COST-EFFECTIVE MONITORING NETWORKS: REDUCING FIELD VISITS WHILE MAINTAINING RELIABLE DATA

OTT HydroMet
Insights for Experts

Illinois Lakes Management Association:
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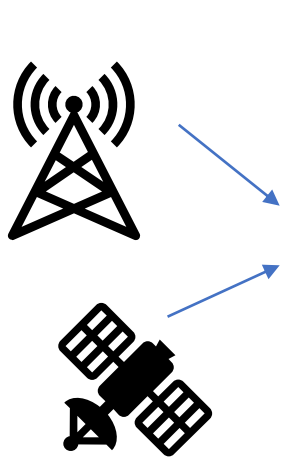
MEASURING THE WORLD‘S WATER CYCLE AND SURFACE WEATHER

Through a range of brands to offer complete hydrologic and meteorologic solutions that serve to monitor and protect the environment and lives.

SYSTEM INTEGRATIONS

System Components for Monitoring Heavy Rain and Rising Water Levels Associated with Stormwater



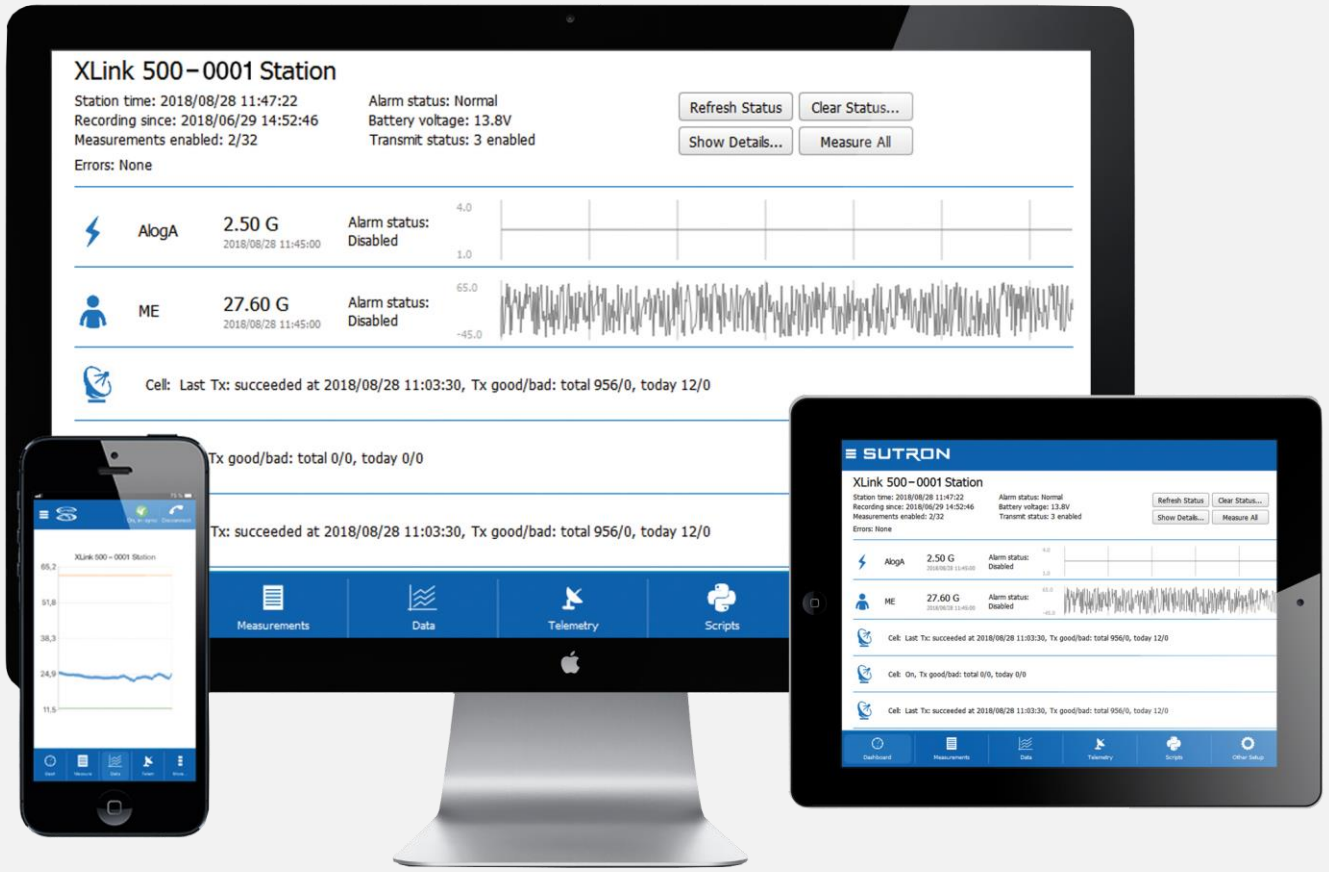
AQUARIUS
Time-Series Client

Sensor suite:
- Hydrology
- Water Quality
- Weather

Datalogger:
- Hardware interface between sensor and Cloud data base
- Powering the sensors
- Trigger, log and transmit measurements

Data Management Software:
- Visualizations
- Data Corrections
- Alarming
- Public facing website

Remote Access And Two Way Comunication



Link Comm app/software

COMPLETE STATION SOLUTION

Remote Monitoring Station

- Sensors
  - Water level
  - Water quality
  - Air temperature, humidity, pressure
  - Back of module temperature
  - Wind speed and direction
  - Precipitation
- Datalogger
- Cabinet
- Tower
- Power
- Communication

