ALTM PEGASUS SENSOR DESIGN: A NEW PARADIGM IN LIDAR TECHNOLOGY INNOVATION

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1. INTRODUCTION

The evolution of airborne lidar mapping systems has been largely driven toward ever-increasing laser pulse repetition frequencies (PRF) for higher density model applications. The greater pulse rates increase the density of points on the ground, providing a higher resolution and detailed representation of the target surface. In combination with an appropriate scanning system, they can provide more efficient area coverage capability to improve survey efficiency and reduce collection costs[1].

2. OVERCOMING THE PRF-ALTITUDE BARRIER

In recent years airborne lidar mapping systems have run into a fundamental limitation: the pulse rates have become so high (>100,000 per second) that operational altitudes must be greatly reduced to accommodate them. Some manufacturers have introduced technical solutions to overcome this fundamental speed-of-light limitation, such as the use of multipulse technology or the co-mounting of like sensors to increase density at lower pulse rates. These solutions work well at extending the operating altitudes higher when compared with single pulse systems. However, is there an alternative solution that will allow continued expansion of the laser pulse rates without limiting operational altitudes?

Figure 1: ALTM Pegasus HD400, the world's first multichannel commercial lidar mapping system.

This paper discusses an alternative method for overcoming the PRF-altitude barrier and presents results from a new generation of lidar mapping systems[2]. The ALTM (Airborne Laser Terrain Mapper) Pegasus HD400 (Figure 1) is the world's first commercial mapping system to use a multi-channel innovation to operate at laser pulse rates of up to 400 kHz, and at altitudes well above the traditional PRF-dependent limits (Figure 2).

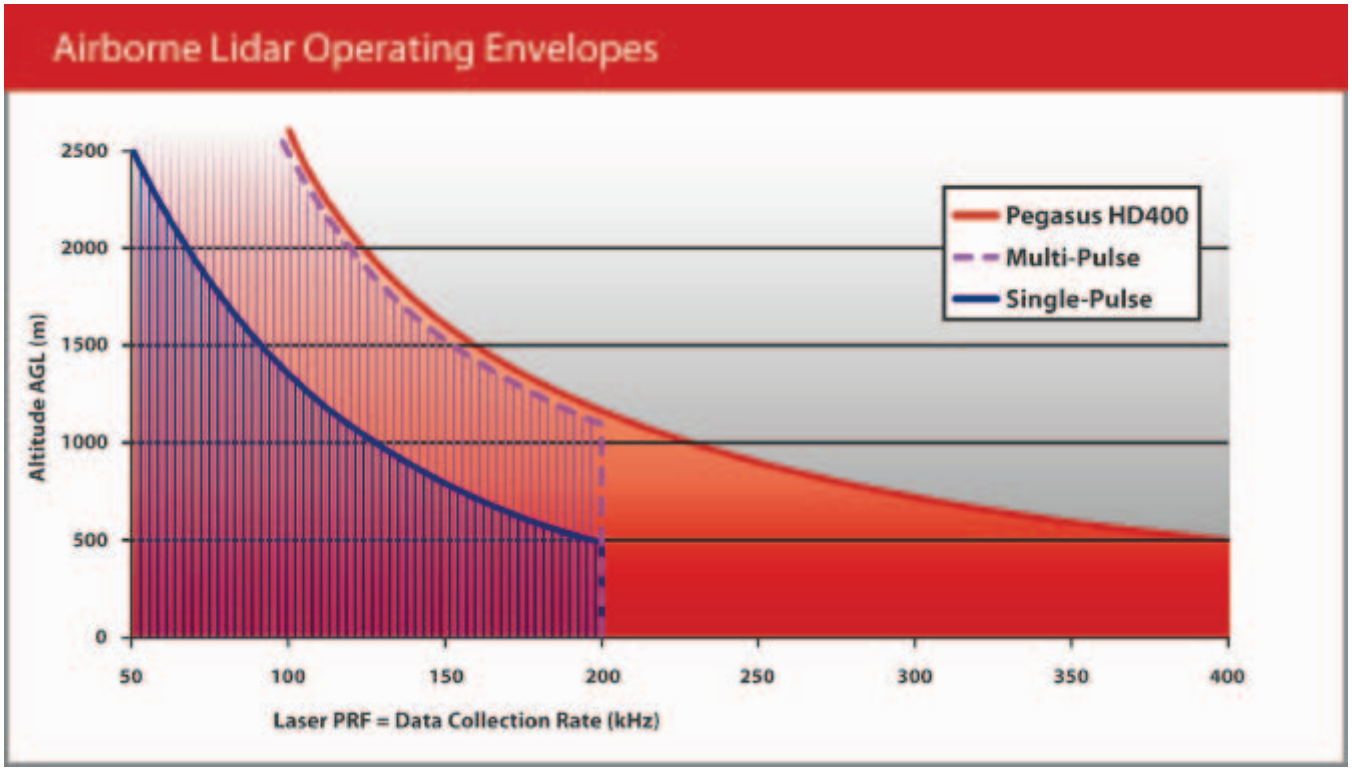

Figure 2: Operating envelope for ALTM Pegasus compared to traditional single pulse systems

The innovative configuration of the ALTM Pegasus goes one step further by incorporating a unique multi-look angle approach for improved tree canopy penetration and increased vertical density capability. Coupled with the latest in laser technology innovation, the ALTM Pegasus also yields a new level of data precision and accuracy.

3. REFERENCES

[1] V. Ussyshkin, M. Boba, M. Sitar (2008). Performance characterization of An airborne lidar system: bridging system specifications and the expected performance, ISPRS, Conference proceeding, July 2008, 2008, Beijing, China

[2] Ussyshkin, V. R., Smith, B. (2006). Performance analysis of ALTM 3100EA: Instrument specifications and accuracy of lidar data. ISPRS, Conference Proceedings (Part B), Paris, France, 1- 4 July 2006 (on CDROM)