SELECTING THE APPROPRIATE GNSS SOLUTION

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Determining the appropriate GNSS solution required in your mobile lidar system can be a bit troublesome. While this is true, it is only true if your preferred vendor offers a choice and if you are aware of the choices. Most manufacturers offer only a single solution, some offer only a particular brand, and others offer a variety. It is easier to build a system around a single product or even a particular brand than to make the system highly configurable. Obviously, the fewer options available

makes the selection much easier from a particular

vendor. Nevertheless, let us consider the possibility of a completely configurable system.

In considering the design and requirements of your system you have to consider the range of products you will be serving. For instance, if you anticipate very large projects covering thousands of kilometers where accuracy is sufficient to only a meter, then an SBAS (satellite-based augmentation systems) solution is likely the best candidate. In this case, no base stations or expensive post processing software are required. This sort of system can be very small, very light, and quite affordable as well as easy to use and deploy. It would likely use an L1 only receiver.

This same system may also be appropriate for UAV work. When using a UAV, size and weight are very real limitations. If your vehicle is seriously restricted by payload, then this will directly influence the GNSS solution. An SBAS solution in this case is the lightest solution available.

What if the projects you want to address are strictly for a UAV where LOS (line of sight) must be maintained? In this case you are immediately limited by range. Additionally, you most likely have a distinct advantage in knowing that you will (almost) always have adequate GNSS coverage. You won't be going under bridges, trees, through tunnels, etc. Likewise, you are unlikely to suffer from multipath situations due to your elevated position. Knowing these difficulties are unlikely allows for the viability of an RTK (real time kinematic) solution.

Even for a UAV, an RTK solution does pose two potential problems. First, there is additional hardware required for the vehicle. Onboard the

UAV there must be a radio modem to receive the RTK corrections. These are not free nor are they weightless. Both of these must be factored in. Of

weightless. Both of these must be factored in. Of course, a relatively costly ground station is also required to broadcast the corrections but this generally balances out the post processing software cost. Second, because the RTK solution does not use a post processed solution, the end result is only as good as the RTK solution. Hopefully this is good enough. If the RTK solution is not good enough, a post processed solution is still likely assuming all of the necessary information has been captured and stored during field collection.

Please keep in mind that we are primarily discussing the GNSS solutions without involving the INS (inertial navigation system) too much. The INS definitely changes some of what we are discussing particularly regarding outages.

Let's jump forward to some of the most demanding projects for survey and engineering grade solutions (meaning only a few centimeters). In this case, the best available system is required along with post processing. This generally means a GPS system with L1/L2 and probably GLONASS is necessary. In these systems, the size of the components is of little or no consequence. The antennas used are generally equipped with some sort of choke ring or collar to minimize multipath interference.

The post processing software becomes very critical at this point. There are some software packages that are free or open source, others that are quite inexpensive, and finally those that are very involved and of considerable more expense. For the truly demanding projects the best software is often required but that's not the biggest issue. To effectively use this software requires a good deal of understanding. This often involves an in-depth understanding of the fundamentals of GPS, coordinates, projections, and datums. Lacking this information can result in inferior results and lots of frustration in spite of having the best equipment

frustration in spite of having the best equipment and software.

To determine the GNSS required for your system you have to determine what is required, what limitations you have, what is available, how much you can afford (or not afford), and what you are equipped to deal with. It is quite conceivable to purchase an expensive system that offers most of what you need and still fail. Likewise, you could purchase what appears to be an inferior system and still succeed. The user in this case is absolutely critical to mission success.

There is a lot yet to be discussed. What about all of those “in-between” situations that need better than a meter but not survey grade results? We’ll try to address those in a coming article. Please take a moment and visit us at www.lidarusa.com and the coming conferences in 2016.

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