

Online Sources of Lidar Data

Christopher Crosby

San Diego Supercomputer Center / OpenTopography.org

2011 SCEC LiDAR Short Course:

Imaging & Analyzing Southern California's Active Faults with High-Resolution Lidar Topography

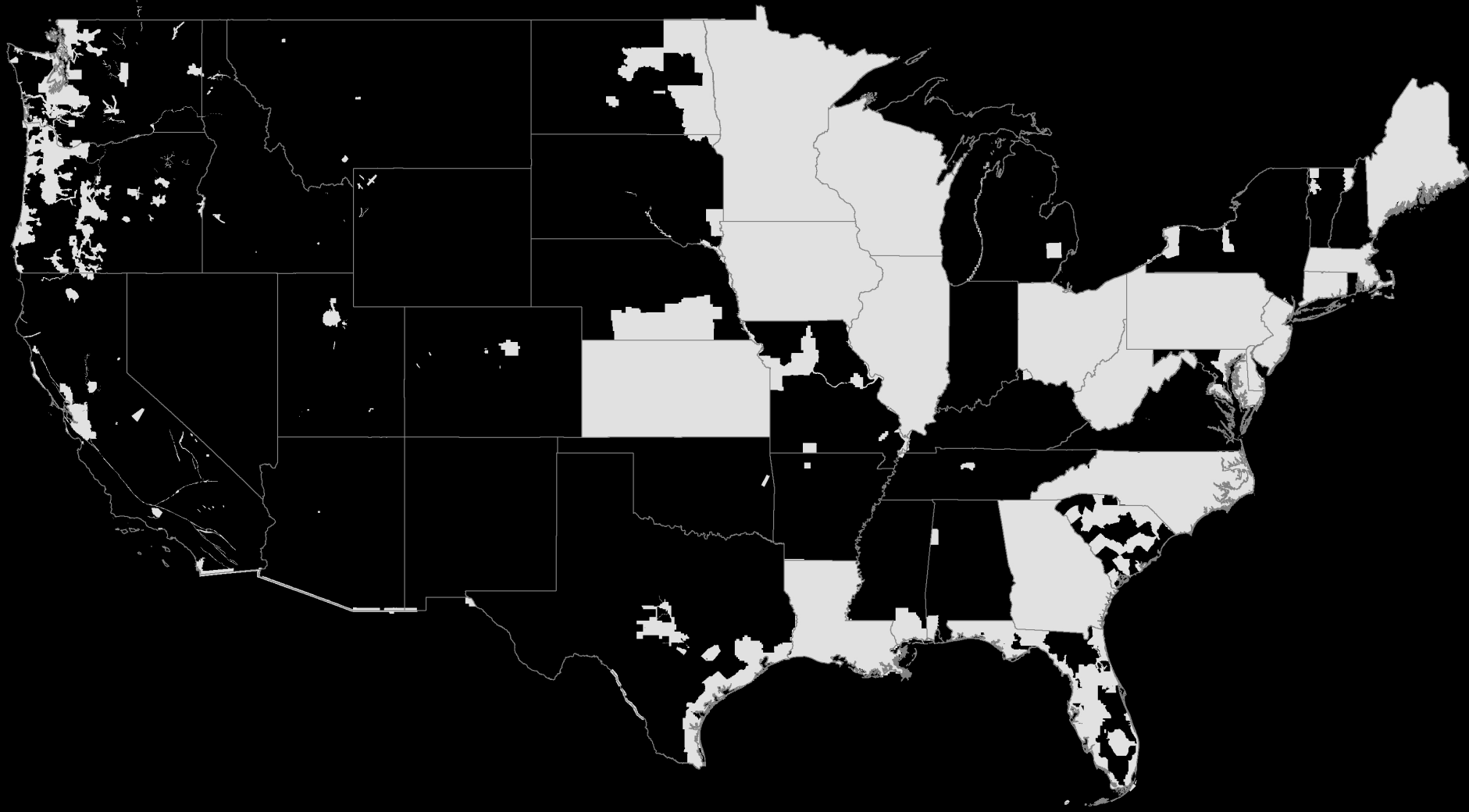
October 24-25, 2011

The Challenge of *Community* Lidar data

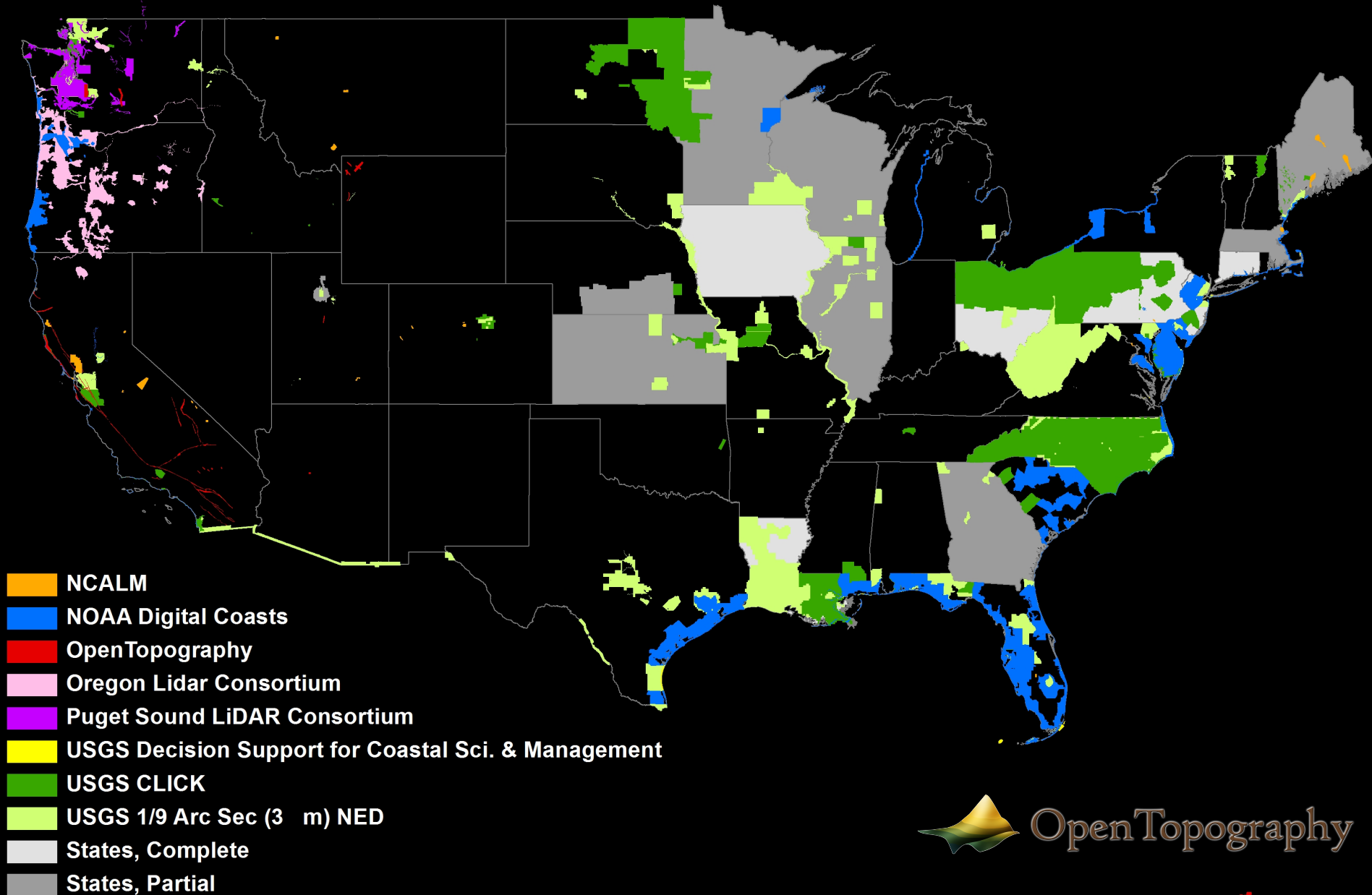
- Large data volumes (terabytes):
 - Billions of points per dataset
 - Many data products (points & grids)
- Large user community with variable needs and levels of sophistication.
- Targeted, small area (100s of km²), collections are common.

