

RETRIEVAL OF VEGETATION AND SURFACE PROPERTIES WITH TERRESTRIAL, AIRBORNE AND SPACE-BORNE LASER SCANNERS

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Airborne Light Detection and Ranging (LIDAR) has become one of the important sources of information on the properties of vegetation canopies relevant for various environmental processes over land. Measurements can be performed with two basic methods, i.e. travel time and phase lag of transmitted pulses, from ground-based, airborne and space-borne platforms. Systems measuring travel time can be further subdivided into discrete and continuous sampling of back-scattered signal.

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Ground-based systems are used to capture and characterize in detail 3D vegetation canopies. A new algorithm has been developed to reconstruct the structure of a single tree in detail and determine morphometric parameters. The method has been validated against both synthetic and actual data.

Airborne scanning systems are used to reconstruct Digital Terrain and Surface Models. Applications to the determination of parameters useful to parameterize the hydrodynamic roughness of vegetation canopies have been documented. This paper presents highlights of a study on the estimation of hydrodynamic vegetation density (D_v) in a forest area and the subsequent mapping of spatially distributed hydrodynamic roughness.

Spaceborne GLAS data have been used to study the morphology of glaciers and their changes in the Qinghai – Tibet Plateau.