

# YES, WE CAN

## Provide High-Quality LiDAR for Less Than \$100 per Square Mile

**T**he October 2015 issue of *LiDAR Magazine* featured an article titled “You Can Do That for *How Cheap?*” The general premise of the article was that although the cost of LiDAR is declining, lower cost does not necessarily represent a better result or ROI for the client agency. It was certainly a thought-provoking look at what is really happening in the profession, which is a lot of disruption. The article offered a lot of questions but did not provide any concrete answers as to why paying more is better. That leaves the question, what are we really paying for?

Some providers suggest that some in the profession are in a “race to the bottom” of the LiDAR market, simply driving price down and offering a lesser service. When linear mode LiDAR providers like my company, Atlantic, provide USGS Quality Level 2 data at less than \$100 per square mile, there is more reluctance to accept this as possible innovation than it is to accept an emerging technology, like Geiger, to get us to a better price point.



\$100 / mi<sup>2</sup> for USGS QL2 LiDAR data using linear-mode LiDAR technology is not only possible, but is already being done by Atlantic.

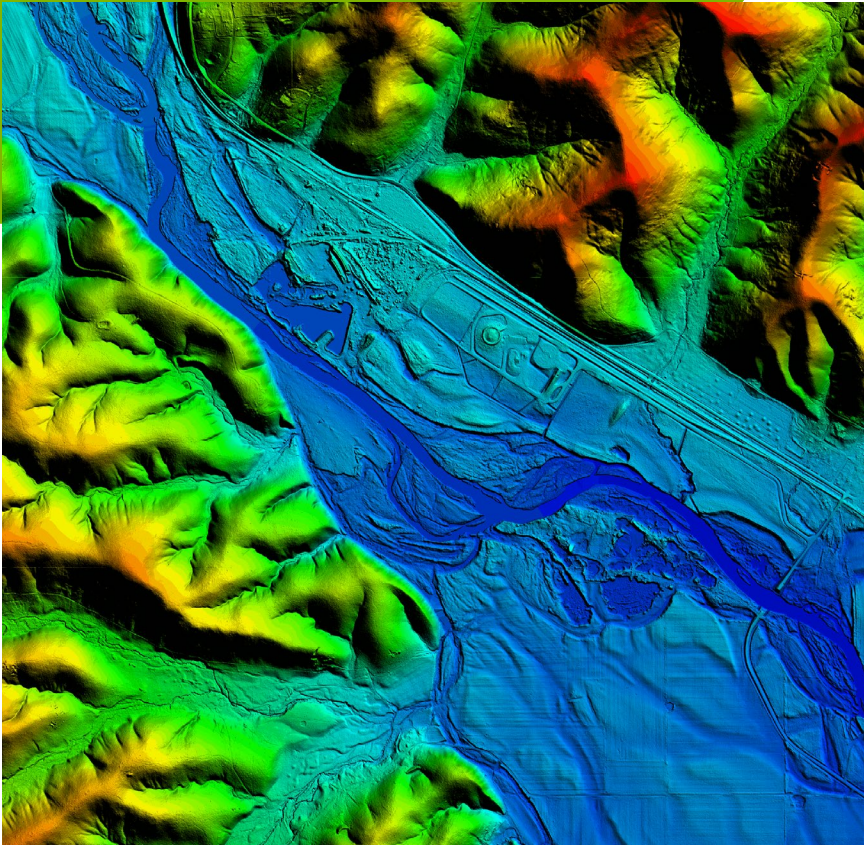
Instead, it is easier to make unfounded assumptions that corners are being cut, production is being sent off-shore or worse yet, there is not a professional-level of practice being performed. None of those are true—high quality, high accuracy LiDAR is already being performed with linear-mode LiDAR systems that meet and exceed the USGS QL2 requirements

for less than \$100/mi<sup>2</sup> all across the United States. We are not “racing to the bottom”; we are simply racing toward a different finish line than anyone else.

### Racing Toward Innovation

One of my inherent struggles with the “LiDAR should cost this amount per square mile” is that there is not a one-size fits all approach. Two private firms with the same LiDAR systems, software and understanding of the requirements can

BY BRIAN MAYFIELD



USGS QL2 hydro-flattened DEM (Digital Elevation Model) produced for less than \$100 / mi<sup>2</sup>.

design an approach that is completely different. I find that too many firms rely on out-of-the-box solutions rather than driving innovation.

