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Towards *in situ* and high frequency estimates of suspended sediment properties

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Sediment properties, including sediment-associated chemical constituents and sediment physical properties (as colour), can exhibit significant variations within and between storm runoff events. However, the number of samples included in suspended sediment studies is often limited by the time consuming and expensive laboratory procedures for suspended sediment analysis after stream water sampling. This, in turn, restricts high frequency sampling campaigns to a limited number of events and reduces accuracy when aiming to estimate fluxes and loads of sediment-associated chemical constituents. Our contribution addresses the potential for portable ultraviolet-visible (UV-VIS) light spectrometers (220-730 nm) to estimate suspended sediment properties *in situ* and at high temporal resolution. As far as we know, these instruments have primarily been developed and used to quantify solute concentrations (e.g. DOC and NO_3-N), total concentrations of dissolved and particulate forms (e.g. TOC) and turbidity. Here we argue that light absorbance values can be calibrated to estimate solely sediment properties. For our proof-of-concept experiment, we measured light absorbance at 15-min intervals at the Weierbach catchment (NW Luxembourg, 0.46 km^2) from December 2013 to January 2015. We then performed a local calibration using suspended sediment loss-on-ignition (LOI) measurements (n=34). We assessed the performance of several regression models that relate light absorbance measurements with the percentage weight LOI. The robust regression method presented the lowest standard error of prediction (0.48%) and was selected for calibration (adjusted r^2 = 0.76 between observed and predicted values). This study demonstrates that spectrometers can be used to estimate suspended sediment properties at high temporal resolution and for long time spans in a simple, non-destructive and affordable manner. The advantages and disadvantages of the method compared to traditional approaches will be discussed. As well as the potential prospects for future developments to go beyond the proof-of-concept experiment in using UV-VIS spectrometers to (i) routine estimations of suspended sediment fingerprints, and (ii) trace suspended sediment sources.