LISST-SL2 Field Testing in the USGS Washington WSC, 2019 funded by FISP ($18K)

Photo (l-r): Chris Curran, Adrian Landstedt, Yogi Agrawal, Jonathan Bell, Chad Opatz

Testing Objectives

- Perform side-by-side measurements with LISST-SL2 and FISP approved samplers at 4 rivers in western Washington
- Determine if SSC and PSD results are consistent with physical samples
- Evaluate general operation, sensor performance and user interface

New and Improved: LISST-SL2 (Sequoia Scientific Ltd.)

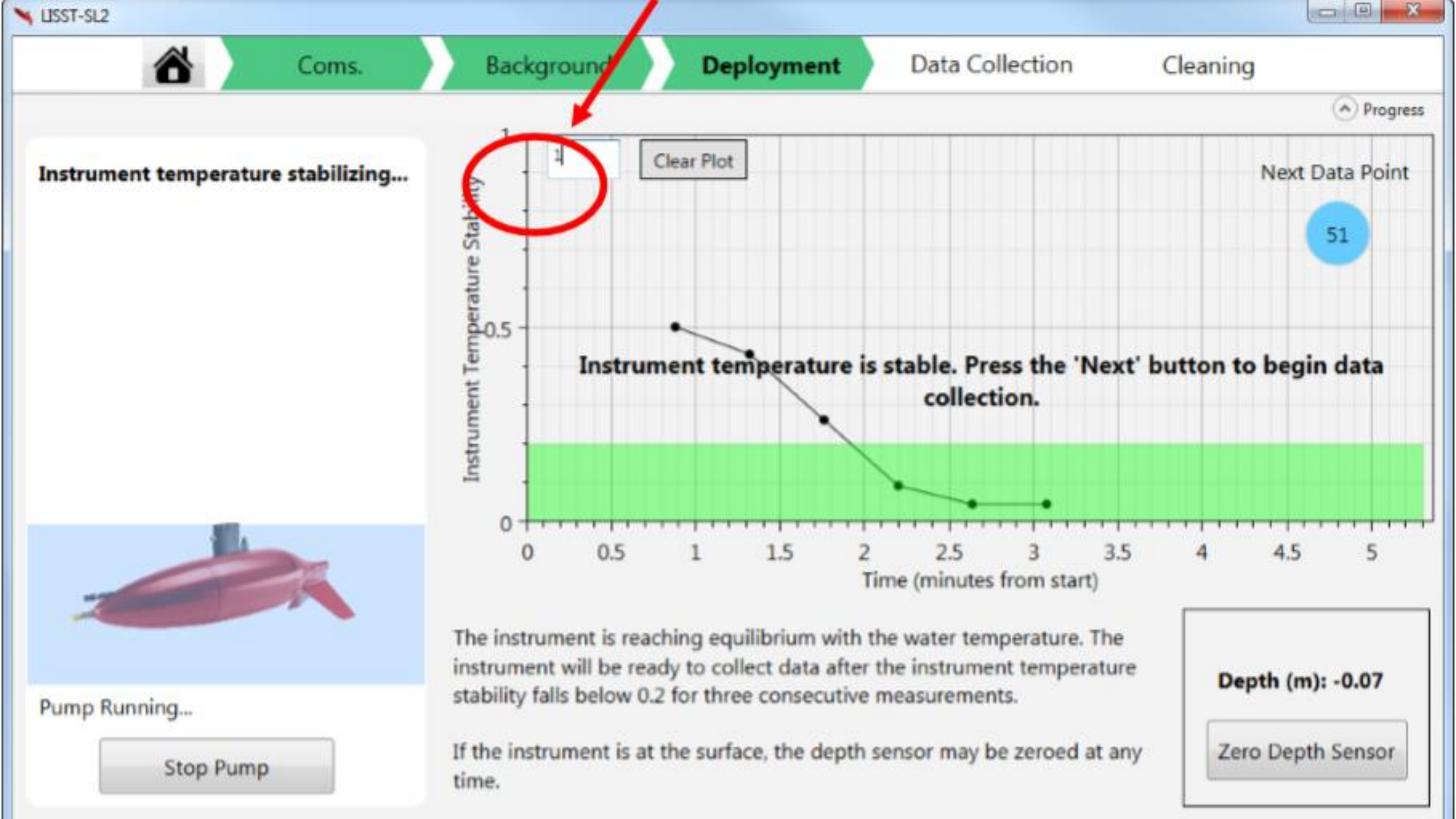
An Isokinetic Laser Diffraction Instrument for Measuring Suspended Sediment Concentration and Particle Size

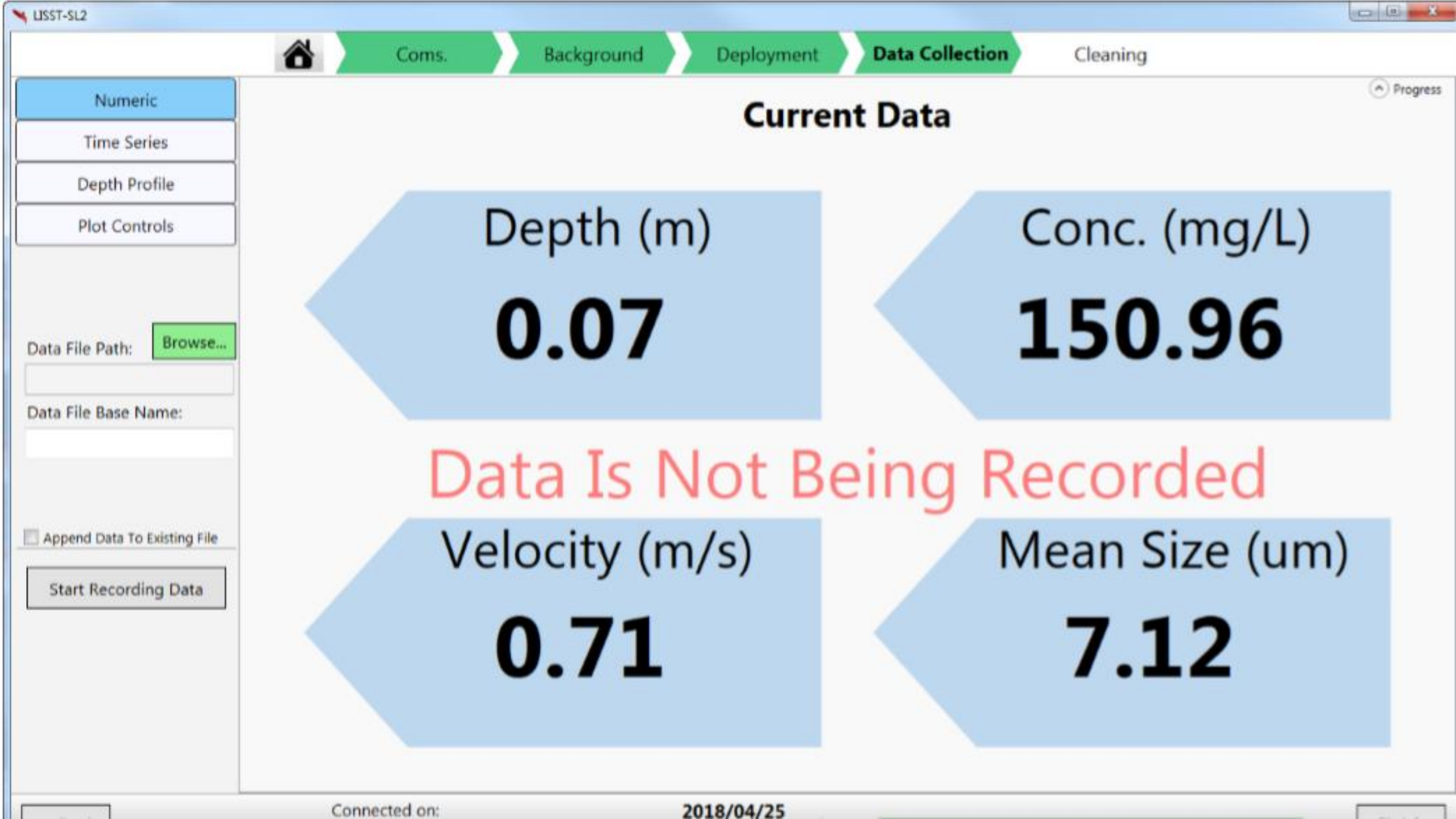
Real-time data display (1 Hz):