On a recently completed project for a large federal contractor, we were asked to perform LiDAR acquisition using the exact same sensor they employ. The contractor provided us a flight plan, system settings, estimated flight time and an estimated cost for the services. When we reviewed their flight plan, we noticed they were not taking advantage of some of the key components of the sensor and flight planning software—yet this is one of the leaders of the LiDAR profession. Their flight plan called for single-pulse mode acquisition and a number of other

inefficient settings and requirements. It was clear their approach did not change much from project-to-project; instead, they relied on a mindset that this approach always works. After reviewing their flight plan, we offered a modified flight plan back to them that saved about 25% of the acquisition time. The reduced number of flight lines also reduced the number of lifts required to complete the mission. By reducing the number of lifts by 25%, we saved thousands of dollars in overnight stays for the crew, per diem cost and most importantly, it had a linear savings to data production since LiDAR data is calibrated by mission. Fewer missions = lower cost for calibration.

Data processing is yet another area where having a one-size fits all approach can be detrimental to a project budget. I personally know a couple of large companies that use a LiDAR editing rate of 20 minutes per square mile. They generally use that rate as the starting point and then increase the rate for more difficult areas like coastal zones, mountainous or heavily forested areas. To me, that sounds very reasonable. But at Atlantic we dig deep to use advanced analytics to offer the most competitive price. Our goal isn't to be the cheapest, but to offer the best solution and reaching this goal has led to better prices for clients, which is truly a win-win.

Since I joined this firm in 2012, I have made it my personal mission to drive our business analytics to levels that currently do not exist elsewhere in our profession. We have been tracking and documenting data production times, quality statistics and overall throughput for nearly 4 years. In that time, we have solidified our processing techniques and know exactly how long it will take us to perform tasks like LiDAR classification on a per square mile basis for a lot of different terrains and vegetation conditions. We have become purposefully better.

Over the past 2 years, we have mapped nearly 25,000 square miles for a Midwestern state to an enhanced USGS Quality Level 2 data requirement—for \$79 per square mile. That cost includes everything ... data acquisition, ground control, accuracy assessment ground control points, data processing and all LiDAR data development. When we initially scoped the project, we spent days analyzing the land cover characteristics of the state and reviewed our findings against our data analytics that we have collected for the past

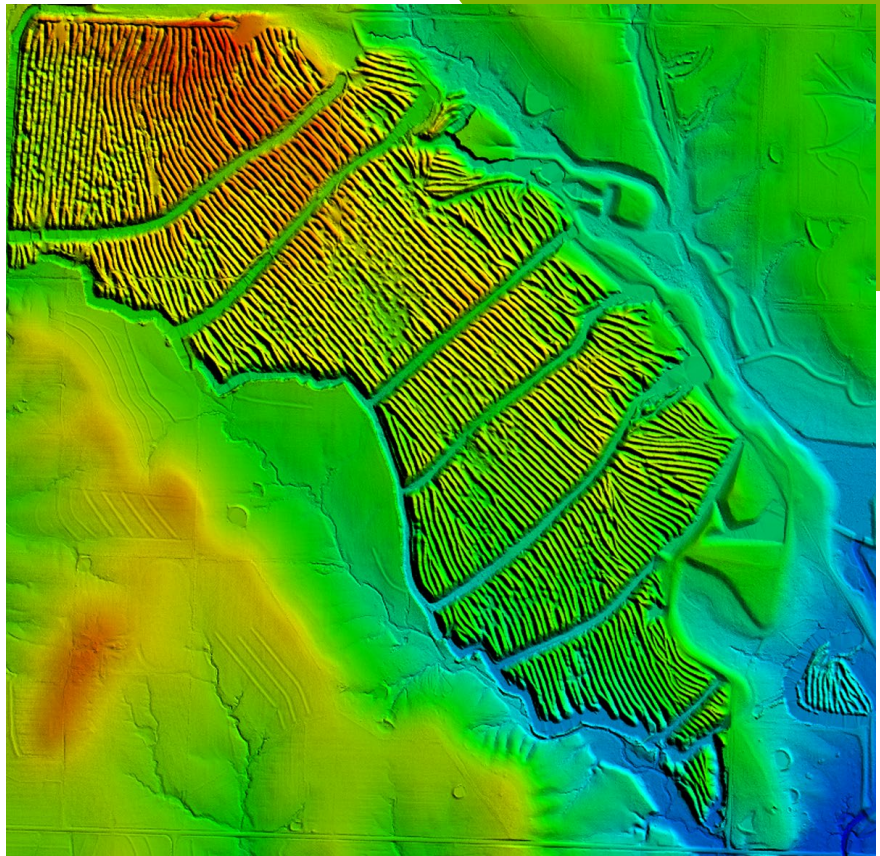
several years. What we determined is that we should average 9 minutes per square mile for manual data classification.