Clearinghouse for public domain Lidar data does not exist.

Lidar in the US



Lidar in the US - Data Access



- Online access to LiDAR varies significantly:
 - *High-end*: Interactive systems offering access to point cloud data (user defined areas) + tools to generate custom products
 - DEMs, contours, browse images/Google Earth files)
 - Interactive maps (web or Google Earth-based) serving tiled DEMs or LAS tiles
 - *Basic*: FTP servers offering tiled data
- File formats (pts & grids) vary by source
 - Points:
 - ASCII formats (.xyz, .txt) or LAS binary (.las)
 - DEMs in various GIS-compatible formats:
 - ASCII grids (.asc), ESRI binary (Arc/INFO) grids, .grd, .flt, GeoTIFF
- Central clearinghouse for national public domain LiDAR data does not exist.

All Lidar Not Equal

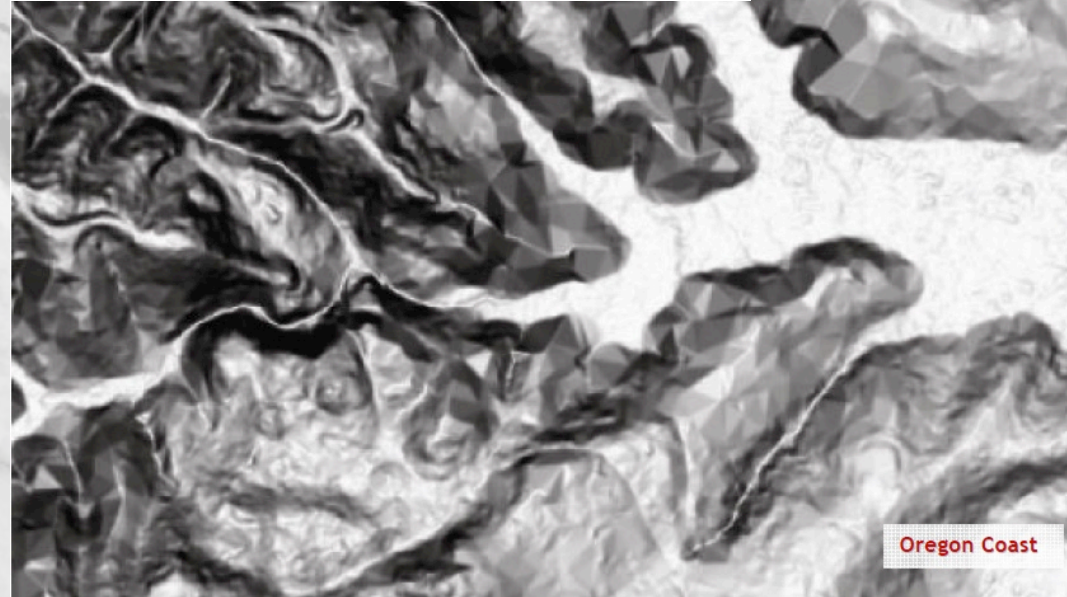
Return Density:

0.25 to > 8 meters²
(200 - 35 cm pulse spacing)

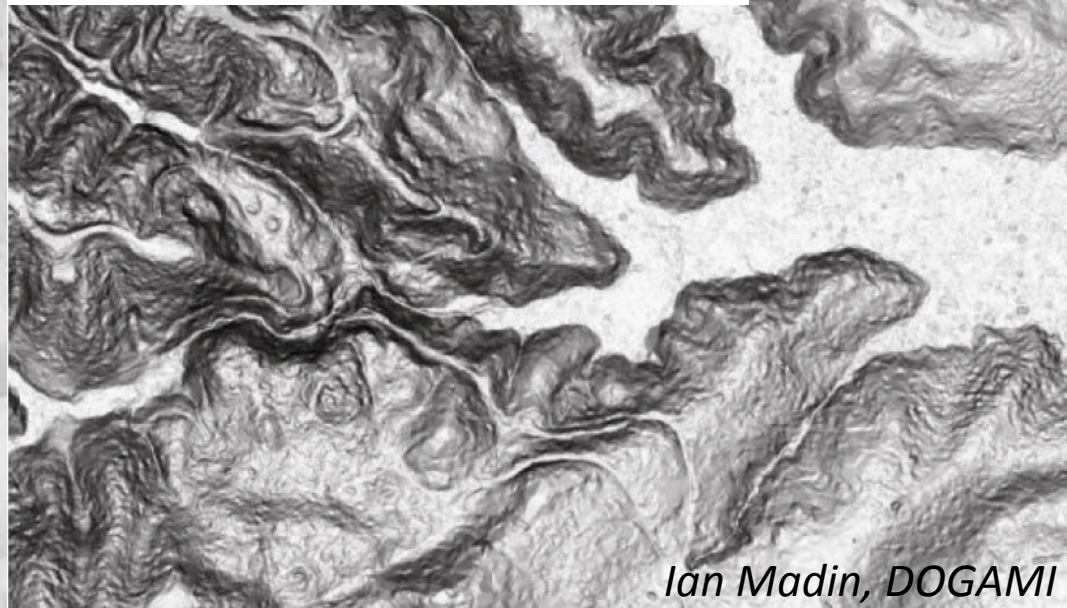
Other Factors:

