EGU21-4966, updated on 17 Jan 2022
https://doi.org/10.5194/egusphere-egu21-4966
EGU General Assembly 2021

Video footage from drones for Structure-from-Motion photogrammetry – A practical and rapid assessment method for large wood accumulations in rivers?

Gabriel Spreitzer, Isabella Schalko, Robert M. Boes, and Volker Weitbrecht
Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH Zurich, Zurich CH-8093, Switzerland
(spreitzer@vaw.baug.ethz.ch)

Large wood (LW) and logjams are common and important elements in rivers, yet knowledge about composition, volume and porosity of wooden structures in streams is still limited. Most studies apply a rectangular approach (manually measuring a rough bounding-box of the logjam) to estimate LW accumulation volume and porosity. However, this method cannot capture the complex dimensions of LW accumulations and may introduce an additional human-made estimation error. Furthermore, there is a risk of accidents involved when obtaining manual measurements on logjams in the field. Drones represent a powerful tool in geosciences, yet their potential has not been fully exploited to date. The application of non-intrusive quantification methods is widely available in geosciences and recently also increasing for research related to LW in rivers. Recent studies demonstrated that drone imagery and Structure-from-Motion photogrammetry provide true replicates of prototype logjams in form of 3D-models. In the present study we used video footage of a LW accumulation, obtained via standard drone (DJI Phantom 4 Pro+), to evaluate its potential for a rapid assessment of geometric measures (e.g. length, width, height, volume) of the LW accumulation. The gained results from the 4k drone video footage (4,096 x 2,160 pixels) were scaled solely from the obtained video georeferencing data and verified with a properly scaled 3D-accumulation-model that has been generated from high resolution drone imagery (5,472 x 3,648 pixels). We are interested in the level of detail and accuracy, that can be obtained from georeferenced drone footage, and aim to introduce a practical and more reliable assessment method as a state-of-the-art alternative to the traditionally applied rectangular approach. Our study may be of interest for river managers and engineers to rapidly and safely assess LW accumulation volume and porosity in the field.