Project Report:
LiDAR Processing and Adjustment, Lake Isabella Dam, California

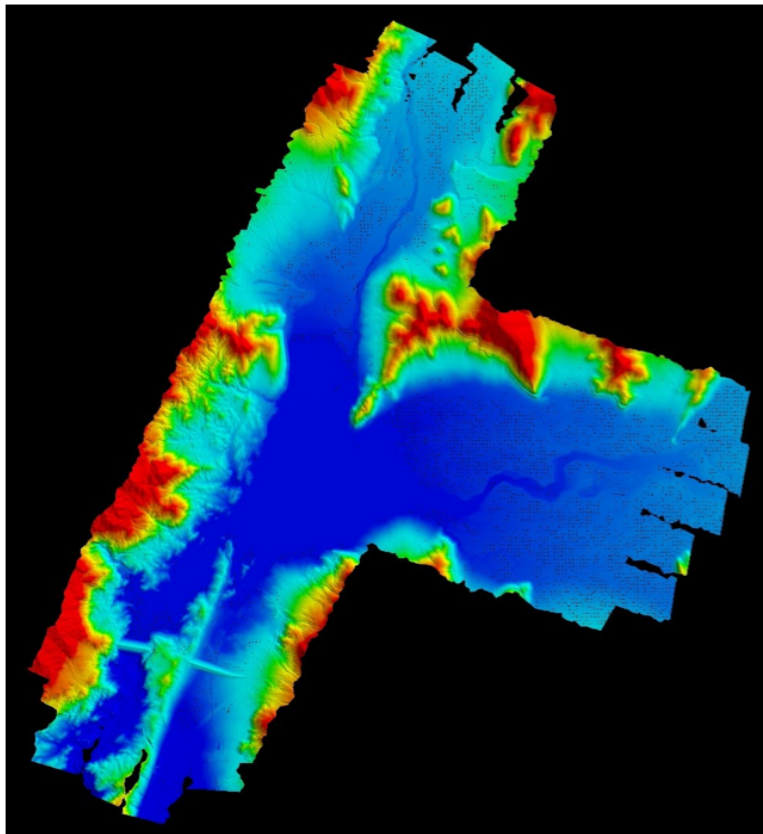**Collection Date:** August 21, 2015

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Overview

Airborne LiDAR data was acquired by CRREL on 21 August 2015 over Lake Isabella and the Lake Isabella Dam, California as part of a coincident regional study (Figure 1). These data were collected using an airborne laser scanning (ALS) system comprised of a Riegl Q680i full-waveform LiDAR sensor, an Applanix POS AV INS system, and custom designed hardware and aircraft integration components. The system was installed in a Partenavia P.68, with an average collection AGL of 2,600' and airspeed of 90 knots. The total collected area was approximately 22-mi^2. A total of 19-flight-lines were collected during a single flight, with 50% overlap of laser swath coverage, given a 60° across track field-of-view.