- Water speed
- Temperature
- Depth
- Concentration
- Mean particle size

Improvements:

- ❖ Easier in-field calibration check
- ❖ Easier cleaning/flushing procedure
- ❖ Better software for data acquisition on a laptop or tablet (Bluetooth)
- Heavier for reduced swimming
- Sensors seem more robust
- Particle size range 1-500 microns


LISST-SL2
Coms.
Background
Deployment
Data Collection
Cleaning
Progress
Instrument temperature stabilizing...
Clear Plot
Next Data Point
51
Instrument Temperature Stability
Instrument temperature is stable. Press the 'Next' button to begin data collection.
Time (minutes from start)
Pump Running...
Stop Pump
The instrument is reaching equilibrium with the water temperature. The instrument will be ready to collect data after the instrument temperature stability falls below 0.2 for three consecutive measurements.
If the instrument is at the surface, the depth sensor may be zeroed at any time.
Depth (m): -0.07
Zero Depth Sensor


LISST-SL2
Coms.
Background
Deployment
Data Collection
Cleaning
Progress
Numeric
Time Series
Depth Profile
Plot Controls
Current Data
Depth (m)
0.07
Conc. (mg/L)
150.96
Data File Path:
Browse...
Data File Base Name:
Data Is Not Being Recorded
Velocity (m/s)
0.71
Mean Size (um)
7.12
Append Data To Existing File
Start Recording Data
Connected on:
2018/04/25

LISST-SL2

Coms. | Background | Deployment | **Data Collection** | Cleaning

Numeric

Time Series

Depth Profile

Plot Controls

Data File Path: Browse...

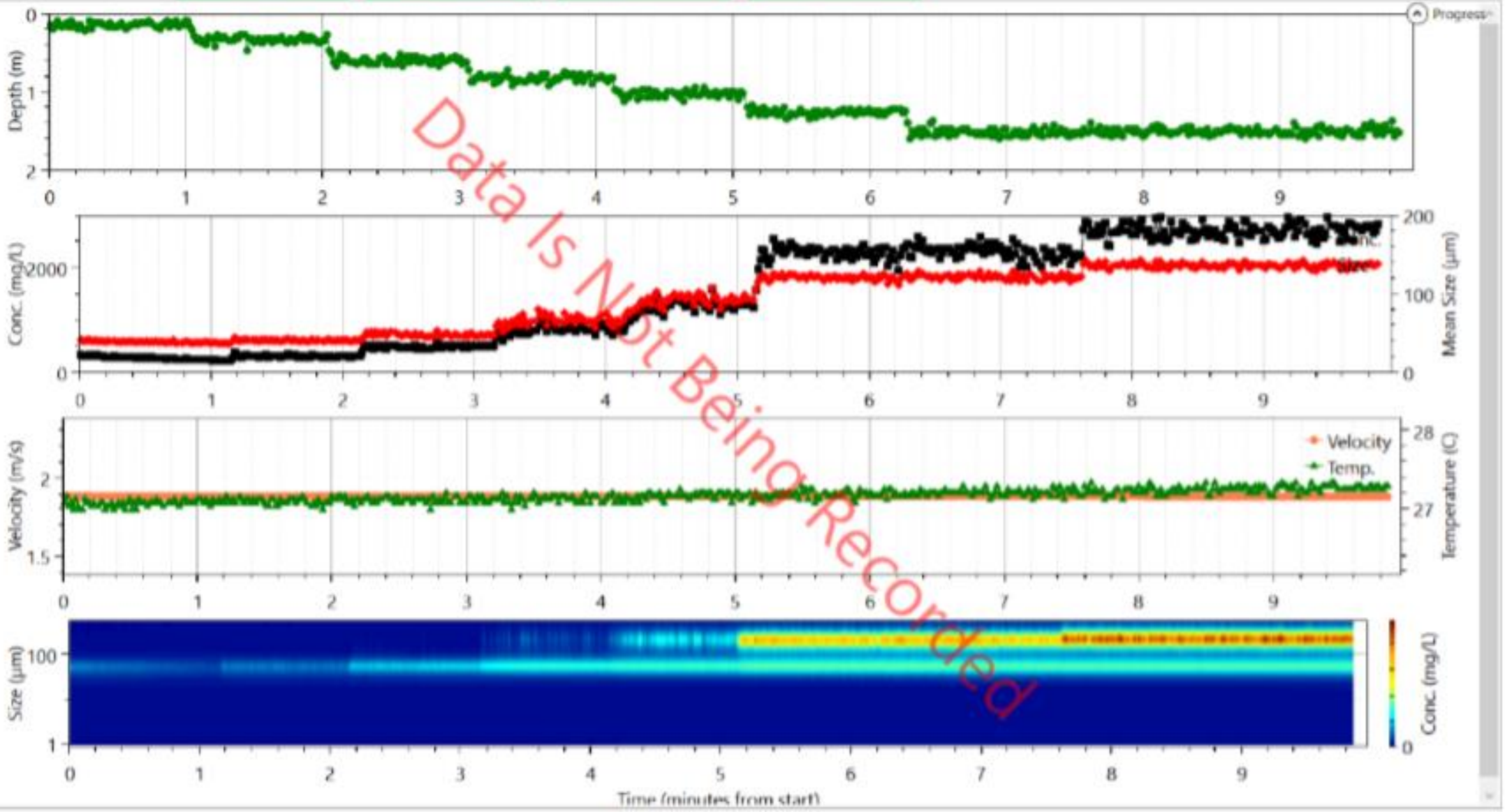
C:\Users\Randy\Documents\

Data File Base Name:

DEPTH_PROFILE

☑ Append Data To Existing File

Start Recording Data



← Back

Connected on: COM7

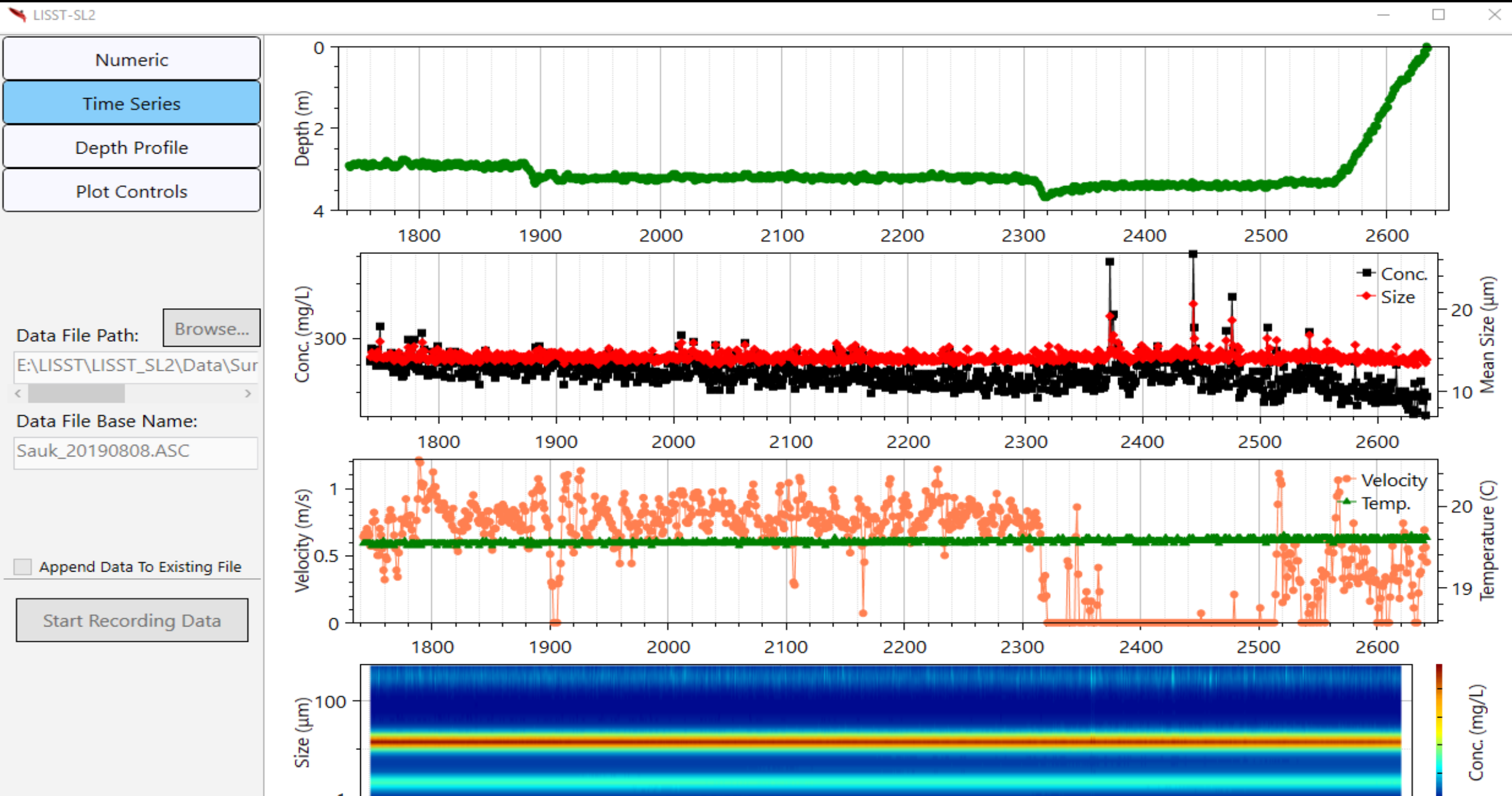
2018/05/03 14:11:21

Battery:

Finish

2:11 PM 5/3/2018

Data Review: load and play back raw data files (.ASC file)



Data Review: Depth-averaged box plots, user sets bin size

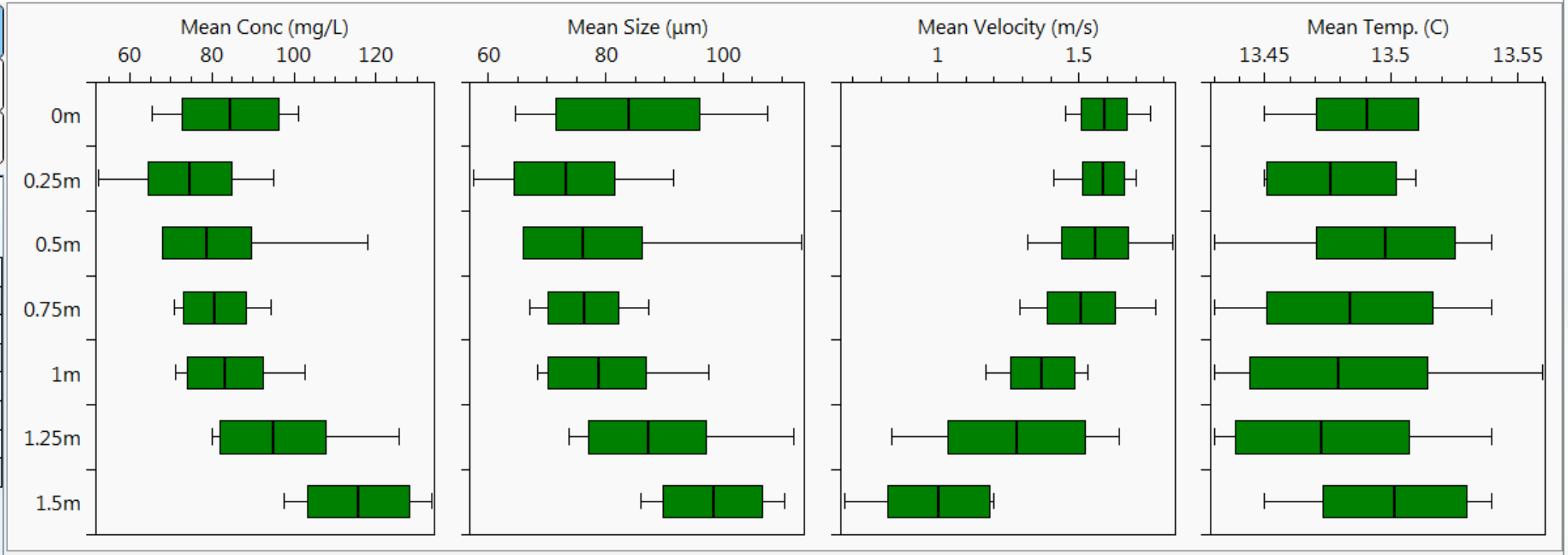
LISST-SL2

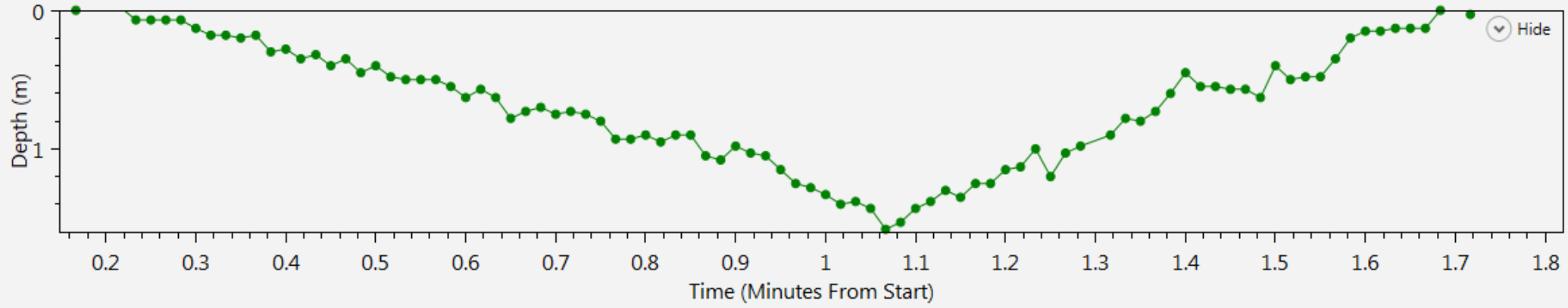
Depth Averaged

Particle Size Distribution

Raw Data

Center Depth (m)	Depth Range (±m)	Num. Data Points
0	0.12	11
0.25	0.12	17
0.5	0.12	19
0.75	0.12	13
1	0.12	15
1.25	0.12	11
1.5	0.12	7





