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Columbus, OH
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NEON Program Instrumentation and Engineering:
Designing for Resiliency

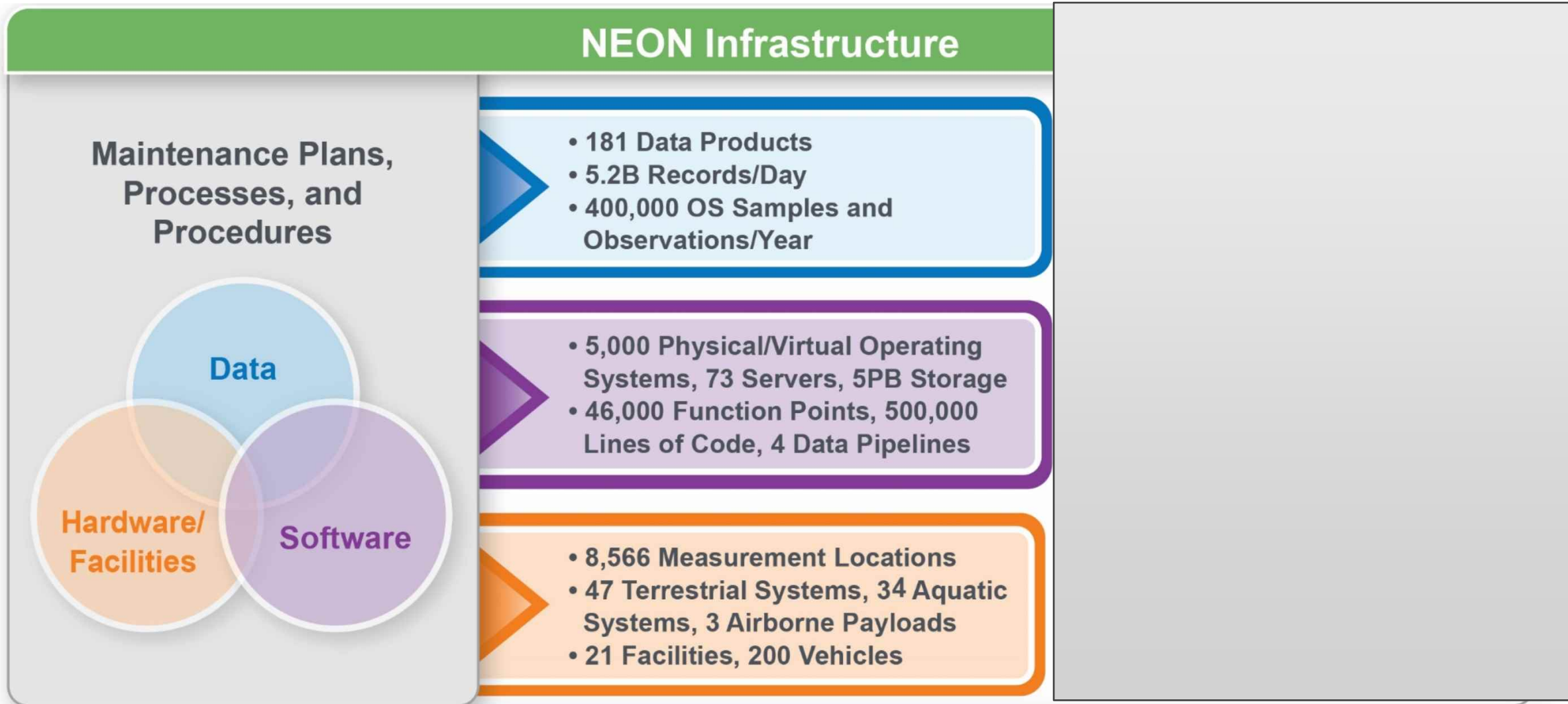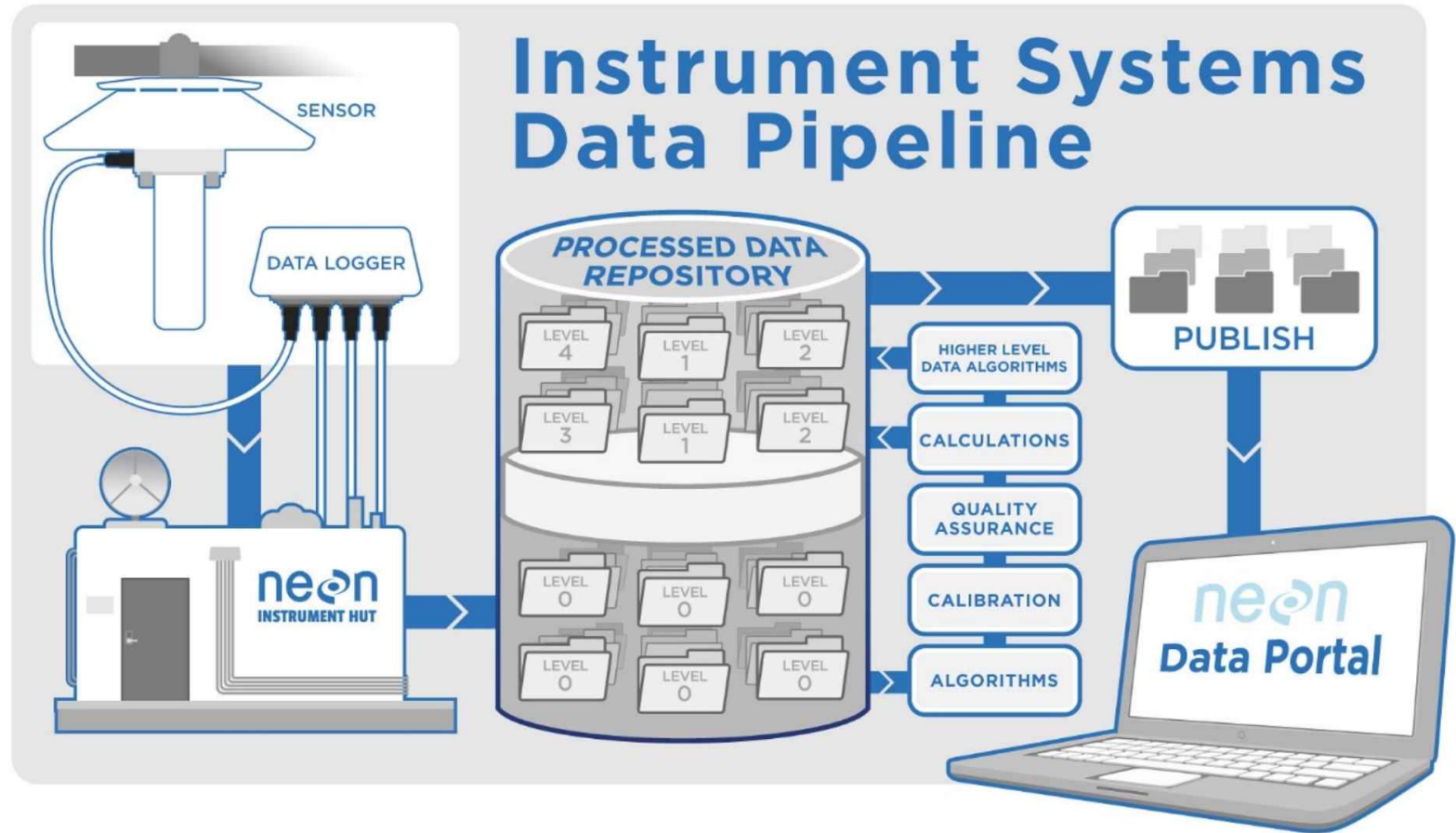Innovations in Climate Resilience Conference

