s::can, a Newfoundland and Labrador experience

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Newfoundland Labrador

RT Purpose

- to meet objectives of the RTWQM program and the WRMD regulatory mandate
  - Must maintain, upgrade and add to tools used in RTWQ monitoring
  - NL is innovative, research and test new technologies
- presentation on our experiences with s::can


Perspective based on what you see.
With the ability to see more...
Your perspective broadens!

s::can instrument

- Data logger/management:
  - Windows platform
  - Highly functional

- Water-quality probe:
  - In situ spectrometer
  - UV (220-390nm)
  - or UV/VIS (220-720nm)
  - up to 8 parameters

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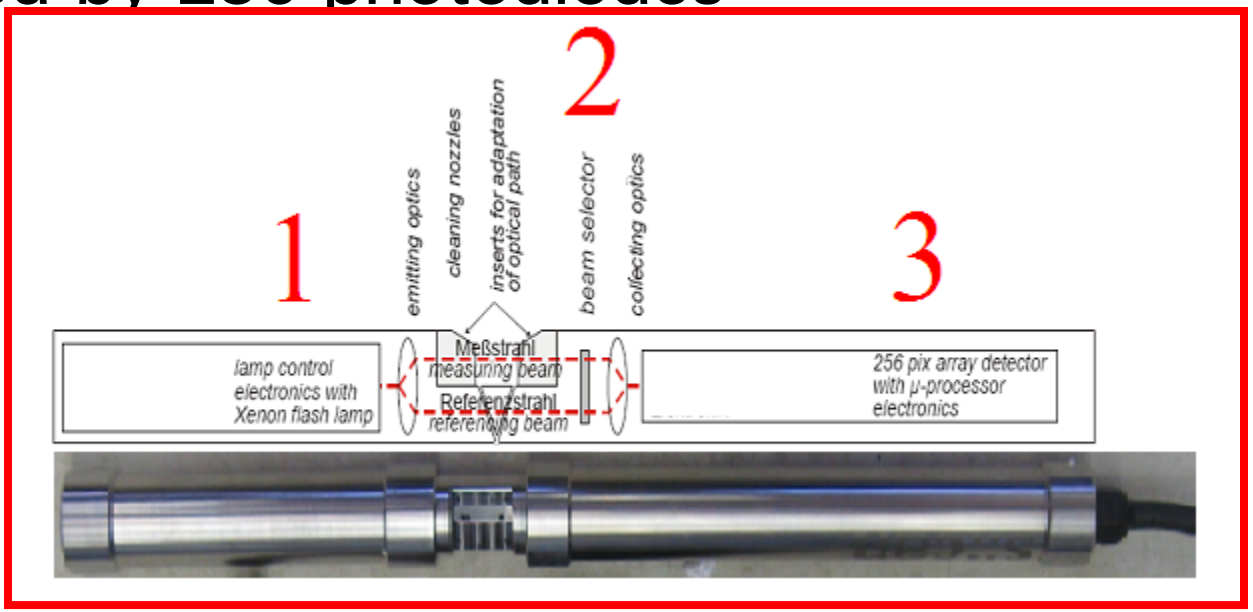
s::can probe, spectro::lyser

1. Send: xenon flashlight
2. Measure: dual-beam
3. Receive: Detector-splits light wavelengths measured by 256 photodiodes



