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Potential of different sensor combination approaches for the estimation of above ground biomass

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Space-borne sensors allow for wide-scale assessments of forest ecosystem assessments. Combining the products of multiple sensors is hypothesized to improve the estimation of forest biomass. We applied interferometric (Tandem-X) and photogrammetric (WorldView-2) predictors, e.g. canopy height models, in combination with hyperspectral predictors (EO1-Hyperion) using 4 different machine learning algorithms for biomass estimation in temperate forest stands near Karlsruhe, Germany. We also estimated the spatial distribution of timber volume to calculate the regional potential for lignocellulosic raw material. Here, we used a combination of airborne Lidar with Landsat TM 7 data linked with terrestrial inventory net data. To enhance the accuracy, we developed a socio-economic predictor regarding the ownership and size of the woods. Finally, we tested the accuracy of canopy top elevation, ground elevation and vegetation height (VH) derived from space borne full-waveform LiDAR (Light Detection And Ranging) ICESat/GLAS data across forested areas, as basis for the estimation of biomass. Computed height metrics from ICESat/GLAS data were compared against airborne laser scanning (ALS) based digital elevation models. Due to the dynamic topography of the sites under investigation, a wide range of slope angles could be investigated. ICESat's raw waveform data (GLA01) and the land surface altimetry data (GLA14) products were used to determine height metrics with different methods. The presentation will provide results of the different methods and sensors for vegetation height assessment, derived estimations on timber volume and above ground biomass.

Biography

Barbara Koch studied Forest Sciences from 1977 to 1982 at the Ludwig-Maximilians University in Munich. From 1982 to 1994, she worked as a Scientific Staff Member at the Institute of Land Use Planning and Nature Conservation at the Technical University of Munich (Ludwig-Maximilians University in Munich). Presently, she holds the Chair of Remote Sensing and Landscape Information Systems at the Albert-Ludwigs University of Freiburg. She has worked in numerous research projects on remote sensing and geo-modelling in the frame of forest and landscape analyses. At this time, she is Academic Dean of the Faculty of Environment and Natural Resources, Board Member of the Centre for Renewable Energy, Head of the working group on Education of the University Centre for Sustainability and Transformation and Vice-Chairwoman of the Senate commission.

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