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| **Modelling Seasonal Sunlight Exposure of Forest Floor Using Unmanned Aerial Laser Scanning** |
| The effect of three-dimensional forest structure on light availability within forest ecosystems is pivotal for forest biodiversity, shaping the composition and abundance of forest flora and fauna as well as forest microclimate. Our ongoing study employs unmanned laser scanning (ULS) to assess potential seasonal sunlight exposure of forest floor within forest research plots affected by recent natural disturbance. To do this we adopted and modified Point Cloud Solar Radiation Tool (PCSRT) of Pružinec and Ďuračiová (2022).Data collection was streamlined using a DJI Matrice 300 RTK drone with Zenmuse L1 LiDAR camera, focusing on achieving high-density point-cloud data of forest stands both in leaf-off and leaf-on state. The PCSRT software was enhanced to support automated voxel structure generation and simulation of light transmittance on individual voxel level The voxel light transmittance was determined by the density and character of vegetation within each voxel, where voxels with less foliage allow more light to penetrate deeper into the forest structure, while voxels fully occupied by solid woody structures may provide effective shading This approach allows for simplified ant thus computationally achievable simulation of light conditions within larger forest scenes and relatively long time periods, e.g. (part of) vegetation season.The study simulates solar radiation exposure across various terrains for the peak vegetation season. Outputs of the simulation represent incoming energy (W · m−2) and insolation time for each voxel. The effect of forest canopy shading relative to unobstructed ground surfacesd was also investigated. Preliminary results illuminate the differential light exposure across research plots, correlating with the diversity in canopy density.Future phases of this research will compare our PCSRT-derived data against advanced radiative transfer models like Discrete Anisotropic Radiative Transfer Model (DART), along with plans for ground-truthing to validate the simulations. This comparative analysis and validation process are critical for refining our understanding of forest light dynamics and for contributing to evidence-based forest management practices.This initiative not only advances our understanding of forest ecosystem light dynamics but also highlights the potential of integrating modern technologies in ecological research. The outcomes are anticipated to enrich evidence based forest management strategies in biodiversity-rich environments, leveraging the study's insights on the critical role of canopy structure in regulating ground-level light availability. |

**References:**

Pružinec, F., & Ďuračiová, R. (2022). A Point-Cloud Solar Radiation Tool. Energies, 15(19), 7018. https://doi.org/10.3390/en15197018