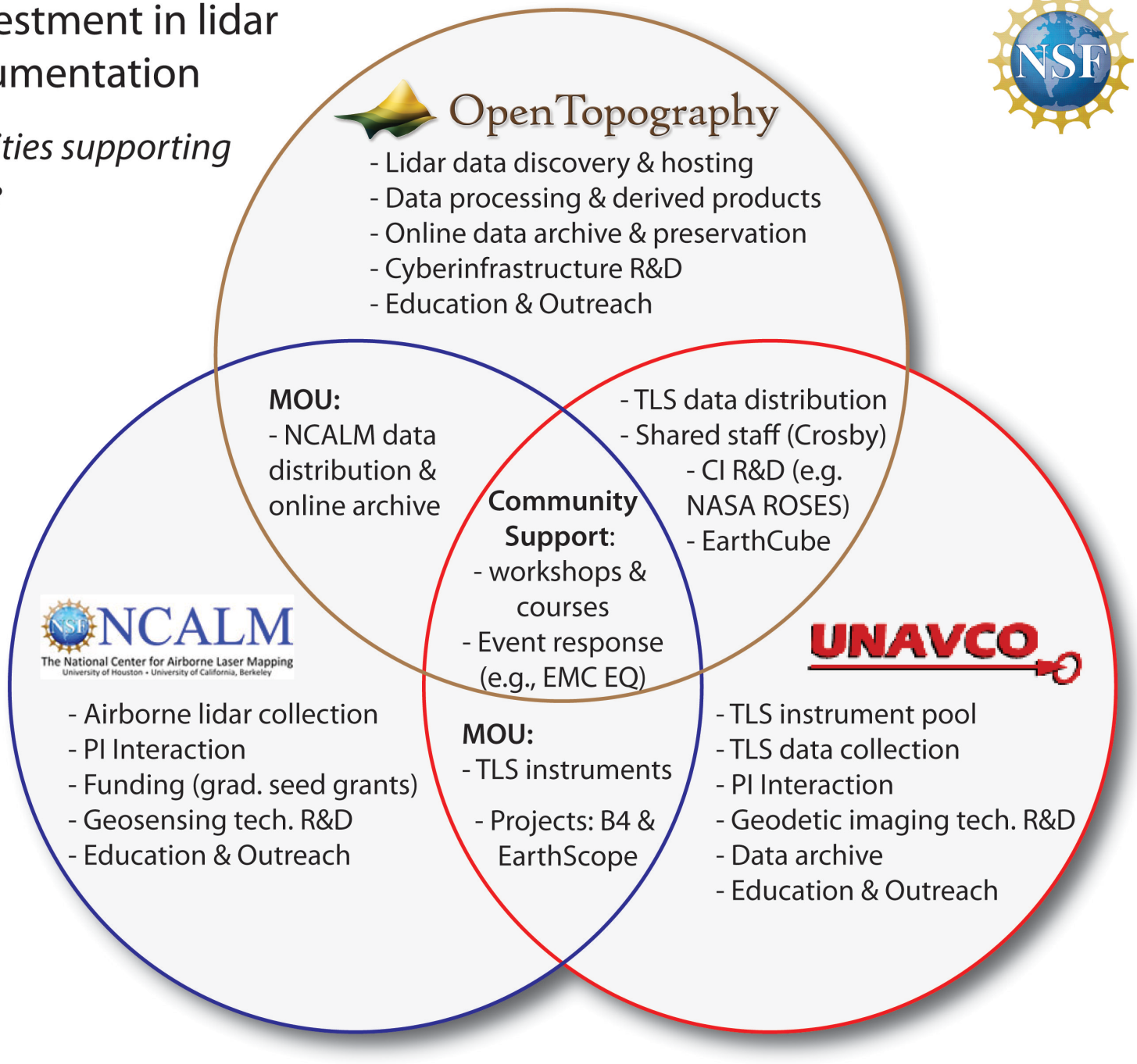
http://achaia.unavco.org/public/newproject/supportform.aspx

UNAVCO staff will follow up coordinate specifics.

