

Topo-Bathymetric LiDAR for Beaver Island, Michigan: Experiences from our first international project

Tuesday, Mar 1st, 2016

Presentation Overview

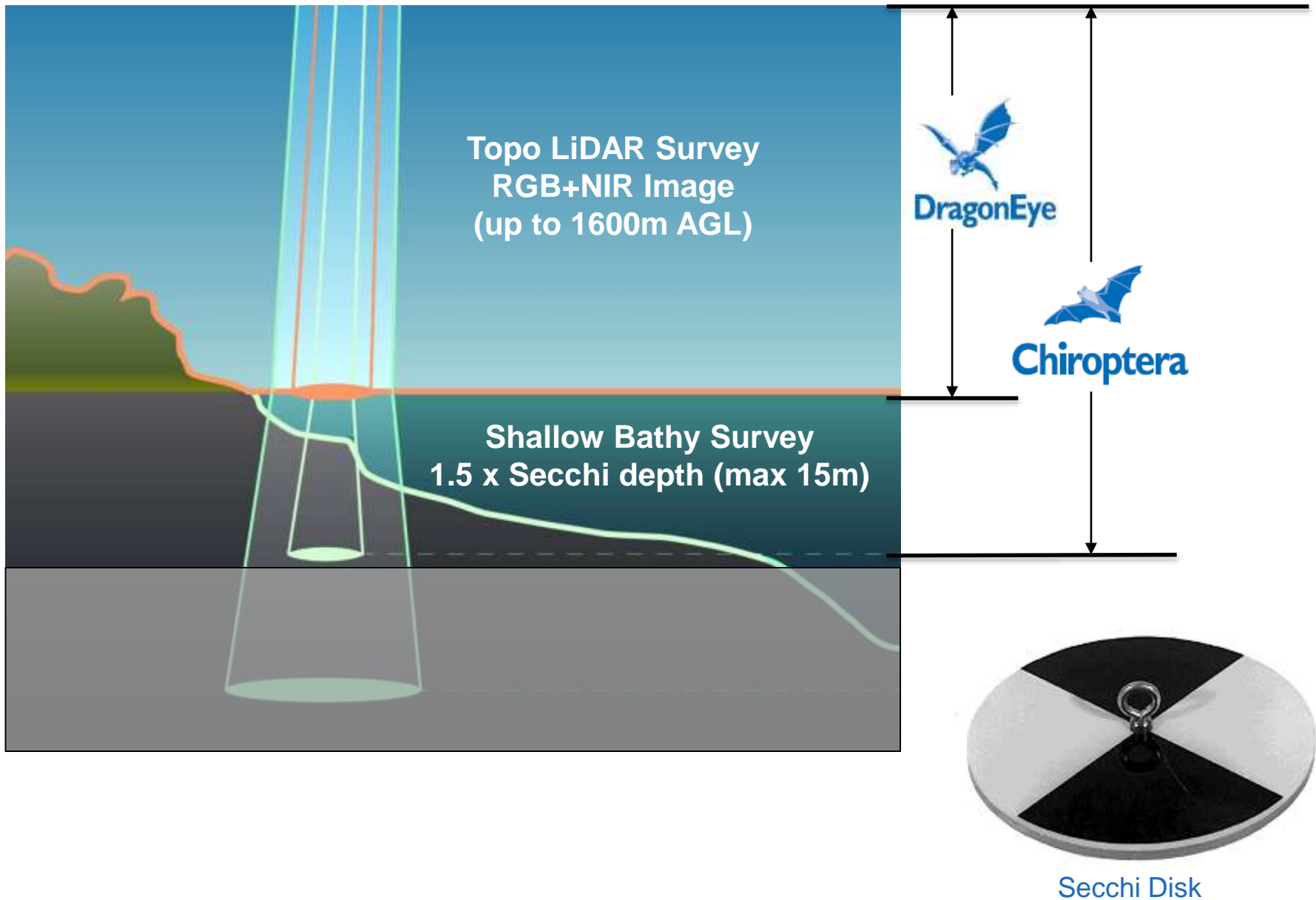
- About the Leica AHAB Chiroptera II
- Project Planning Process
- Preparation Upon Arrival
- Airborne Data Collection
- Ground Control Collection
- Projects Results
- Project Status
- Challenges
- Lessons Learned

