

# Investigation of instruments for real-time suspended sediment monitoring

Many rivers transport fine sediment particles in suspension (Fig. 1). This is ecologically relevant and needs to be considered in the sustainable operation of hydropower plants, e.g. with respect to reservoir sedimentation and turbine erosion. Real-time data on suspended sediment concentration (SSC) and particle size distribution (PSD) are required for a better understanding of such processes and as a basis for sediment management. Various measuring techniques are available: turbidimetry, acoustic backscatter (ABS), densimetry and laser diffraction (LISST). The latter is currently the only real-time in-situ technique yielding both SSC and PSD with high temporal resolution and in detailed size classes. However, LISST only works if the turbidity is not too high. An option to overcome this limitation is to dilute samples prior to the measurements, which is automatically carried out in a *LISST-Infinite* instrument (Fig. 2).

As a basis for a field study, the performances of a *LISST-Infinite* and a more recently developed acoustic sensor (*LISST-ABS*) shall be investigated in the hydraulic laboratory. Therefore, measurements on sediment-laden water at increasing SSC will be carried out using these instruments and reference methods. The measurements will be evaluated to establish or improve the calibration of the instruments for specific particle types and to quantify the measuring uncertainties. Based on the findings, the possibilities and limitations for the use of the instruments in field conditions shall be addressed. This investigation allows you to get to know the state-of-the-art methods for real-time suspended sediment monitoring.

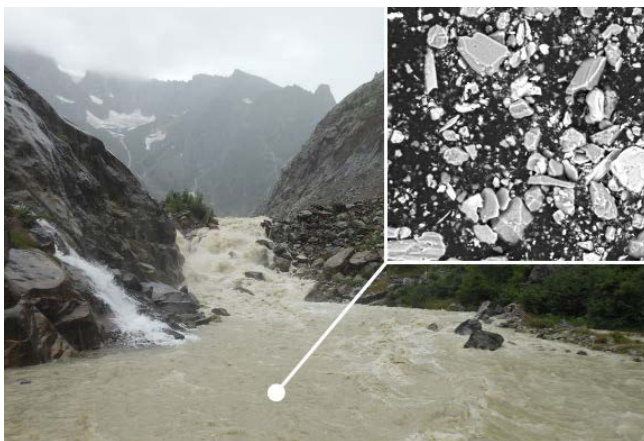


Fig. 1: Mountain stream downstream of the Fieschergletscher and microscopic image of sediment particles (Abgottsporn *et al.* 2016)



Fig. 2: In-situ laser diffractometer with automatic dilution chamber ([www.sequoiasci.com](http://www.sequoiasci.com))

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**Particularities:**

1 student for Master Thesis, or 2 students for a Project Thesis; report in English or German