UNAVCO TLS Support Resources:

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

C. Crosby, UNAVCO, Boulder, CO

TLS Community Support

Support Resources

- Instrumentation
- Field engineering
- Data processing
- Training
- Data archiving & dissemination

Community Building

- Workshops
- Inter-Agency collaborations & partnerships

Education and Outreach

- Training courses
- Field courses

UNAVCO TLS Instrument Pool

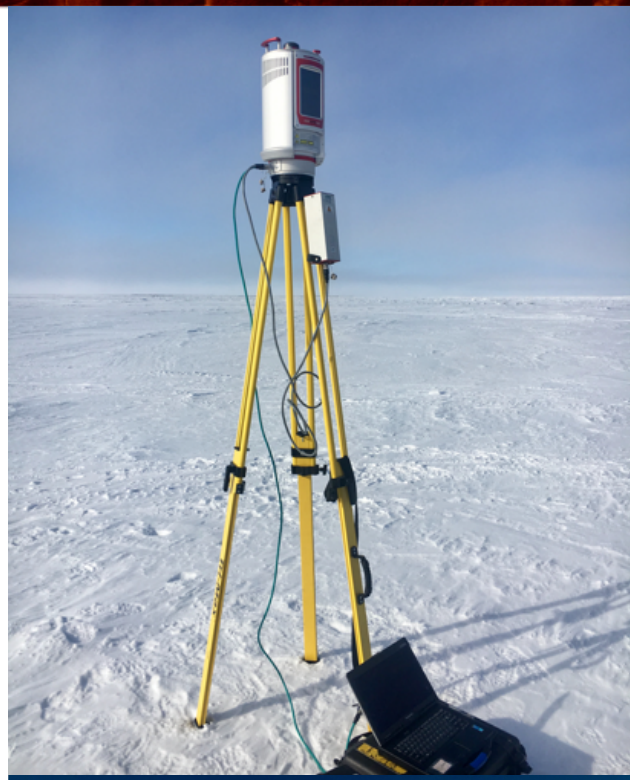
Scanners funded by the National Science Foundation

	 Riegl VZ-2000	 Riegl VZ-1000	 Riegl VZ-400	 Riegl Z620	 Leica C10
Laser wavelength	Near infrared				532 nm (green)
Effective range	2050 m	1400 m	500 m	2000 m	150 m
High-speed meas. rate	396,000 pts/sec	122,000 pts/sec	125000 pts/sec	11,000 pts/sec	50,000 pts//sec
Precision	5 mm	5 mm	5 mm	10 mm	4 mm
Accuracy	8 mm	8 mm	5 mm	10 mm	6 mm
Field of view	100°x 360°	100°x 360°	100°x 360°	80°x 360°	270°x 360°
Dimensions	308 mm x 196 mm	308 mm x 180 mm	308 mm x 180 mm	463 mm x 210 mm	238 mm x 395 mm
Weight	9.9 kg	9.8 kg	9.8 kg	16 kg	13 kg

RIEGL VZ-6000

Newest instrument: Riegl VZ-6000 long range scanner for PLR PI project. Chris Polashenski, Dartmouth: *Snow, Wind, and Time: Understanding Snow Redistribution and Its Effects on Sea Ice Mass Balance*

~6km range, NIR class 3B laser. Eye safety considerations make this a limited use instrument.



UNAVCO TLS PI Support – Costs & Prioritization

UNAVCO TLS Support Costs:

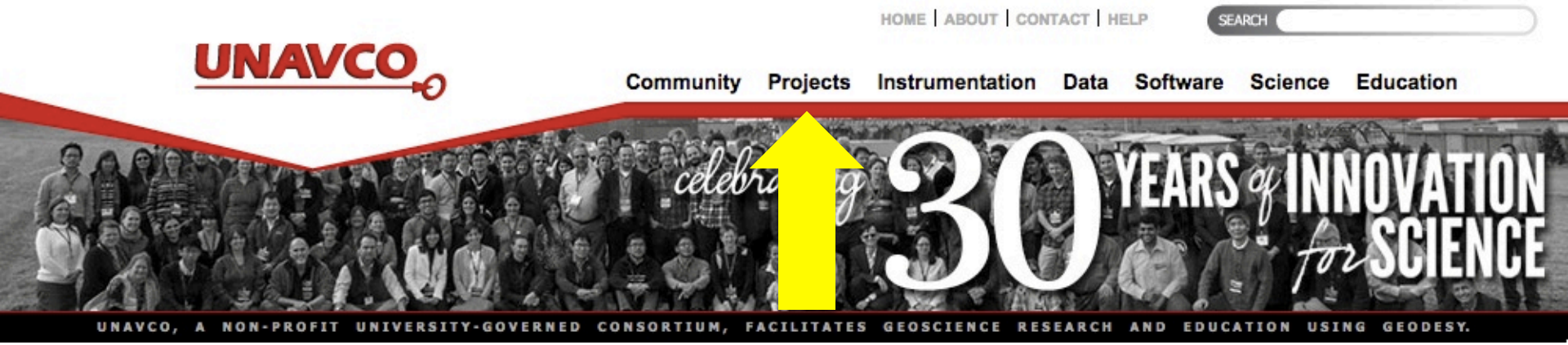
- For NSF-supported projects, PI pays field engineer travel and equipment shipping.
- For non-NSF supported work, full cost recovery required.

