

Supplementary Materials for:

Bottom and suspended sediment backscatter measurements in a flume – towards quantitative bed and water-column properties

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This PDF file includes:

Supplementary Text: Introduction; Background information to Figures S1 and S2
Figures S1 and S2 with captions
Captions to Videos S1 and S2

Supplementary Materials submitted as separate files:
Videos S1 and S2

Supplementary Text

1. Introduction

During the Backscatter-in-Flume feasibility test in the Delta Flume from the 12th to 15th of October 2020, water-temperature and -conductivity profiles were made (Text S1, Figures S1) for correcting the acoustic measurements, if necessary. Photos of the surface water samples (Figure S2) show the optical water quality. We recorded short movies of the generation of each of the sediment plumes, an example of which is Movie S2. Furthermore, the short movies of the multibeam-sonar results, recording settling plumes in the water column, are worth a thousand words (Movie S1).

Data as recorded in the Delta Flume are available on SEANOE (42). Tables explaining the available datasets, their configurations and equipment are given in this repository.

2. Background text to Figures S1 and S2

Water properties affect acoustic backscatter measurements. During this feasibility test, the hydrological (fresh water) properties were monitored with a WTW LF 197 conductivity-temperature (CT) probe, twice a day and at 1-m depth intervals. The CT probe was calibrated before the experiment. Conditions proved to be very stable both with respect to depth and over time (Figure S1a-c). The water in the flume was slightly murky (Figure S2), from an earlier flume project, but this did not hamper the measurements.

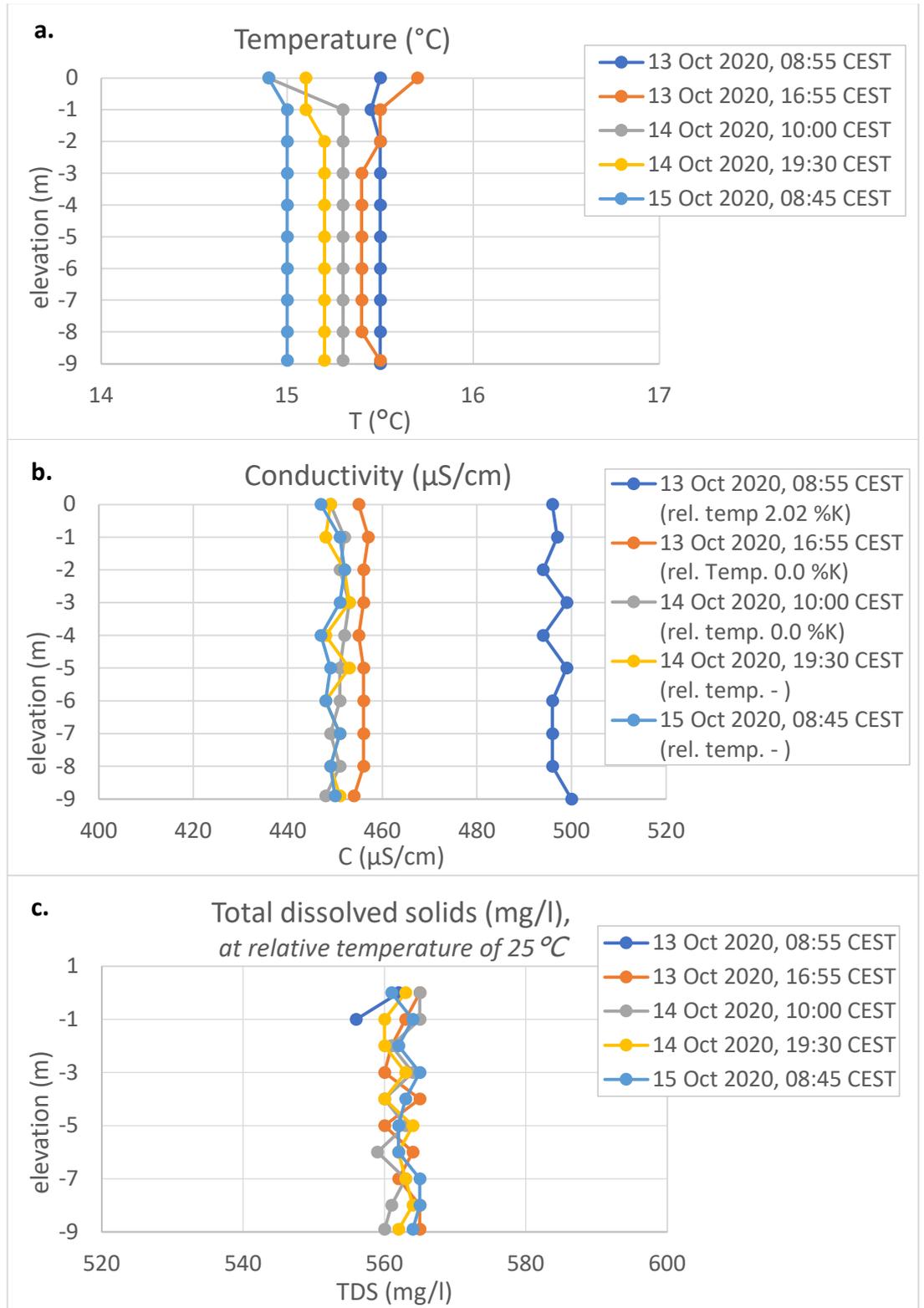
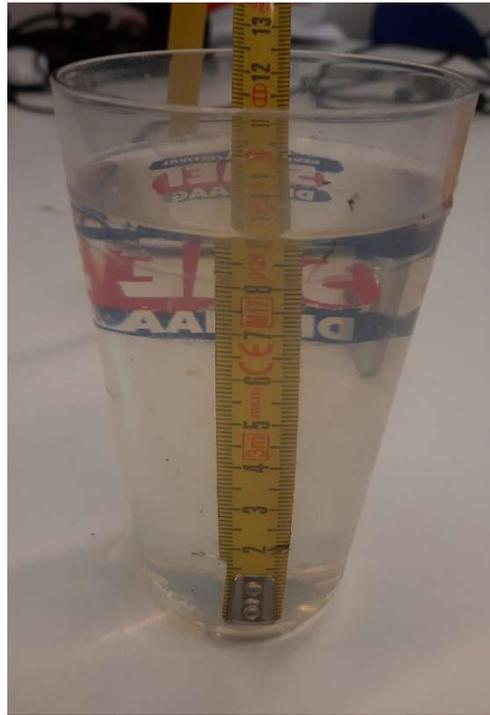