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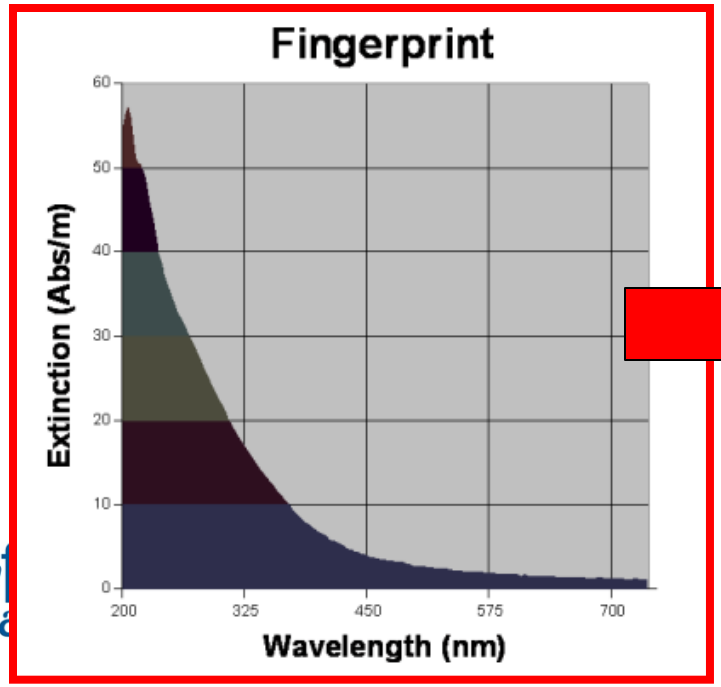
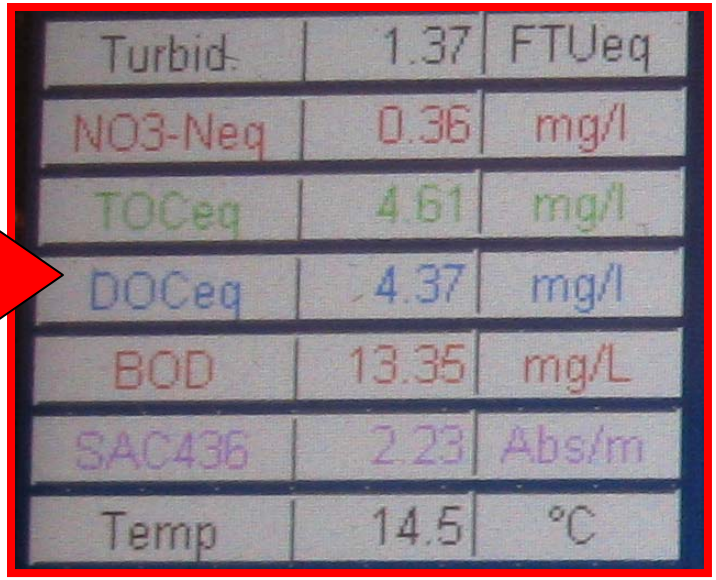
Measurement

- Principles of spectroscopy
  - Based on parameters unique light absorption, known parameters in library
  - Light absorption over UV and VIS wavelength is a fingerprint of the water
  - More light absorption means greater parameter concentration





Parameters

Parameter\Probe	UV-VIS	UV
Turbidity	✓	✓
NO3	✓	✓
NO2		✓
TOC	✓	✓
DOC	✓	
Colour	✓	
Alarm	✓	✓

- Possible to create algorithms for additional spectral parameters
- Non spectral-parameter probes also available

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Calibration

- Global calibration
  - Parameters quantified using algorithms of known parameter absorptions
- Local Calibration
  - to make connection between global calibration parameter and lab result based on grab samples

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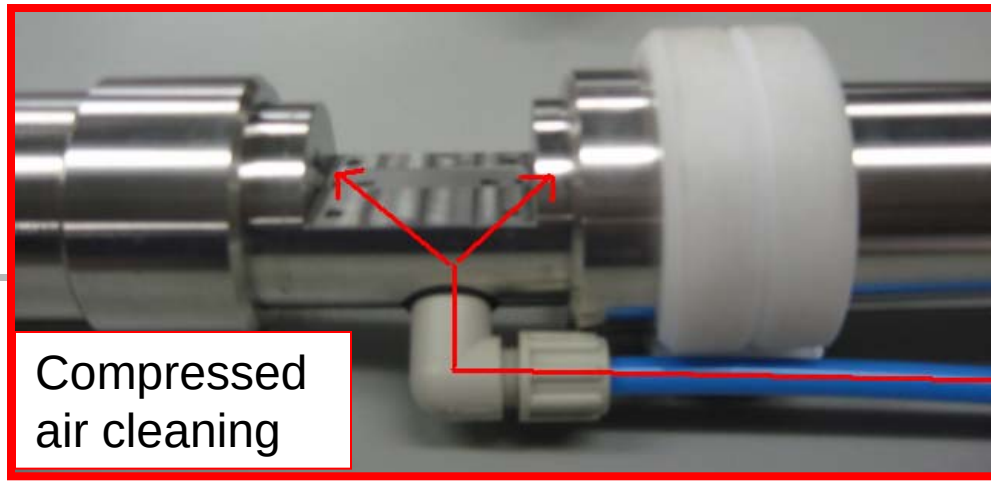
Cleaning

- Compressed air released over sensors at regular intervals
- In situ cleaning on monthly basis
- Regular reference checks to ensure quality of readings