The NEON Program

The NEON Program

NEON Infrastructure

Maintenance Plans, Processes, and Procedures

- Data
- Hardware/Facilities
- Software

- 181 Data Products
- 5.2B Records/Day
- 400,000 OS Samples and Observations/Year

- 5,000 Physical/Virtual Operating Systems, 73 Servers, 5PB Storage
- 46,000 Function Points, 500,000 Lines of Code, 4 Data Pipelines

- 8,566 Measurement Locations
- 47 Terrestrial Systems, 34 Aquatic Systems, 3 Airborne Payloads
- 21 Facilities, 200 Vehicles

# The NEON Program

Extreme Events

Snowfall/pack Levels

- Primary Precipitation Sensor with DFIR at Woodworth (WOOD) in Domain 09 (ND)

- Snowpack on a Terrestrial Instrument Hut at Lower Teakettle (TEAK) in Domain 17 (CA)

Severe Storms & Hurricanes

- Hurricane Ian making landfall as CAT4 in Domain 03 (FL) and 04 (PR)

- Hurricane Fiona as CAT1 hitting Lajas Experimental Station (LAJA) in D04 (PR)

- Storm cell in the distance at a Tower site at Jornada Experimental Range (JORN) in Domain 14 (NM)
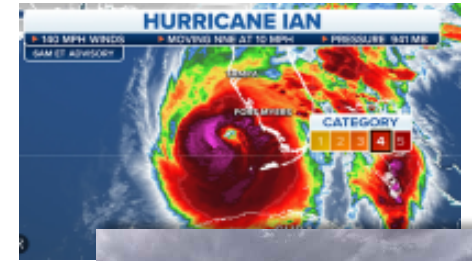
Hydrological Events

- Flooding at Stream Aquatic Instrument Sites at Upper Big Creek (BIGC) in Domain 17 (CA) and LeConte Creek (LECO) in Domain 07 (TN)

Volcanic Events

- Volcanic activity in Domain 20 (HI): Mauna Loa and Kilauea Volcanoes

Extreme Events

Wildfires & Controlled Burns

- Wildfire smoke at Rocky Mountain National Park (RMNP) in Domain 13 (CO)
- Controlled burn at Ordway-Swisher Biological Station (OSBS) in Domain 03 (FL)

Extreme Cold & Subsidence

- Extreme cold at Northern Sites in Domain 09 (ND), Domain 12 (MT), Domain 13 (CO), Domain 05 (MI), & Domain 18/19 (AK)
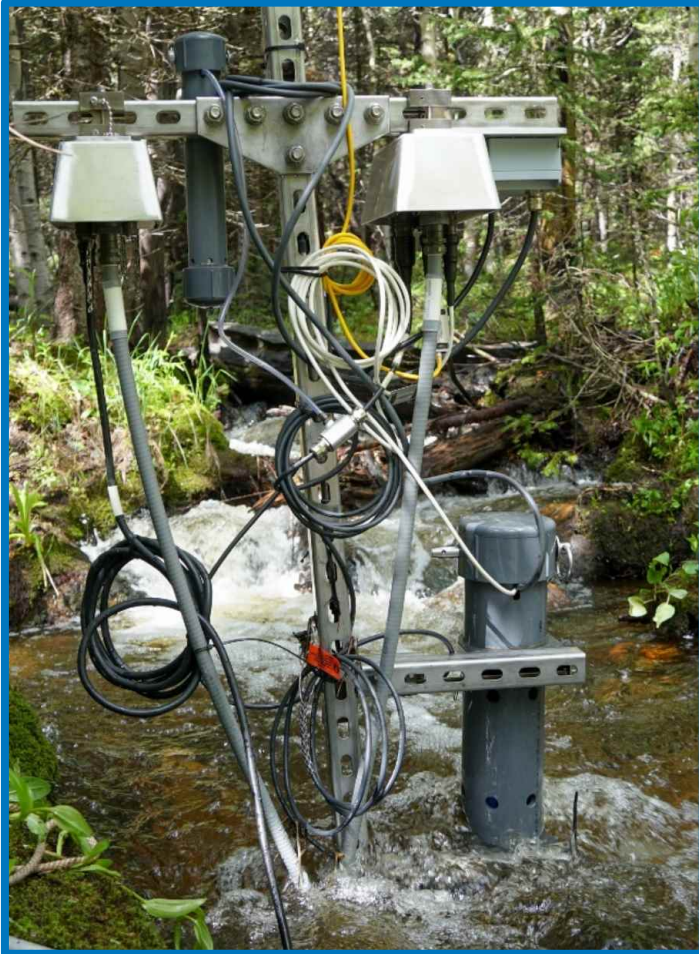- Subsidence at Tundra sites in Domain 18/19 (AK)

Extreme Heat

- Extreme heat at southern and neo-tropical sites in Domain 08 (AL), Domain 03 (FL-GA), Domain 04 (PR), Domain 11 (TX), and Domain 14 (AZ-NM)

