

Geological Society of America
Short course 507

Saturday, 27 October, 9 a.m.-5 p.m.

Processing and Analysis of GeoEarthScope and Other Community LiDAR Topography Datasets

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Summary

LiDAR—Light, Distance, and Ranging (also Airborne Laser Swath Mapping-ALSM) topographic data are of broad interest to earth scientists. Many datasets are or will be available freely to the scientific community, especially for fault systems in the western United States via the GeoEarthScope project. These data have exciting and powerful applications in geomorphology, active tectonics, and geoscience education. Participants in this course will learn about LiDAR technology, access to publicly available datasets, software and hardware considerations for working with the data, data processing (raw or classified point clouds, digital elevation models, other derived products), and approaches for analyzing the data to answer their research questions.

Related web sites

<http://lidar.asu.edu> ASU managed site includes information related to this short course, our GEON LiDAR Workflow, and related research.

http://facility.unavco.org/project_support/es/geearthscope/ UNAVCO site for management of GeoEarthScope Project.

<http://www.geongrid.org/> GEON site including portal access to the GEON LiDAR Workflow

<http://www.ncalm.ufl.edu/> National Center for Airborne Laser Mapping

http://arrowsmith410-598.asu.edu/Lectures/Lecture9/DEM_data.html Tutorial to acquire Digital Elevation Data from USGS site and process them in ArcGIS

http://arrowsmith410-598.asu.edu/Lectures/Lecture9/ARC_scene.html Small tutorial on ArcSCENE to merge elevation data and air photos for 3D visualization

Acknowledgements

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- At the Geological Society of America, Jennifer Nocerino has been our main point of contact and has very professionally managed the short course logistics.
- Our GEON colleagues at San Diego Supercomputer Center, Chaitan Baru, , Efrat Frank (formerly at SDSC), Ashraf Memon, Ghulam Memon, Viswanath Nandigam, Dogan Seber, Margaret Smeeckens.
- Han Kim of the Computer Science Department of the University of California San Diego developed the local binning code that is central in the GEON LiDAR Workflow.
- Our ASU technical support colleagues Newton Alex, Jeffrey Conner, and Gilead Wurman. Sue Selkirk helped with the cover graphics. Josh Coyan produced the initial version of the main GEON LiDAR Workflow tutorials that are included here. Olaf Zielke, Megan Muretta, and David Hadded helped with the assembly of the notes.
- This course preparation and presentation as well as the data and technology presented within it were supported in part by US NSF grants ITR/EAR-0225543 (to Arrowsmith), ITR/EAR 0225673 (to Baru at SDSC), EarthScope and UNAVCO.
- ESRI and Global Mapper Software LLC for providing free software for the Short Course.
- Discussions with Jason Stoker at the USGS CLICK program.
- The teams at the National Center for Airborne Laser Mapping (NCALM--<http://www.ncalm.ufl.edu/>) and the Bevis group at the Ohio State University have generated much of the impressive research grade data we will discuss and that will be part of GeoEarthScope.
- The B4 data were gathered by the Ohio State University/USGS/NCALM/UNAVCO team team lead by Mike Bevis and Ken Hudnut. The NSAF and West Ranier Seismic Zone data were gathered by a NASA/USGS effort lead by David Harding and Carol Prentice. The Eastern California Shear Zone data were gathered for Mike Oskin of University of North Carolina by NCALM.
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Agenda

- 8 am *Board Bus at Denver Convention Center. Drive to UNAVCO Facility in Boulder.*
- 9 am Welcome and introductions--team and participants
Acknowledgements (Arrowsmith)
Goals of course and agenda review (Arrowsmith)
Overview of GeoEarthscope (Phillips)
- 9:30 am General overview of applications of LiDAR (Arrowsmith)
- 10 am Review of LiDAR technology and data acquisition considerations
- Sensor types and pulse rates (Phillips)
 - GPS control and dataset accuracy (including "corduroy" issues) (Phillips)
 - The role of vegetation in determining "quality" of the data (Crosby)
- 10:30 am *Break*
- 10:45 am Overall LiDAR processing workflow - what happens at each step, who typically does it, what is the processing parameter space that geoscience users should be thinking about exploring
B4 (OSU/USGS/NCALM) and NCAL (GeoEarthscope) experience (Phillips)
Data volumes, considerations for managing these datasets and point cloud inclusion in the GLW (Crosby)
- 11:15 am Accessing LiDAR data --NOAA LDART, USGS CLICK, NCALM data center, GEON LiDAR Workflow (Arrowsmith, Crosby)
- 11:45 am Exercise: An introduction to point cloud data using LVIZ for visualization (Arrowsmith, Crosby)
- 12:15 pm *Lunch*
- 1:15 pm UNAVCO tour (Phillips)
- 1:45 pm DEMO: GeoEarthScope data tutorial
- DEMO and Exercise: Getting terrain models into ArcGIS and then constructing useful derivatives and visualizations (Arrowsmith, Crosby)
- DEMO: Using the GEON LiDAR Workflow to access data and produce custom DEMs (Arrowsmith, Crosby)
- Additional ArcGIS exploration (Arrowsmith) OR working with GEON Points2Grid and Global Mapper (Crosby)
- 4:30 pm Final discussion
- 5 pm *Board bus to return to Convention Center, arriving before 6 pm.*