Get in touch at proposal development stage – UNAVCO can provide a budget, letters of support, planning advice

NSF EAR IF investment in lidar data and instrumentation

Cooperative facilities supporting NSF earth science



Online Resources

- UNAVCO (http://www.unavco.org/tls)
- OpenTopography (http://www.opentopography.org)
- NCALM (http://www.ncalm.org)
- University of Texas - Dallas http://www.utdallas.edu/research/interface/Resources.html

- Manufacturers, e.g.,
  - Riegl (http://www.riegl.com)
  - Optech (http://www.optech.ca)
  - Leica (http://hds.leica-geosystems.com)

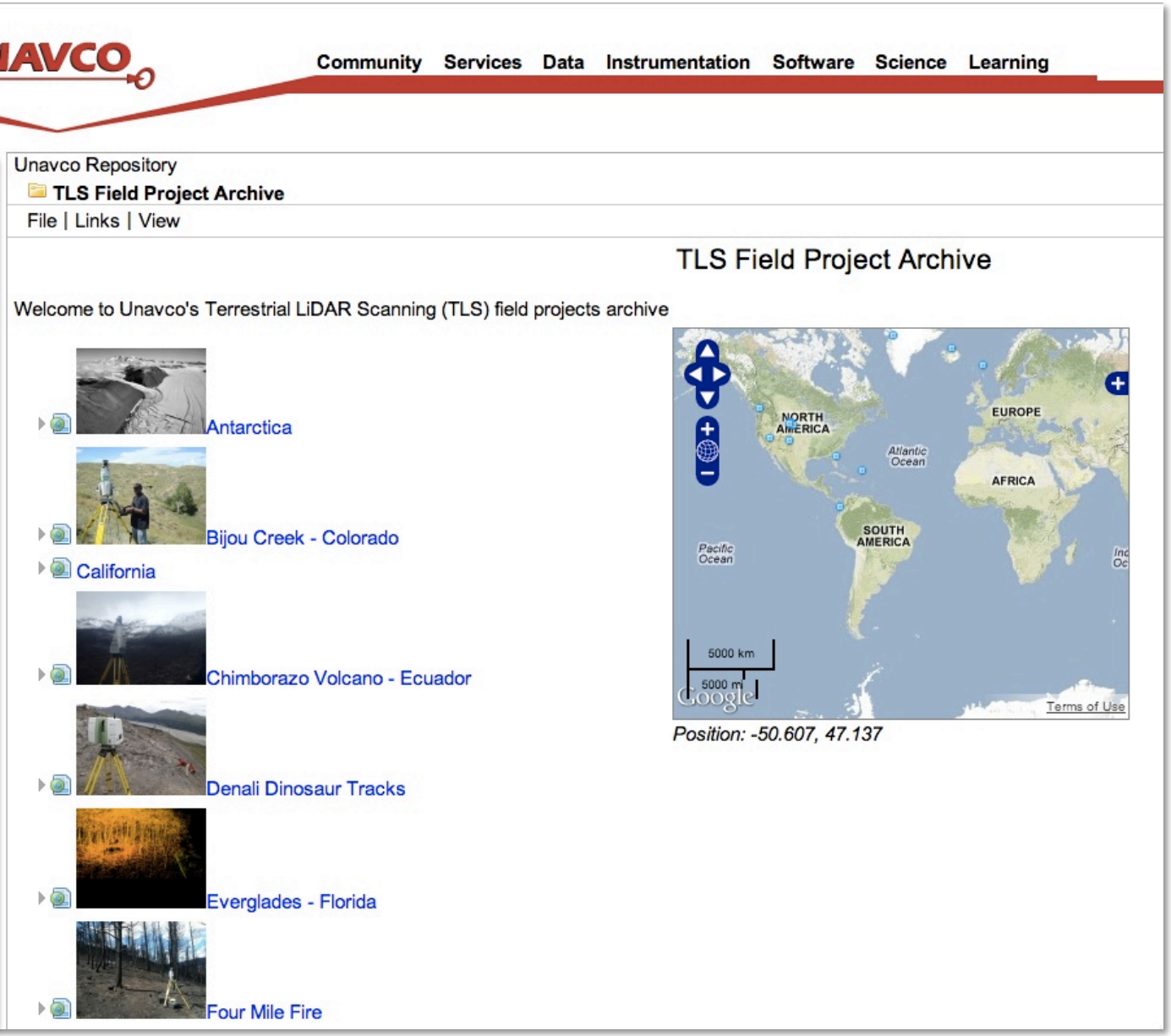
UNAVCO Online TLS Archive

Organization & archive of TLS project data

- Raw scan data
- Point clouds
- Raw & processed GPS
- Metadata & site photos.
- Derived products.