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Communication

On-site communication

USB Port → to jump drive

LAN Port → to PC

RS 485 → to probe

Remote communication

USB to modem

-Dial-up

-GSM

-CDMA

-Iridium

→ file transfer protocol

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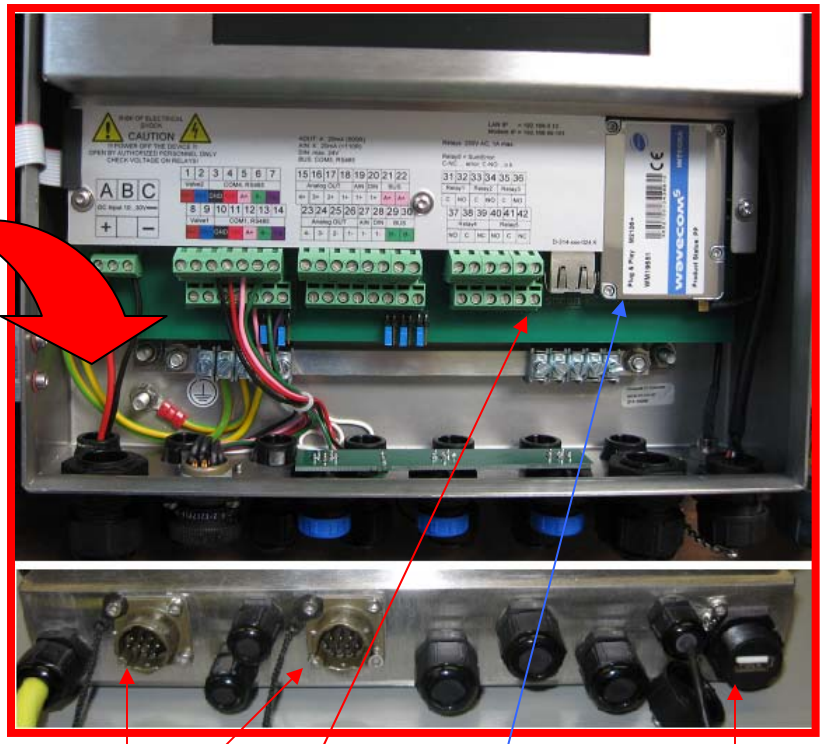
On-site Communication



RS485 port

LAN port

GSM modem

USB port

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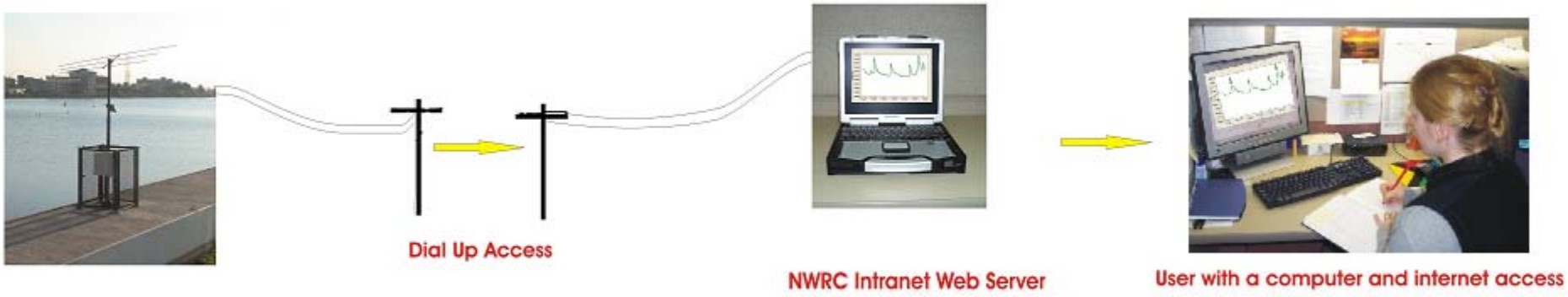
Dial-up Connection



- Communicate via analog modem with USB port
- Requires telephone line
- FTP to Con::stat from office and retrieve data

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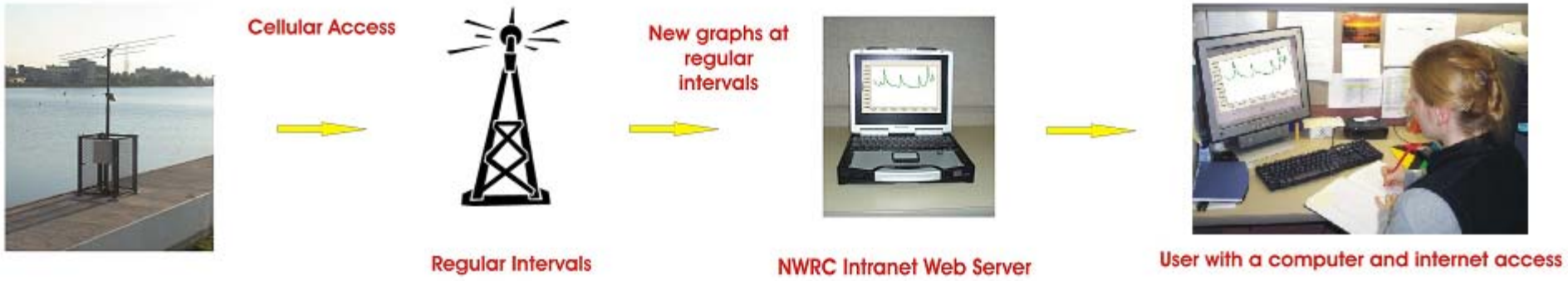
Cellular Connection



