



M.Sc. Topic

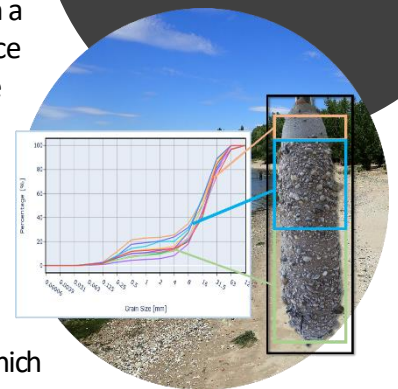
“From picture to depth-explicit grain size characteristics”

Background

Hydrodynamic and morphological quantities of rivers are characterized by high-spatiotemporal variability. In this context, labor-intensive field sampling is required to investigate substrates grain size characteristics. State-of-art substrate (i.e., sediment) sampling methods include the so-called freeze coring technique, in which a steel pipe is hammered into the riverbed and filled with a freezing agent to extract frozen, undisturbed substrate samples. To reduce fieldwork efforts, past research developed a novel approach to derive substrate porosity through photogrammetric post-processing of freeze core samples. In addition, so-called *photosieving* tools to derive grain size characteristics from substrate pictures were developed and verified regarding correctness. Yet, such methods cannot provide a representative differentiation of sediment layers over the depth.

To address this challenge, this thesis will develop a novel approach for estimating depth-explicit grain size characteristics from freeze core samples, which will be accomplished through the combination of available approaches. The thesis builds on Structure-from-Motion (SfM) and implements image improvement (e.g., ice removal), scaling techniques, and application of suitable *photosieving* software (e.g., BASEGRAIN).

From picture to
depth-explicit
grain size
characteristics



Thesis Overview

1. Familiarize with *in-situ* and digital (*photosieving*) methods for substrate sediment analysis and Structure-from-Motion
2. Develop a workflow using suitable programming tools for image processing
3. Apply and verify the novel approach on freeze core samples of the Upper Rhine river

Desirable Skills

- Interest in rivers, image processing, and creative method development (i.e., problem-solving)
- Knowledge of a programming language (preferably Python) is an advantage



Apply now!

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Please send a few lines on why you would like to work on this topic.

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