Topo-Bathymetric LiDAR

- AGRG's Leica AHAB Chiroptera II installed into our Navajo
- Work together to accomplish our individual projects

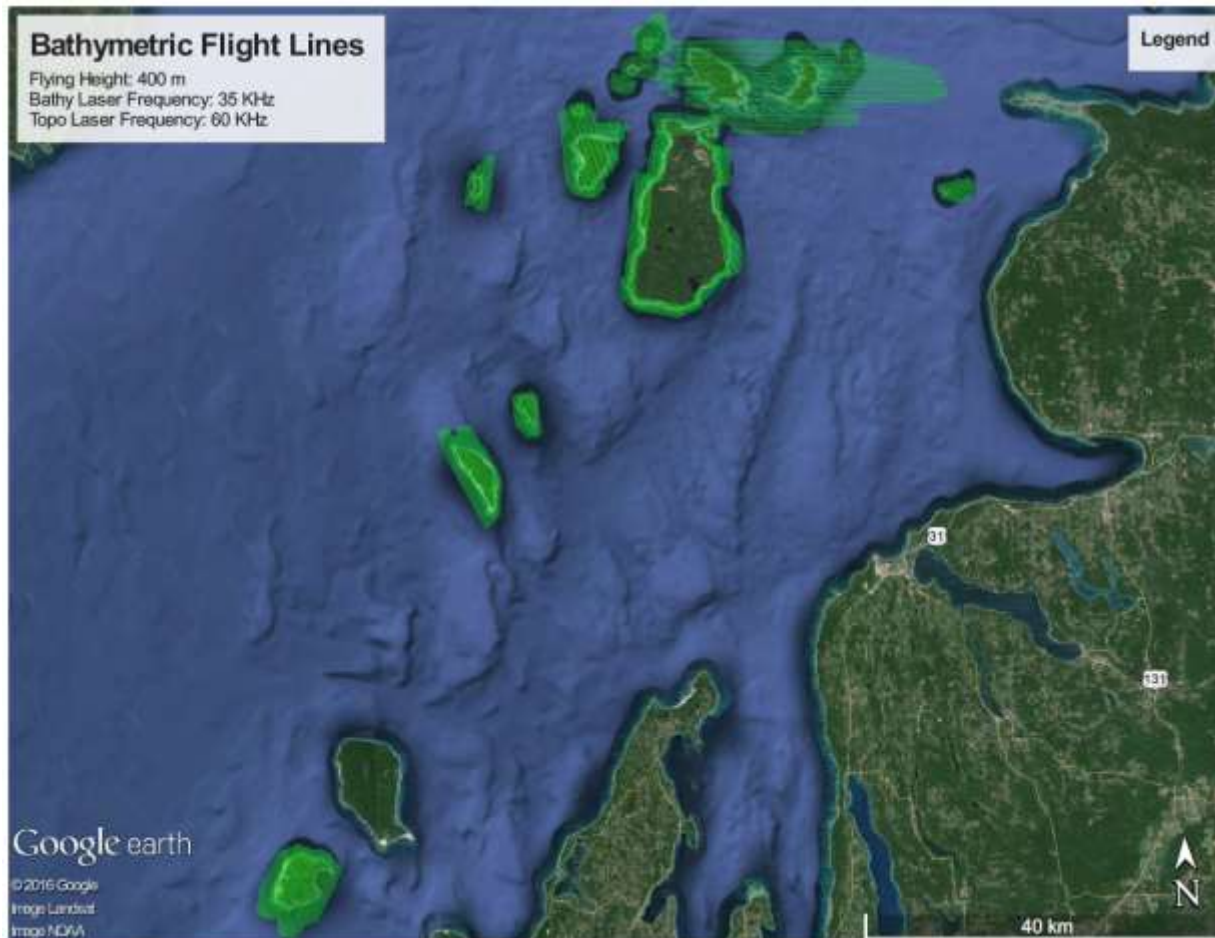


Topo-Bathymetric LiDAR



Planning

- Collect Topo-Bathymetric LiDAR data for Beaver Island and several smaller surrounding islands