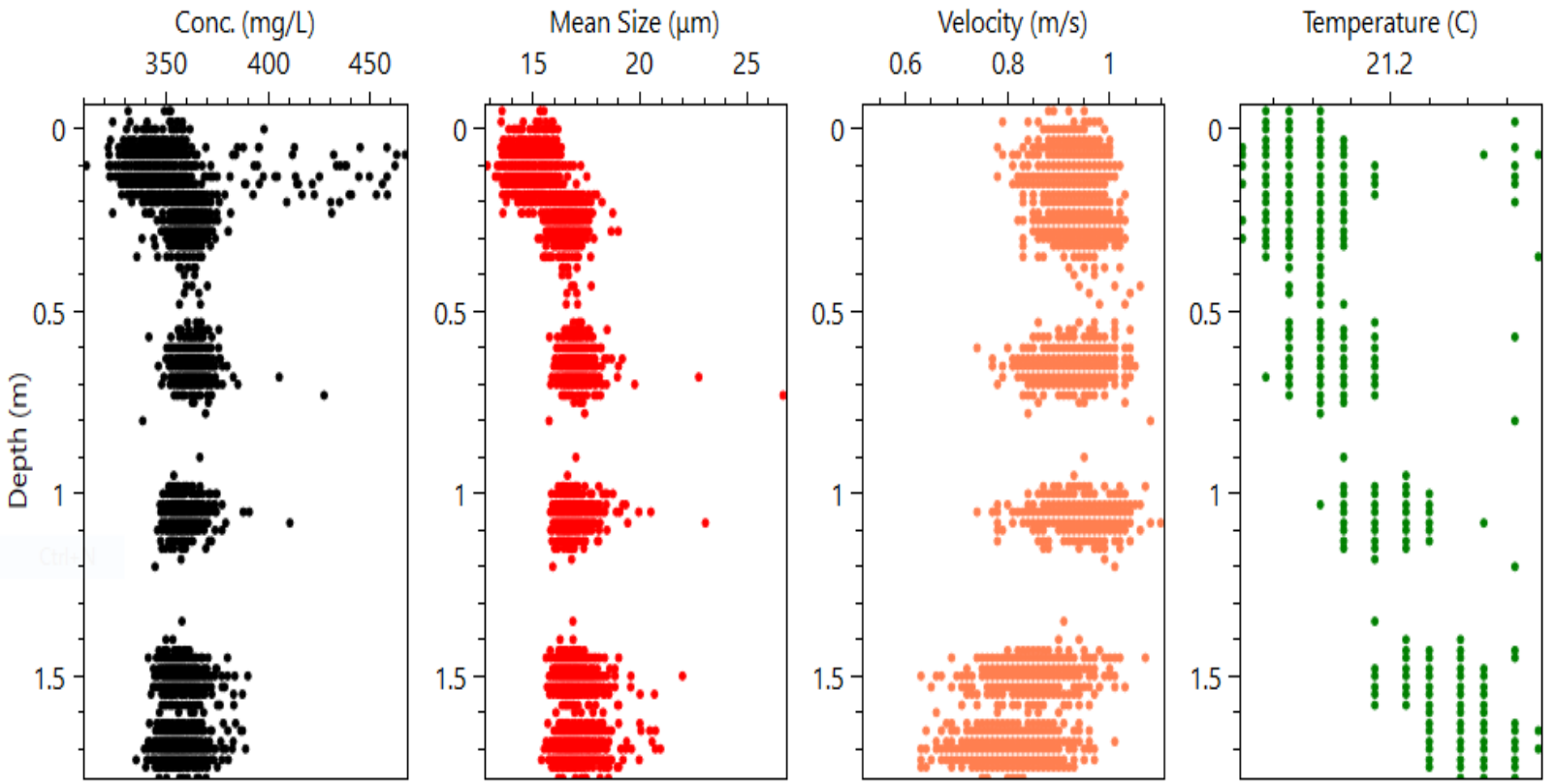
Save Summary File

← Home

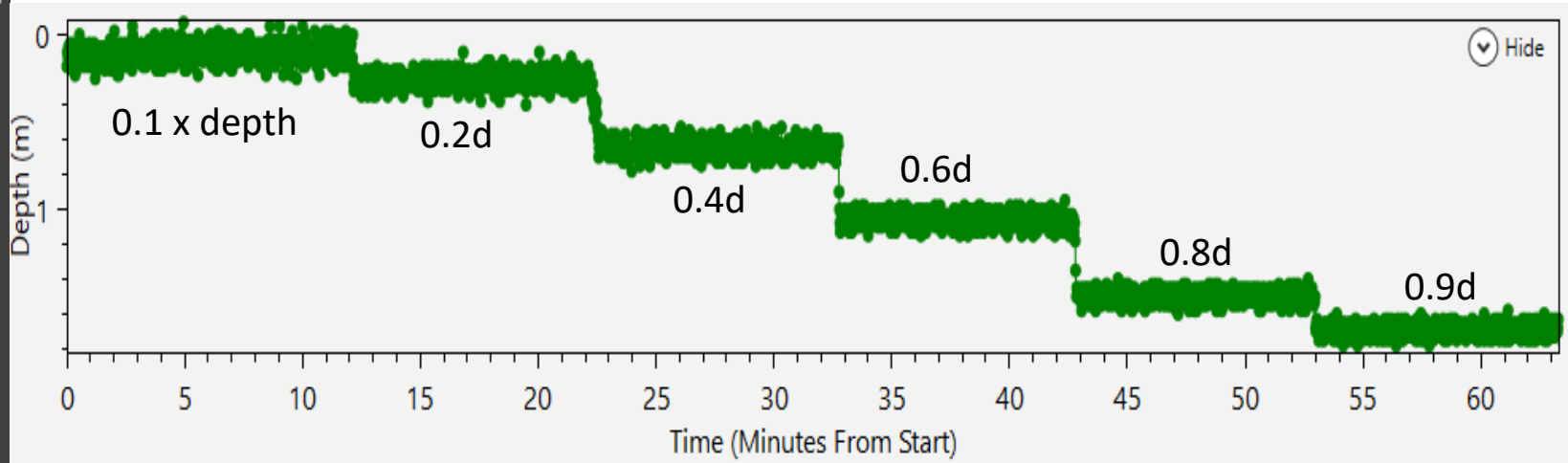
Time Range:

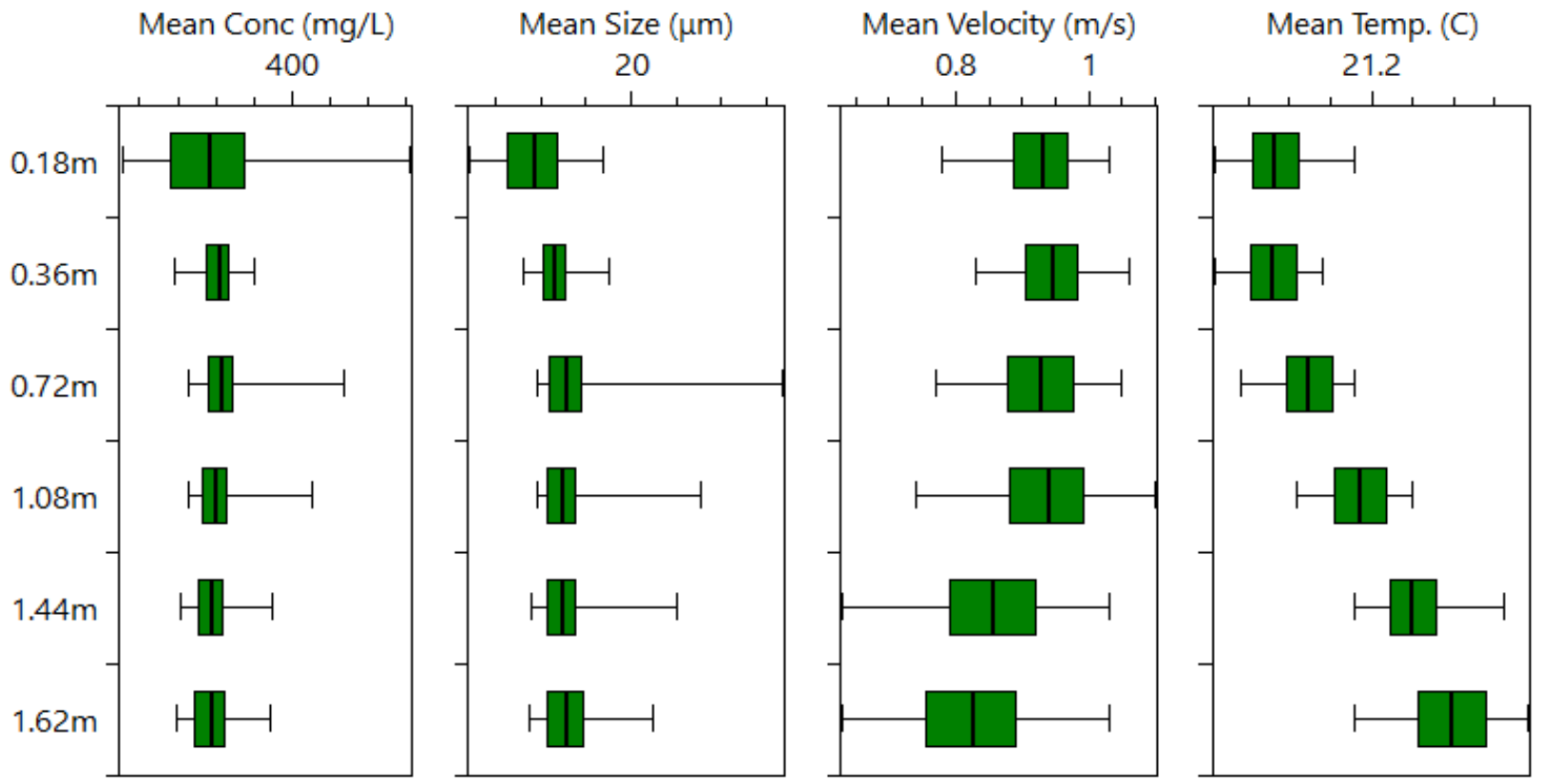
Field Methods

- Deploy the LISST–SL2 at 6 depths in the deepest, fastest section of the river (0.1 x depth, 0.2d, 0.4d, 0.6d, 0.8d, 0.9d).
- At each depth, collect LISST-SL2 data for 5 - 10 minutes.
- Concurrently collect physical samples at each depth with a P-6.
- Deploy an ADCP to compare velocity data w/ -SL2 (most sites).
- Physical samples were collected in duplicate, analyzed for SSC, %fines (<63 um), and PSD at USGS Cascade Volcano Observatory SedLab.



Puyallup River
Puyallup, WA
Aug. 2019





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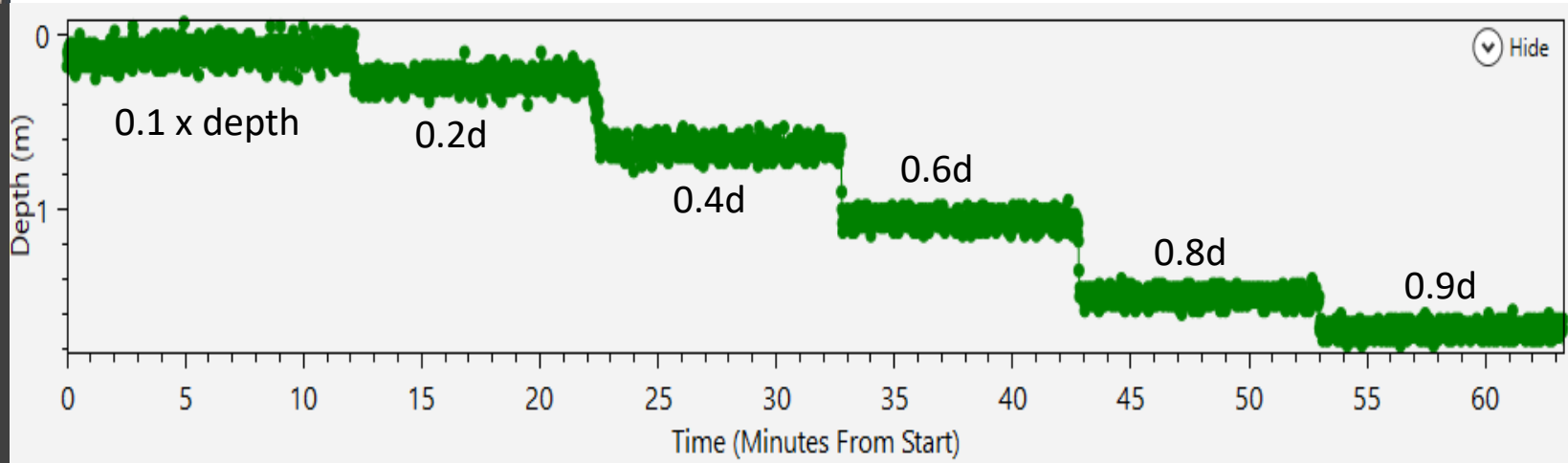