Earthquakes

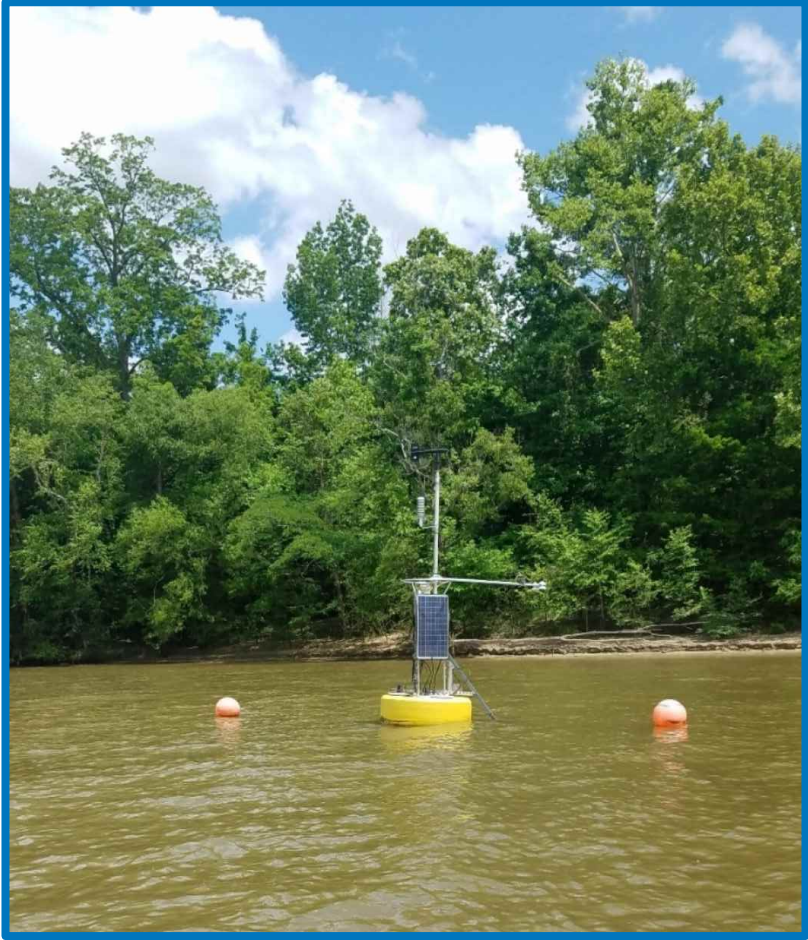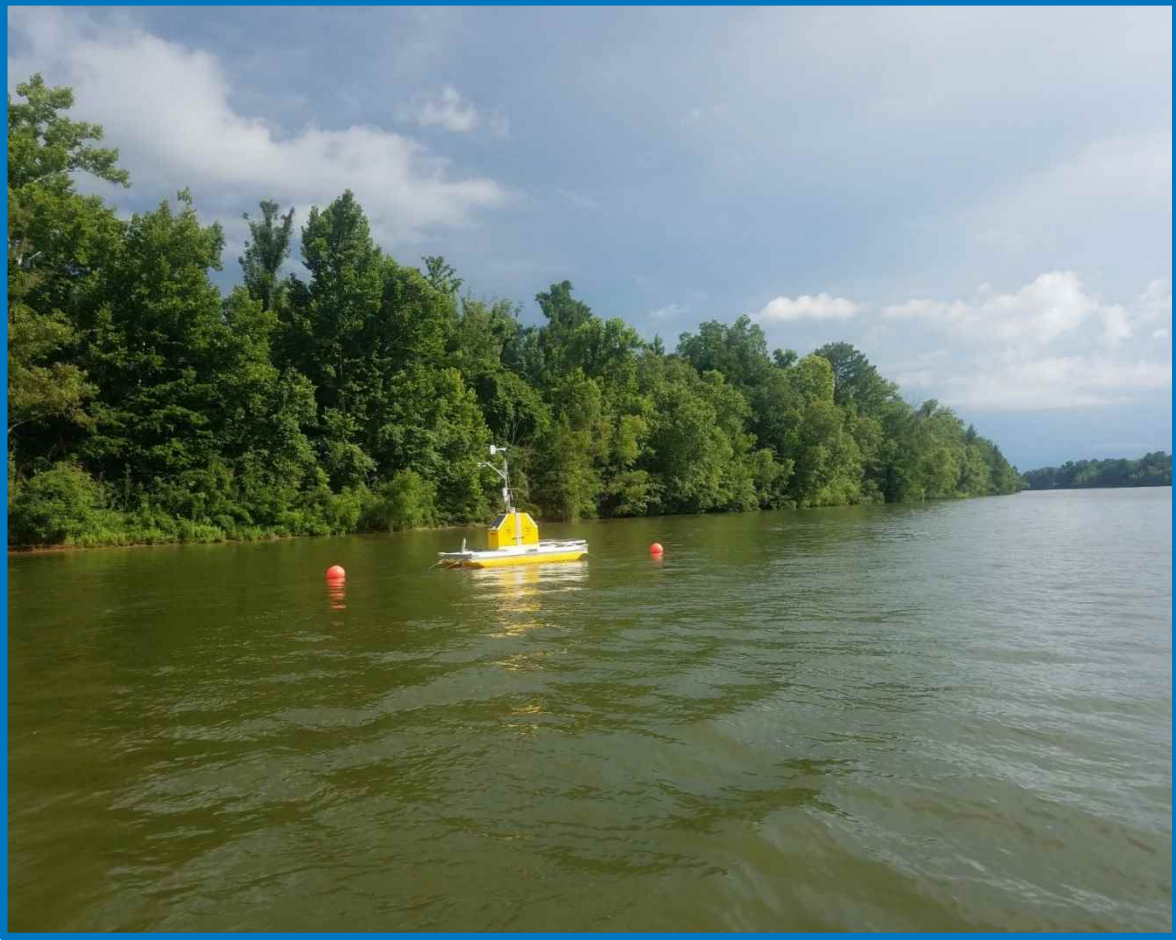- San Andreas Fault and other fault lines in Domain 17 (CA) and across other Domains CONUS and OCONUS

