

Case Studies

GeoCue Down Under

GeoCue



Martin Flood
November 2013
Revision 1.0

We have a long history at GeoCue of working with companies and organizations from “down under”. Our LP360 for ArcGIS continues to find widespread adoption in Australian firms and government agencies, and our GeoCue workflow management suite is deployed to support production operations in the very active airborne LIDAR market in the region. However, this spring we were invited to consult on a unique project with the Tablelands Regional Council in northern Queensland. If you have ever visited the region – and if you haven’t, you should – you will know that far north Queensland is a wonderful place to explore. The Tablelands region itself covers 64,768 square kilometers of diverse landscapes, including world heritage rainforests and crater lakes, expansive savannahs and wetlands, along with a variety of rural and agricultural farming. Cairns is the major town in the area and is a great staging area for exploring the region or the Great Barrier Reef just offshore.



Figure 1 - GeoCue consultant hard at work...

We were contacted by the Tablelands Regional Council, acting through Atherton Tablelands GIS (ATGIS), to assist them with a unique mobile LIDAR pilot project. Our consulting services are not as well-

known as our software products, but we often engage with clients who are at the front-end of LIDAR technology deployments to assist them in this manner. As a neutral observer with years of experience in this industry, we can offer advice and insight on everything from the business model to the technology. ATGIS felt we were uniquely qualified to assist them with managing this pilot project, while maintaining an independent position on specific solutions or technology. The driver for the pilot project is the Tablelands Regional Council decision to evaluate the potential for mobile LIDAR scanning technology to improve accuracy and efficiency in the assessment and reporting of road asset defects on a regular, on-going basis for its entire road network. They are particularly interested in rapid damage assessment after disaster events. The intent of the initial pilot study is to determine the cost/benefit offered by LIDAR technology, as it applies to Tablelands Regional Council's specific needs and requirements. Specifically, this will include assessing both LIDAR hardware and software tools' suitability for data capture, automatic feature identification, and repeatability of subsequent pass surveying for acquiring change detection data in the Atherton Tablelands, including both sealed and unsealed roads. The project is motivated by the large economic value that timely, accurate road assessment tools represent to the Tablelands Regional Council. It is anticipated that if the pilot is successful in demonstrating useful, cost-effective feature extraction capabilities, especially in disaster response scenarios, ATGIS will move forward with acquiring both hardware and software tools to support its own mobile LIDAR mapping capability in the future.

ATGIS asked us for assistance in coordinating the field trials, assessing the data quality and suitability for purpose and coordinating with the software vendors on feature extraction capabilities demonstrations. In the spring, several mobile LIDAR sensor manufacturers were invited to perform a series of field tests by collecting mobile LIDAR data and imagery of five pilot sites in the Tablelands region. Several of these test sites include features unique to the Tablelands, such as driving under the rainforest canopy for extended distances. The field sites were chosen carefully to be representative of some of the toughest environments across the Tablelands, as well as offering examples of a diversity of known road defects. This meant we were often driving on some pretty rough roads! Project control was provided by both ground points (painted chevrons) and elevated targets (checkerboard signs) placed along the road network at 100 m intervals, with half of the control provided to the vendors and half withheld for independent validation of results. We participated in these field trials as observers and got to spend three weeks in the Atherton area. In addition to the field work, this was a great opportunity to explore the area and get in some scuba diving on the Great Barrier Reef, an experience nearly curtailed by the arrival of tropical cyclone Zane, a category 3 cyclone off the coast at the beginning of May. Despite the bad weather, there was still a lot to experience. For example, you can – and we did – take a tour to sample the locally manufactured beer, chocolate and cheese, all in the same afternoon; wonderful!



Figure 2 - Ground Control Point



Figure 3 - Elevated Control Point

With the field work completed, attention has now turned to assessing the ability of commercial software tools to identify and extract defects from the point cloud and imagery. To support this data analysis phase of the project, ATGIS has compiled an extensive list of road defects and related features it wants to be able to identify from this field data, ideally in as automated manner as possible. The questions we are exploring with software vendors, for each feature type, include:

- Can it be identified and extracted automatically from the point cloud using an algorithmic approach?
- Can it be identified and extracted semi-automatically from the point cloud where either (a) an automated routine identifies candidate areas and a user manually verifies and edits the results or (b) a user manually trains the software on candidate areas and the software then automates the extraction of similar areas?
- Can the defect be identified and extracted from the point cloud manually by a user?
- Can the defect be identified and extracted from the LIDAR point cloud alone or is imagery also required?
- Can the defect be extracted from the imagery alone?

Currently, we are in the process of overseeing the dissemination of the field data collected by the hardware vendors to any interested software vendors for evaluation and demonstration of their product's feature extraction capabilities (and if you are interested in participating and haven't heard from us, please do let us know!). The goal is to identify software tools that would be beneficial for ATGIS to deploy in data post-processing, should they move ahead with a hardware purchase in 2014. We expect to have a final report ready early in 2014.

Case Studies

GeoCue Down Under



Figure 4 - Field work; field work never changes.

This has been an exciting project for us, not just because of the locations we got to travel to (although that certainly didn't hurt!), but because it shows the increasing exploitation of mobile LIDAR to solve very difficult road surveying problems in a timely and cost-effective manner. It brings together many of the areas we are always excited about exploring with clients: implementing effective data management systems, deploying robust workflow management tools and last, but certainly not least, evaluating cutting-edge feature extraction algorithms and approaches. We are looking forward to completing our work on this pilot project with ATGIS on behalf of the Tablelands Regional Council, but have to admit we are secretly hoping they will need much more assistance in the future and ask us back for another visit to the Tablelands.



Figure 5 - No problem for LIDAR, right?