Alpha version online:

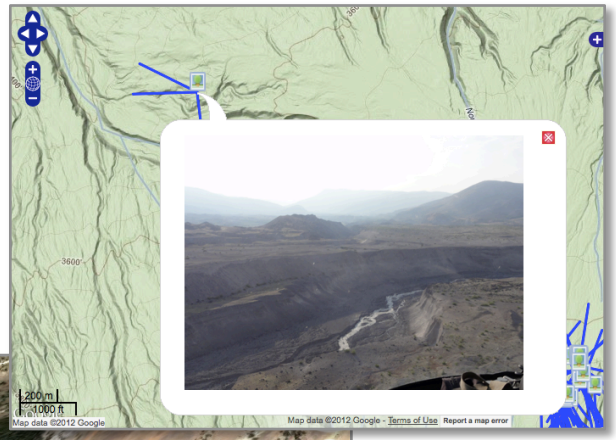
http://tls.unavco.org



UNAVCO Online TLS Archive

TLS Archive Features:

- GPS: RINEX creation, submission to OPUS for position processing, generation of control point lists for georeferencing in RiScan or Cyclone.
- Laptop-based version for use by field engineers (tested summer 2012) to document metadata and manage data during field projects. Content synced with archive server upon return to Boulder.
- On-the-fly:
  - Format conversion (LAS, ASCII)
  - Data thinning and AOI subsetting
  - Simple gridding, visualization, export to Google Earth.



Georeferenced & azimuth oriented field photos

Visualization in Google Earth

OpenTopography

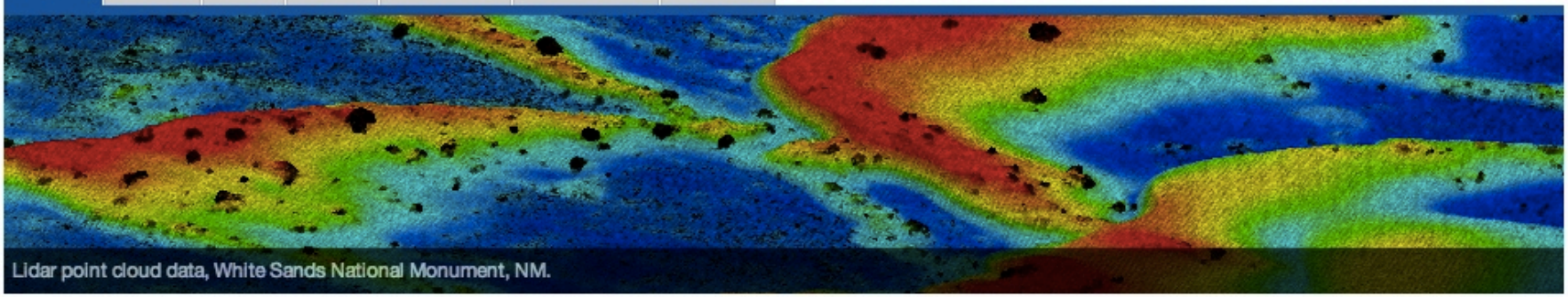
A Portal to High-Resolution Topography Data and Tools

myOpenTopo

Search

Data Tools Site

Home | About | Data | Tools | Education | Community | Support

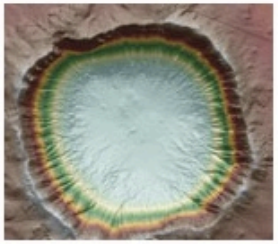


Lidar point cloud data, White Sands National Monument, NM.

Overview Video | Find Data | Tools | Learn

Spotlight

NSF Renews Funding for OpenTopography



We are happy to announce that the National Science Foundation (NSF) has renewed funding for OpenTopography. The three-year renewal under the National Science Foundation's Geoinformatics and Earth Sciences: Instrumentation and Facilities (EAR-IF) program follows an initial three-year award from EAR-IF and the Office of Cyberinfrastructure, announced in late 2009.

Latest News

OpenTopography at 2013 European Geosciences Union Meeting

Posted: April 07, 2013

OpenTopography will be at the 2013 European Geosciences Union (EGU) Meeting this week in Vienna, Austria and presenting a talk... [more]

10 New Point Cloud Datasets from Brazil, Alaska, California, Montana, North Carolina & Oregon

Connect with OpenTopography

9 days ago: 10 new #lidar datasets posted - data in AK, CA, MT, NC, OR, PA & Brazil, our 1st dataset from the S. Hemisphere: opentopography.org/index.php/news...