Planning

- Collect Topo-Bathymetric LiDAR data for Beaver Island and several smaller surrounding islands



Preparation & Travel

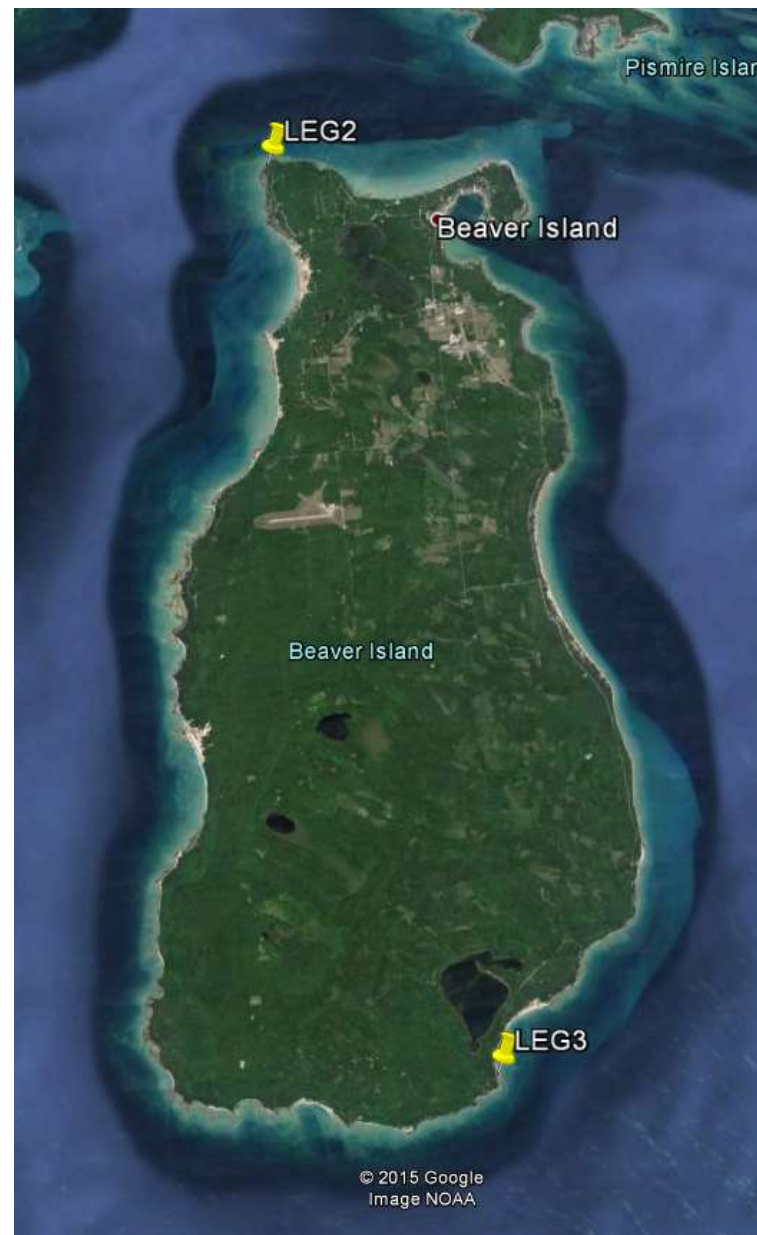
- Conference call with client to discuss details and introduce team
- Coordinating with our partners at AGRG
- Driving to island
- Waiting to get across on the ferry



Beaver Island Ferry, Charlevoix

Preparing for Collection: Plane Bases

- Plane base reconnaissance
- Establishing control markers
- Clear View of Sky (no obstructions)
- Within 30 km of flight lines
- Send approximate position to operator
- Plane base set up prior to data collection
- Coordinate adjusted using CORS stations



Collection Crew

- Pilots and System Operators
- Started data collection on November 16



From left: Cole, Jonny, Nathan (AGRG), and Allan

Getting Data From Plane

- Two flights a day if weather permitted
- Plane landed in between flights to fuel up
- Jonny sent estimated landing time
- Exchanged full drives for empty ones I backed up

