New Tools in Process-Based Analysis of Lidar Topographic Data

University Corporation for Atmospheric Research (UCAR)
UCAR Center Green 1, 3080 Center Green Drive
Boulder, Colorado, USA
June 1-2, 2010

Workshop organizers:
Dorothy Merritts (Franklin and Marshall College, dorothy.merritts@fandm.edu)
Noah Snyder (Boston College, noah.snyder@bc.edu)

Workshop website:
http://www.opentopography.org/index.php/resources/short_courses/lidar2_2010/

Sponsored by the National Science Foundation, Geomorphology and Land Use Dynamics and Instrumentation and Facilities programs and the National Center for Airborne Laser Mapping (NCALM) at the University of Houston.

This workshop is dedicated to the memory of Dr. Clint Slatton.

Workshop schedule

Monday, May 31

6:00-7:00 pm   Meet other early-arriving attendees at the Millennium Hotel bar

Tuesday, June 1

7:30-8:00 am   Welcoming coffee and tea
Put up posters, for display during the entire workshop

8:00-8:15   Workshop introduction: Dorothy Merritts and Noah Snyder

8:15-9:15   Plenary Lecture 1
Remotely-sensed topography used to map earth history
Ralph Haugerud (USGS- Seattle)

9:15-9:30   Break and posters

9:30-12:00   Workshops 1

1A. River Bathymetry Toolkit
Leaders: Jim McKean and Dave Nagel (U.S. Forest Service, Rocky Mountain Research Station); and Philip Bailey and Frank Poulsen (ESSA Technologies Ltd.)
Description: This workshop presents the River Bathymetry Toolkit (RBT), which processes high-resolution DEMs of channels and calculates standard measures of hydraulic geometry and aquatic habitat at user-defined locations. (*Note*: this workshop will be presented twice.)

1B. Filtering and quantitative analysis of lidar data
Leaders: Steve Martel (University of Hawaii) and Taylor Perron (MIT)
Description: This workshop will present methods for filtering and smoothing lidar data to detect and remove outliers, to diminish noise, and to detect and enhance signals.

12:00-1:00   Lunch

1:00-3:30 pm   Workshops 2

2A. Extracting landscape metrics for tectonic interpretation
Leaders: George Hilley (Stanford University) and Ramon Arrowsmith (ASU)
Description: This workshop includes the wavelet analysis of high resolution digital topography and the calculation of area-slope based metrics across DEMs with different spatial resolutions.

2B. Meaningful change detection and sediment budgeting from repeat topographic data
Leader: Joseph Wheaton (Utah State University)
Description: As repeat topographic data sets become an increasingly popular form of scientific monitoring, the need grows for robust methods of quantifying and accounting for uncertainties in those data to reliably distinguish between calculated changes likely to be real versus those changes one cannot distinguish from noise. Once the uncertainties in repeat topographic data sets are accounted for, the more interesting question of how to interpret the data and use it to test specific hypotheses remains. In this session, participants will learn how to use the DEM of Difference Uncertainty Analysis Software to do both an uncertainty analysis of repeat topographic datasets and interpret the data in terms of sediment budgets.
More Information: http://www.joewheaton.org/Home/research/projects-1/morphological-sediment-budgeting

3:30-3:45   **Break and posters**

3:45-4:15   **Update on NCALM activities and technology**
Bill Dietrich (UC-Berkeley), Ramesh Shrestha (University of Houston) and/or Bill Carter (University of Houston)

4:15-6:00   **Pop-ups 1**
Short (<5 minutes) talks on lidar-related research by workshop participants.

6:00-7:00   **Break, reception and posters**
Appetizers and drinks

7:00-9:00   **Workshop banquet**

Wednesday, June 2

7:30-8:15 am   **Welcoming coffee and tea**

8:15-9:15   **Plenary Lecture 2**
Lidar remote sensing of ecosystem structure
Michael Lefsky (Colorado State University)

9:15-9:30   **Break and posters**

9:30-12:00   Workshops 3

3A. River Bathymetry Toolkit
Leaders: Jim McKean and Dave Nagel (U.S. Forest Service, Rocky Mountain Research Station); and Philip Bailey and Frank Poulsen (ESSA Technologies Ltd.)
Description: This workshop presents the River Bathymetry Toolkit (RBT), which processes high-resolution DEMs of channels and calculates standard measures of hydraulic geometry and aquatic habitat at user-defined locations. (*Note*: this workshop will be presented twice.)

3B. GeoNet: A computational tool for channel extraction from lidar
Leader: Paola Passalacqua (National Center for Earth-Surface Dynamics, University of Minnesota)
Description: GeoNet is an advanced methodology for channel network extraction, which incorporates nonlinear diffusion for the pre-processing of the data and geodesic energy minimization for the extraction of channels. This 3-hours workshop will combine a lecture with hands-on practice. The lecture will introduce the theoretical background, and the hands-on portion will focus on the application of GeoNet to basins of different geomorphologic characteristics.

12:00-12:45   Lunch

12:45-1:15   Discussion of Open Topography
Ramon Arrowsmith (ASU), Chris Crosby (UCSD)

1:15-2:00 pm Pop-ups 2
Short (<5 minutes) talks on lidar-related research by workshop participants.

2:00-4:30   Workshops 4
4A.   Identifying and mapping landforms and quantifying fault displacement with lidar digital topographic data
Leaders: Kurt Frankel (Georgia Tech) and Ramon Arrowsmith (ASU)
Description: A hands on and applied workshop on mapping, designed to bridge from academic to agency and industry communities. Workshop will include reference to activities underway by California Geological Survey and Oregon DOGAMI.

4B. 1D open channel flows on lidar data using HecRAS and HEC-GeoRAS
Leader: Noah Finnegan (UC- Santa Cruz)
Description: This workshop will present the basics of (1) generating input files from lidar data for use with the 1D hydraulic modeling package HEC-RAS, and (2) performing simple lidar-based open channel flow calculations in HEC-RAS.

4:30   Workshop adjourns
Take down posters