Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Versuchsanstalt für Wasserbau,
Hydrologie und Glaziologie

Project work or Master's thesis
Spring Semester 2021

Examiner: Prof. Dr. Robert Boes
Supervision: Dr. Gabriel Spreitzer

3D-Point Cloud and Mesh Models of Large Wood (LW) Accumulations

Large wood (LW) plays an important role in rivers, as it regulates stream power, protects stream bed from erosion and creates habitats for numerous living organisms. Besides all the benefits of wood in streams, there are also challenges and risks involved when large amounts of wood are mobilized and transported by the flow. During floods, wooden elements are often entrapped by river crossing infrastructure and other instream structures, leading to the formation of massive LW accumulations that significantly affect flow hydraulics and may lead to backwater and inundation. New insights into LW accumulations as well as a strong knowledge about accumulation volume and porosity is required in order to better predict the resulting effects on flow hydraulics.

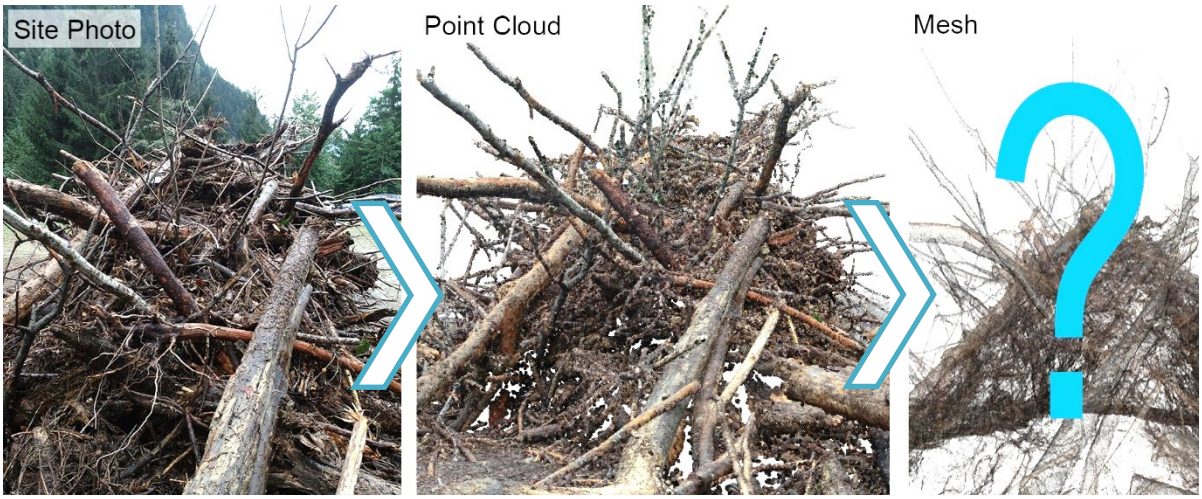

Fig. 1: From 2D images to 3D point clouds and mesh models of LW accumulations.

In the course of the SmartWood_3D research project an image-based photogrammetry approach (Structure from Motion) is applied to shed some new light onto LW accumulations. Generated 3D point cloud and mesh models of prototype LW accumulations (Fig. 1) will allow for the assessment of particle arrangement and volume, but also for the estimation of accumulation porosity. This project focuses on the reconstruction process of LW accumulations, with the aim to elaborate a suitable workflow pipeline, including essential processing steps and parameters required for the transformation of noisy point clouds into most realistic 3D mesh models. The workflow pipeline will then provide a useful tool for river managers and engineers to better control for LW accumulations in streams.

Contact: Dr. Gabriel Spreitzer
HIA C 14
spreitzer@vaw.baug.ethz.ch

Remarks: Software: CloudCompare, MeshLab, Meshmixer;
Single Master thesis, or up to two project theses;
Project language: English or German