

Fairly New Review of Global Mapper Lidar Extension – Automated Ground Classification

The Lidar Extension for Global Mapper has been around for about a year now, a good period of time for the development to take care of a decent amount of the little bugs. It is also a good time to review it as I have not seen many user-reviews of the software yet.

Global Mapper (GM) without the Lidar Extension (LE) is pretty capable for handling lidar, in measured amounts. It is not the program, with or without the LE, to review an entire county dataset unless you really decimate it, at which point it kind of defeats the purpose. Processing large amounts of data is better handled by the power-programs like Terrascan, MARS, or LASTools; however, in V16 there is support for scripting of lidar tasks like automated classification (LIDAR_CLASSIFY), which will be a great help when doing multiple tiles. Using GM to review a county to state-wide collection of DEMs, on the other hand, is right up its alley.

For this discussion I am going to review the automated ground classification and the manual editing aspect of the LE. It is a good way to play with other aspects of the add-in along the way. I have chosen a classic coastal setting with dunes, dense vegetation, and suburban development. I am working on a fairly small area, just to keep processing time down. And that is one of the nice things about GM's lidar extension – you can choose the boundaries of the processing window to 'test' small areas before doing it all.

I am going to cheat a bit, and start with a data set that has been classified, call it "baseline", so I know about where the 98% (or however you call it) level of completeness is. For the "test" data set I will wipe clean all the ground class points, and start with a clean slate. The lidar data were captured in 2007 with a point spacing of 1.2 m and a bare-earth RMSE of around 10 cm – pretty standard stuff, nothing overly note-worthy in terms of processing difficulty.

So a nice aspect is that if you are used to GM for vector data, it is pretty much the same. You can select the same way and edit the lidar points, which is facilitated with a lidar-centric edit interface (Figure 1). I choose to simply change all classifications. Easy, good.



Figure 1. Lidar point editing interface and the lidar toolbar

The automated classification algorithm (AG on toolbar; Figure 1) is pretty straightforward and is (or appears to be) slope driven with an acceptable height deviation that you set. The calculation window is pretty straight forward, only two parameters to play with (Figure 2). I kept the "Maximum Height Departure" around 2x the RMSE and varied the Bin Size until I found something that got me pretty close to the Baseline data set. It took some work, I tried doing it with grid size and then with point spacings – and settled on the later in the end to keep it simple.

The trend when modifying the bin size was a bit difficult to understand. For example, the baseline of the area being tested had 33,000 ground points and when I set the bin size to 2 pts I got 31,000 ground points (not bad). When I varied it, however, I got results that surprised me. Using 3 points yielded 29,000 ground points and when I used 1 point spacings the ground point count went down to 14,000. So it looks like when you vary it on either side of the 'sweet-spot' you start to lose ground point density.

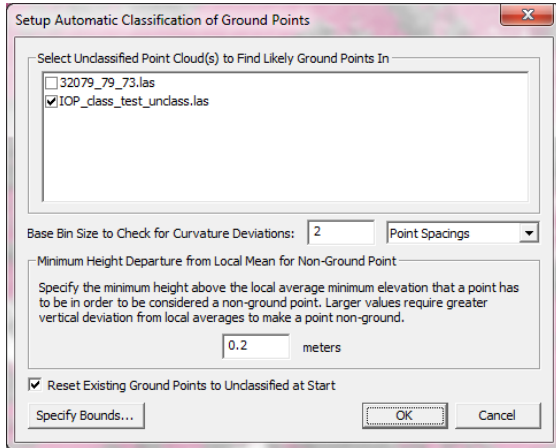


Figure 2. Automated Ground Interface

Given that I choose 2 pts as the sweet spot. How does it look? Not bad (Figures 3-5), in most cases, but it will take a bit of manual work. A couple of roofs were not classified well in the GM routine (Figure 5); I tried a bunch of different settings and could not really get rid of them without massive loss of ground points in other areas. Also, the dune ridge in the middle right of the area was overly aggressively classified (removal of ground points) compared to the baseline. These are small issues and can be fixed.