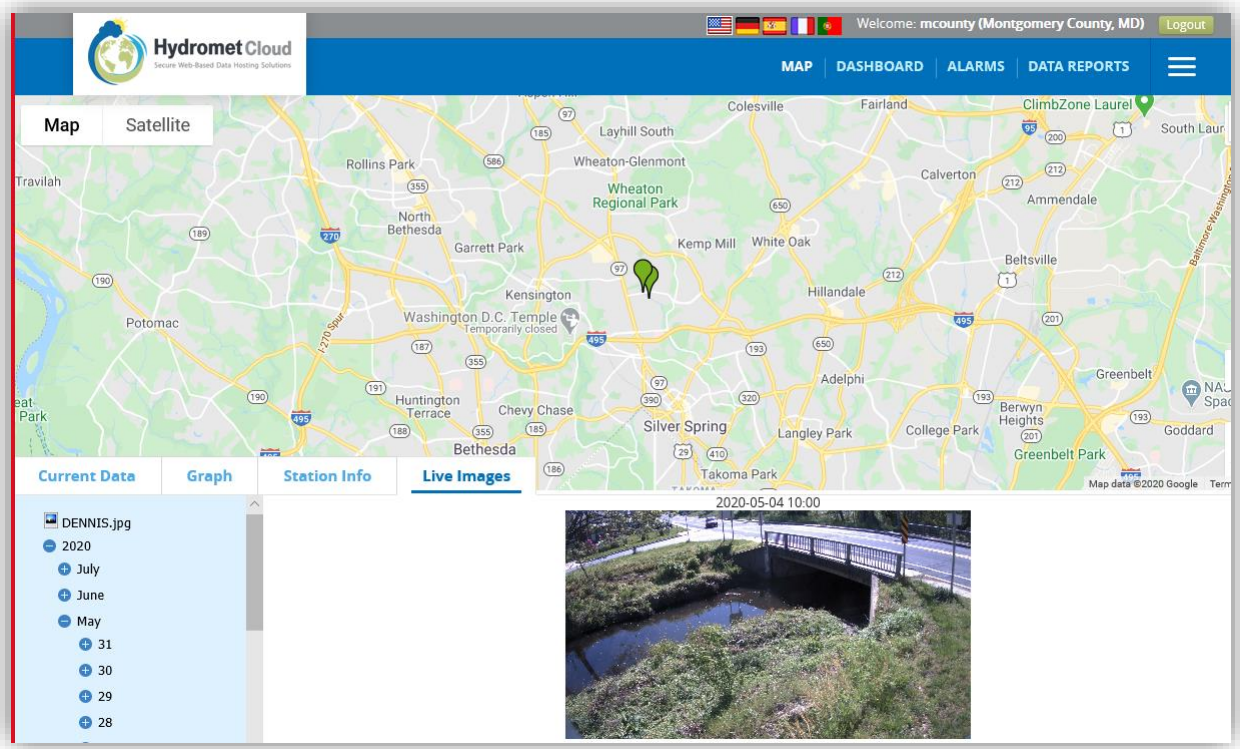
Tips: Managing Remotely

- Alarming
  - Alarms based on sensor measurement, station status, or transmission success
  - SMS or email
  - High/Low vs ROC
  - Green, Yellow, Red
- Communications: SDI-12 Commands
  - Acknowledgement
  - Identification (e.g. SN)
  - SDI-12 Address
- Power
  - Low battery
  - Low sensor power supply
- Server
  - Cloud, FTP, HTTP, etc.

STATION CAMERA

General Advantages

- Camera to be used for visual confirmation of water level and conditions
- Stills can be viewed and downloaded through Cloud based solutions
- Use historical images to justify removal of outliers



Remote Solutions: Sensor Management

MULTIPARAMETER SONDES

Applications

- Lakes and reservoirs
- Streams and rivers
- Groundwater
- Wetland management
- Academic research
- Regulatory monitoring

Tips: Managing Remotely

- **Outlier Identification**
  - All sensors reference temperature.
  - Conductivity drop = reading air
  - Chl-a and/or BGA spikes are often correlated with turbidity spikes.
  - pH readings should match with mV ranges stated in manual
- **Calibration**
  - Calibrate as specified by the manual: 90 days
  - Do not deploy ISE's long term
  - Measurements bouncing up and down indicate need for calibration.

NITRATE SENSORS: SEABIRD AND OTT HYDROMET

Applications

- Lakes and reservoirs
- Streams and rivers