- Collection parameters
- Processing
- **Metadata!**

1.2 pulses/m² (0.91m post spacing)



8.0 pulses/m² (0.35m post spacing)





In this section

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Education & Training

► [Classroom Resources](#)

► [Documents](#)

► [Links](#)

► [Short Courses](#)

► [Tutorials](#)

Metadata & Files

Links

LiDAR Data Sources:

Online LiDAR data sources other than the OpenTopography Portal - see the [Data tab](#) above for data hosted by OpenTopography

- [USGS CLICK](#) (Center for LIDAR Information Coordination and Knowledge) - a large collection of LiDAR point cloud data mostly in LAS format.
- [National Center for Airborne Laser Mapping \(NCALM\) Data Distribution Center](#) - high-resolution LIDAR DEM data collected by NCALM for National Science Foundation-funded research projects.
- [Puget Sound LIDAR Consortium](#) - high-resolution LIDAR data for western Washington.
- [USGS Decision Support for Coastal Science and Management](#) - LiDAR data of coastal and marine environments acquired by the USGS Coastal and Marine Geology Program. Data includes coverage of many coastal National Parks, Monuments, Recreation Areas, and Historic Sites.
- [NOAA Digital Coasts: Coastal LIDAR](#) - LIDAR coverage in narrow coastal swaths acquired mostly for topographic change mapping. Point clouds and custom DEMs available.

State Data Collections:

- Idaho: [Idaho Lidar Consortium data](#)
- Iowa: [Iowa LiDAR Mapping Project](#)
- Kansas: [Kansas Data Access & Support Center: Elevation Data and LiDAR](#)
- Louisiana: [Atlas LiDAR Downloader](#)
- North Carolina: [NC Floodplain Mapping Program](#)
- North Dakota: [North Dakota LiDAR Dissemination Mapservice](#)
- Ohio: [Ohio Statewide Imagery Program](#)
- Oregon: [Oregon LiDAR Consortium](#)
- Pennsylvania: [PAMAP Elevation Data](#)
- Utah: [Utah GIS Portal Elevation/Terrain Data](#)
- Virginia: [VA Lidar at William and Mary](#)
- [National LiDAR Wikipedia entry](#) - listing of state-oriented LiDAR collections and links to download data and get more information

Other Topographic Data Sources:

- [USGS National Elevation Dataset \(NED\)](#) - 1 arc-second (~30 meters), 1/3 arc-second (~10 meters), and some 1/9 arc-second (~3 meters) digital elevation model data via the [USGS National Map Seamless Server](#).
- [Shuttle Radar Topography Mission \(SRTM\)](#) - 90 m DEM data available via [CGIAR-CI](#). 30 and 90m SRTM data are also available via the



OpenTopography

A Portal to High-Resolution
Topography Data and Tools

myOpenTopo

Search

☐ Data ☐ Tools ☒ Site

Home

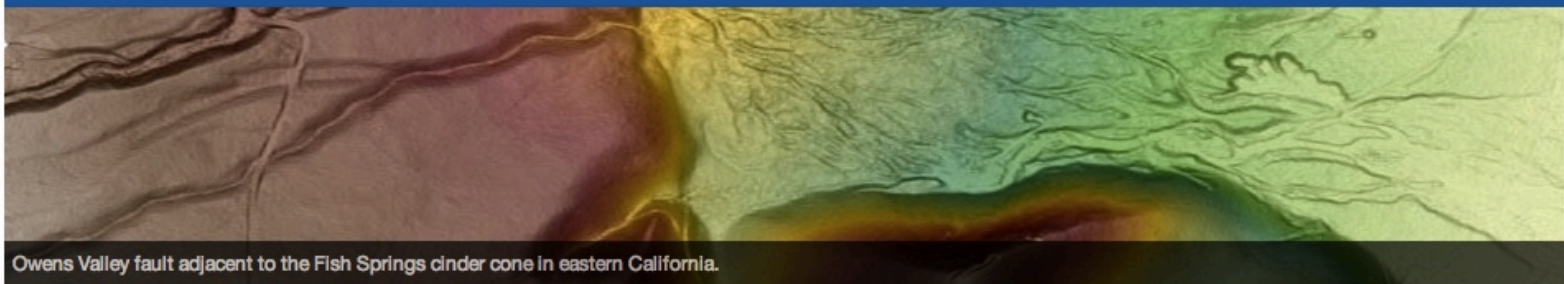
About

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Owens Valley fault adjacent to the Fish Springs cinder cone in eastern California.



Overview Video



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Data: Lake Tahoe Basin Lidar Data Released



OpenTopography is pleased to announce that lidar point cloud data for the whole Lake Tahoe Basin (941 km²) on the California/Nevada border are now available. The full 12+ billion return point cloud dataset plus standard DEM products and Google

Earth-based visualizations of the data can be downloaded from

- Mostly active faults (and associated landforms) in western US
- point cloud, custom products (DEMs), standard DEMs, Google Earth hillshades
- Other resources including tutorials, short course materials, links, etc.

Connect with OpenTopography



Data Summary



Total Coverage: 17,729 km²

Total number of LIDAR returns: 81,870,266,707

Latest LIDAR Datasets:

2005 San Diego Urban Region

Andrews Experimental Forest & Willamette Nat. Forest LIDAR (Aug 2008)

[More Metrics...](#)

Latest Blog Entries

[Short Course: Imaging and Analyzing Southern California's Active Faults with Lidar](#)

