

**A COMPARATIVE STUDY BETWEEN FREQUENCY-MODULATED
CONTINUOUS
WAVE LADAR AND LINEAR MODE LIDAR**

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ABSTRACT:

Light Detection and Ranging (LiDAR) technology has advanced greatly in the past decade. Pulse repetition rates of terrestrial and airborne systems have multiplied thus vastly increasing data acquisition rates. Geiger-mode and FLASH LiDAR have also become far more mature technologies. However, a new and relatively unknown technology is also maturing rapidly: Frequency-Modulated Continuous Wave Laser Detection and Ranging (FMCW-LADAR). Due to its comparisons with modern radar systems, FMCW-LADAR has the ability to more finely resolve objects separated by very small ranges. In fact, FMCW-LADAR can range resolve objects at 10^{-7} to 10^{-6} meter scales. FMCW-LADAR can also detect objects at greater range with less power. In this study, a FMCW-LADAR instrument and traditional LiDAR instrument are compared. The co-located terrestrial scanning instruments were set up to perform simultaneous 3-D measurements of the given scene. Several targets were placed in the scene to expose the difference in the range resolution capabilities of the two instruments. The scans were performed at or nearly the same horizontal and vertical angular resolutions. It is demonstrated that the FMCW-LADAR far outsurpasses the performance of the linear mode LiDAR scanner in terms of range resolution. Some results showing the maximum range acquisition are discussed but this was not studied in detail as the scanners' laser powers differed by a small amount. Applications and implications of this technology are also discussed.