Innovative Designs: *Stream Overhead Design*

Design Innovations: *TOMB River Buoy*

Design Innovations: *Aquatic Alternate/Remote Power Site Designs*

Sycamore Creek (SYCA) in AZ: Solar Power

Oksrukuyik Creek (OKSR) in AK: Solar Power

Red Butte Creek (REDB) in Utah: Stirling Engine Propane System

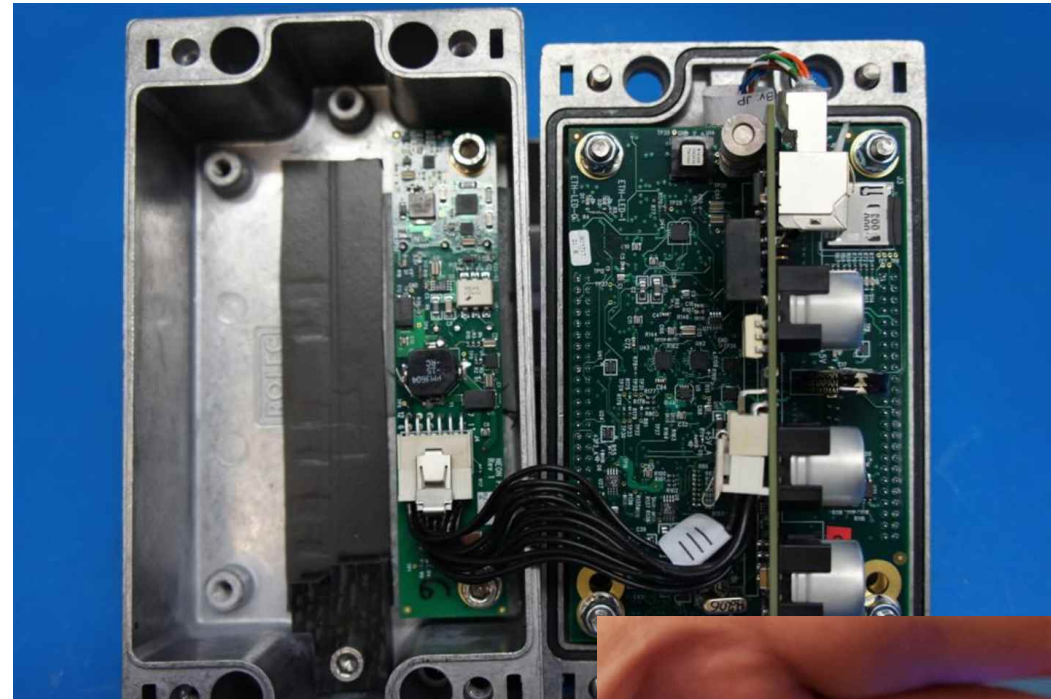# Asset Lifecycle Management

Predictive Maintenance & Planning Objectives

Observatory wide coordination to address asset condition and plan to maintain and support the observatory to meet its mission.