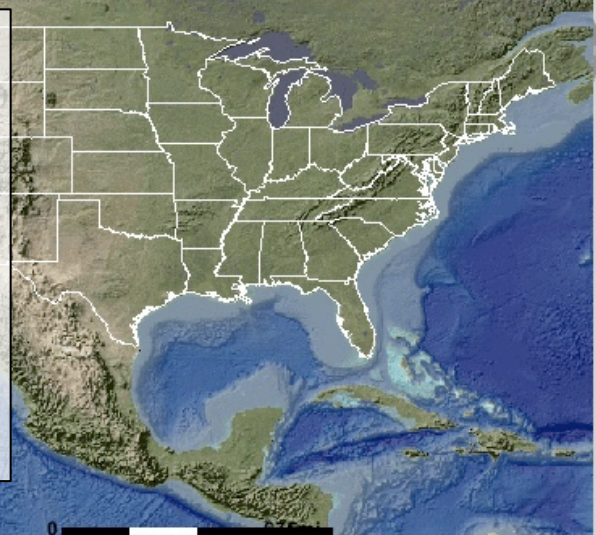

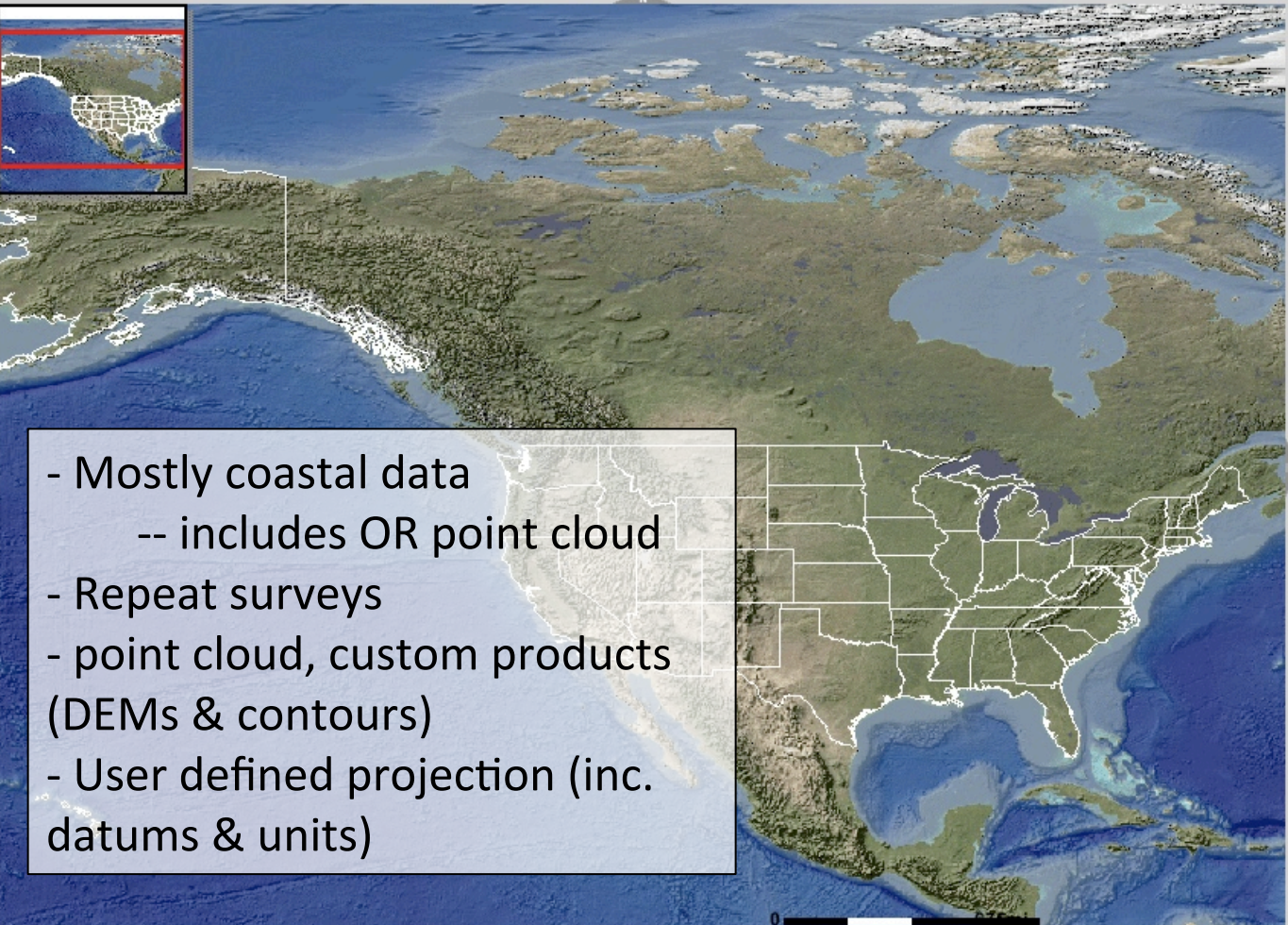
Posted: September 14, 2011

NOAA Digital Coasts:

<http://www.csc.noaa.gov/digitalcoast/index.html>

DIGITAL COAST

Digital Coast : Data Access Viewer



- Select Area
- Area

Data SearchResultsHelp

Location Search ▼

Click and drag a box on the map to search for data.