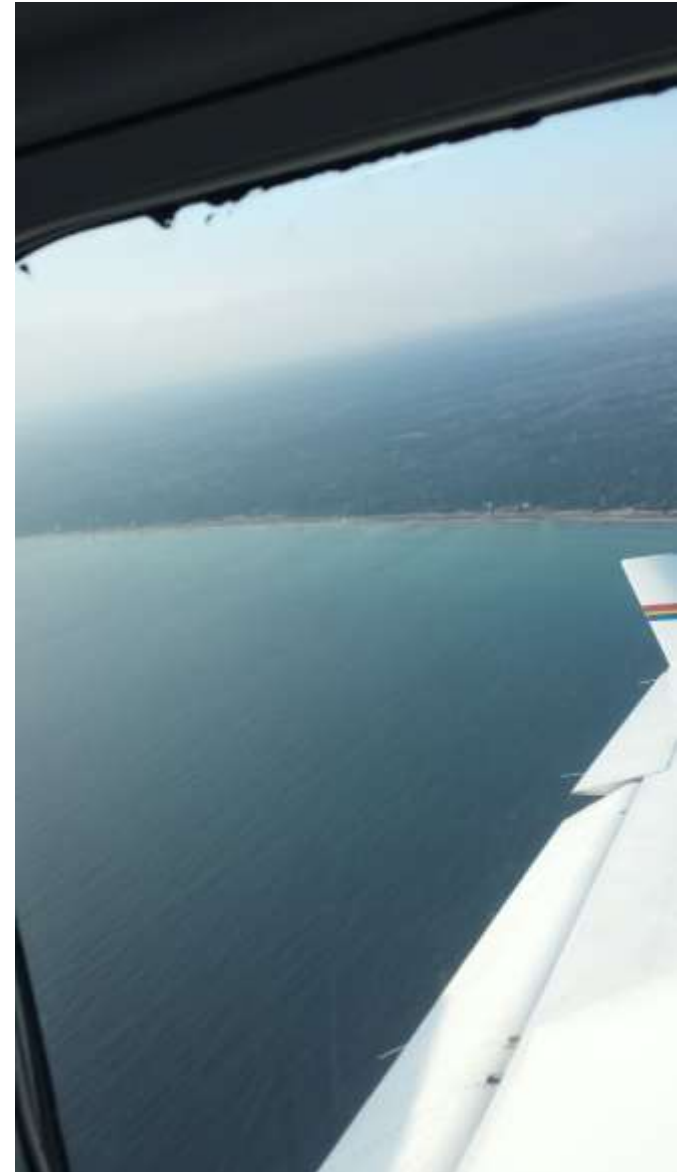


Cole fueling the Navajo

Data Collection

- 10 minutes of static before and after landing
- Obtain fixed position
- Fly over plane base before and after collecting lines
- Perform s-turn (reset IMU)

- Watching system power levels to minimize noise
- Avoid clouds/fog using incoming photos & LiDAR waveform



Collecting Project Control

- Collected during rainy days
- Topcon HiPerV
- Transects to check LiDAR data
- Photo points for aerial photos
- 15 – 25 min rapid static points
- Adjusted using CORS stations



Photo Point



Transect Point

Water Temperature

- Used for refractive index of water calculation in Leica Survey Studio
- Maintained by the National Data Buoy Center
- Chosen by the client