Data Summary

Total Coverage: **93,147 km^2**

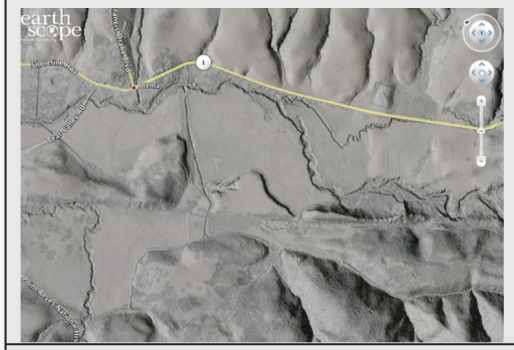
Total Number of Lidar Returns: **533,927,158,741**

Latest Lidar Datasets:

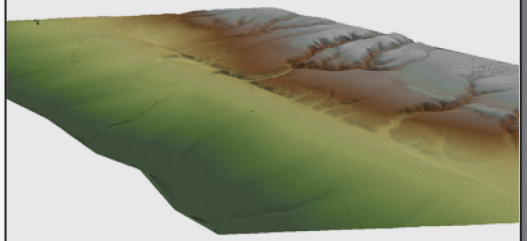
- Flathead Lake Biological Station, MT (September 2005)
- Mojave Desert, CA: Evolution of the Hector Mine Earthquake Surface Rupture
- North Sister, OR: Collier Cone Lava Flow
- Coastal Dune Fields of Garopaba and Vila Nova, Santa Catarina State, Brazil

OpenTopography
Multi-Tiered Data Products

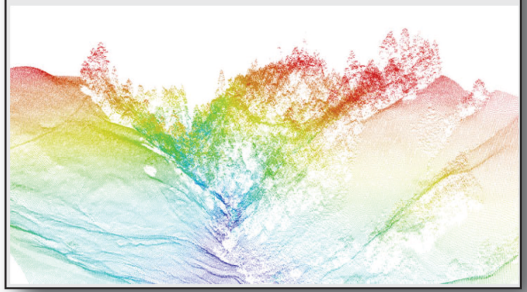
Google Earth (KMZ): *visualization & synoptic data browsing*



DEMs: *qualitative & quantitative analysis, GIS-users, data integration*

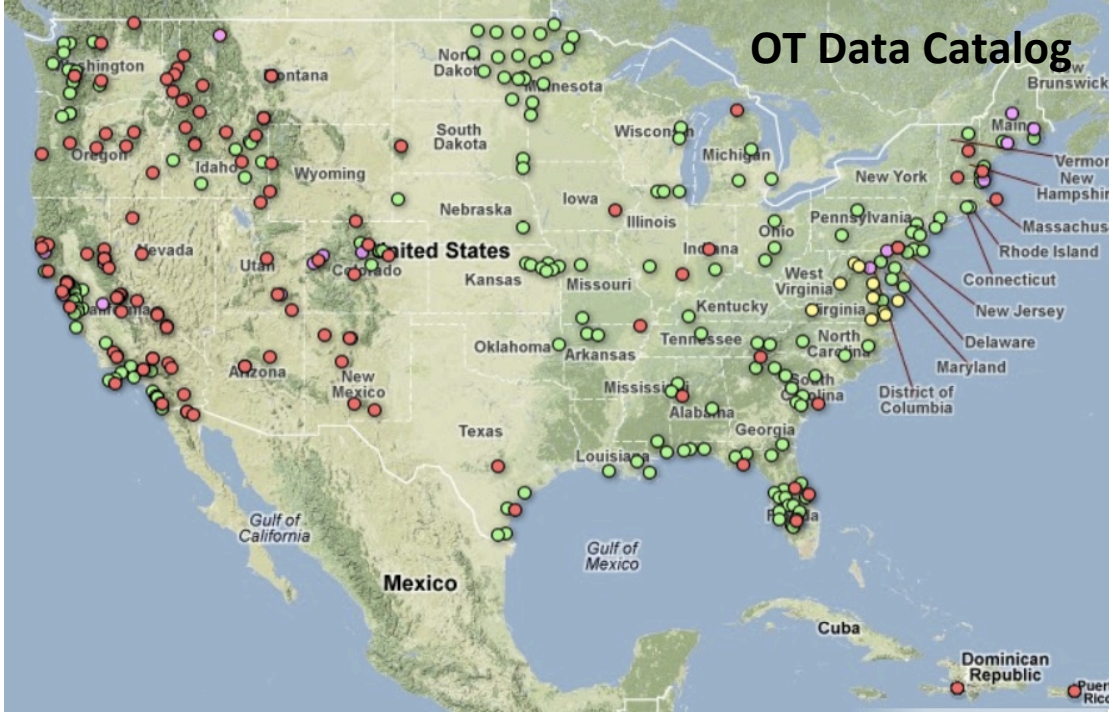


Point Cloud & Custom DEMs: *"raw" data access and fully customized data products*