Area

(Optional) Limit by keywords*: ?
lidar

☒ Match ANY ☐ Match ALL

State Search ▼

Find data in: Select State

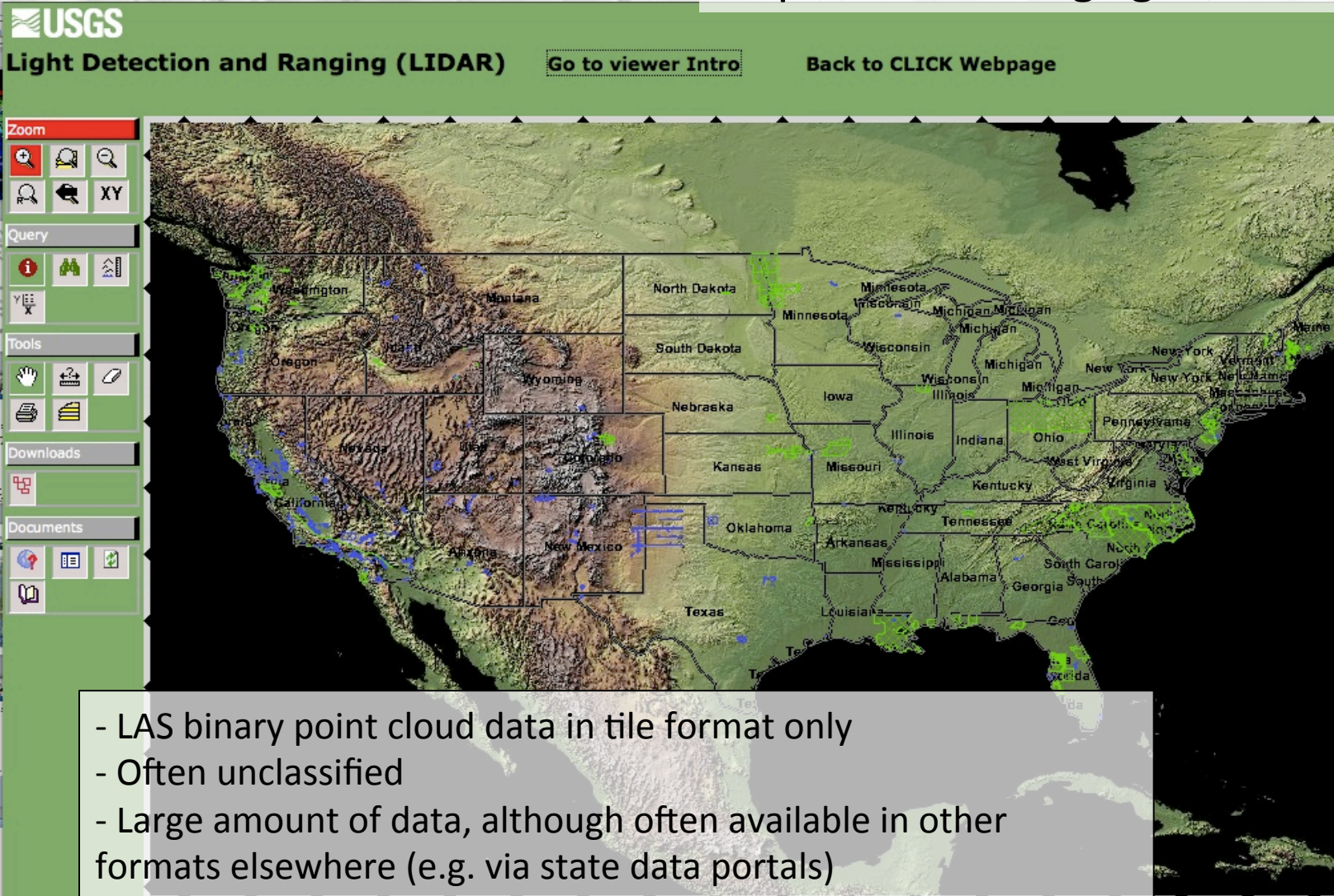
(Optional) Limit by keywords*: ?
lidar

☒ Match ANY ☐ Match ALL

Search

Enter Search Coordinates ►

- Mostly coastal data
 - includes OR point cloud
- Repeat surveys
- point cloud, custom products (DEMs & contours)
- User defined projection (inc. datums & units)



- LAS binary point cloud data in tile format only
- Often unclassified
- Large amount of data, although often available in other formats elsewhere (e.g. via state data portals)
- Bare earth data in CLICK becomes 1/9 arc second (~3m) DEM data in NED.
- Excellent LiDAR discussion forum also hosted by CLICK



NCALM

LIDAR DATA
DISTRIBUTION CENTER



The National Center for Airborne Laser Mapping

Welcome to the NSF Supported NCALM Data Distribution Center
For the main NCALM website please visit www.ncalm.org

<http://calm.geo.berkeley.edu/ncalm/ddc.html>

Google Earth

File Edit View Tools Add Help

Search

Places

- My Places
- Sightseeing
- Temporary Places
- NCALM LIDAR Data
 - Napa Watershed, CA
 - Tender Foot Creek, MT
 - South Fork Eel River, CA
 - Dragon's Back Ridge (Sa...
 - Big Sky, MT
 - Archibald Station, FL
 - Susquehanna River, MD
 - Potomac River, MD
 - Silver Plume, CO
 - St. Elias Mountains (Katall...
 - Lake Powell, UT
 - Death Valley (Furnace Cr...
 - Flathead Lake, MT
 - Death Valley (Furnace Cr...

St. Elias Mountains (Katalla), AK

Flathead Lake, MT

Tender Foot Creek, MT

Big Sky, MT

South Fork Eel River, CA

Napa Watershed, CA

Lake Powell, UT

Death Valley (Furnace Creek, Fish Lake Valley), NV

Silver Plume, CO

Susquehanna River, MD

Potomac River, MD

Google Earth-based (download KML file)

DEMs delivered in tiles

ESRI Arc/INFO grids

Puget Sound Lidar Consortium

public-domain high-resolution topography for western Washington

<http://pugetsoundlidar.ess.washington.edu/>

[Data!](#)

[About
LiDAR](#)

[About
the
PSLC](#)

[Uses of
LiDAR
Data](#)

[Links](#)

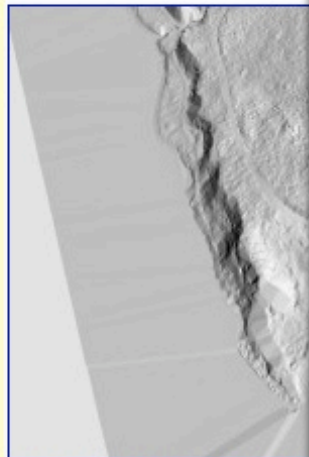
[Contact
Us](#)



Seattle
Public
Utilities

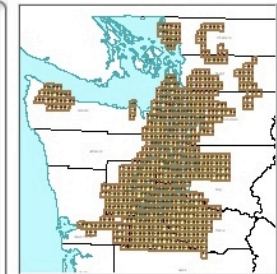
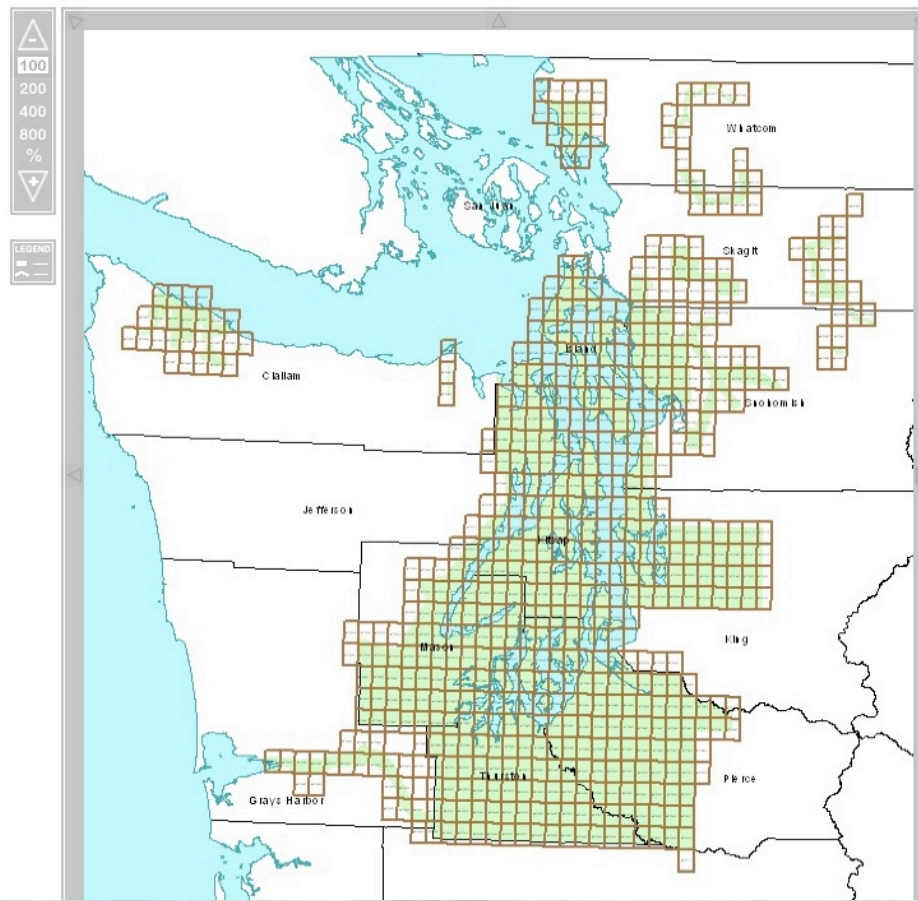


PRISM



Oblique view of south
SE Bain
[More examples of](#)

Download Bare Earth 6-ft DEM - Washington State Plane North



Zoom in and then Click on the map on the left to download data for each quarter quad.