- Communicate via on-board GSM modem on the Con::stat or USB port to external cellular modem
- Requires cellular access and subscription
- FTP to Con::stat from office and retrieve data

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Iridium Connection

Iridium modem

Iridium

Iridium modem

Mobile center

User with a computer and internet access

- Communicate via external Iridium modem
- Requires Iridium subscription
- FTP to Con::stat from office and retrieve data

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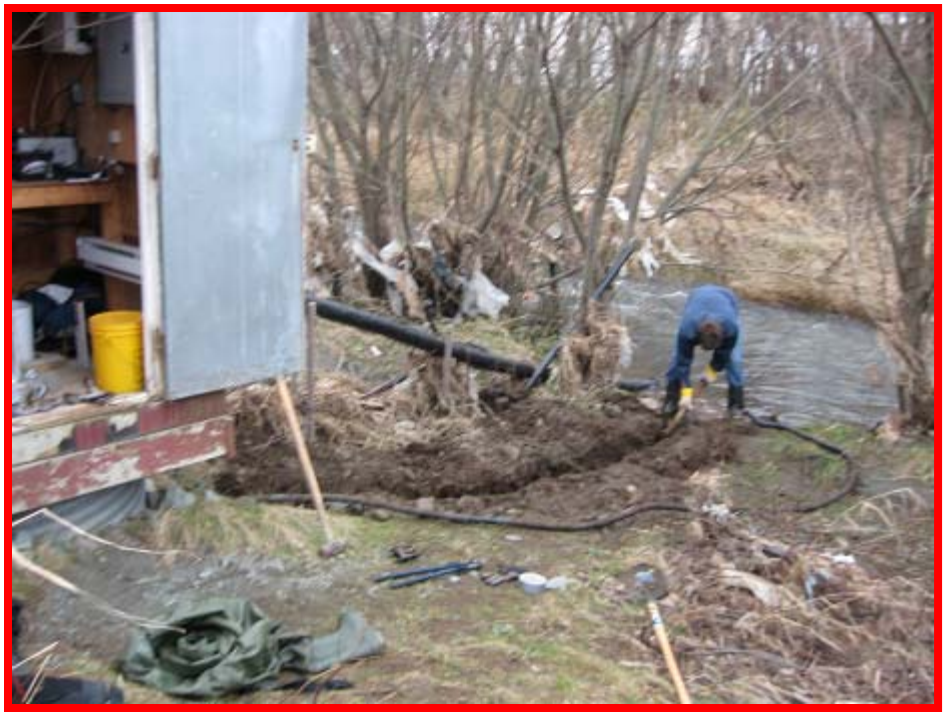
Deployment

- Leary's Brook
- Site preparation
- Regular site visits:
  - Calibration- can input on site
  - Cleaning – manual and reference checks
  - Communication – ensure all data is retrieved



2008 Trends

- Turbidity
- Dissolved Organic Carbon
- Total Organic Carbon
- Nitrate
- Temperature

