Online Sources of Lidar Data

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2011 SCEC LiDAR Short Course:
Imaging & Analyzing Southern California’s Active Faults with High-Resolution Lidar Topography
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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 meters$^2$
(200 - 35 cm pulse spacing)

Other Factors:
• Collection parameters
• Processing
• Metadata!
Links

LiDAR Data Sources:

Online LiDAR data sources other than the OpenTopography Portal - see the Data lab 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 D3M** - 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 Coast: 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-CSI. 30 and 90 m SRTM data are also available via the Earth System Research Laboratory (ESRL) at NIST.

http://www.opentopography.org/index.php/resources/links
- Mostly active faults (and associated landforms) in western US
- Point cloud, custom products (DEM), standard DEMs, Google Earth hillshades
- Other resources including tutorials, short course materials, links, etc.
NOAA Digital Coasts:
http://www.csc.noaa.gov/digitalcoast/index.html

- Mostly coastal data
  -- includes OR point cloud
- Repeat surveys
- Point cloud, custom products (DEM's & 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
- 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/

- Lots of data for w. Washington
- DEMs, ASCII point clouds, hillshade images, contours
- clickable maps and FTP
Coastal and National Park/Monument emphasis
Collected with Experimental Advanced Airborne
Research Lidar (EAARL)
DEM, 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/](http://inside.uidaho.edu/geodata/LiDAR/)
- Iowa - [http://www.geotree.uni.edu/lidarProject.aspx](http://www.geotree.uni.edu/lidarProject.aspx)
- Louisiana - [http://atlas.lsu.edu/lidar/](http://atlas.lsu.edu/lidar/)
- Ohio - [http://ogrip.oit.ohio.gov/ProjectsInitiatives/StatewideImagery.aspx](http://ogrip.oit.ohio.gov/ProjectsInitiatives/StatewideImagery.aspx)
- Oregon - [http://www.oregongeology.org/sub/projects/olc/default.htm](http://www.oregongeology.org/sub/projects/olc/default.htm)
- Pennsylvania - [http://www.dcnr.state.pa.us/topogeo/pamap/elevation.aspx](http://www.dcnr.state.pa.us/topogeo/pamap/elevation.aspx)

List with URLs updated as I encounter new data sources at:
Interactive hillshade viewers:
- Web map or Google Earth based
- Make the data easy to access without GIS skills
- Excellent resource for education

http://www.opentopography.org/kml/
Open Topography

- 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

OpenTopography Partners:
- GEON
- SDSC
- ASU

OpenTopography Portal:
www.opentopography.org

Education
Fed / State / Local Gov’t users
Academia (NSF Science Geo / Bio / Eng)
Private sector

OpenTopography user communities:
Demonstrated interest in such a system from all groups

Education
CS R&D*
Cloud, waveform
Community Support

* R&D = research & development
D&P = development and production

Produced by NSF
EAR IF

OpenTopography Portal:
Would leverage education, geoinformatics and computer science funding combined with facility support to build a portal devoted to accessing, distributing and processing high-resolution LIDAR topography to serve a variety of user communities

Data partners / collaborators:
- UNAVCO
- NSF-funded, PI-driven data acquisitions
- CLICK data archives
- USGS
- Science for a changing world

other data and service partnerships to be determined...
CZO, NEON, etc

GeoES & TLS data

System interoperability and shared infrastructure
1. Acquire
   - Laser
   - GPS
   - IMU

2. Process
   - point cloud

3. Classify (filter)

4. Grid
   - First return
   - Bare earth

5. Generate Derivatives
   - slope
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
Spotlight

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 OpenTopography.

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: 77,735,266,441

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