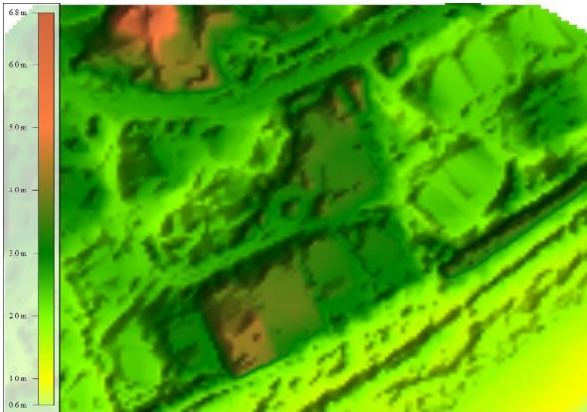


Figure 3. Baseline DEM

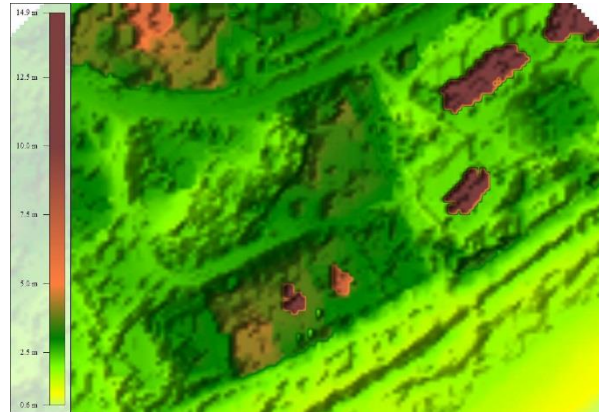


Figure 4. Global Mapper DEM

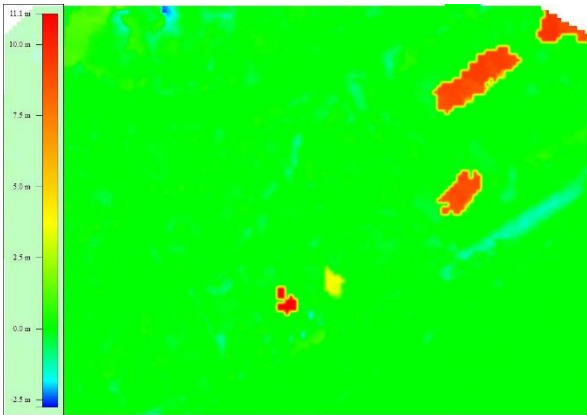


Figure 5. Difference between GM and Baseline

A very nice aspect of the GM program is the ability to do profiles with both points and a DEM. I don't know that I have seen that in other programs. Figures 6 (baseline) and 7 (GM) show the ground points (pink for ground) overlain on the baseline DEM. So, as you can see, a bit of editing needed there – gray unclassified points abound along the top of the dune.

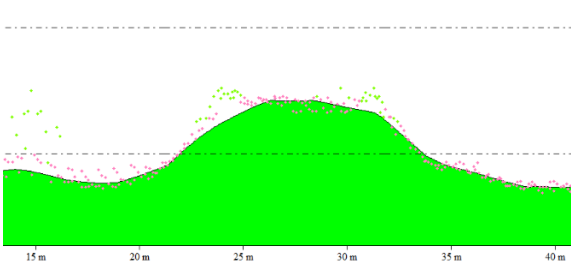


Figure 6. Baseline DEM overlain by baseline points

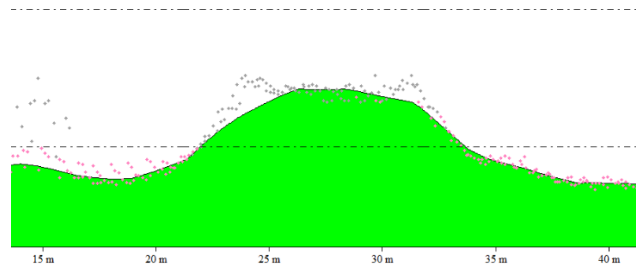


Figure 7. Baseline DEM overlain by GM automated points

The manual editing is a bit tougher – you have to get a creative with the selection technique, and I found that using the profile tool to select points for editing is probably as easy as any. You can change the width of the profile and then select points from within the profile tool to reclassify like a lidar dedicated software.

The manual edited result is pretty close to the baseline (Figures 8 and 9) but I did cheat a bit – knowing the correct answer (or close to it). I would have easily found the buildings, but not so sure about the dunes unless I was specifically looking for them. Let me just say that I have used other software to classify coastal areas and dunes are tough regardless. Look for linear stretches of unclassified points – that is the best way to find them, then you have to classify them.