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 to coordinate specifics.

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

NSF EAR's investment in high resolution topography

UNAVCO	• Terrestrial laser scanning (TLS) instrumentation and expertise • PI & graduate student support • Data archiving • Education and training
NCALM THE NATIONAL CENTER FOR AIRBORNE LASER MAPPING	• Airborne lidar data collection • PI & graduate student support • Graduate student seed grants (funding) • Education
OpenTopography	• Online data discovery and access • Custom data products and processing • Cyberinfrastructure R&D • Education and training

NCALM

THE NATIONAL CENTER FOR AIRBORNE LASER MAPPING

- Based at University of Houston & University of CA, Berkeley

- Funded by NSF EAR-IF program. Initiated in 2003, funded through 2018.

- Cessna 337 Skymaster:
  - Titan three wavelength (532, 1064, and 1550 nm), 300 kHz (per wavelength) lidar
  - AQUARIUS Green bathymetric/topographic lidar

- Collect data for NSF-funded researchers. Cost integrated into proposal budgets.

NCALM

THE NATIONAL CENTER FOR AIRBORNE LASER MAPPING

Research-oriented data

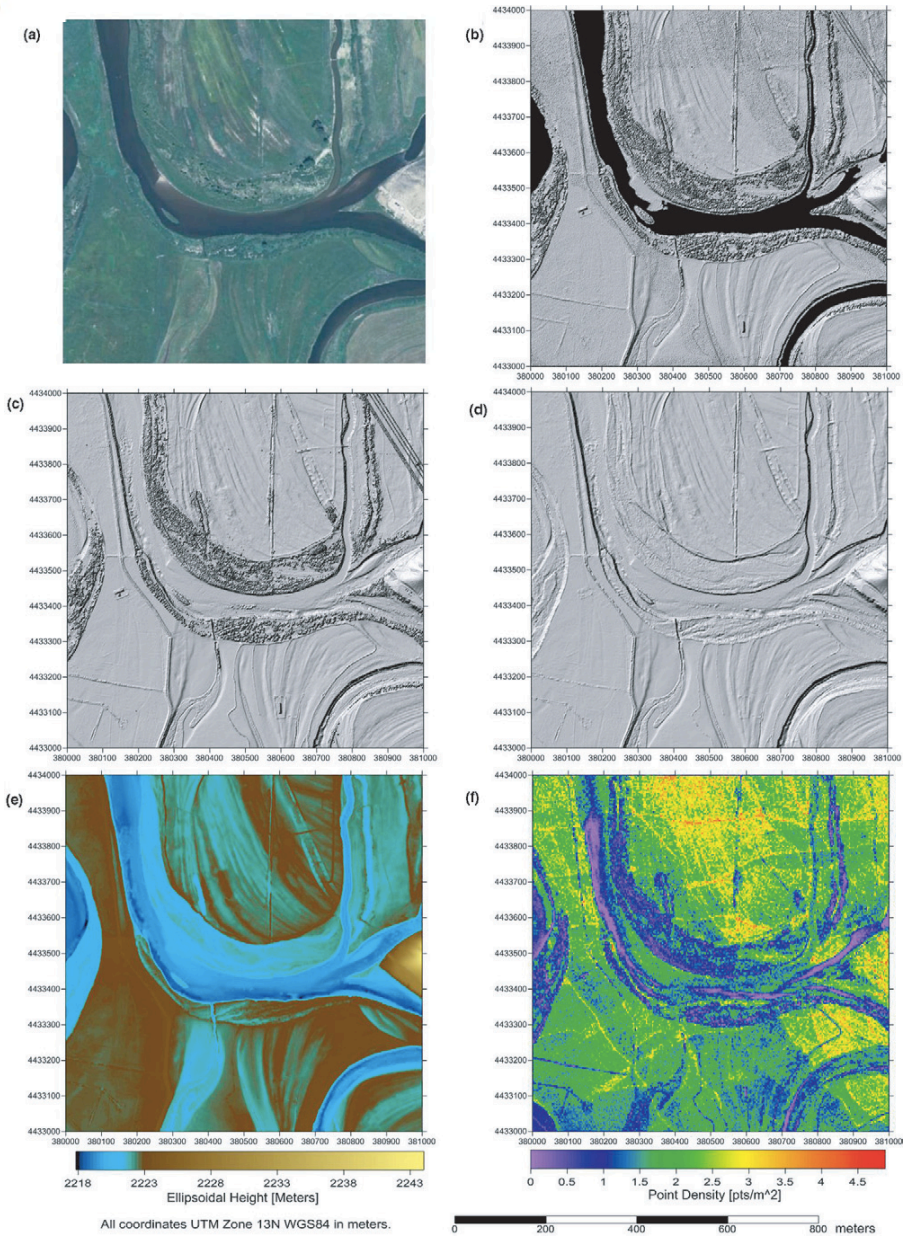
Typically 8+ pts/m^2, 0.5 - 1 meter resolution DEMs.