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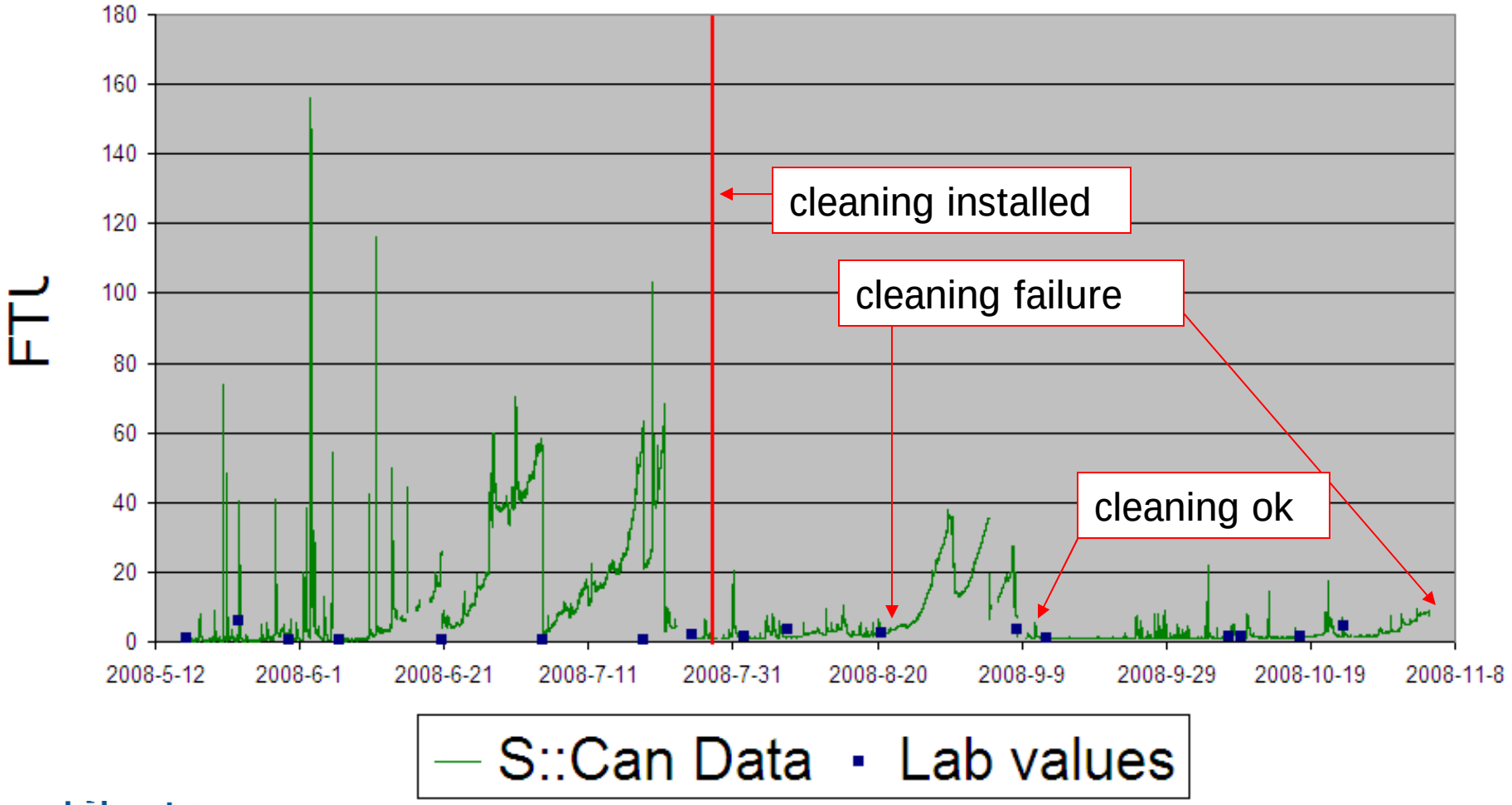
Turbidity