- Lots of data for w. Washington
- DEMs, ASCII point clouds, hillshade images, contours
- clickable maps and FTP

Decision Support for Coastal Science and Management

DSP Home Technology Mapping Data Publications Outreach Collaborators Contact Acronyms

Decision Support for Coastal Science and Management

Data: View in Google Maps

<http://ngom.usgs.gov/dsp/>

- [Assateague Island National Seashore](#)
- [Biscayne National Park](#)
- [Cape Cod National Seashore](#)
- [Colonial National Historic Site](#)
- [Dry Tortugas National Park](#)
- [Fire Island National Seashore](#)
- [Florida Keys](#)
- [Gateway National Recreation Area](#)
- [George Washington Birthplace National Monument](#)
- [Gulf Islands National Seashore](#)
- [Jean Lafitte National Historic Park and Preserve](#)
- [Natchez Trace Parkway](#)
- [Northeast Barrier Islands](#)
- [Northern Gulf of Mexico](#)
- [Padre Island National Seashore](#)
- [Sagamore Hill Historic Site](#)
- [Thomas Stone National Historic Site](#)
- [U.S. Virgin Islands](#)
- [Vicksburg National Military Park](#)



- Coastal and National Park/Monument emphasis
- Collected with Experimental Advanced Airborne Research Lidar (EAARL)
- DEMs, point clouds, hillshade images, Google Earth overlays
- links to USGS OFR and Data series
- Data not in CLICK...

State Data Collections:

State collections with some form of data online (*list may be incomplete – if you know of others let me know*):

- Idaho - <http://inside.uidaho.edu/geodata/LiDAR/>
- Iowa - <http://www.geotree.uni.edu/lidarProject.aspx>
- Louisiana - <http://atlas.lsu.edu/lidar/>
- North Carolina - <http://www.ncfloodmaps.com/>
- Ohio - <http://ogrip.oit.ohio.gov/ProjectsInitiatives/StatewideImagery.aspx>
- Oregon - <http://www.oregongeology.org/sub/projects/olc/default.htm>
- Pennsylvania - <http://www.dcnr.state.pa.us/topogeo/pamap/elevation.aspx>
- Utah - <http://gis.utah.gov/elevation-terrain-data/2-meter-bare-earth-lidar>

List with URLs updated as I encounter new data sources at:

<http://www.opentopography.org/index.php/resources/links>

Interactive hillshade viewers:

- Web map or Google Earth based
- Make the data easy to access without GIS skills
- Excellent resource for education



State of Oregon

DOGAMI Lidar Data Viewer

OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES (A MEMBER OF THE OREGON LIDAR CONSORTIUM)

<http://www.oregongeology.org/interactivemaps/lidardataviewer/>



- ☒ Reference Features
- ☒ South Coast Project Area
- ☒ Camp Creek Project Area
- ☒ Ontario Project Area
- ☒ Regional Base Map



Map Data Credit: Oregon Lidar Consortium, DOGAMI, Oregon Geospatial Data Clearinghouse