Task List

- Reprojection of LiDAR point-cloud data into the desired coordinate system (NAD83, CCS Zone 5, US Survey Feet, NAVD88 USFT)
- Classified vertically for vegetation and bare earth
- Tiled output in LAZ format (500m x 500m tiles)
- Compared to previous collection data of Lake Isabella and adjusted/aligned
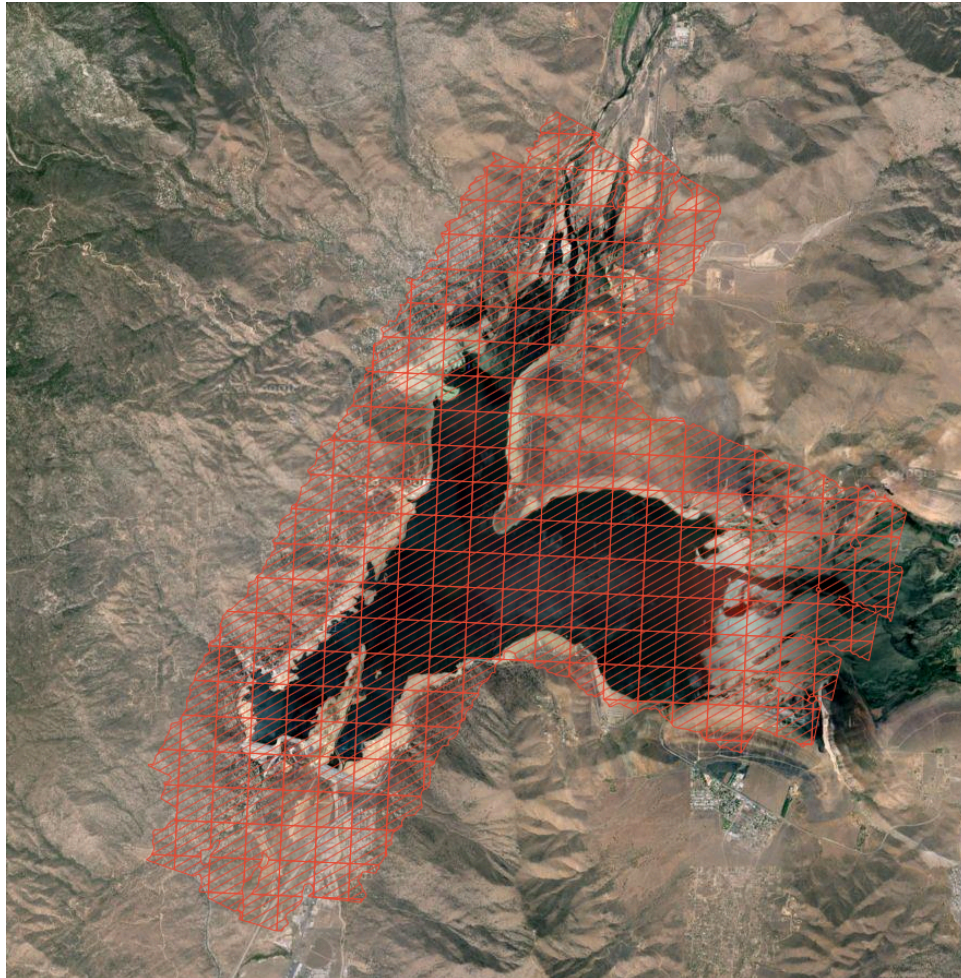- Uploaded to GRiD for access

Figure 1: Tiled LiDAR data collected 21 Aug. 2015 by CRREL, Lake Isabella, CA (Image from GRiD).

Data Acquisition and Processing

- Full-waveform LiDAR data was collected with the Q680i and trajectory information was collected by the Applanix FOS AV INS system.
- Airborne trajectory was processed using six Continuously Operating Reference Stations (CORS), which completely surround the collection area.
- All CORS sites were recording GNSS observations at 1-second epochs.
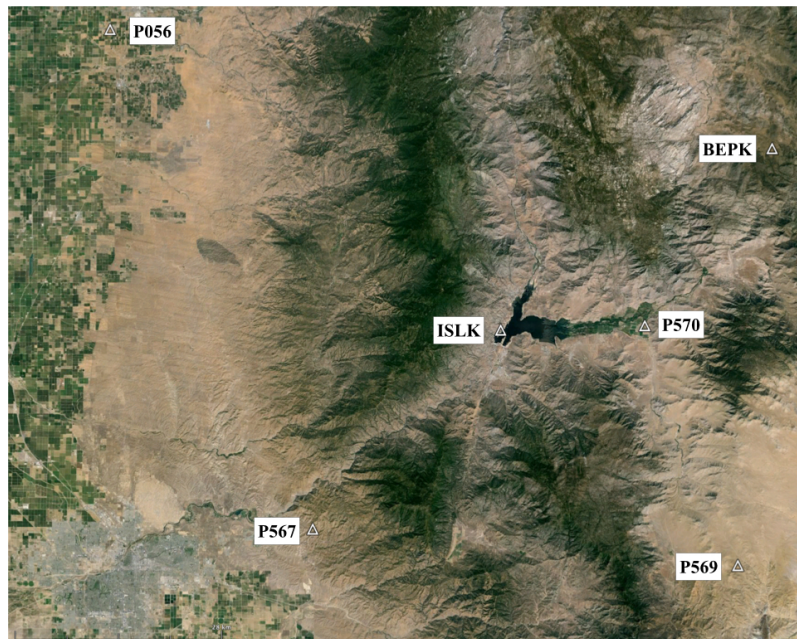- Stations used: BEPK, ISLK, P056, P567, P569, and P570 (Figure 2).