- Groundwater
- Wetland management
- Academic research
- Regulatory monitoring
- Nitrate loading and reduction studies

Tips: Managing Remotely

- Reference parameters: SUNA
  - Light averages: Less than 10,000 means dirty/stained window or degraded lamp. Max 55,000
  - Dark averages: 500–1000 counts, with a standard deviation of no more than 12 counts.
- Reference parameters: ecoN
  - SQI
  - RefA=nitrate; RefB=organics; RefC=turbidity; RefD= lamp
- Maintenance
  - Annual manufacturer service for SUNA, regular cleaning for ecoN

Add text

PHOSPHORUS SENSOR: SEABIRD

Applications

- The HydroCycle is a wet-chemistry sensor engineered to provide scientifically defensible data that lead to better management recommendations.
- Provides continuous or real-time measurement of dissolved phosphate
- Advanced fluidics
- Accurate measurements
- Onboard Quality Control
- Extended deployments

Tips: Managing Remotely

- Correlate WQ Parameters
  - Check Hydrolab or multiparameter sonde data
  - High sediment loads cause filter blockage
  - Extreme DOC interferes with absorbance
  - Fast temperature swings
- Other general deployment tips
  - Reagent shelf life
  - Replace filters often in high TSS
  - Check QC flags and bubble tests after retrieving

WATER LEVEL SENSOR TYPES

Stilling Well
(Shaft encoder)

Submersible
Pressure Transducer

Radar / Surface Velocity
(non-contact)