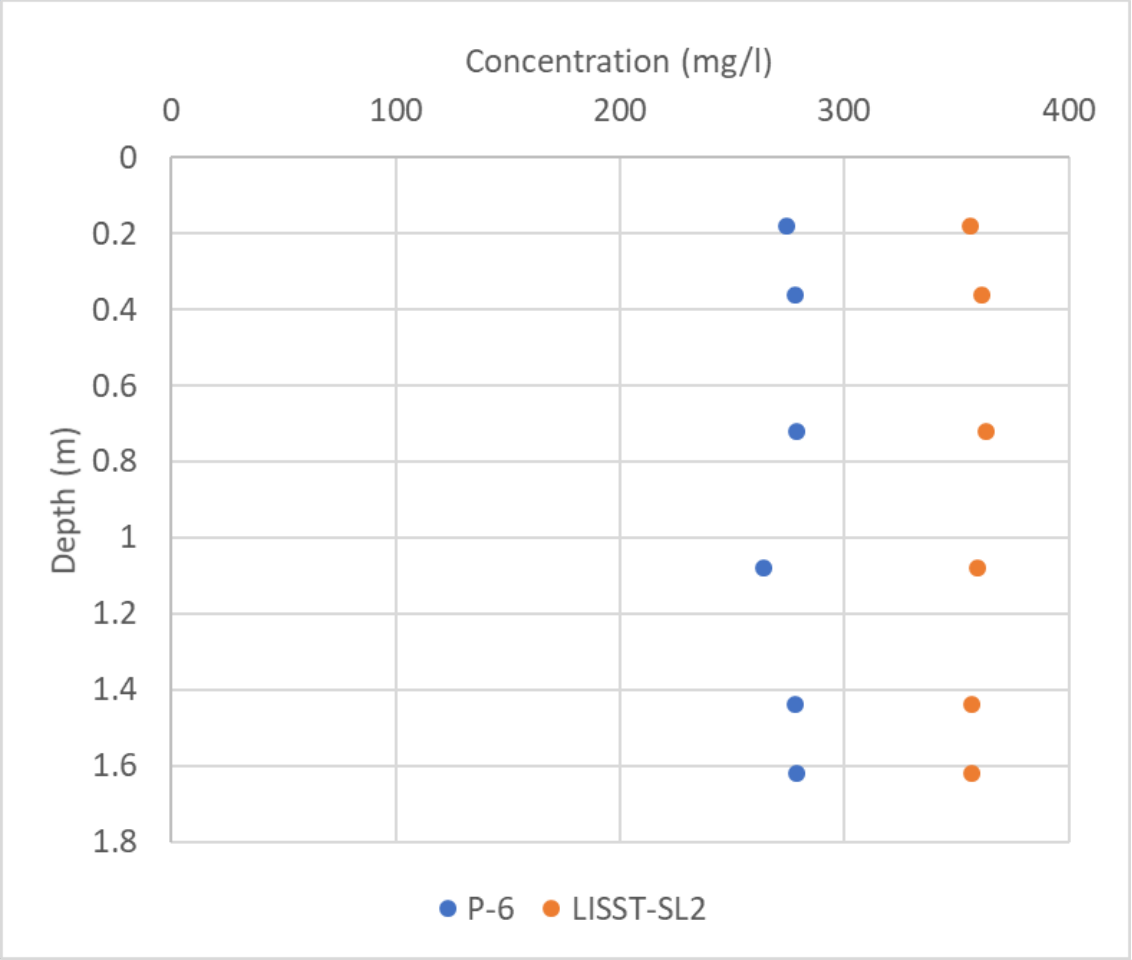

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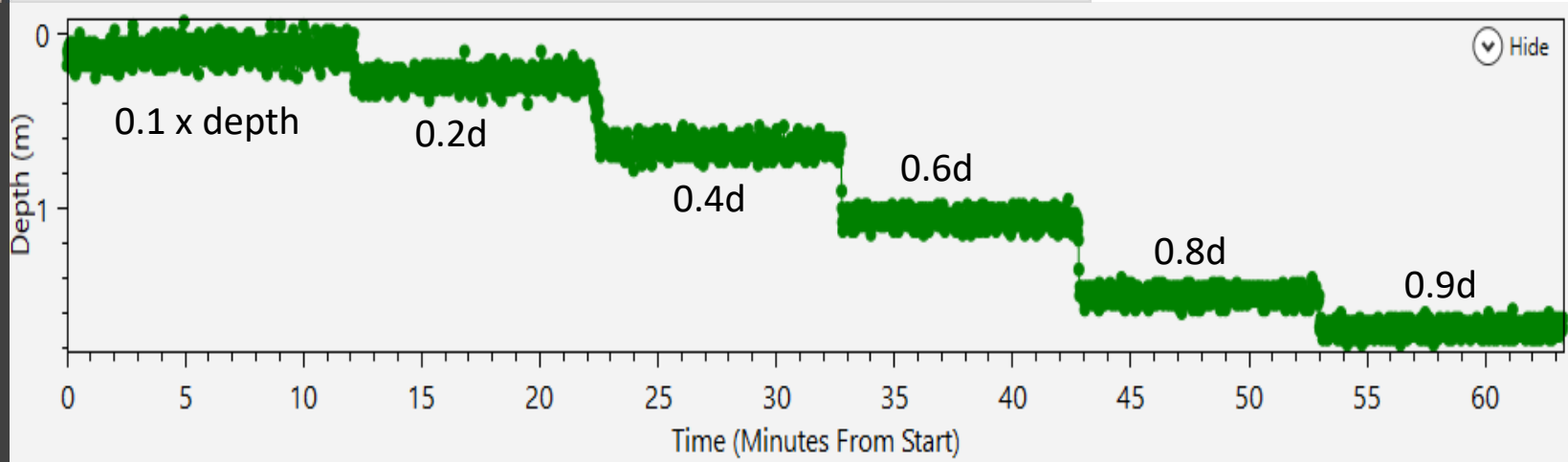