Data Portal



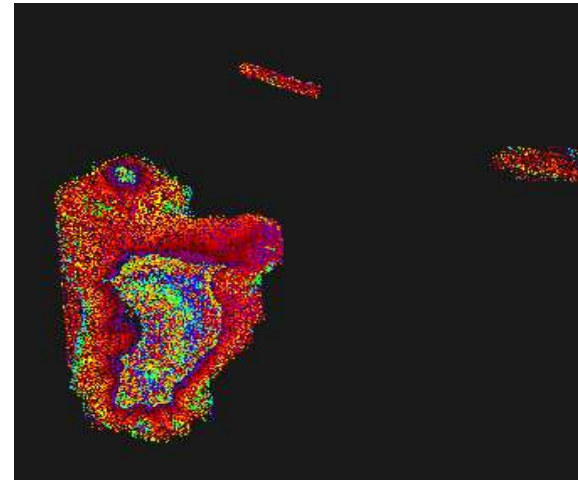
Data Processing Workflow



Project Control: GrafNet



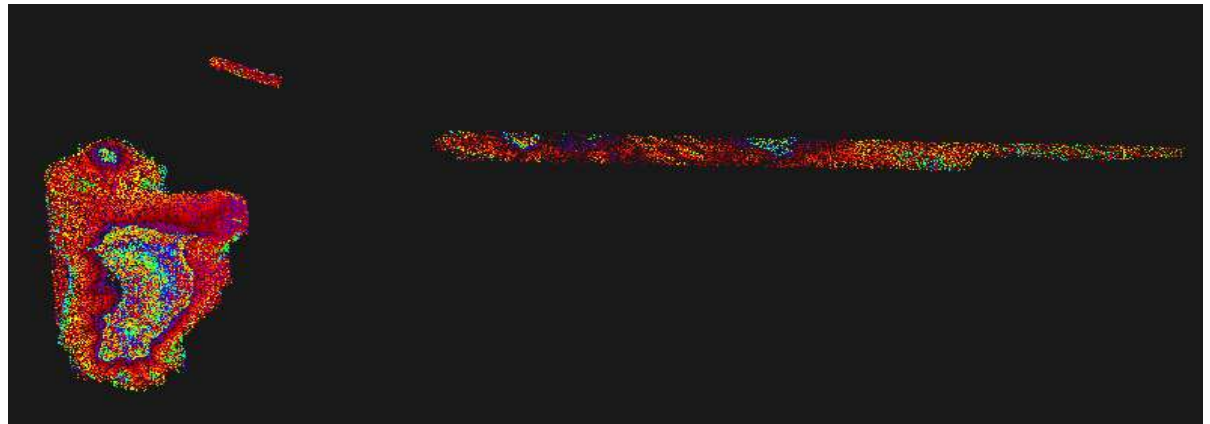
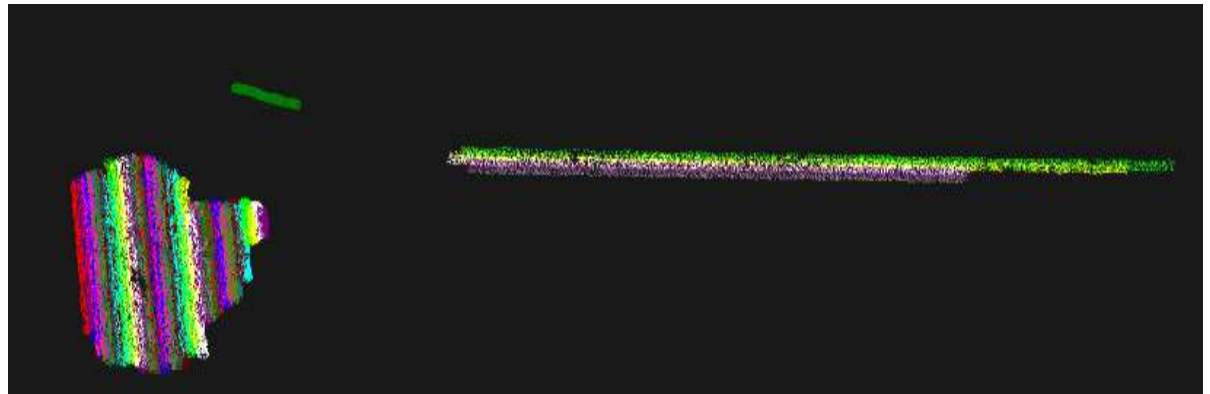
Trajectory: Inertial Explorer



LiDAR: Leica Survey Studio (LSS)