Data Volume, Computational Demands

Accessibility / Ease of Use

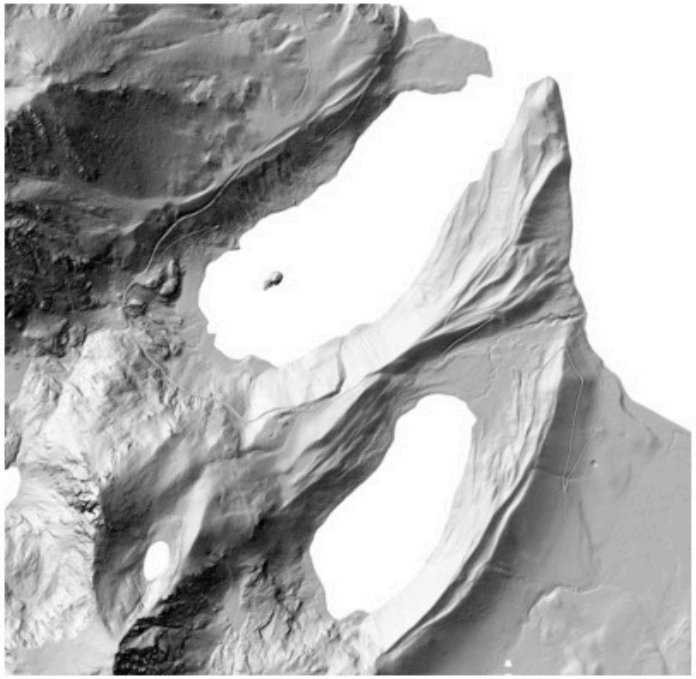


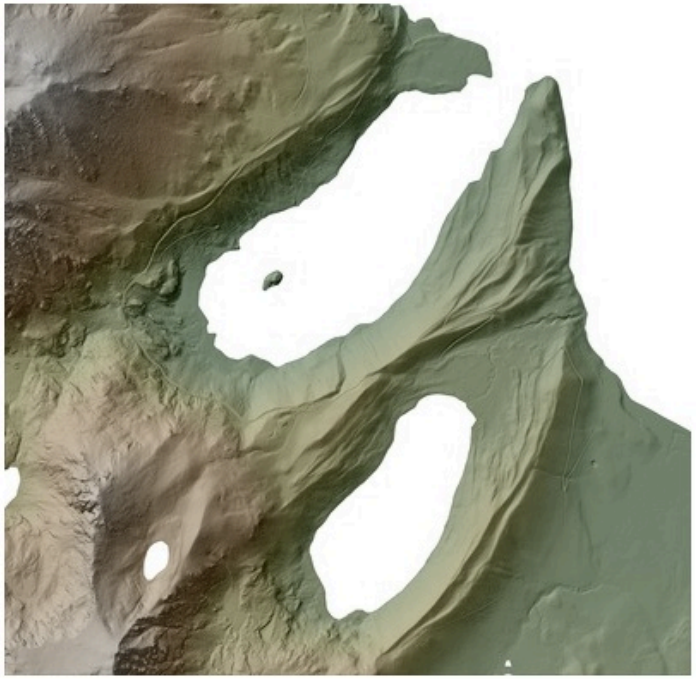
- Large user community with variable needs and levels of sophistication.
- Goal: maximize access to data to achieve greatest scientific impact.
- Big data – treat data as an asset that can be used and reused

Ztin DEM:

Download KMZ file: viz.tin.hs.kmz
View with Google Earth browser plug-in

Download KMZ file: viz.tin.crhs.kmz
View with Google Earth browser plug-in





SYSTEM STATUS

OpenTopo

Search

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San Diego
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6