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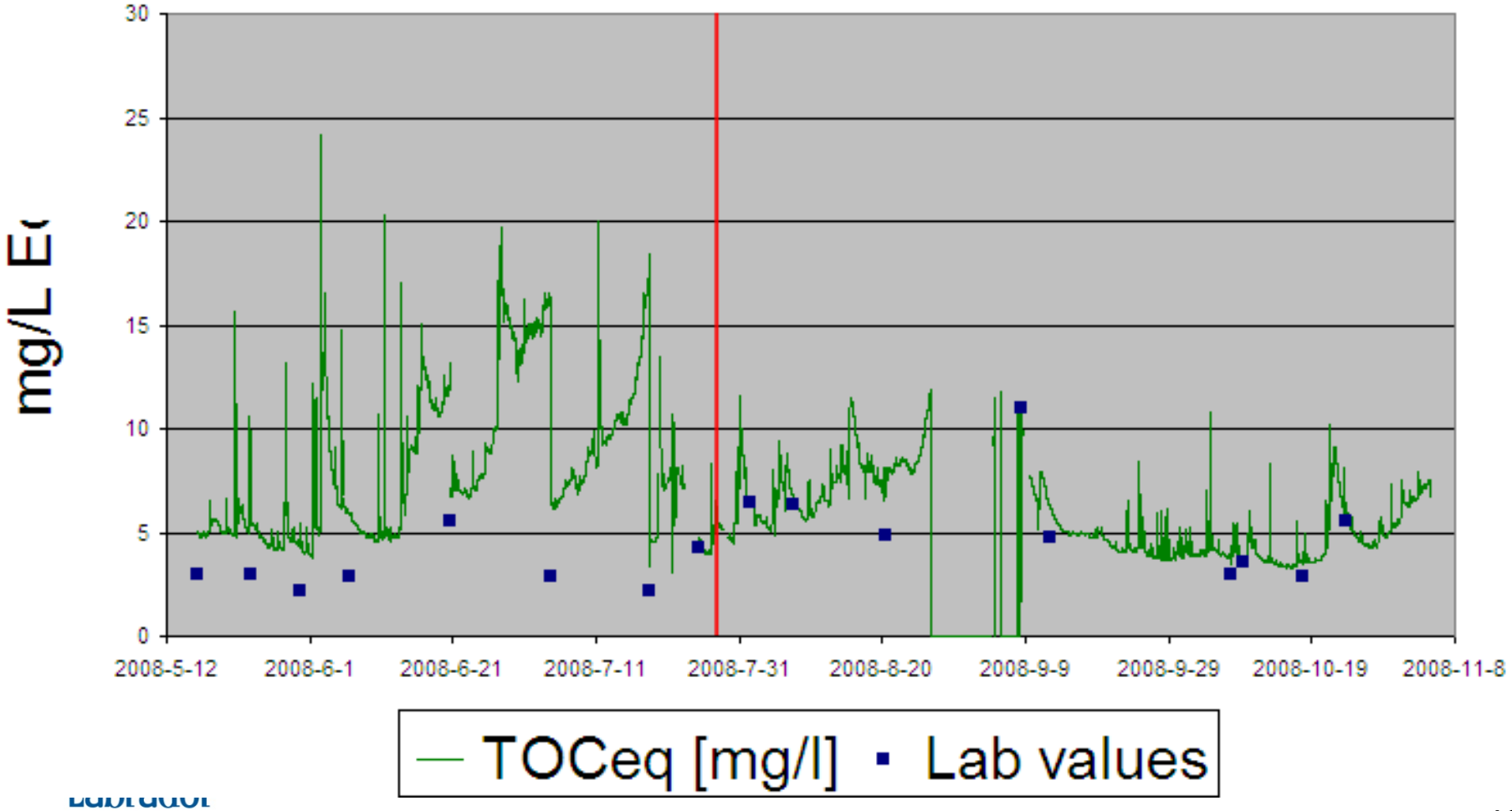