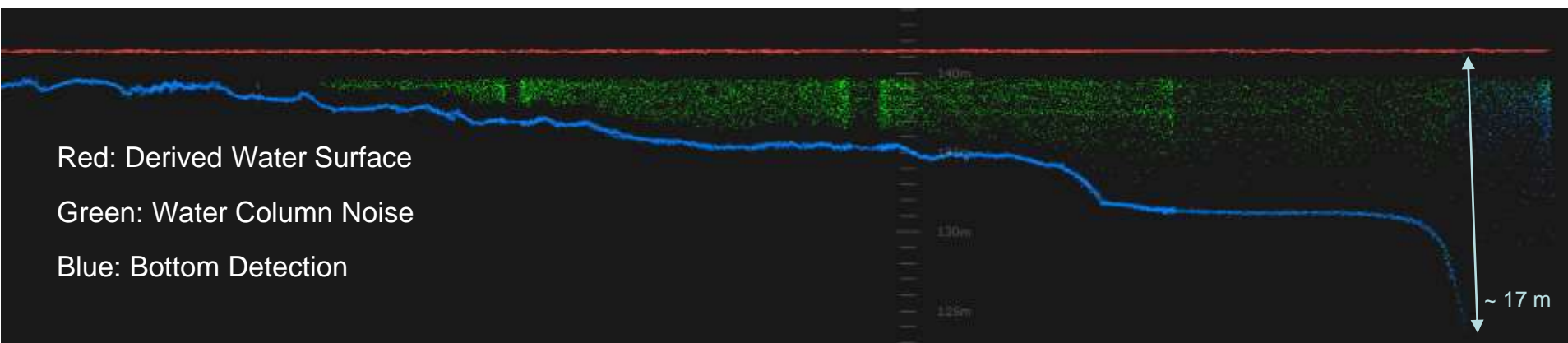
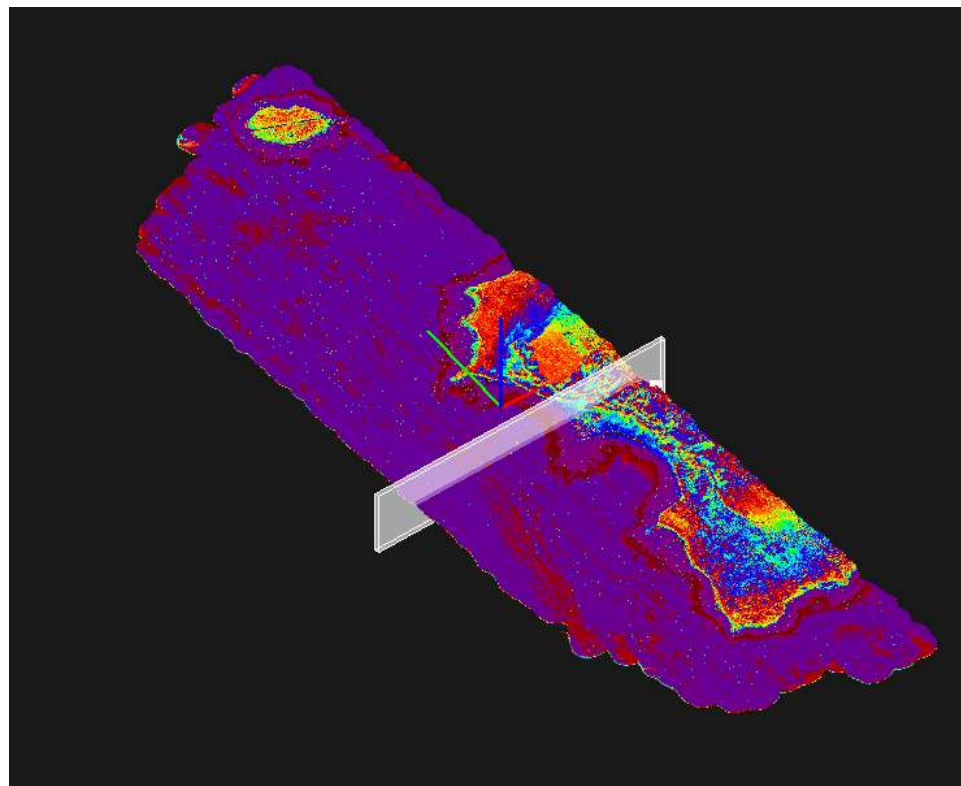
Data Visualization in LSS

- Data Colored by Strip
- Used to ensure all of the data was processed correctly (ie no gaps)
- Data Colored by Height
- Used to check strip/strip (relative) accuracy
- Used to identify clouds or fog in data



Data Visualization in LSS

- Taking a cross section in LSS
- Checking strip/strip (relative accuracy)
- Checking classification