Data Status

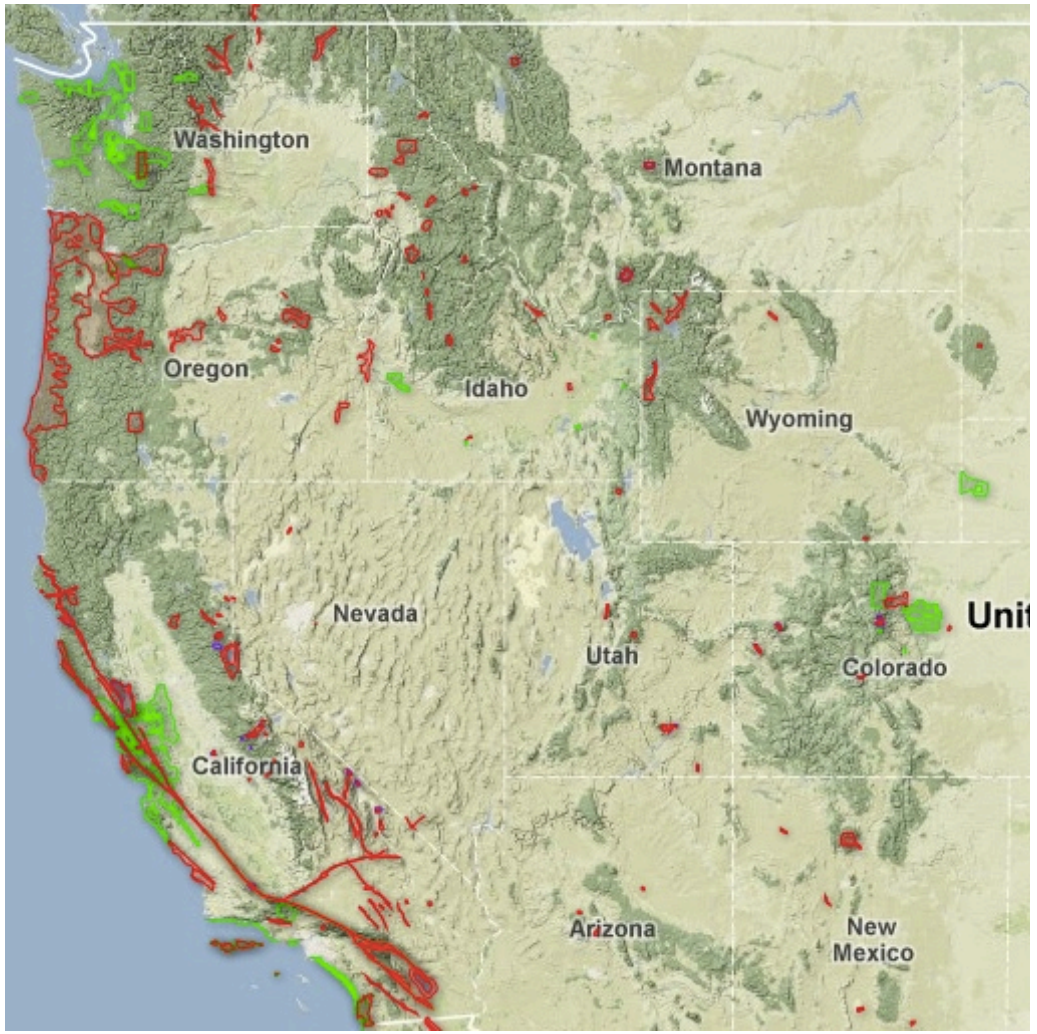
- ~600 billion LIDAR returns
- 158 datasets
- 120,407 km^2

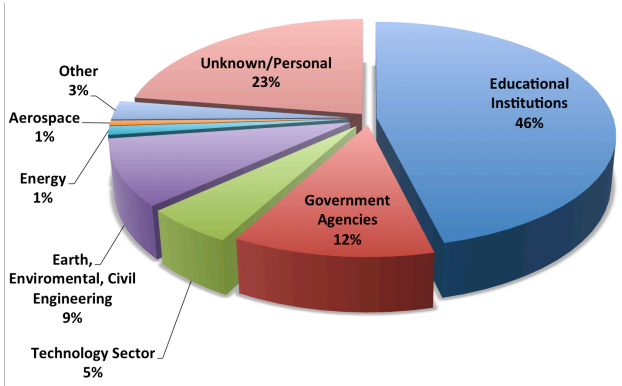
MOUs & Partnerships

NSF: NCALM, UNAVCO, CZOs, LTER

Other: World Bank, Tahoe Regional Planning Authority, Teton Conservation District, Oregon Lidar Consortium, Idaho Lidar Consortium, …

Service Agreements: State of Indiana Watershed Sciences Inc (for PG&E)