Data openly available after 2 yrs via OpenTopography.

152 datasets collected through 2015

Numerous publications and educational impacts from these data

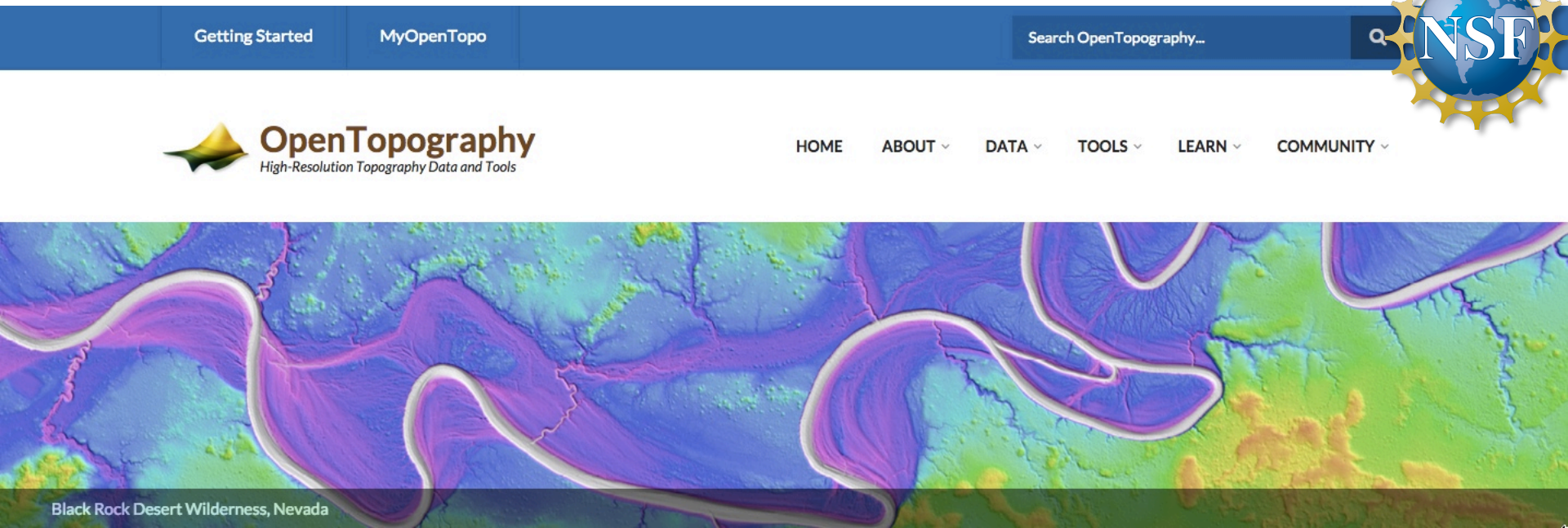
Seed grant program provides 40km^2 of data for graduate students through annual proposal process.



OpenTopography

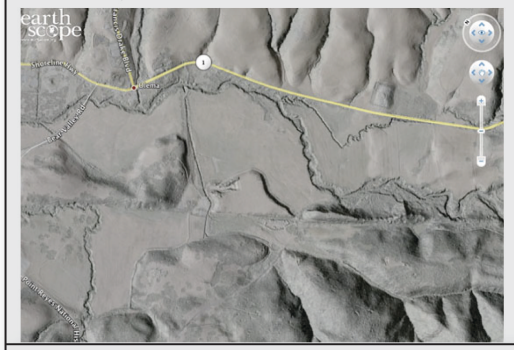
Democratize online access to Earth science-oriented high-resolution topography

- Lidar (ALS & TLS), Structure from Motion, satellite (e.g., SRTM)

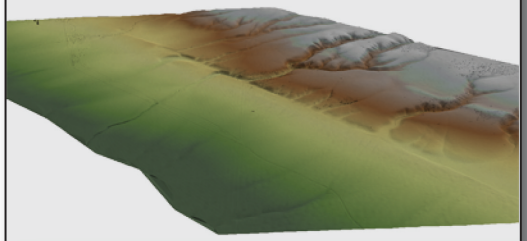


OpenTopography
Multi-Tiered Data Products

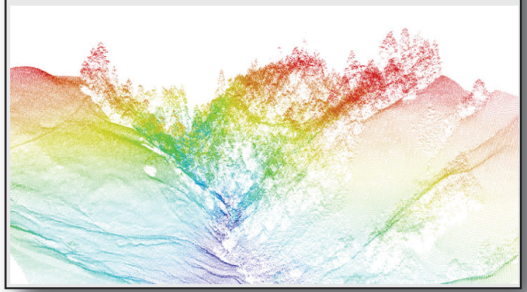
Google Earth (KMZ): *visualization & synoptic data browsing*