Bubbler

WATER LEVEL SENSOR TYPES

Submersible
Pressure Transducer

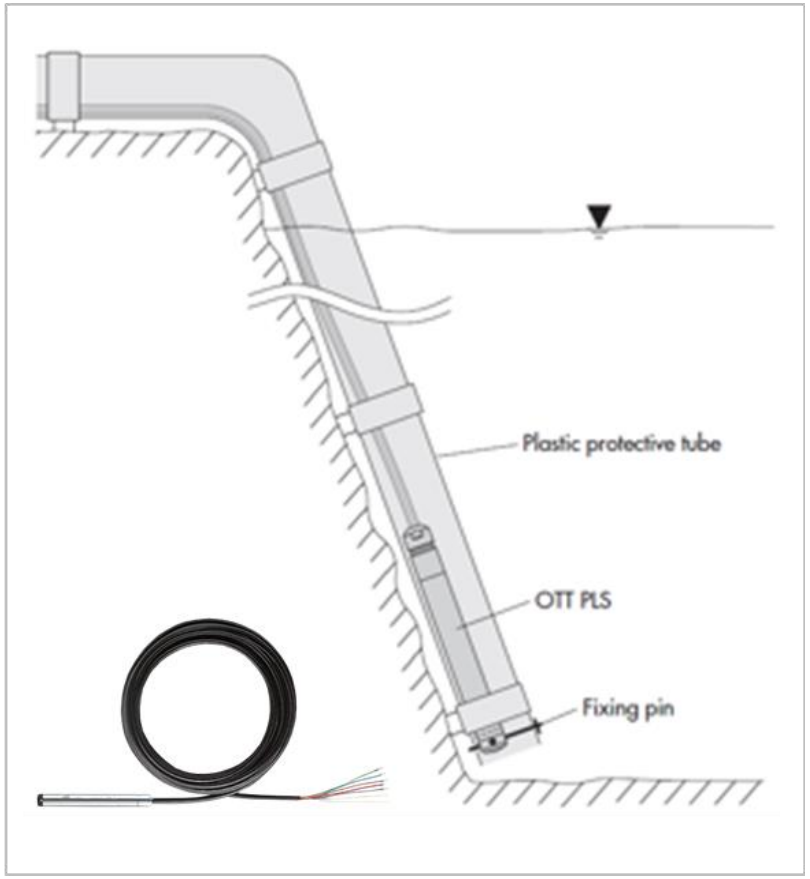
Radar / Surface Velocity
(non-contact)

PRESSURE TRANSDUCERS

Advantages and considerations

Applications

- Lakes and reservoirs
- Streams and rivers
- Groundwater



Tips: Managing Remotely

- Site Selection
  - Biofouling
  - Debris/turbulence
  - Negative readings
- Maintenance
  - Position
  - PT material
  - Desiccant
  - Routine cleaning (annual if necessary)

RADAR LEVEL SENSOR

Advantages and considerations

Applications

- Lakes and reservoirs
- Streams and rivers

Tips: Managing Remotely

- Ice, waves, or vibrations can cause “painting”
  - Line squiggles up and down, indicating unstable signal response
- Dry river or macrophytes cause reading error
  - User selected (e.g. NAN, -99999, etc)
  - Mitigate with metal plate
- Equipment testing needs wide water source
  - Lab verification is difficult

VELOCITY AND DISCHARGE SENSOR

SVR 100 advantages

SVR 100 Strengths

- Continuous, reliable measurement of water surface velocity
- Non-contact: safe from floating debris, flooding, and sediments
- Integrated tilt sensor for simple instrument alignment and control
- Velocity and status information available via SDI-12, RS-232, RS-485, and MODBUS protocol

Tips for Managing Remotely: Same as Radar Level Sensor!

RAIN GAUGES

Instrument characteristics of precipitation gauges

Different types of applied technologies with individual measurement performance and characteristic. What are the differences? When to use which device?

Tipping bucket

Hybrid

Weighing gauge

Radar

Disdrometer

Thank You

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