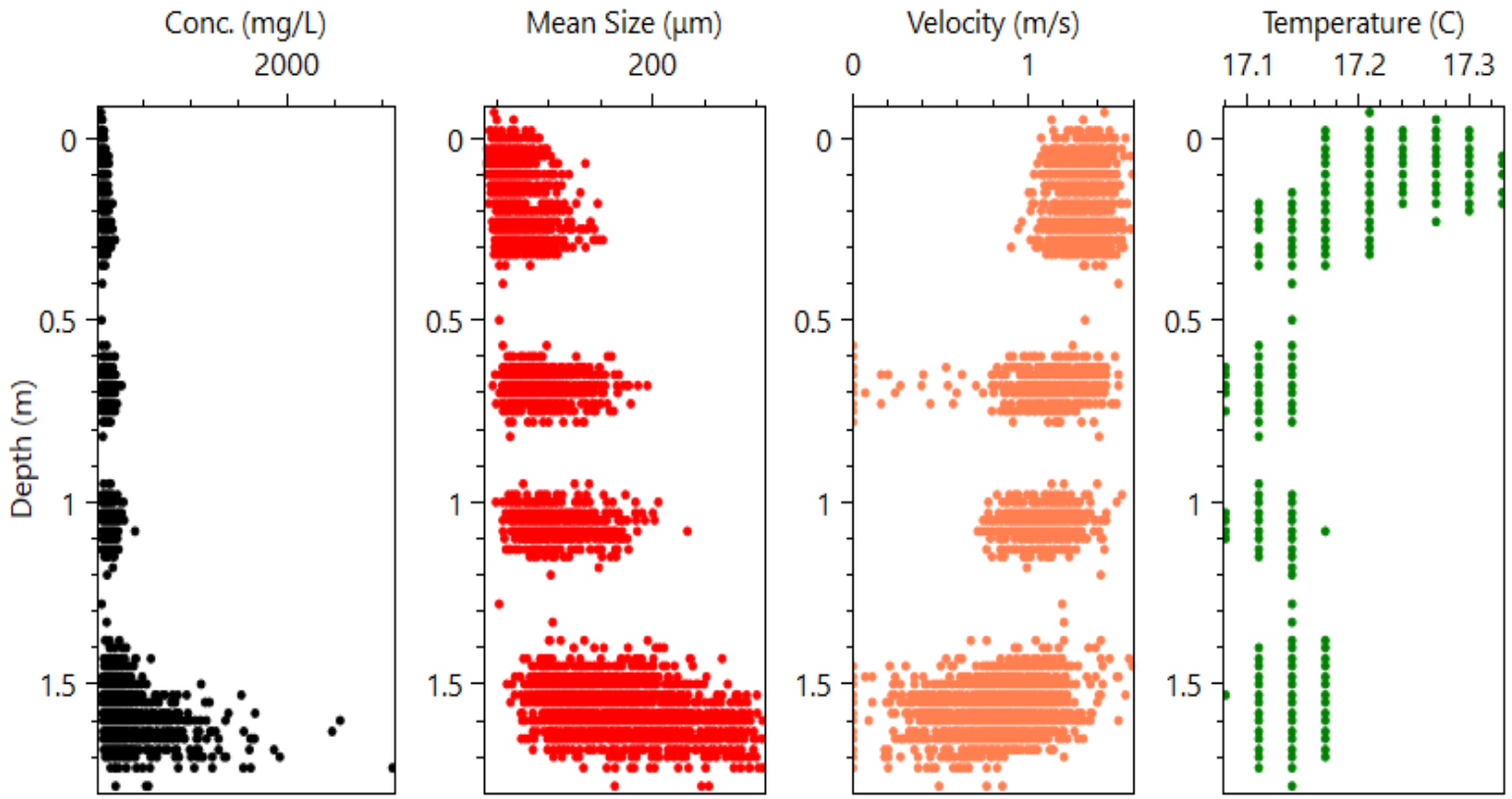
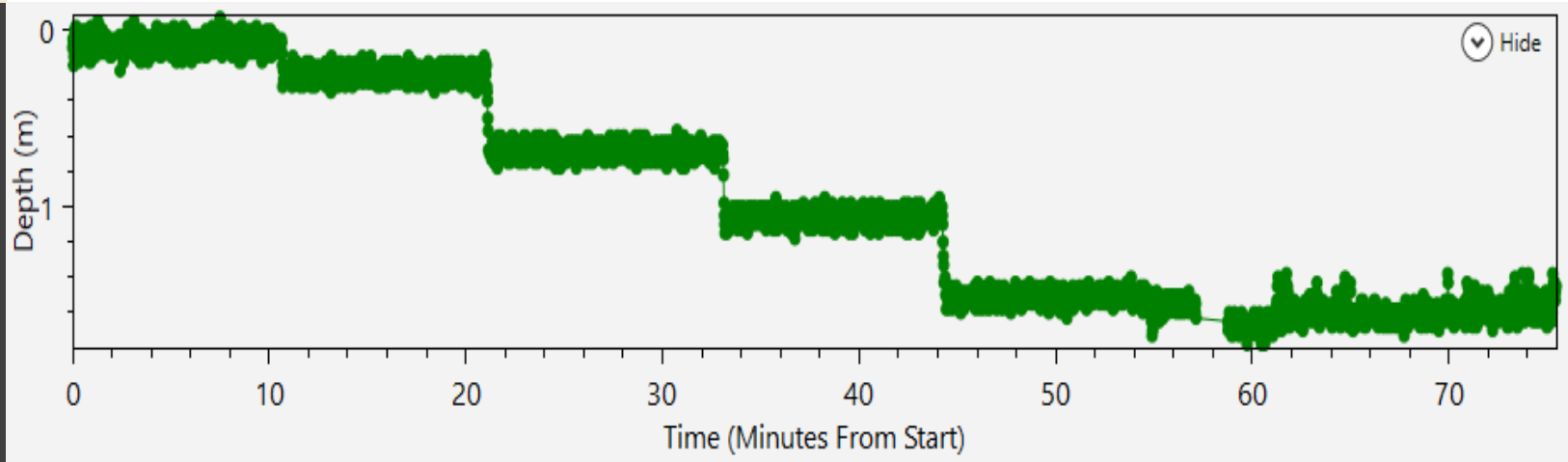
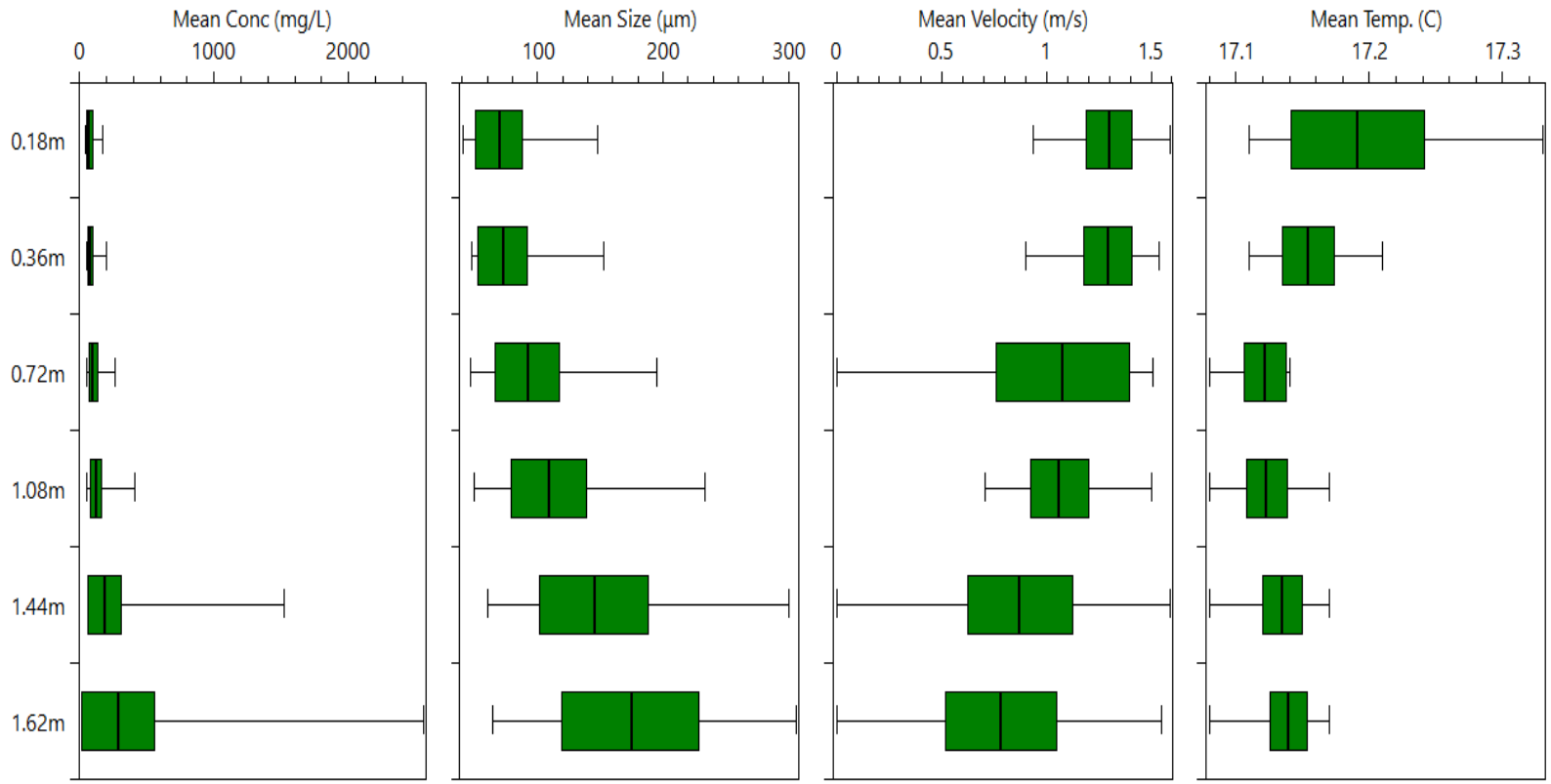