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

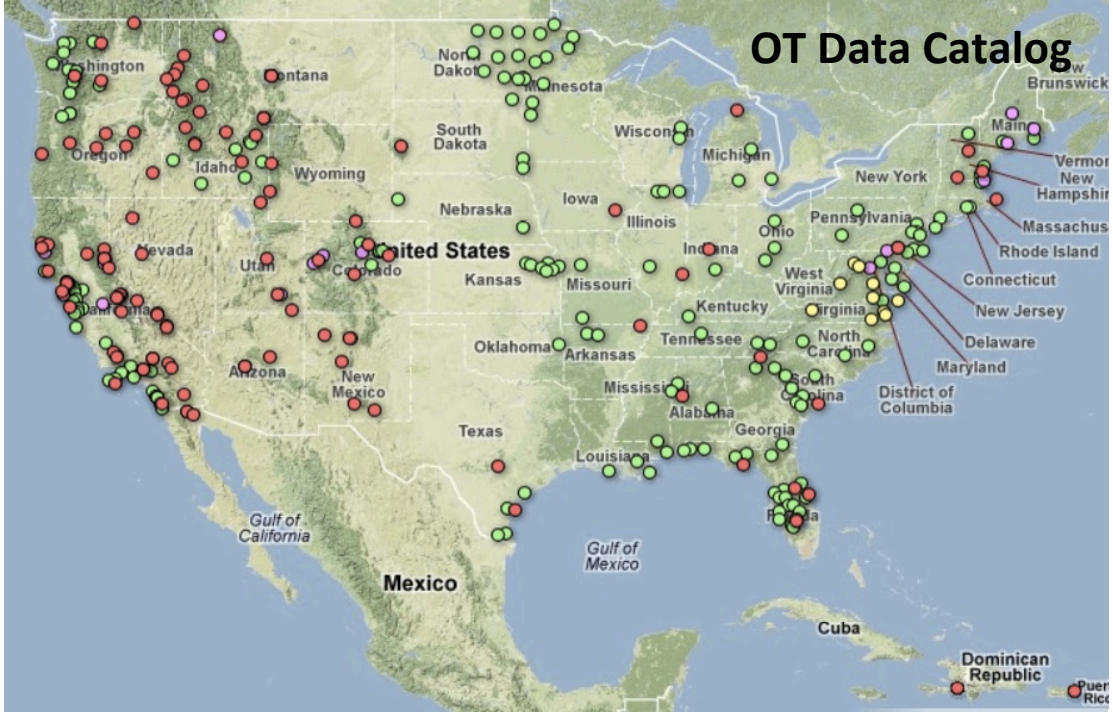


Point Cloud & Custom DEMs: *"raw" data access and fully customized data products*