<http://www.opentopography.org/kml/>

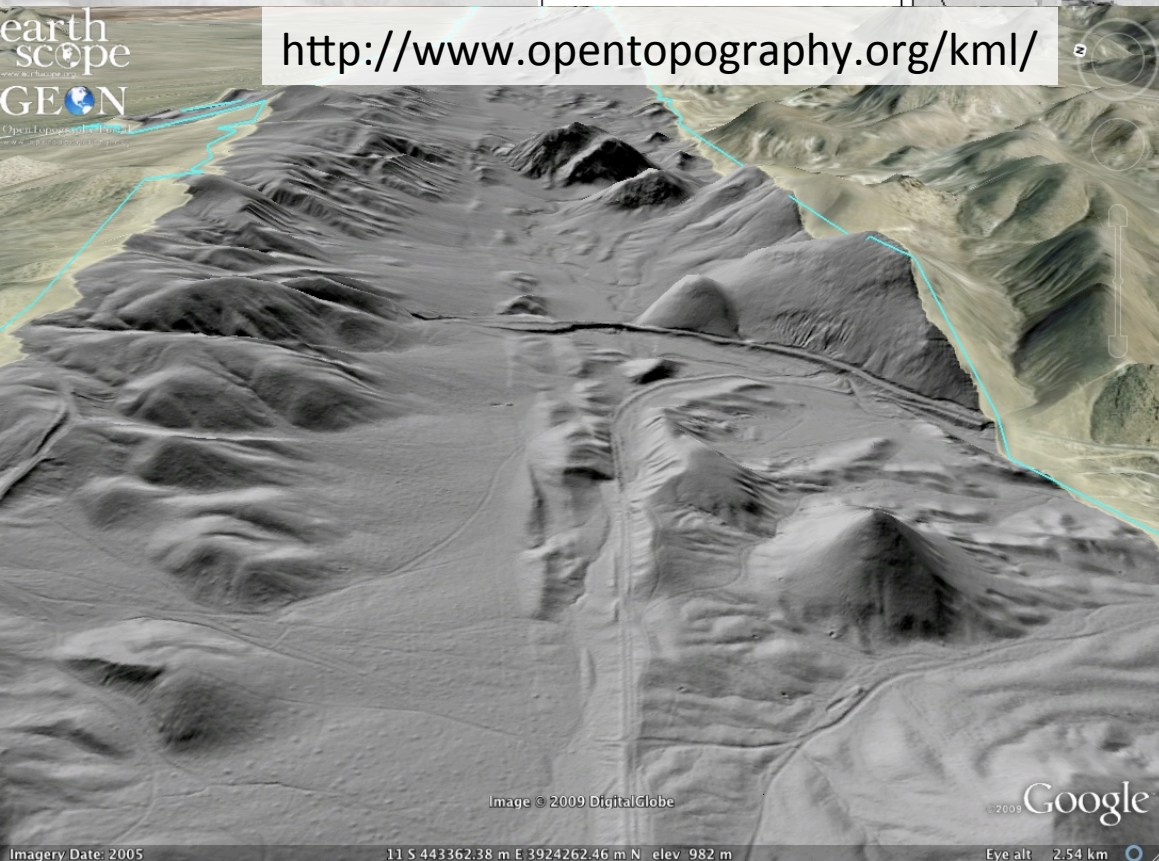


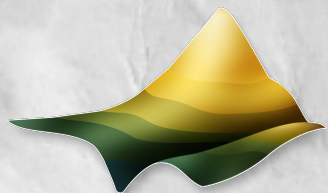
Image © 2009 DigitalGlobe

2009 Google

Imagery Date: 2005

11 S 443362.38 m E 3924262.46 m N elev 982 m

Eye alt 2.54 km

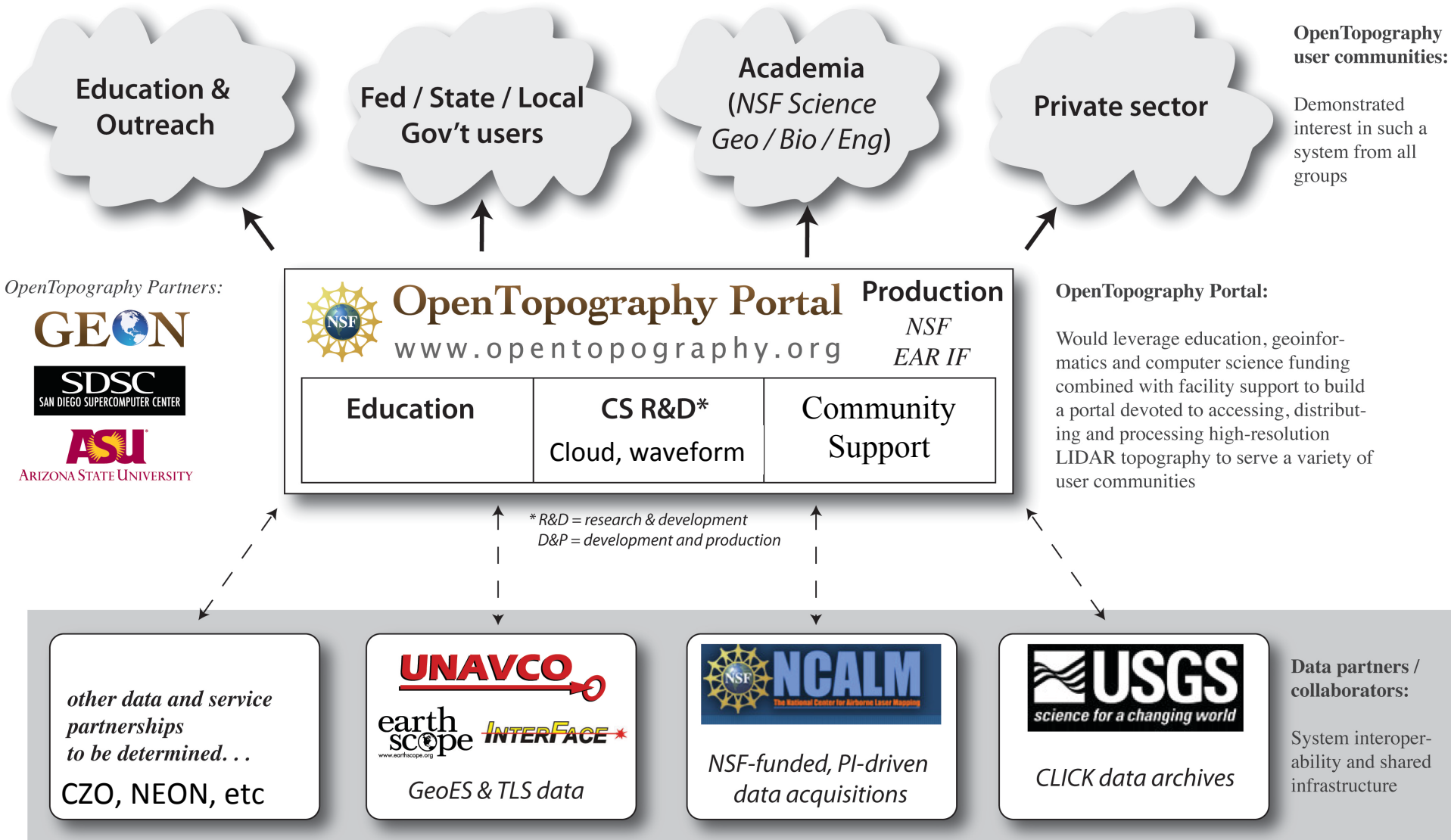


OpenTopography



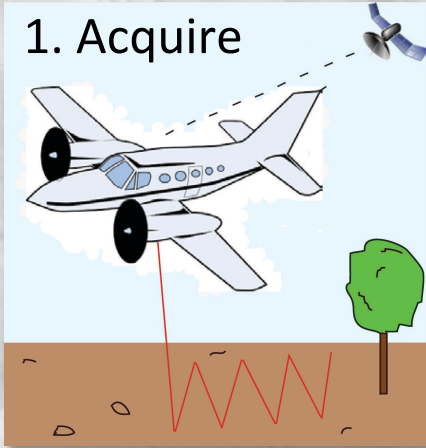
- NSF Facility: 3 yr support in 2009 (funding via EAR IF and OCI)
 - SDSC & ASU
 - Related research projects from NASA ROSES, NSF SI² (CyberGIS), and NSF CluE
- Increase the amount of Earth science-oriented LiDAR available online
- Enhanced web-based processing capabilities, with a focus on computationally intensive tasks (leveraging SDSC resources).
- Community support:
 - Software
 - Tutorials and short courses
 - Education, outreach, social networking

