



Panel 2 - Vegetation & Land Use

Reference topic: remote sensing, river management, satellite imagery

Presentation type: oral (**invited talk**)

Monitoring from close-range remote sensing the hydraulic resistance (Manning) of agricultural channel network

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Ditch vegetation has numerous positive effects on the main regulating services of agricultural channels, such as seed retention, pollutant mitigation, bank stabilization, and sedimentation. The channel vegetation also limits the water conveyance, and consequently is frequently removed by farmers (management practices) to increase its porosity and consequently decrease the hydraulic resistance. A large body of literature attempts to characterize vegetation characteristics affecting hydraulic resistance, through the introduction of the blockage factor of flow by vegetation. However, this factor has multiple definitions and is still difficult to assess in the fields with actual and diverse vegetation covers, especially for grassy plants of channels. In addition, the temporal variability resulting from growing vegetation and management practices make the objective monitoring of hydraulic resistance in channels highly challenging. Close-range remote sensing (photogrammetry, Flash Lidars) offers possibilities now to get time series of complex channel vegetation characteristics but up to know, it has never been studied up to the hydraulic resistance monitoring. This talk is presenting two experiments trying to overpass this challenge.

In the first experiment, we present an approach using a photogrammetric technique (SfM-MVS) to construct time series of herbaceous vegetation porosity (3D point clouds) in a real agricultural channel (ditch) variously managed by farmers. After point clouds time-series analysis, an indicator of vegetation porosity for the whole section and of the surface of the channel is computed. Results show that mowing and chemical weeding are the practices presenting the most favorable temporal evolutions of the porosity indicators regarding flow events. Burning did not succeed in restoring the porosity of the channel due to quick recovery of the vegetation and dephasing of the maintenance calendar with the flow events.

In the second experiment, we aim at predicting flow resistance from 3D vegetation characteristics using a close-range laser scanner also providing 3D point clouds. Flow resistance and vegetation 3D characteristics were defined using Manning coefficient and blockage factors, respectively. We tested combined effects of flow discharge against plant species and densities characterizing intermittent channels in a controlled channel flume. Our results showed a variability of Manning coefficient describing flow rugosity against species and densities, with a highest rugosity for sclerophyllous species than herbaceous ones. Different blockage factors were calculated on the basis of scan clouds