Let's assume the companies I referenced that use a 20 minutes per square mile approach to classifying data also use a blended labor rate of \$75 per hour that includes all of their corporate overhead and general administration costs. That is a very reasonable rate for our profession. If you apply the 20 minutes per square mile, times 10,000 square miles, times \$75 per hour you arrive at a data classification cost of \$250,000 or \$25.00 per square mile. In contrast, by using a 9 minute per square mile approach and the same labor rate, you arrive at a data classification cost of \$112,500 or \$11.25 per square mile. That is a \$137,500 (55%) overall savings between two firms on one part of the project—data classification. If you apply the same advanced analytics to estimating the entire level of effort for the project, there is plenty of room for saving the client money. Sure, it reduces profits for the company but it is possible to be aggressive and profitable at the same time. Isn't that what clients expect?

Perhaps we aren't racing to the bottom, but rather trying to reach a different finish line. We aren't trying to do things the way they've been done—we are seeking to be purposefully better each day.

### The Geiger Promise

There is clearly an established old guard in the profession and new technologies like Geiger or Single Photon LiDAR challenge the status quo. There are numerous articles, blog posts and even advertisements proposing these new technologies are the panacea we have all been seeking for decades. The



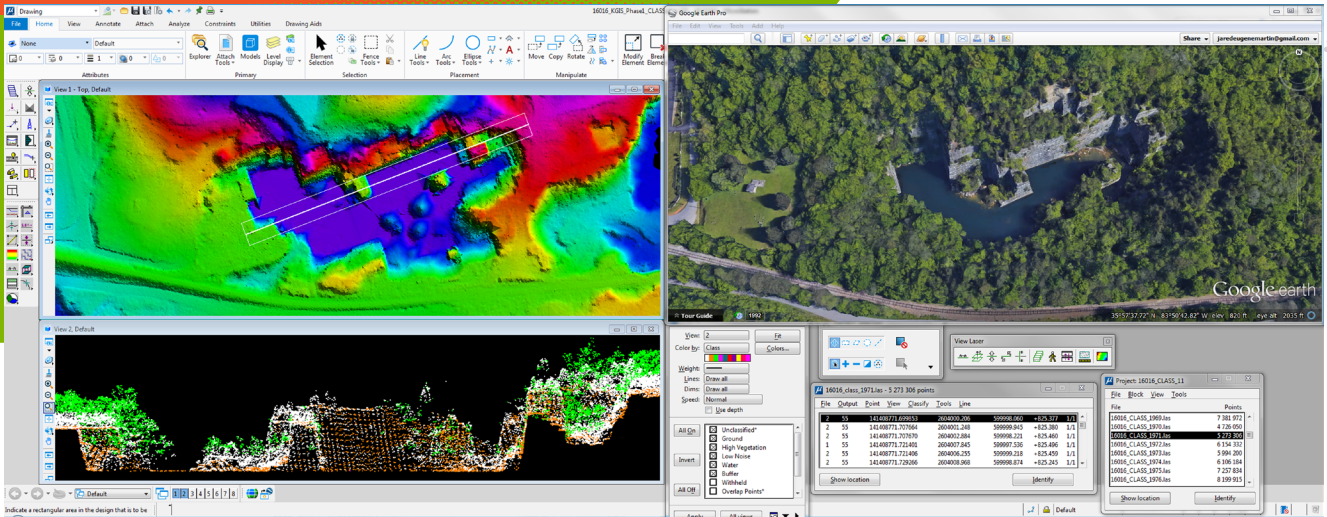
Processed Bare Earth USGS QL2 DEM (Digital Elevation Model) showing piles of timber from a large tree farm in the Midwestern United States.

unstated promise of those technologies is to deliver more data at a lower cost. But can Geiger even reach the \$100 per square mile price?