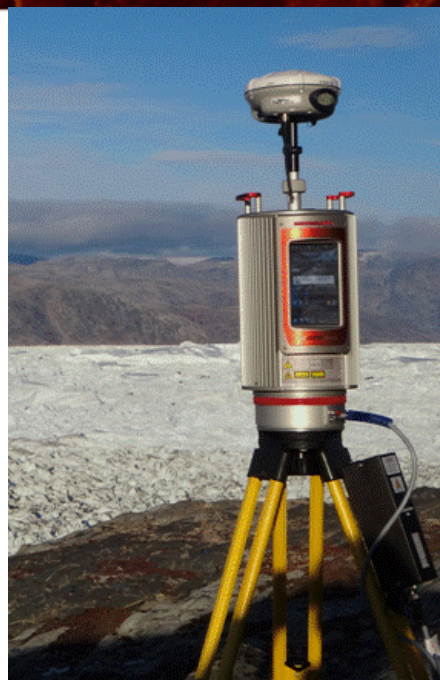


Diverse user base for these data, 3470 registered users, 21,000+ jobs, >30 billion pts/month downloaded.

Future - User Requirements & Workshop Recs

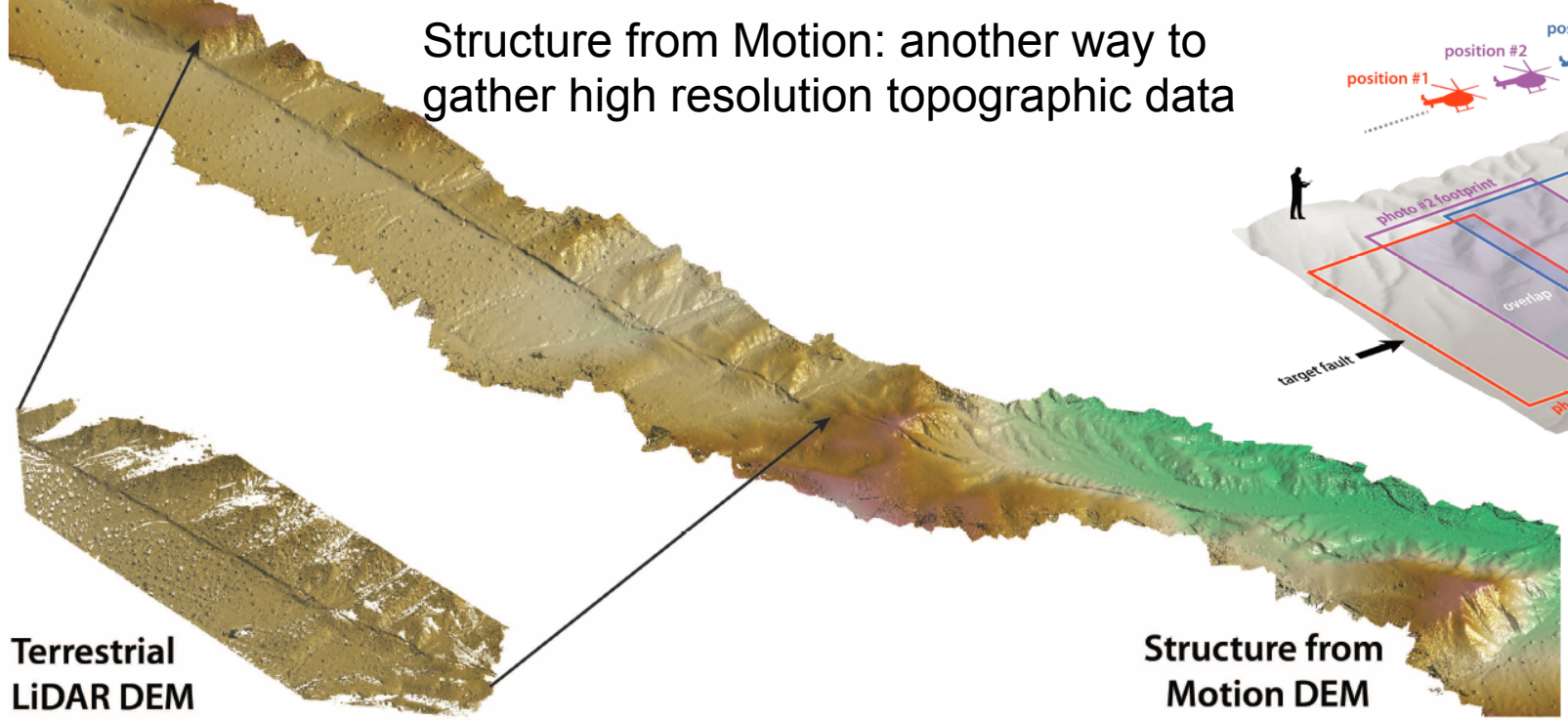
- Access to TLS instruments and data acquisition no longer “roadblocks” to NSF investigators. These are now “speed bumps”.
  - More instruments are available and are easier to use.
  - Workflows optimized for Earth science applications.
  - New instruments still desired for special capabilities (i.e. water penetration, full waveform, very long range, etc.) and to ensure meeting demand.
- TLS data handling, processing and analysis are the new roadblocks. We are working to turn them into speed bumps now too.
  - Need for post processing workflows and best practices.
  - Need for data (and metadata) formats and standards.
  - Need for data analysis training.