Data Volume, Computational Demands

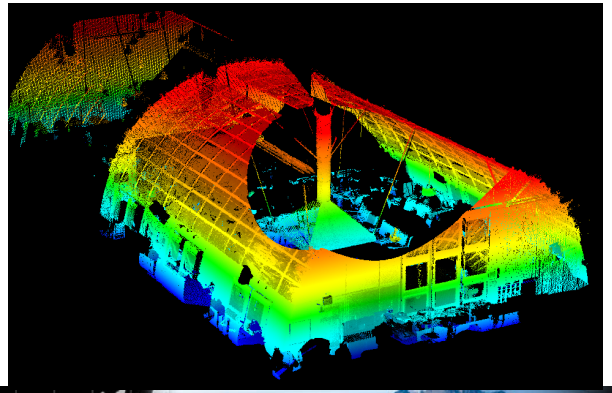
Accessibility / Ease of Use

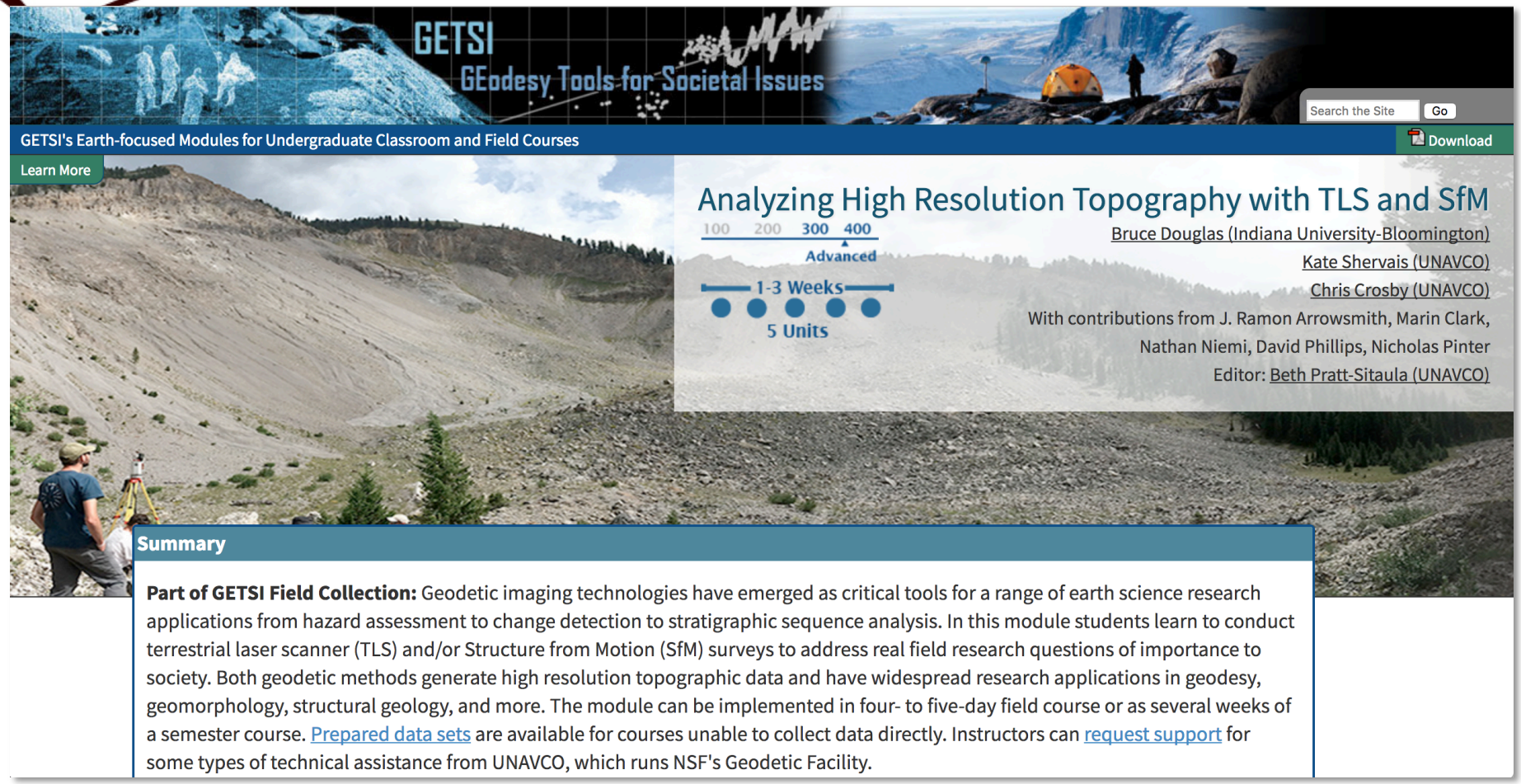


- Large user community with variable needs and levels of sophistication.
- Goal: maximize access to data to achieve greatest scientific impact.
- Big data – treat data as an asset that can be used and reused

Two dozen field education projects since ‘09

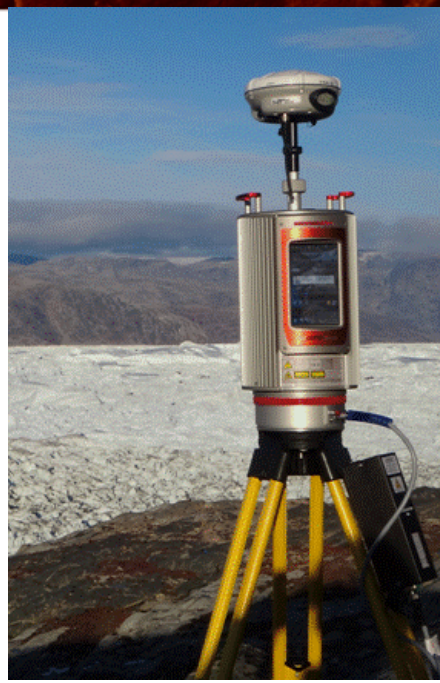
- Indiana University (8x)
- University of Michigan (7x),
- University of Houston (3x)
- UC Santa Cruz, Cal Poly Pomona, U. Saint Thomas, Stanford, NM State University, Montana State University, Rocky Mountain College



