

High-Altitude Topographic and Bathymetric Lidar Sensor Development

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Most airborne bathymetric lidar systems collect data between altitudes of 400 and 600 meters. Although collecting data from 3,000 meters is common for topographic systems, it is extremely challenging for bathymetric systems due to energy losses incurred when crossing the air/water interface, and due to the water column's impact on light penetrating through it to reflect off the bottom and return to the sensor.

In 2018 Woolpert began working with US Government customers to develop a topo-bathymetric lidar sensor that would increase efficiency and flight safety by flying at altitudes of 3,000 meters or higher. They developed the Bathymetric Unmanned Littoral LiDar for Operational GEOINT (BULLDOG), a patented multispectral, multichannel, topo-bathymetric lidar system that can fly higher and collect more data in less time than previous bathymetric systems. The system emits green light (532nm) to collect seafloor data and infrared light (1064nm) to collect topographic data while simultaneously collecting high-resolution aerial images along a coastline. The ability to fly at a higher altitude makes the system ideally suited to survey in areas that would normally be inaccessible to low-flying aircraft (steep fjords or remote mountainous coastal terrain) or vessels. Testing of the system, while ongoing, has been promising for the shallow, higher resolution, channel and deeper channel with respect to object detection to meet the International Hydrographic Organization (IHO) S-44 Standard for hydrographic surveys. In addition, by collecting information on the Raman return (647nm), the system can discern whether data represents land or turbid water.

Woolpert has taken its experience in owning and operating numerous bathymetric lidar sensors to design and test the feasibility of conducting airborne bathymetric lidar surveys at higher altitudes. This presentation will showcase the results that have been attained from these trials and discuss the next steps in the testing and evaluation process.