**Tree-Level Structural Dynamics from Temporal LIDAR Data**

This figure presents a detailed temporal analysis of a single tree located within the Münster Area of Interest (AOI), tracked annually from 2022 to 2025 using high-resolution LIDAR point clouds. The left column displays yearly top-down vegetation height maps, where the selected tree is highlighted with a yellow circle. Across the central columns, its 3D point cloud structure, extracted vertical profiles, and canopy outlines illustrate the progression of structural change.

From 2022 to 2024, the tree exhibits healthy vertical growth and canopy expansion evident through increased elevation values and more complex contour geometry. However, in 2025, a distinct reduction in both height and canopy volume is observed, likely due to pruning, storm damage, or partial removal. The elevation scale on the far right quantifies this change, confirming a measurable decrease in vertical extent.

This micro-scale case demonstrates the power of temporal LIDAR analysis in capturing subtle, year-to-year variations in individual vegetation structures, offering valuable insight for urban forest monitoring, ecological assessment, and precision landscape management.