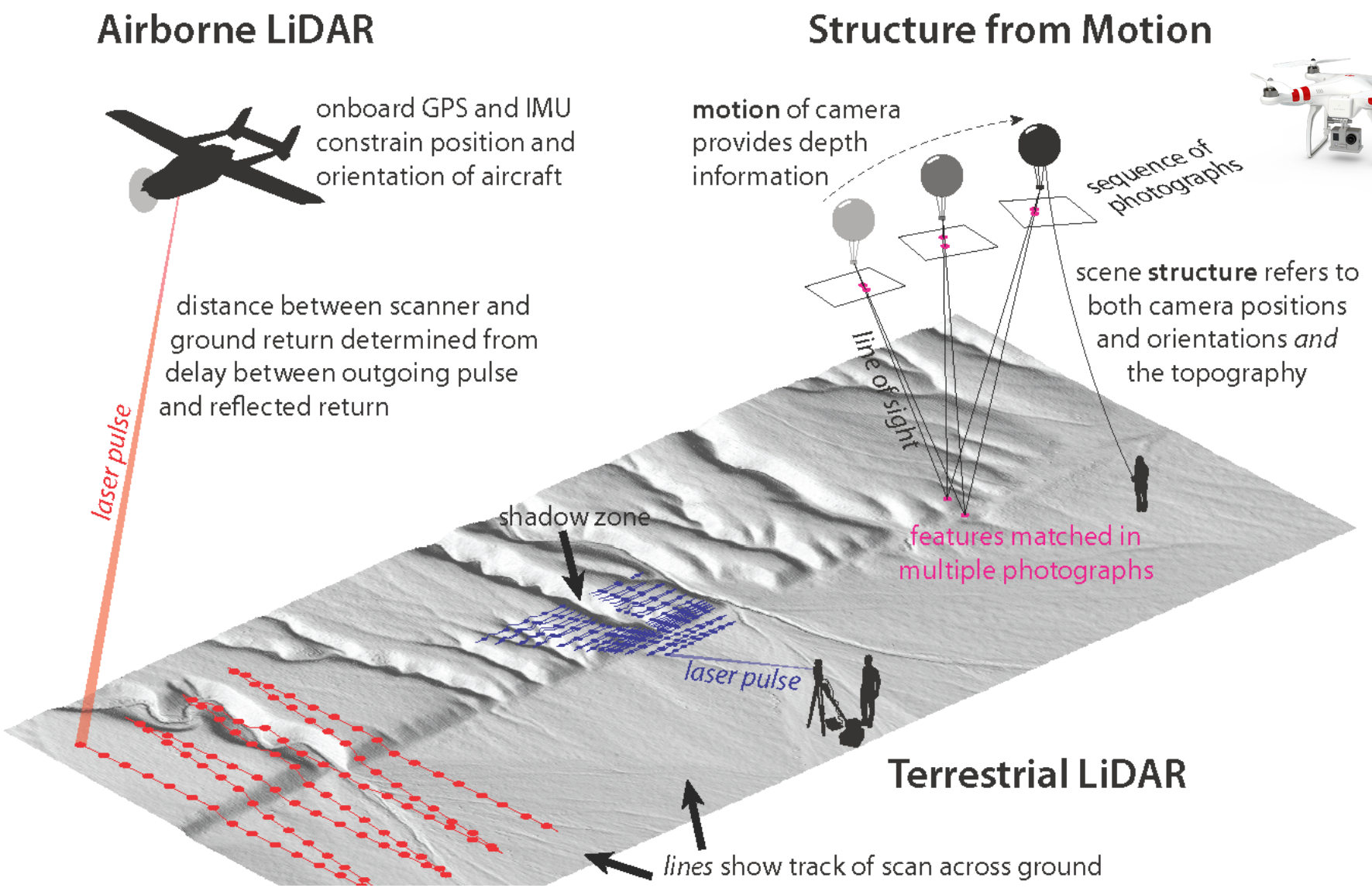


https://serc.carleton.edu/dev/getsi/teaching_materials/high-rez-topo/index.html

Future Trends & Technologies

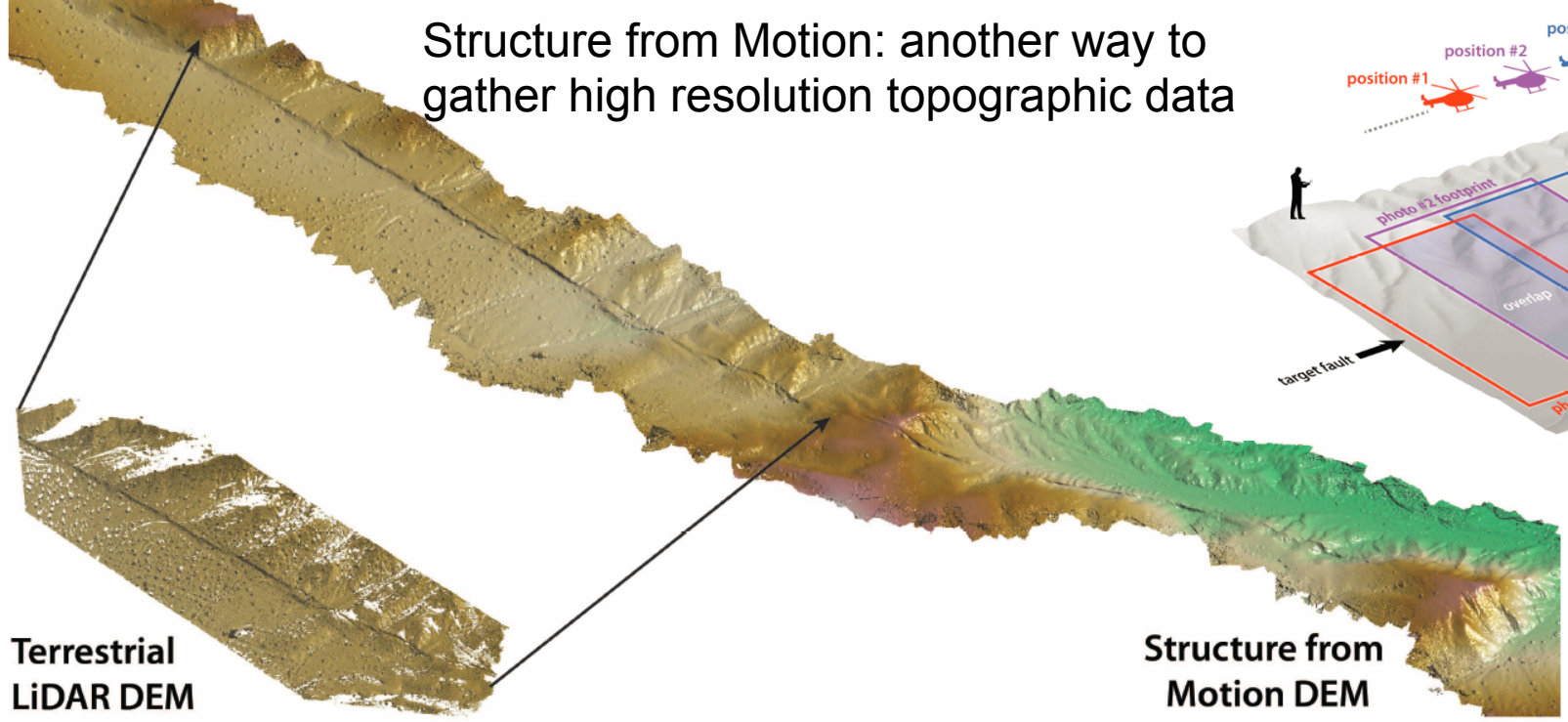


- Faster & longer data collection
- Full waveform
- More streamlined workflows
- Better & more powerful analysis software
- Error analysis
- Continuous scanning deployments