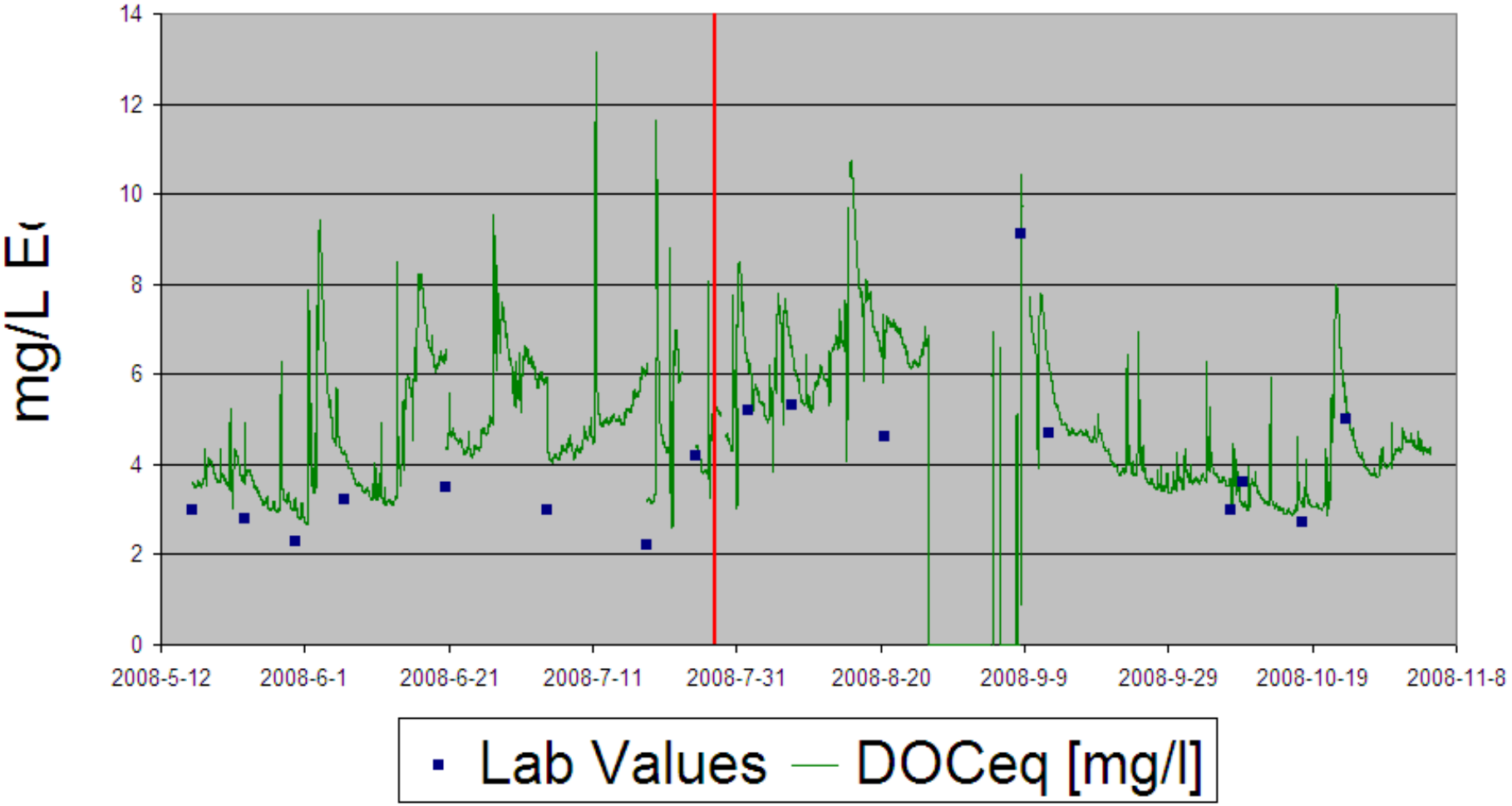
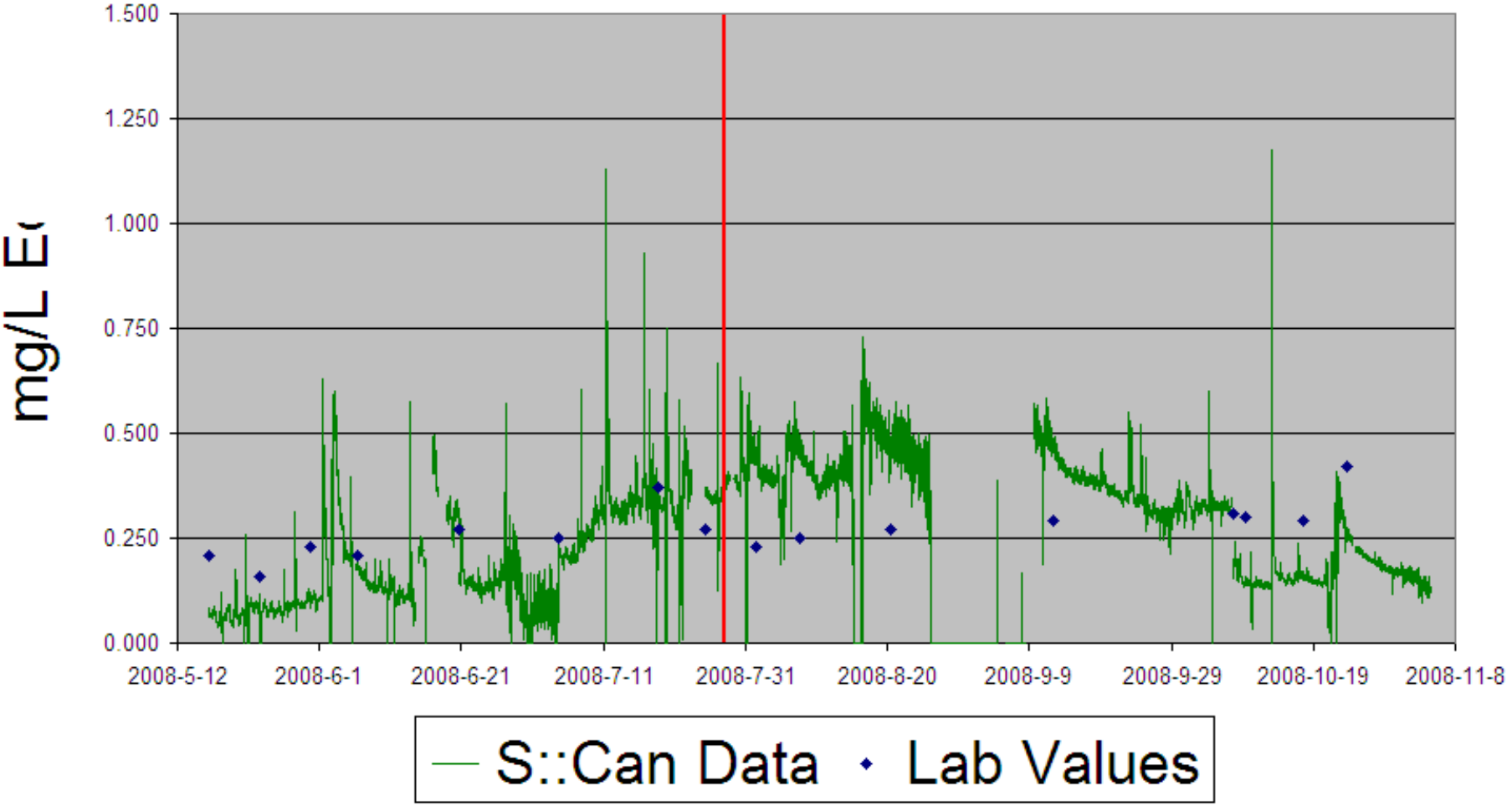
Total Organic Carbon