For Geiger, it is difficult to imagine the cost ever coming close to \$100 per square mile for a USGS Quality Level 2 dataset. The cost of the systems alone can range between \$5M and \$30M. If we assume a \$5M purchase price that is amortized over a 5-year period and assume that the system will be utilized 250 hours per year, then the hourly cost is approximately \$4,000 before insurance, maintenance and replacement costs are factored into the hourly rate. In comparison, a state-of-the-art linear

mode system can cost as little as \$450 per hour to operate.

On top of the hourly rates, the other challenge with operating a Geiger sensor is the flying height. Geiger providers are selling this as an advantage ... fly higher, collect more data more efficiently. The reality is that flying higher also adds to the overall cost. The systems currently in use today require a large fuselage in a pressurized aircraft. The aircraft itself often involves a 2-pilot operation in addition to the sensor operator running the system. Aircraft of this size and configuration cost roughly 5x of what a linear mode LiDAR system can operate within. The higher altitude



Atlantic's LiDAR production environment using proven tools like Terrasolid's TerraModel (upper left) and Terrasolid's TerraScan (lower left). Most LiDAR data providers utilize the same suite of tools.

also reduces the number of available flying days as there are many days a linear mode system is operating under a cloud deck that may be solid between 10,000 – 15,000'. For a Geiger system, that would be a non-flyable day resulting in overnight stays and per diem costs incurred for the flight crew.

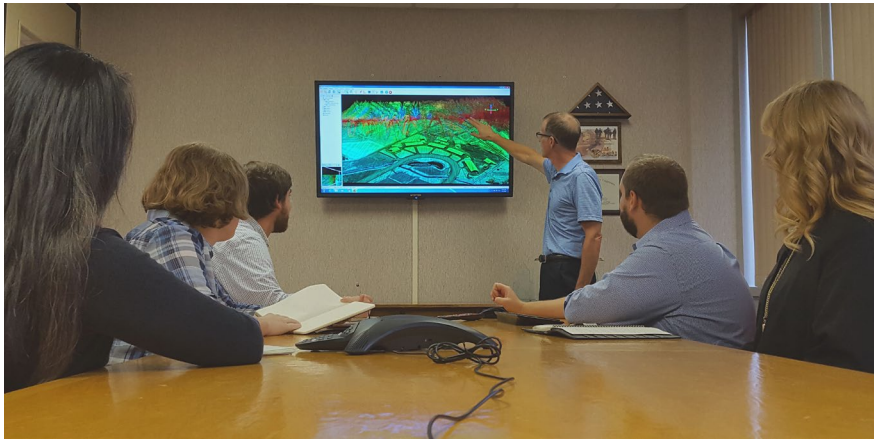
The promise of Geiger mode LiDAR is that the data can be collected at higher altitudes, faster and more economically. Once you peel away the impressive marketing characteristics of the new technology, it is easy to

see that the economics simply do not provide a viable solution for greatly reducing the cost of LiDAR acquisition and collection. Instead, we are being asked as a community to pay more for a dataset that doesn't quite meet the expectations of the established needs of the LiDAR market.

**What is Next**

Despite the notions of the October 2015 issue of *LiDAR Magazine* article titled "You Can Do That for *How Cheap?*" it is absolutely possible to provide USGS

Quality Level 2 LiDAR data for less than \$100 per square mile without using Geiger technology—and quite possibly only possible using a linear LiDAR system. Some federal, state and local government agencies have already taken advantage of working with companies that utilize a smarter approach to LiDAR than simply using the approach of what has always worked. We do not need technology to drive the cost down, we just simply need to start acting like professionals that have a total command of the technology and drive the cost to meet our client's needs. We all need to be purposefully better because innovation wins. ■



Atlantic's senior team of LiDAR professionals discussing Quality Control results on a recent project.

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