- Mobile/kinnematic laser scanning
- Integration with other datasets (ALS, GPR, terrestrial radar/INSAR, etc.)

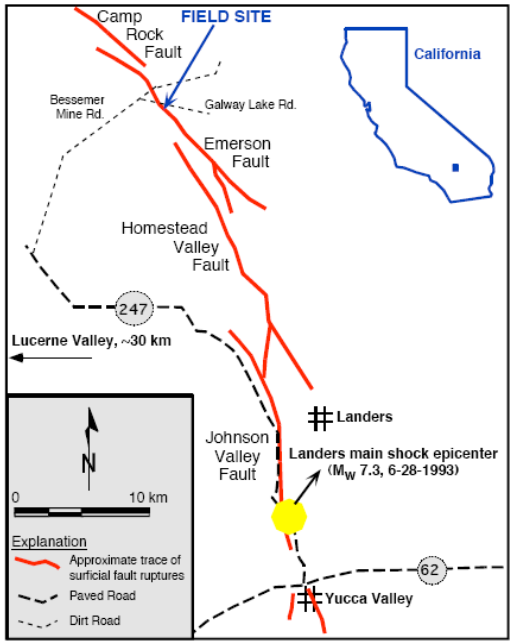


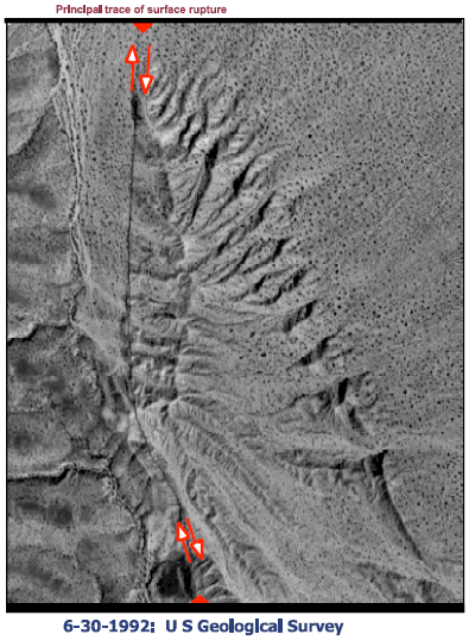
Johnson, et al.,Geosphere, v. 10; no. 5; p. 1–18; doi: 10.1130/GES01017.1, 2014.

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



Nissen, et al. in prep.