Figure 2: Location of base stations used.

- 24-hour occupations for each site were used to compute NAD83(2011) Epoch 2010.000 coordinates for each site using OPUS.
- Next, a static network adjustment using 48-hours of data was undertaken using all six sites in Grafnet software in order to refine the OPUS solutions and ensure no relative errors between base station coordinates.
- All six base stations were utilized in the Applanix PostProc kinematic GNSS/INS trajectory determination software to compute a Virtual Base Station for the over flight.
- The GPS static network estimated point accuracy was at the level of 1-cm Horizontal and 2-cm Vertical (95% confidence).
- Output coordinates were UTM Zone 11 (meters), elevations were in ellipsoidal height (meters), datum remained NAD83(2011) Epoch 2010.000.
- LiDAR point-cloud processing was conducted in RiPROCESS.
- LiDAR data was reprojected into the desired coordinate system (NAD83, CCS Zone 5, US Survey Feet, NAVD88 USFT) using check and control points from previous LiDAR collection.
- Data was tiled into 500m x 500m sections and converted to the LAZ file format.
- The data was classified: Class 5 = Keypoints, Class 3 = Remaining Ground Points

Data Products

The tiled, classified LAZ files (286 files total) have been uploaded to GRiD (https://griduc.rsgis.erdc.dren.mil) and are available for download and online processing within the GRiD System.
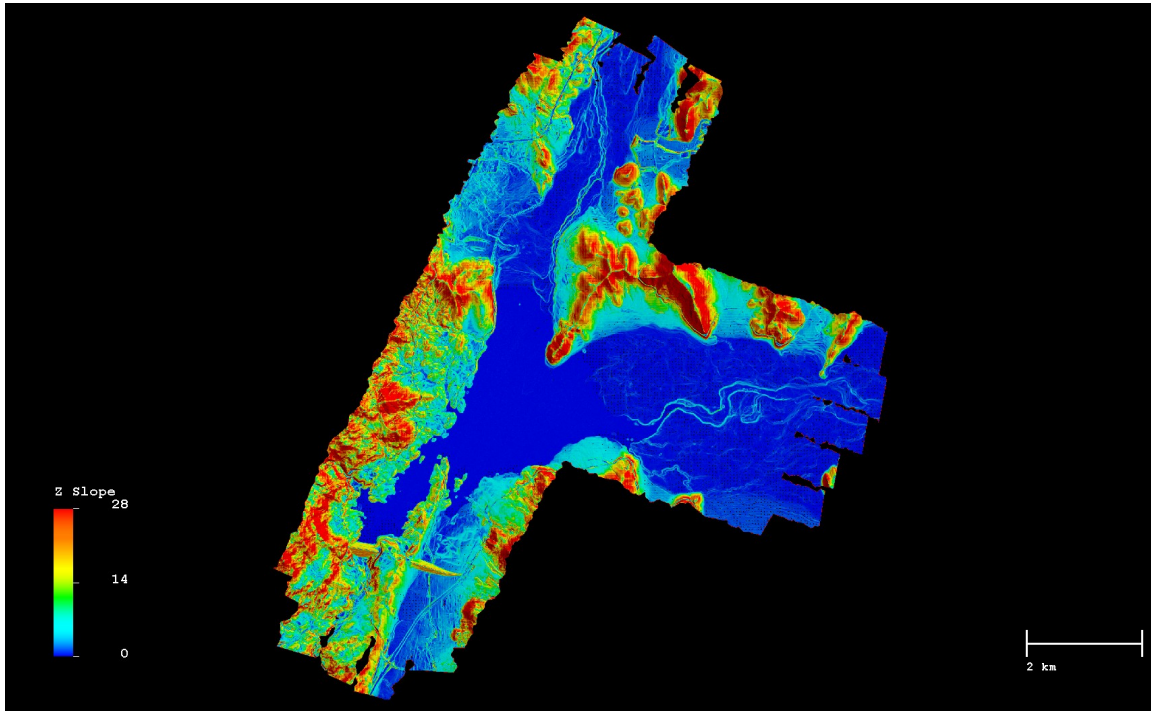

Figure 3: Example of Class 5 (Keypoints) DEM colored by slope.