

Handheld terrestrial laser scanning for geomorphology – a viable tool or a meandering fool?

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There have been rapid developments in mobile terrestrial laser scanners (TLS) resulting in their inclusion within architecture and construction fields. Handheld TLS scanners now overcome the mobility issues that face traditional TLS equipment. Many handheld devices combine Simultaneous Localization and Mapping (SLAM) and Inertial Measurement Unit (IMU) technology. SLAM helps define the trajectory of the device and the three-dimensional reconstruction of the recorded sensors [1]. Cameras within most TLS devices are used to obtain imagery which is used to detect homologous features between successive images, which are then used to calculate the scanners movement throughout the environment.

Newer devices now produce RGB values for pointcloud output, where panoramic images are captured to associate RGB colours to 3D point data [2]. Handheld TLS have recently been deployed for geomorphic studies and there is an emerging body of work that provide survey advice using mobile TLS in the natural environment. However, there has not been much research into the relative accuracy of the approach or benchmarking against more common methods such as aerial structure from motion photogrammetry and uncrewed aerial vehicle derived lidar. This talk will provide an overview of handheld TLS and discuss how it can be applied to future geomorphic research.

References

1. Campi, M.; Falcone, M.; Sabbatini, S. Towards Continuous Monitoring of Architecture. Terrestrial Laser Scanning and Mobile Mapping System for the Diagnostic Phases of the Cultural Heritage. *Int. Arch. Photogramm. Remote Sens. Spat. Inf. Sci.* 2022, 46, 121–127.
2. Gharineiat, Z., Tarsha Kurdi, F., & Campbell, G. (2022). Review of automatic processing of topography and surface feature identification LiDAR data using machine learning techniques. *Remote Sensing*, 14(19), 4685.