Future Trends

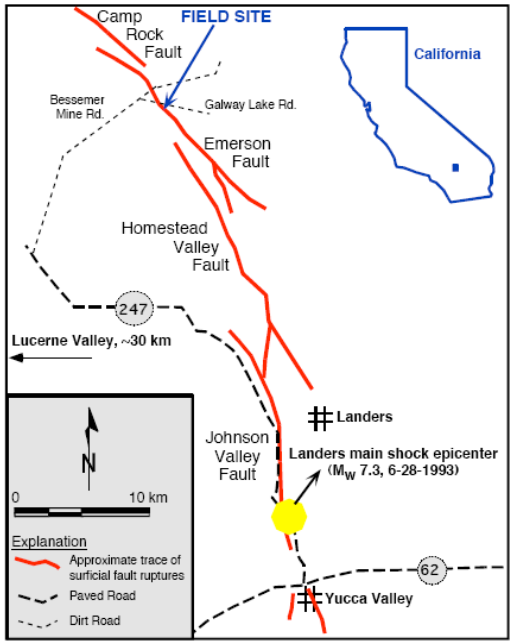


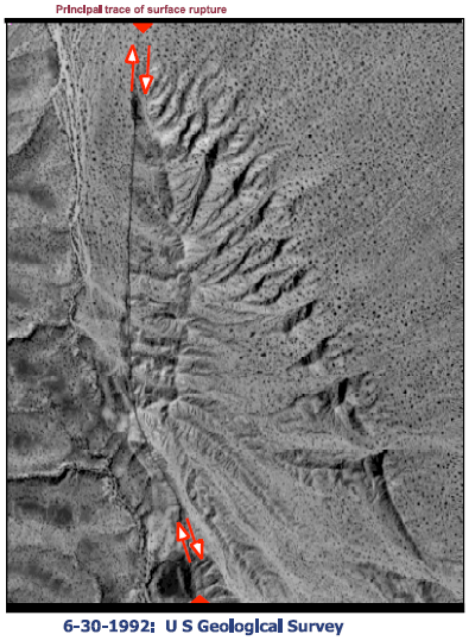
- Faster & longer data collection
- Full waveform
- More streamlined workflows
- Better & more powerful analysis software
- Error analysis
- Continuous scanning deployments
- Mobile laser scanning (e.g., Blidar)
- Integration with other datasets (ALS, GPR, terrestrial radar/INSAR, etc.)

Structure from Motion: another way to gather high resolution topographic data



Nissen, et al. in prep.





Structure from Motion: another way to gather high resolution topographic data

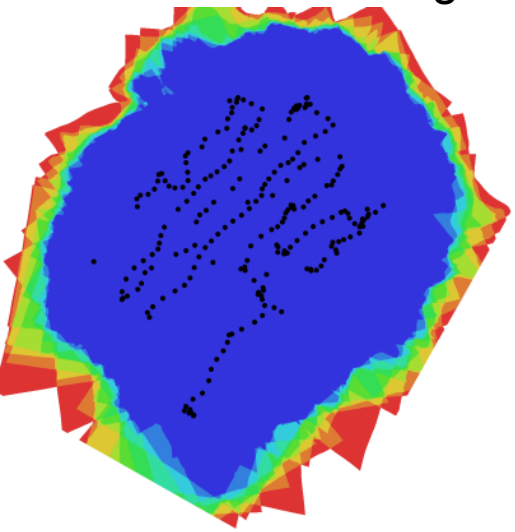


Fig. 1. Camera locations and image overlap.

Nissen, et al. in prep.