

Reports and Metadata for Snow-On and Snow-Off LiDAR Point Cloud Data and Digital Elevation Models for Study of Topography, Snow, Ecosystems and Environmental Change at Boulder Creek Critical Zone Observatory, Colorado

ABSTRACT

This data release consists of Digital Elevation Models (DEM's) and LAS-formated point cloud tiles derived from a snow-on (May, 2010) and snow-off (August, 2010) LiDAR (Light Detection and Ranging) survey inside the Boulder Creek Critical Zone Observatory (CZO), near Boulder Colorado. This data was collected in collaboration between the Boulder Creek CZO and the National Center for Airborne Laser Mapping (NCALM), both funded by the National Science Foundation (NSF). Together, the LiDAR Digital Elevation Models (DEM) and point cloud data will be of interest to land managers, scientists, and others for study of topography, snow, ecosystems and environmental change. The Boulder Creek CZO will be using the LiDAR data to further their mission of focusing on how water, atmosphere, ecosystems, & soils interact and shape the Earth's surface. The "Critical Zone" lies between rock and sky. It is essential to life - including human food production - and helps drive Earth's carbon cycle, climate change, stream runoff, and water quality.

The dataset contains 1m Digital Surface Models (first-stop), Digital Terrain Models (bare-earth), and 10 points/m² LAS-formated point cloud tiles. Total area imaged is 600 km². The DSM's and DTM's are available in GeoTIFF format, approx. 1-2 GB each, with associated shaded relief models, for a total of 30 GB of data. The continuous DEM surfaces were created by mosaicing and then kriging LiDAR point cloud LAS-formated tiles using Golden Software's Surfer 8 Kriging algorithm. Each DEM has the functionality of a map layer for use in Geographic Information Systems (GIS) or remote sensing software. The Digital Terrain Model (DTM), is a ground-surface elevation dataset better suited for derived layers such as slope angle, aspect, and contours. The LiDAR point cloud data was acquired with an Optech Gemini Airborne Laser Terrain Mapper (ALTM) and mounted in a Piper Twin PA-31 Chieftain with Inertial Measurement Unit (IMU) at a flying height of 600 m. Data from four GPS (Global Positioning System) ground stations were used for aircraft trajectory determination. The point cloud data was divided into 1x1 km tiles for the Snow-On data and 500 m x 1 km tiles for the Snow-Off data for a total of 310 GB of data. Horizontal accuracy is 11 cm RMSE at 1 sigma and vertical accuracy is 5-30 cm RMSE at 1 sigma. Accessory layers consist of index map layers for point cloud tiles and flight lines. The data is available through an unrestricted public license.

The snow-off datasets have a common extent, extending from the top of the Continental Divide east to Boulder. The snow-on datasets have a smaller, though overlapping extent, encompassing the top of the Divide then east to Gordon Gulch. All map layers share a UTM zone 13 projection, with a NAD83 horizontal datum and a NAVD88 vertical datum, with FGDC-compliant metadata. All together, the data release totals 340 GB. To access the data, see: <http://opentopography.org>. With questions, please contact the CZO Data Manager, University of Colorado, Institute of Arctic and Alpine Research (INSTAAR), Boulder Creek CZO; 1560 30th Street; Boulder, CO 80309-0450; email: Chi.Yang@colorado.edu or Eric.Parrish@colorado.edu.

**** Important Note: Due to weather and equipment failures the Snow-On surveys were flown during 2 different time periods in May, between which there were substantial snow accumulations. Check the Snow-On dataset metadata files for details.**

METADATA AND CITATION

PLEASE READ the FGDC-compliant metadata files that are available for each dataset (in .html, .txt, and .xml formats). These files provide numerous details that may be of interest. Also, please cite this data release as: Anderson, S.P., Qinghua, G., and Parrish, E.G., 2012, Snow-on and snow-off LiDAR point cloud data and digital elevation models for study of topography, snow, ecosystems and environmental change at Boulder Creek Critical Zone Observatory, Colorado: Boulder Creek CZO, INSTAAR, University of Colorado at Boulder, digital media.

FILE LIST

File or Folder Name	Description	Size
0README_BcCZO_LiDAR_reports_metadata.pdf	Readme file (this file)	
► BcCZO_project_reports		13 MB
BcCZO_FGDC_DTM_SnOff_metadata.html	Also available in .txt and .xml. This file is the metadata file from the snow-off bare-earth (DTM) DEM.	
BcCZO_2010_Project_Report.pdf	CZO LiDAR project report, 6 sites, 11 LiDAR surveys, prepared by NCALM	
BcCZO_2010_QA_QC_Snow_Off_Report.pdf	Quality Assurance/Quality Control Snow-Off report from the Spatial Analysis Lab at the Uni of CA, Merced	
BcCZO_2010_QA_QC_Snow_On_Report.pdf	Quality Assurance/Quality Control Snow-On report from the Spatial Analysis Lab at the Uni of CA, Merced	
GEM_2005_Tutorial.pdf	Tutorial: Evaluating the Quality of ALSM Observations by Reading Artifacts in the Computer Surface Coordinates	
NCALM_2007_WhitePaper.pdf	"Research-Quality" Airborne Laser Swath Mapping: The Defining Factors	