Structure from Motion: photogrammetric high resolution topographic data

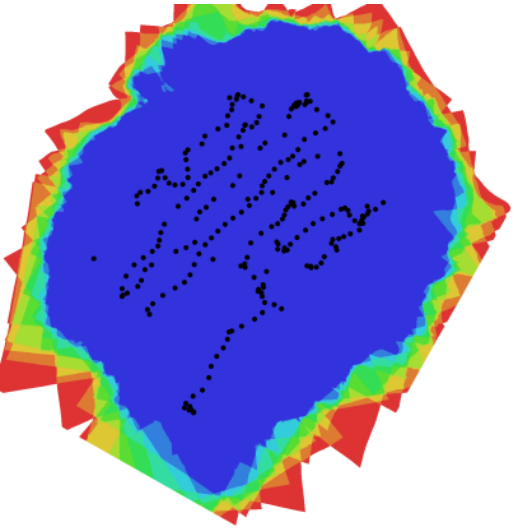
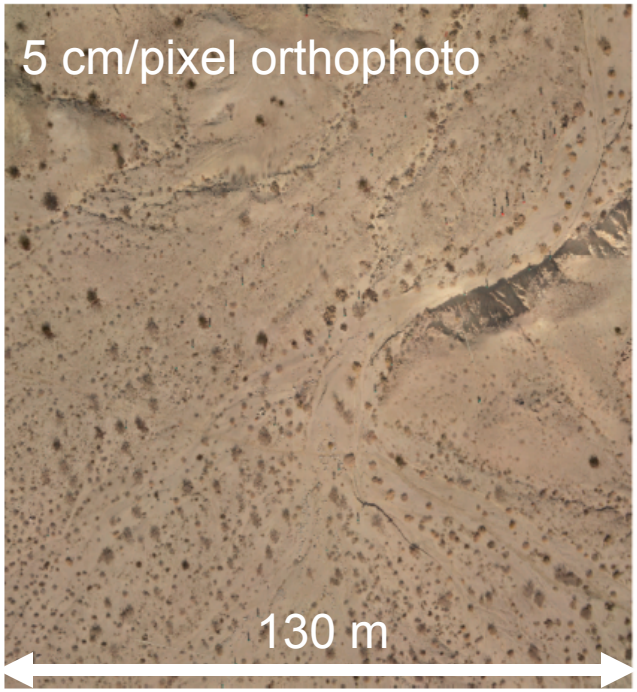
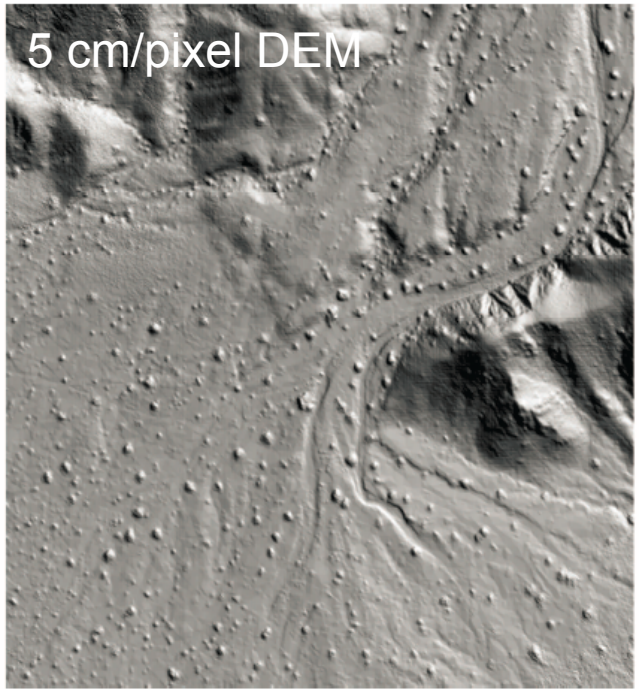
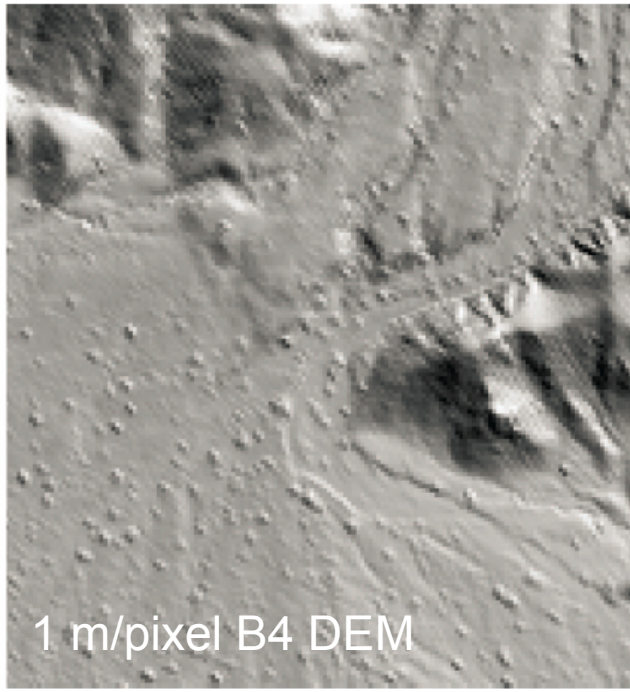


Fig. 1. Camera locations and image overlap.

Nissen, et al. in prep.







Unmanned Aerial Systems