Diss. Organic Carbon



Nitrate



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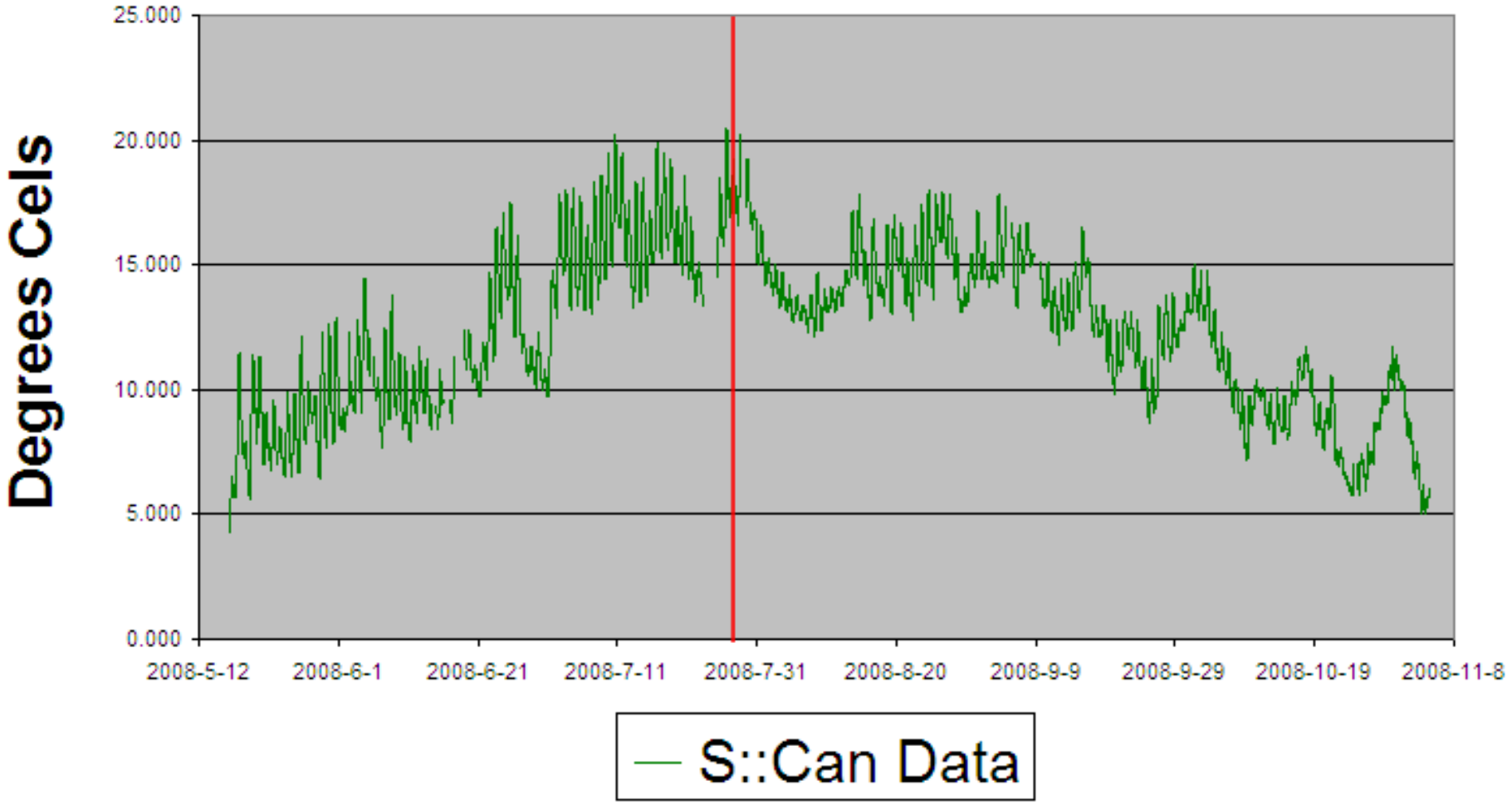
Temperature



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Summary

- Compact and rugged
- Real-time
- Precise readings
- Multi-parameters
- Calibration on-site, no solutions
- Automatic cleaning
- In-situ maintenance
- Communication options
- Data validity

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Path Forward

- Transition from research to deployment
- Integrate into RTWQ network
- Expansion into other water quality applications

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