MWP – Young Researcher Abstract 2024

Project title: Utilising lidar to quantify forest structure and its relationship with forest microclimate	
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Abstract (approx. 200 words)**:**

Characterisation of forest microclimate is crucial to understanding forest functions that influence critical ecological processes. Research findings have demonstrated that the contrasts and parallels between the macroclimate outside the forest and the microclimate inside the forest are a function of, among other factors, the distribution of plant material in the forest canopy. With state-of-the-art lidar scanning, it is possible to capture the distribution of plant material with a high level of detail and recreate the forest environment in the form of a dense point cloud, allowing for a comprehensive assessment of the local distribution of plant material. Lidar scanning of eight one-hectare forest plots (four in Belgium and four in Germany) coupled with local temperature measurements in a 20m 4x4 grid is carried out to study the links between the forest structure and forest microclimate. Preliminary findings agree with heuristic reasoning that an open canopy results in lower buffering of temperatures and vice versa. We expand upon the findings to examine various descriptors of local forest structure, ranging from plot-level to tree-level structural characteristics, to further our understanding of the linkages between forest structure and its microclimate. Furthermore, we also investigate the potential of time-series lidar measurements to track changes in forest structure across seasons.

Key words: lidar, forest structure, microclimate, time-series, digital twin