Cowlitz River at Castle Rock, WA Aug. 2019





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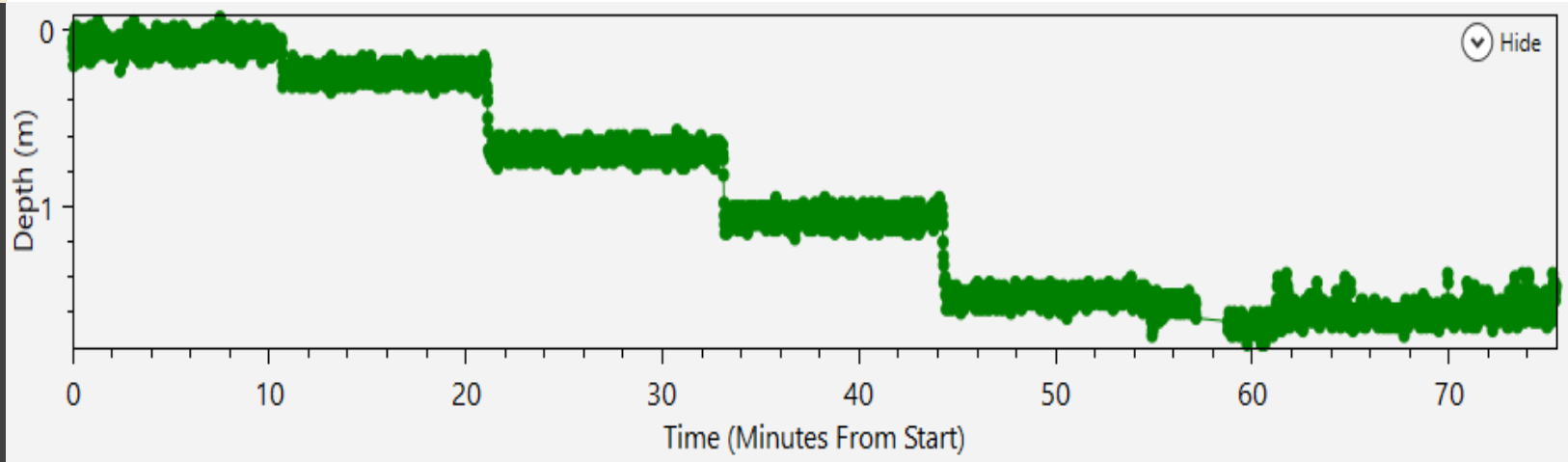
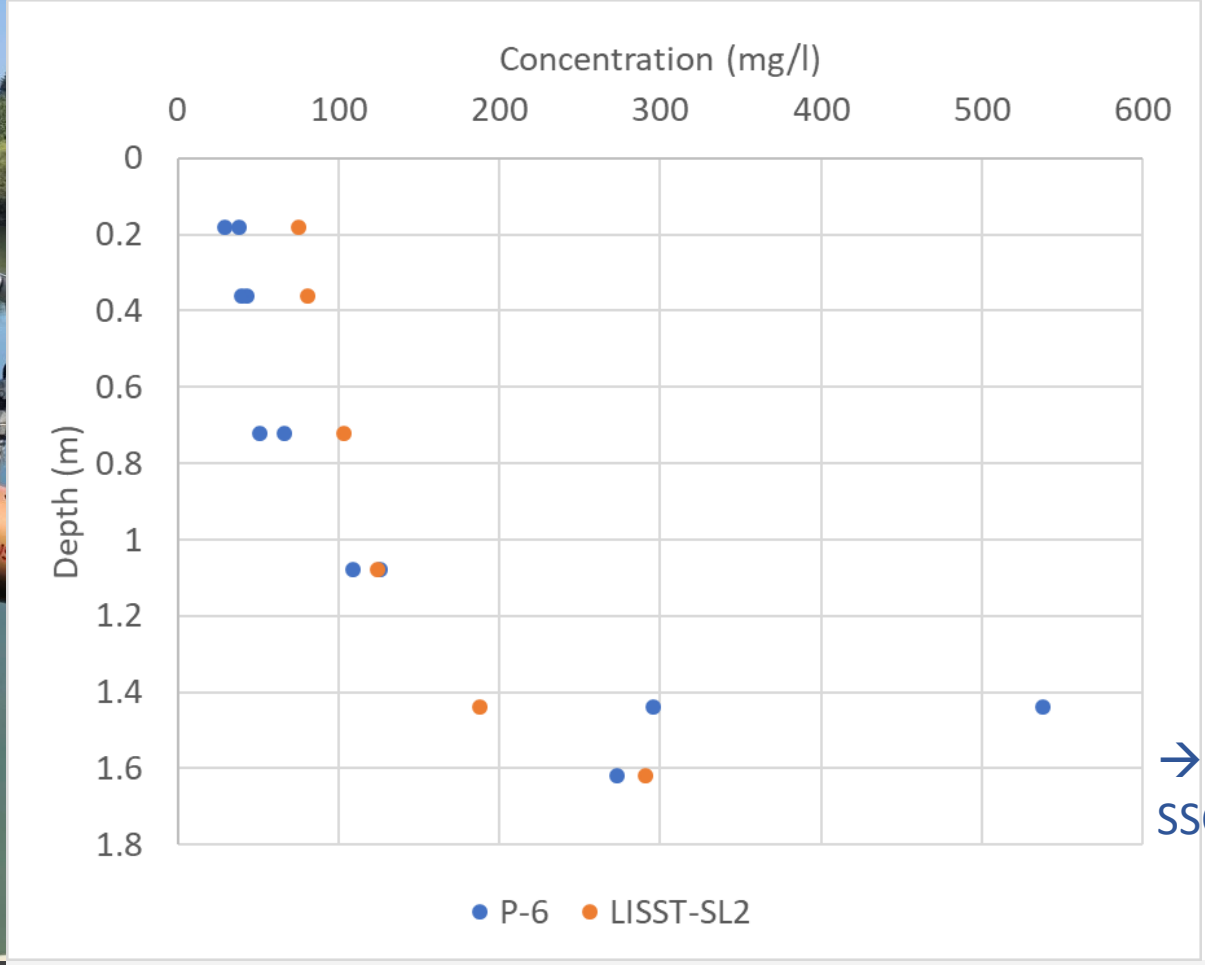
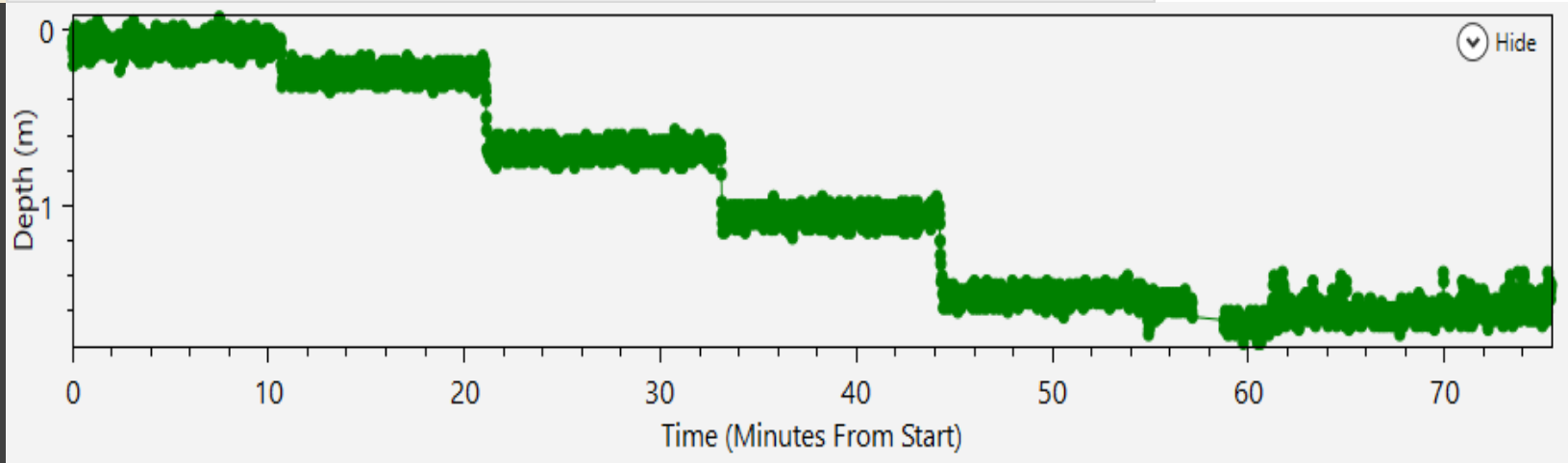




→P-6 B sample
SSC~3,600 mg/l

Cowlitz River at Castle Rock, WA Aug. 2019



Additional field testing sites, August 2019

White River near Sumner, WA

Sauk River near Sauk, WA


LISST-SL2