OpenTopography as Gateway

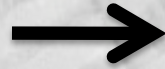


Airborne Lidar Workflow

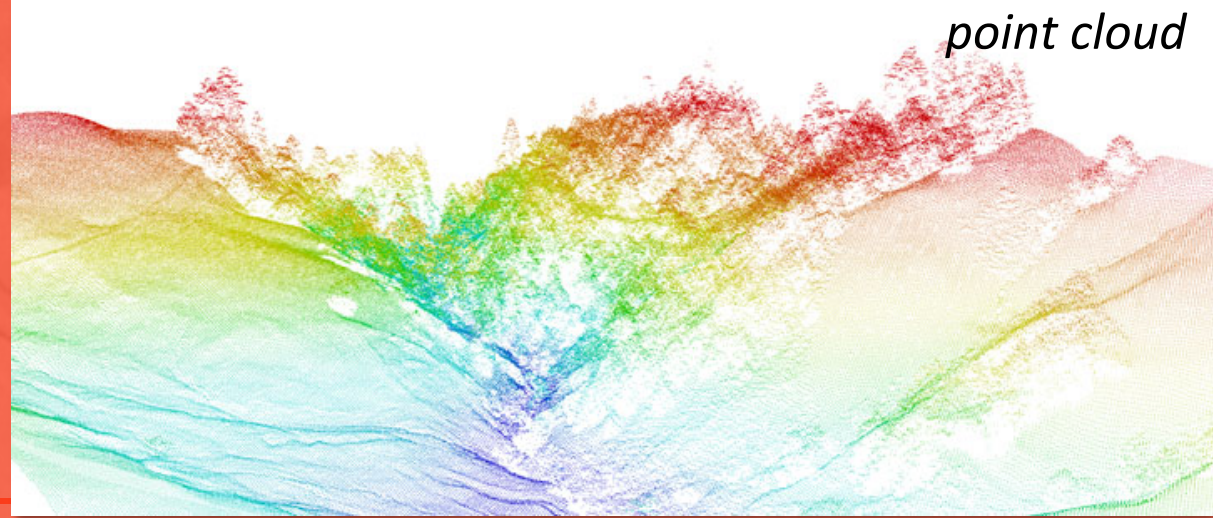
1. Acquire



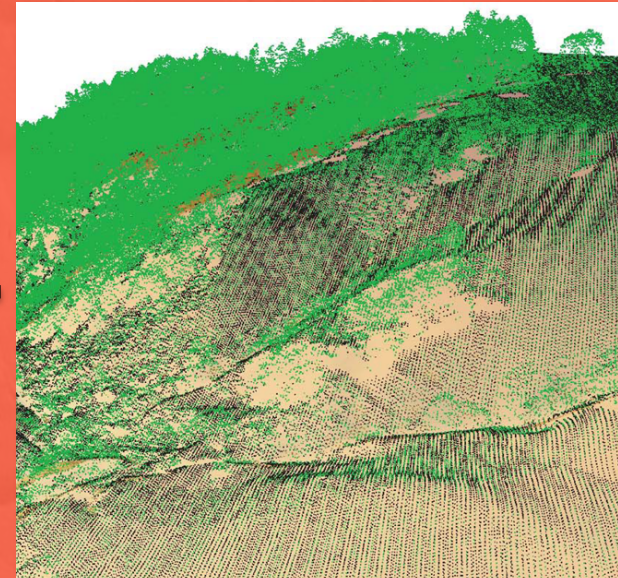
2. Process



Laser
+ GPS
+ IMU



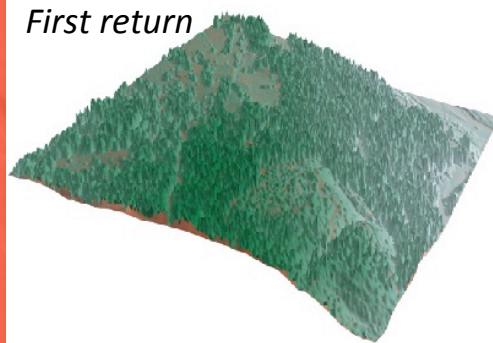
3. Classify
(filter)



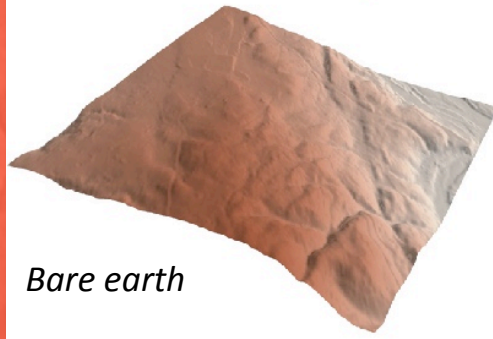
4. Grid



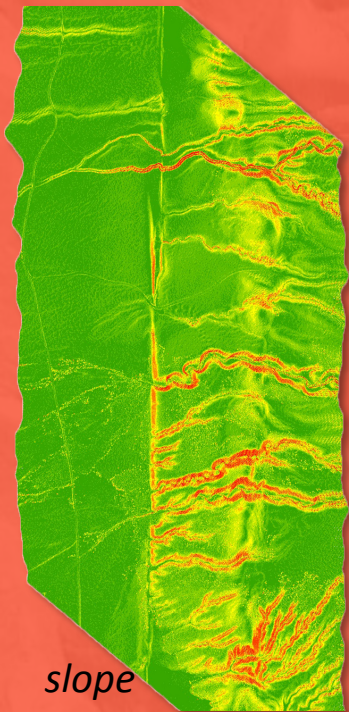
First return



Bare earth



5. Generate
Derivatives



Tiered Data Access:

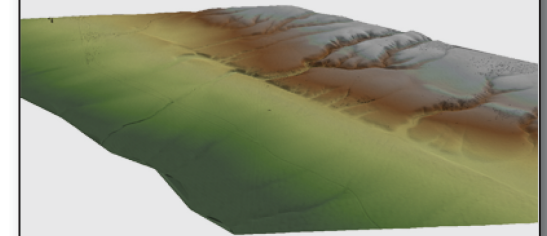
- Large and diverse user community requires range of data products.
- Pretty picture for synoptic data browsing and education.
 - Google Earth
- Vast majority of earth science users want a standard gridded product:
 - Optimized DEM
- Co-locate “raw” data next to processing tools to allow users to optimize terrain representation.
 - Data access *NOT* web-based GIS

Multi-Tiered Data Access: OpenTopography Products

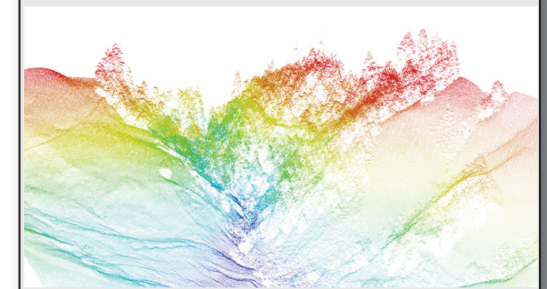
Google Earth (KMZ): *visualization & synoptic data browsing*



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



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



Data Volume, Computational Demands



Number of Users & Ease of Use



Owens Valley fault adjacent to the Fish Springs cinder cone in eastern California.



Overview Video



Find Data



Tools



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Latest News

OpenTopography v 3.2 Release Adds TIN-Based Gridding

Posted: June 16, 2011

We are pleased to announce the release of v. 3.2 of the OpenTopography system. This is a major update that... [[more](#)]

CSIG'11: Big Data and Big Computing in the Geosciences

Posted: June 08, 2011

The 8th annual Cyberinfrastructure Summer Institute for Geoscientists (CSIG'11) will be held

Connect with OpenTopography



Data Summary



Total Coverage: **16,056 km²**

Total number of LiDAR returns: **77,735,286,441**

Latest LiDAR Datasets:

[Lemhi Watershed - US Bureau of Reclamation](#)

[Oregon Dept. of Geology and Mineral Industries LiDAR Program Data](#)

[Lake Tahoe Basin \(CA/NV\) LiDAR](#)

[More Metrics...](#)

Latest Blog Entries

[AGU Session: New Constraints on Active Fault Zones from Laser Scanning, Satellite Interferometry](#)