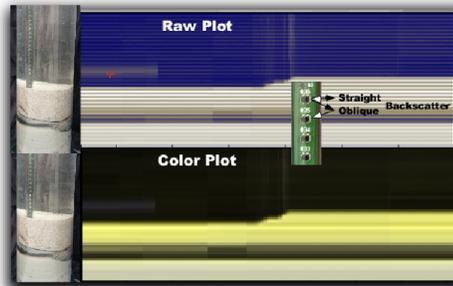
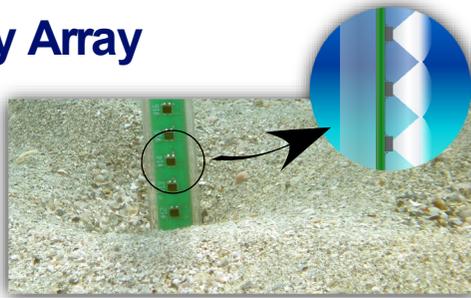


Turbidity Array

The SediMeter sensor consists of an array of 36 optical backscatter detectors (OBS) mounted inside a vertical transparent tube at 1 cm interval. They measure both straight and oblique backscatter. By presenting the data as a 5 mm-resolution false color plot, the bottom comes out beige and the air becomes blue. The turbidity profile also shows the darkness of the sediment below the bottom, such as the black color resulting from anoxia.



Bed Level

The bed level of the sea floor is interpolated from the backscatter profile. In an experiment it was possible to detect the sedimentation of 0.1 mm, or 100 g/m². In the real world there are many factors to consider, including the fact that often the bottom is not clear-cut, but gradual. The turbidity profile reflects this better than a single value of level.

Software

The PC software is used to set up the instrument for stand-alone logging, for real time monitoring, for downloading, and for data analysis. It also allows the scientist-in-charge to interactively interpret the data for level determination. Plus, it can sound the alarm if a threshold is exceeded.

Nephelometric Turbidimeters

The standard method of deployment uses a holder tube that is screwed down. The holder tube protects the sensor but precludes good turbidity readings. The SM4 has therefore got a thicker section above the holder tube, with nephelometric turbidimeters—both ISO and EPA—that are ideally suited for measuring turbidity from 10 to 400 FTU, the range of most interest for studying suspended sediment transport.



Fluorescence Meter

The fluorescence meter emits UVA light and measures white light at 90° angle. The UVA LED is mounted very close to the white LED of the EPA style turbidimeter, and they measure the scattered light using the same photodetector. Since they are both calibrated using formazin (we call this unit FFU, formazin fluorescence units), it is possible to see if the suspended sediment is more or less fluorescent than formazin, by comparing the values in NTU and FFU. This is an experimental sensor still, but a possible use for it is to detect petroleum contamination, since petroleum is known to be fluorescent.

Light Meter, Thermometer

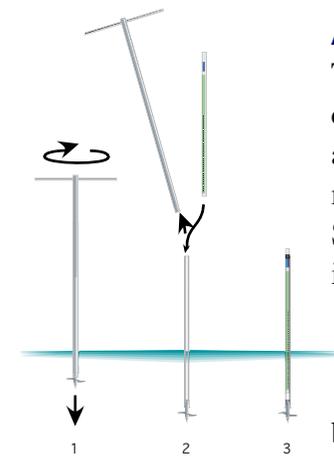
The SM4 also measures visible light (horizontally), and water temperature.

Anti-Fouling

Two UVA LEDs irradiate the windows of the nephelometric turbidimeters with ultra-violet light to discourage microbial growth. A vibrator shakes off bubbles and particles. The kits also include copper tape, which—when applied to the rear side—discourages barnacles from settling also on the front side of the sensor.

Accelerometer

The 3D accelerometer continuously gathers data at 10 Hz in a FIFO memory. When a SediMeter measurement is due, the SM4 saves the last 20 or 30 values, depending on if the resolution is 12 or 8 bits, respectively. The software then calculates