Figure S1. Depth profiles of water conditions in the Delta Flume during the feasibility test (12-15 October 2020). (a.) temperature, (b.) conductivity and c. total dissolved solids.



a.



b.

Figure S2. Water surface samples in the Delta Flume: optical murkiness due to suspended-clay remains of an earlier flume operation. (a.) 21 July 2020; (b.) 5 August 2020, i.e. approximately two months before the experiment was conducted.

Video S1. Example of the generation of a suspended sediment plume in the Delta Flume: pouring a 20-g sand sample (212-250 μm) into the dedicated PVC tube, with the most-possible constant flow over a period of 15 seconds. We videoed pouring the sand for each plume to relate any inconsistencies to data results. The movie was recorded by Simon Bicknese (RWS) on the 15th of October 2020 at 10:52. [VS01_BSiF_FT_2020.10.15_10h52m.mp4]

Video S2. Dynamic presentation of EM2040c measurements of three suspended sediment plumes in the Delta Flume: 300 grams (Figure 2.4), 37 grams and 3 grams with 180-212 μm grain size, at 400 kHz with 25 μm pulse length. The plumes enter theinsonified area and were recorded over the time for the plumes to settle. The visualizations of the three plumes, recorded successively one after the other, are combined in the same video file. [VS02_BSiF_FT_SandPlumes_EM2040c.mp4; Plume 300 g: 14 Oct 2020, 16:35; Plume 37 g: 14 Oct 2020, 16:49; Plume 3g: 14 Oct 2020, 17:05.]