- Maintain data quality

- Continuous improvement framework

- Systematized maintenance approach for repair, upgrade planning and forecasting

- Method to address upgrades and obsolescence

- Establish and consistently apply a risk-based framework Develop an Annual Road Map

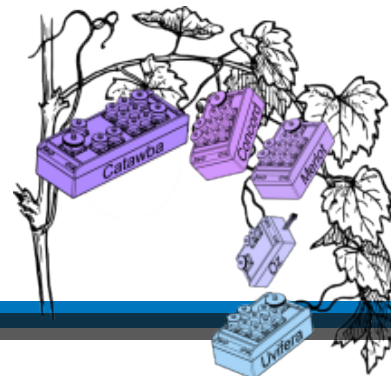- Cross-functional team approach: Asset Lifecycle Management (ALM) Integrated Product Team (IPT)
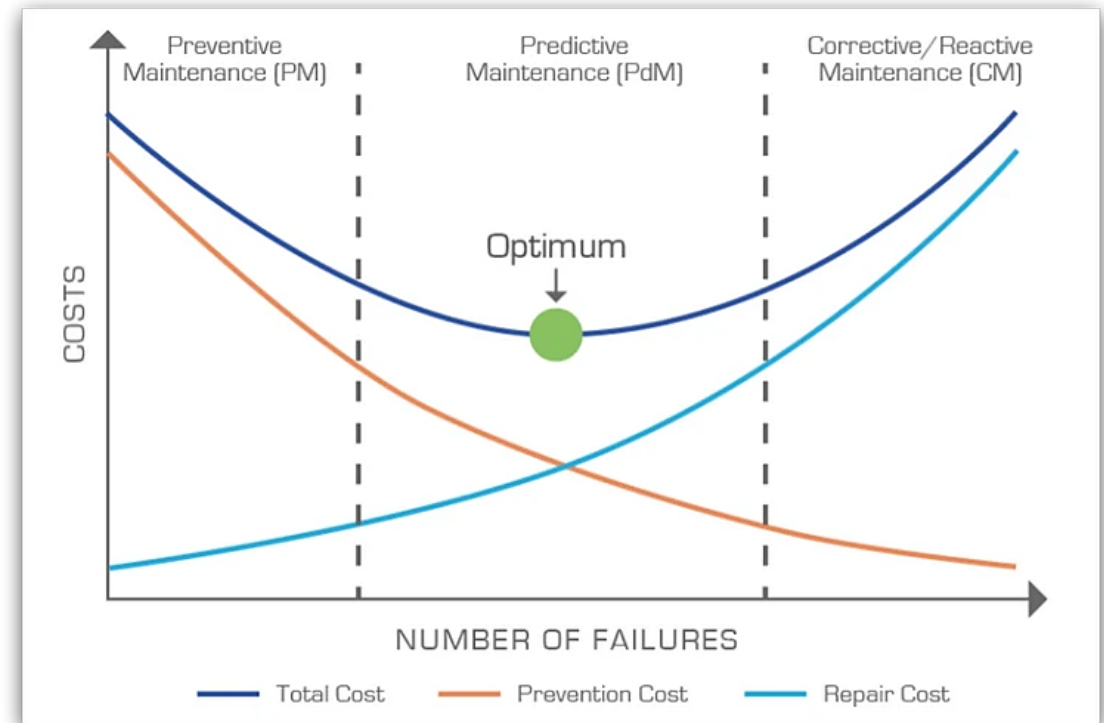
Significant Upgrades & Optimizations
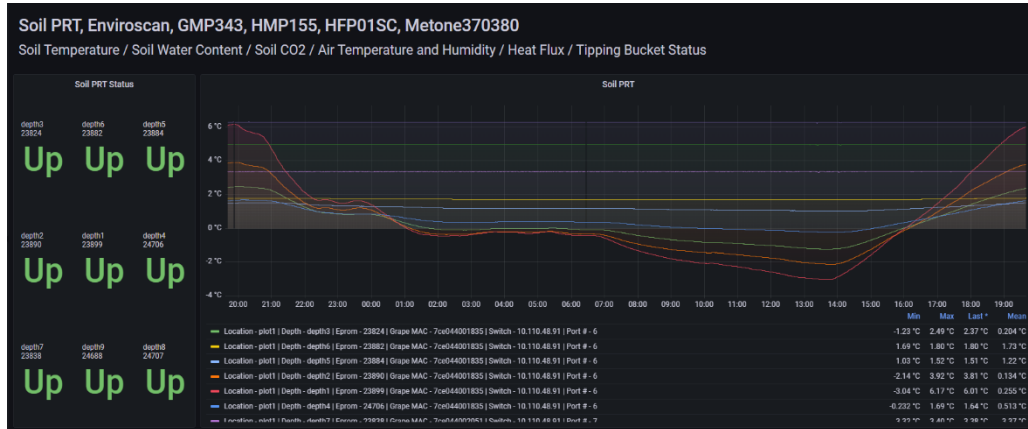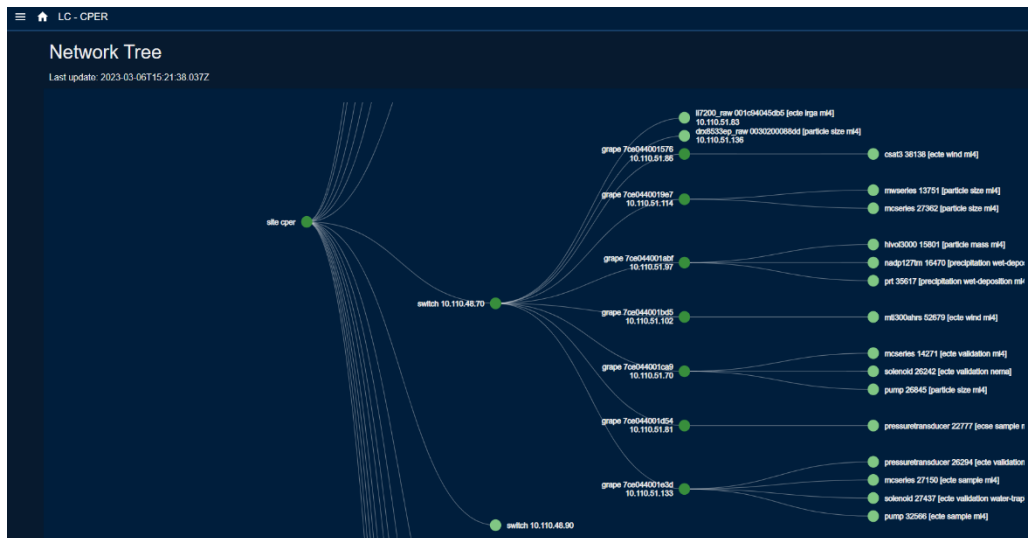## Grape 2.0 Data Logger

Grape Installation on a Tower Boom Arm

Old Grape Internal View

NEW Grape Internal View

Significant Upgrades & Optimizations
The New Location Controller (LC)

NEON Program Assignable Asset Program
A Research Platform for Industry Use

Use NEON infrastructure for research activities! NEON infrastructure includes 4 areas:

1. Adding sensors to existing field site infrastructure

2. Using NEON scientists to collect field observations at a field site

3. Requesting a Mobile Deployment Platforms (MDP): These mobile sensor arrays may be deployed for short- to medium-term data collection projects and may be outfitted with meteorological, soil, and surface water sensors

4. Requesting an airborne remote sensing survey

Why does this matter?

Industry

✔ 24/7/365 direct emissions mapping, e.g., for carbon sequestration and soil health monitoring

Syngenta Group

Policy

Carbon Dew – Direct Greenhouse Gas Exchange Measurements for an Equitable Worldwide Emissions Trading

THE FEDERAL STRATEGY
TO ADVANCE AN
INTEGRATED U.S. GREENHOUSE GAS
MONITORING & INFORMATION SYSTEM

THE WHITE HOUSE
WASHINGTON

Prepared by the
Greenhouse Gas Monitoring & Measurement Interagency Working Group

Stefan Metzger et. al.

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