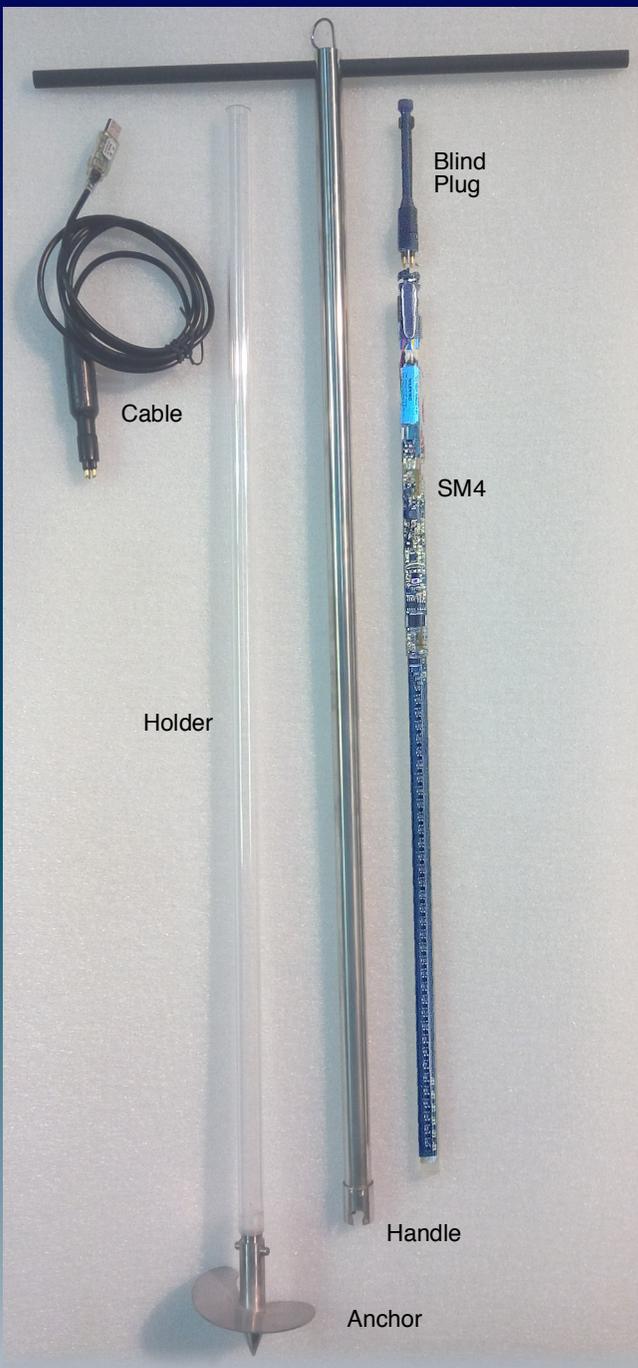
instrument tilt (to make sure it has not fallen over), and vibration. Strong currents may cause the instrument to vibrate due to vortex formation, so the accelerometer data is a proxy to the energy level available for sediment transport. The measurement rate, filtering parameters, range etc can be customized through the calibration settings.

Conditions-Based Monitoring

If the accelerometer measures a value above the set threshold, it will signal the CPU that an extra measurement should be taken. This allows the SM4 to collect accelerometer and other data during peak events that might otherwise have fallen between regular measurements. To prevent the memory from overflowing, the threshold is raised a little after each CBM event. Also, the minimal delay to the next CBM event is 2 s. As default CBM is on, and the start threshold is at about double the noise level. Many of the accelerometer settings are customizable in calibration.

Networking

SediMeters can be connected through an RS485 network, and by the SediLink radio modem. They can also be interfaced to third party equipment, such as loggers and telemetry.



Specifications

SediMeter sensor

Light emitted	945 nm (NIR)
Number of OBS detectors	36
Detector spacing	10 mm
Diameter	15 mm / 20 mm
Data output	Turbidity in 36+35 levels, bed level

Turbidity resolution; range	1 FBU; 0 - 10,000+ FBU
Bed level resolution; precision	0.01 mm; 0.1 mm

International nephelometric turbidimeter (ISO 7027 type)

Light emitted	850 nm (NIR)
Measurement angle	90°, NIR filter
Turbidity resolution; linear range	1 FNU; 0 - 400 FNU

U.S. nephelometric turbidimeter (EPA type)

Light emitted	White (LED)
Measurement angle	90°, daylight filter
Turbidity resolution; linear range	1 NTU; 0 - 400 NTU

Fluorescence meter

Wavelength emitted	367 nm (UVA)
Measurement angles	90°, 180°, daylight filter
Fluorescence resolution	1 FTU

Light meter

Resolution; range (ca)	1 lux; 0 - 50,000 lux
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Accelerometer

Range	±2 g
Resolution	0.001 g, or 0.016 g
Samples per measurement	20, or 30
Rate	10 Hz
Conditions-Based Monitoring	Dynamic threshold

Logger

Memory size	32,768 measurements
Logging interval	1 second to 24 hours
Communication, charging	USB to RS485 cable
Intended deployment time	Weeks to months

Cleaning

Vibrator, UV light, automatic optimization

Battery

Type	AA rechargeable
Capacity, ca	900 mAh

Specifications subject to change without prior notice. Precision refers to repeatability.

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SediMeter™ SM4

- Bottom Level
- Vertical Turbidity Profile
- ISO-style Turbidimeter
- EPA-style Turbidimeter
- Fluorescence Meter
 - Lightmeter
 - Thermometer
 - Accelerometer
- Conditions-Based Monitoring
- UV and Vibrator Cleaning