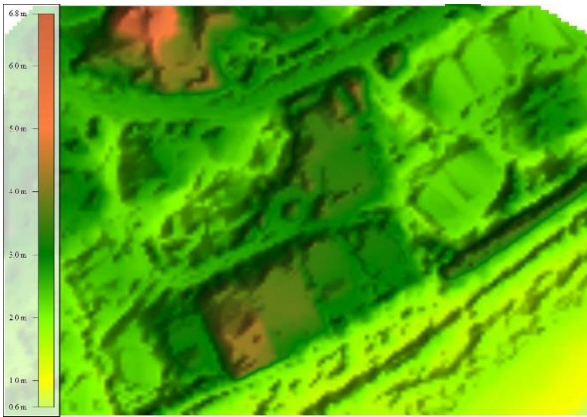


Figure 8. Baseline DEM

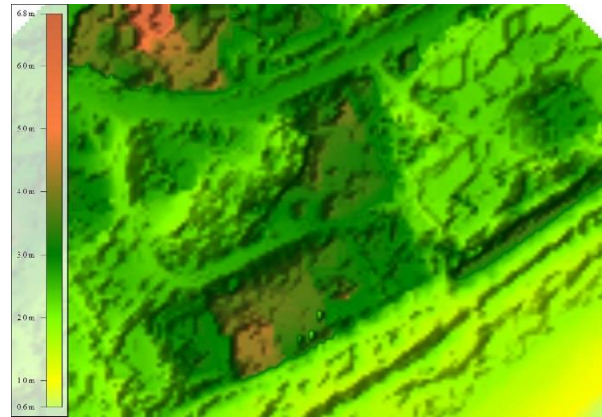


Figure 9. Final GM DEM

Last but not least, I wanted to see if my 2 point window and 20cm deviation recipe would work consistently with another data set. I used a 2006 data set from USACE that was from a single return sensor (topo-bathy lidar data set) and was never classified. I ran the same automated routine and had very similar results (Figures 10 and 11) even though the data sets were quite different. Still a couple buildings that need some manual editing; and the dune was, again, aggressively removed from ground. I guess this is a good example of the last 10% of the work taking 90% of the effort.

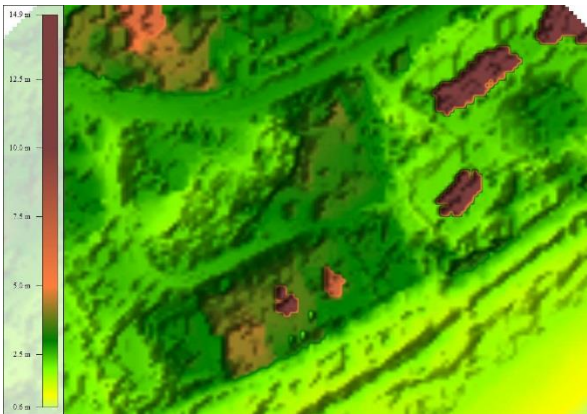


Figure 10. Global Mapper - 2007 lidar

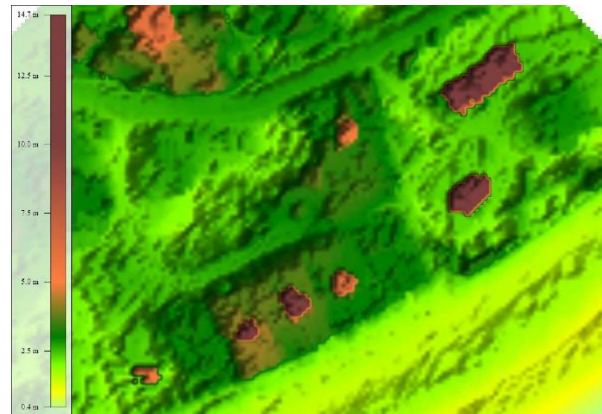


Figure 11. Global Mapper - USACE 2006

Final comments – the Lidar Extension seems like a good investment for people that use lidar and global mapper. The automated ground classification (the point of this review) performed fairly well but not as well as I have seen with ‘core’ lidar programs. In general, the extension adds a bunch of additional functionality throughout the program, which I have not touched on much here (maybe next blog) but adds tools for other processing as well. I see it as an LP 360 type program running through Global Mapper instead of ESRI. Both are good at what they do and it depends mainly on which GIS platform you or your company prefer.