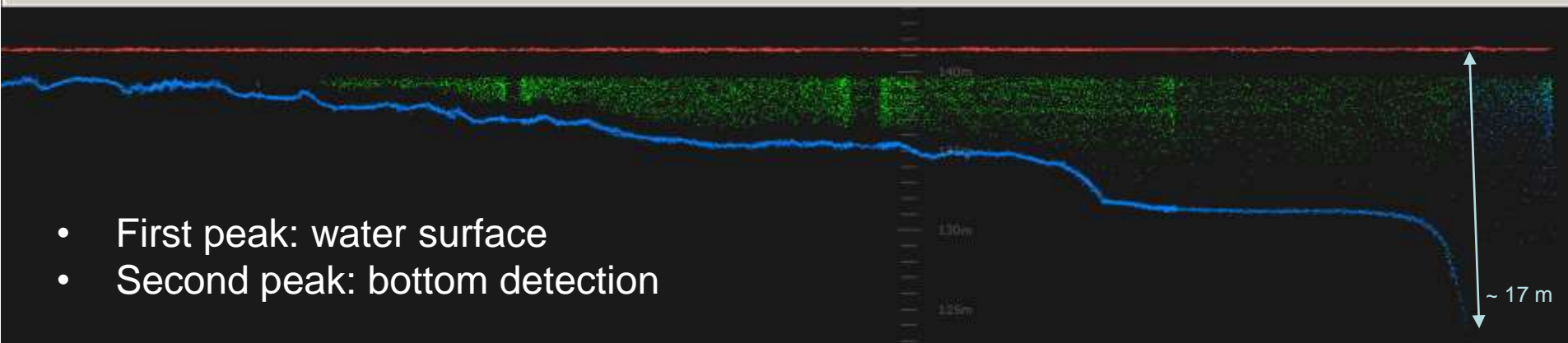
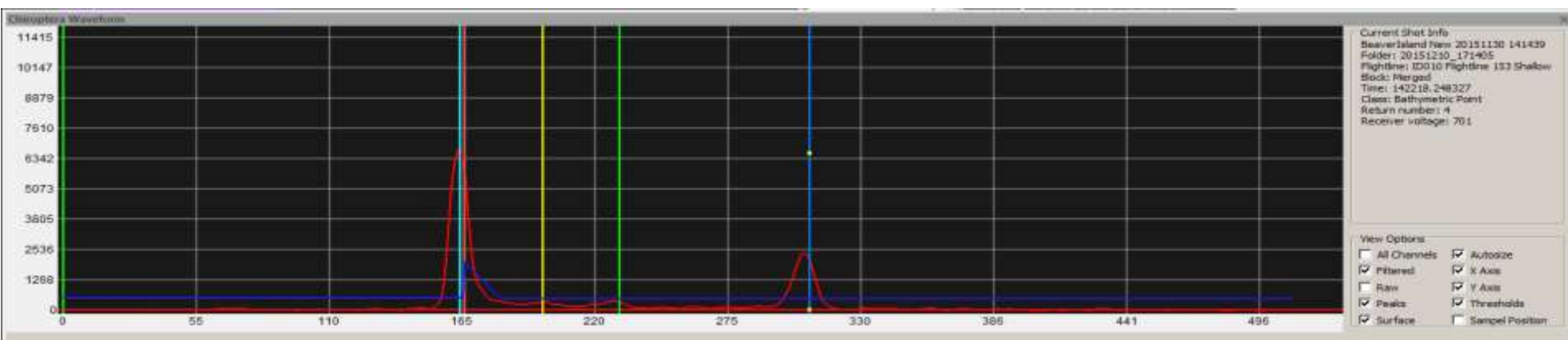
Red: Derived Water Surface

Green: Water Column Noise

Blue: Bottom Detection

~ 17 m

LSS Waveform Viewer



- First peak: water surface
- Second peak: bottom detection

Project Status



- Did not finish collection due to weather
- 305 lines flown
- 64 lines to go
- 1 - 2 more days of collection



Challenges

- Weather
- Location
- Plane base logistics
- Time of year (got dark early)



Lessons Learned

- Be prepared to wait for weather
- Keeping client informed and satisfied
- Weather days are good for control collection
- The importance of good reconnaissance
- Public awareness never hurts!

