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| **Modeling Urban Trees with Mobile Lidar to Mitigate Urban Heat** |
| **Introduction/Aim:**  Urban trees are an easily overlooked component of the built environment, providing numerous benefits such as improved air and water quality, carbon sequestration, and providing shade, mitigating urban heat island effect. To better understand the importance of the various ecosystem services provided by urban trees, we must be able to map, identify, and measure individual trees as accurately and efficiently as possible.  The overall goal of this project is to map urban trees on a portion of a university campus and estimate their biophysical parameters, such as tree height, diameter at breast height, and crown diameter, using mobile lidar. The specific objectives will be to: develop the methodologies of mobile lidar data collection and analysis, compare direct and derived biophysical parameters against field-collected forest inventory data, and quantify the cooling effect of urban trees.  **Methods:**  Mobile lidar data were collected in the winter of 2023 using a GeoSLAM ZEB Horizon laser scanner mounted to a backpack while riding an electric scooter. GPS reference data were collected using a Trimble Geo7x concurrent to the lidar scan. The forest inventory was conducted in the spring of 2023. Within the scan area, n=120 trees were randomly selected and measured for diameter at breast height (DBH), total tree height (h), and identified by species. DBH measurements were collected using a steel diameter tape, and tree heights were collected using a TruPulse 200 laser rangefinder.  **Results:**  In a bivariate fit of field vs lidar-derived DBH measurements, we found an R2=0.868, RMSE=0.076, and p<0.0001; comparing field vs lidar-derived height measurements yielded an R2=0.957, RMSE=0.477, and p<0.0001. Cooling effect is still being investigated.  **Conclusion:**  From this work, we can develop localized allometric equations in an effort to scale-up our estimations to a larger geographic area with airborne laser scanning. Additionally, we can model tree shade output, quantifying cooling effect, mitigating urban heat. We can then identify areas of greatest concern, and coordinate with city planners to appropriately landscape with green spaces and water features, creating improved areas for recreation and urban wildlife. |

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