



## Monitoring water turbidity with camera: a real scale experiment

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Turbidity is one of the most critical metrics in water quality monitoring. High turbidity in river basins can be an indicator of both organic and inorganic material presence. Improving existing river monitoring techniques is essential, given the growing presence of critical factors, such as climate change, population growth, and pollution in recent years.

In this study, a real scale experiment has been conducted in Selke River within the Bode catchment in Germany. The Bode basin is one of the best-instrumented catchments in Central Germany, managed by UFZ Helmholtz Centre for Environmental Research. In this experiment, the level of turbidity has been artificially increased by adding kaolin clay into the river, upstream enough from the monitored river cross-section to ensure the complete mixing between clay and water. Kaolin is usually exploited to prepare turbidity standard solutions. In addition, it is a harmless, easy to handle, and low-cost clay mineral, which is also an abundant silicate in soils and sediments.

The monitoring field campaign has been conducted using different instruments, such as an optical camera, a multispectral camera mounted on fixed positions and a drone, which have been used to describe, from different points of view, the synthetic turbidity event generated. Different types of camera and installation settings have been investigated to understand the full potential of this technology for water quality monitoring. The gathered optical data was compared to the recorded turbidity of the UFZ sensors, which has been currently installed in the Selke river cross-section.

The final goal of this work is to build a reliable image processing procedure for the development of a camera system that could support existing monitoring techniques and increase the temporal and spatial resolution in river monitoring.

**Keywords:** camera, UAS, river monitoring, sediment transport, image processing, spectral indices, remote sensing, drones, water quality assessment