Geophysical Research Abstracts
Vol. 21, EGU2019-18886, 2019
EGU General Assembly 2019

Combined LiDAR and hyperspectral imagery to characterize the response of riparian communities to water availability: insights for climate change impact assessment

Julien Godfroy (1), Luca Demarchi (2), Dandan Cui (3), Kristell Michel (1), Simone Bizzi (4), Jaroslaw Chormanski (2), Dimitri Lague (5), and Hervé Piégay (1)

(1) Univ Lyon, ENS de Lyon, CNRS, UMR 5600 EVS, F-69342 Lyon, France, (2) Department of Hydraulic Engineering, Faculty of Civil and Environmental Engineering, Warsaw University of Life Sciences (WULS), Poland, (3) Northwest Institute of Eco-Environment and Resources, Chinese Academy of Sciences, Lanzhou 730000, China, (4) Department of Electronics, Information, and Bioengineering, Politecnico di Milano, Piazza Leonardo da Vinci, Milano, Italy, (5) Univ Rennes, CNRS, OSUR, Plateforme Lidar Topo-Bathymétrique Nantes Rennes, 35042 Rennes Cedex, France

Recent developments in remote-sensing enable a continuous monitoring of riparian vegetation, a task that was traditionally reliant on resource-consuming field campaigns and is key for river management policies. Over the Ain River (France), a simultaneous acquisition of high-resolution hyperspectral and LiDAR data was conducted through EUFAR-funded HYMOSENS2 airborne campaign in order to assess the potential of such technologies for characterizing the ecological condition of the riparian corridor. The coupling of these datasets with in-field sampling of vegetation plots and complementary LiDAR data from other airborne campaigns was used to determine the environmental conditions (e.g., depth to water and overbank sedimentation over a 7 year period) and riparian vegetation structural characteristics of each sampled plot through LiDAR-derived parameters. An empirical growth model was established by linking the structural characteristics of the vegetation to its age, for each plot. Deviations to this model and variations in canopy height within a plot were found to be correlated to geomorphic indicators of connectivity such as overbank sedimentation or the depth to water. This hydrological disconnection of the vegetation which affects both plant growth and species distribution can be identified with hyperspectral data at the levels of the plot and of individual tree crowns through leaf water content. This research shows the applicability of multiple sources of airborne-sensed data for the monitoring of vegetation health in a riverine environment and the identification of water-driven stress and competition, which is a growing concern in a context of climate change.