

SPECIAL SESSION 15

Synthetic forests for sensitivity analyses and scenario building in forest inventory and 3D-forest applications

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The goal of the session

The ever-increasing availability of remote sensing data is contrasted by hardly increasing amounts of ground-reference information which is urgently required to further optimize the operational application of remote sensing data in forestry. In this session we discuss approaches to create synthetic 3D-forest datasets by coupling the outputs of forest growth simulators with 3D-tree-models extracted from LiDAR point clouds. By coupling these synthetic 3D representations of forest stands with LiDAR acquisition flight simulators (e.g., virtual laser scanning with DART or HELIOS), it is possible to create large and realistic datasets where both a complete single-tree reference dataset and corresponding realistic LiDAR dataset are available. Such datasets have an enormous potential for sensitivity analyses to improve remote-sensing based forest inventory work-flows and for scenario building of other use-cases including for example the assessment the efficiency of fire protection measures on wildfire risks through fire-spread simulation models or the efficiency of conservation measures.

The session will bundle talks focusing on all steps of the work-flow including:

- (1) latest methods to extract 3D-tree models from LiDAR point clouds
- (2) current developments towards storing and sharing 3D-tree models and point clouds via an open database
- (3) examples on how to create large synthetic 3D forests by coupling 3D-tree models with the outputs of forest growth simulators
- (4) evaluation of the suitability of the 3D forests to provide realistic datasets
- (5) application examples on how synthetic forest datasets can be used in sensitivity analysis to improve forest inventory approaches, algorithm developments and for scenario building