

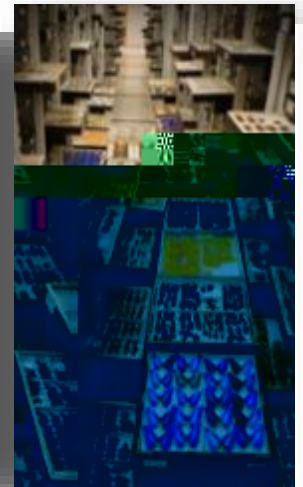


# NATIONAL ECOLOGICAL OBSERVATORY NETWORK

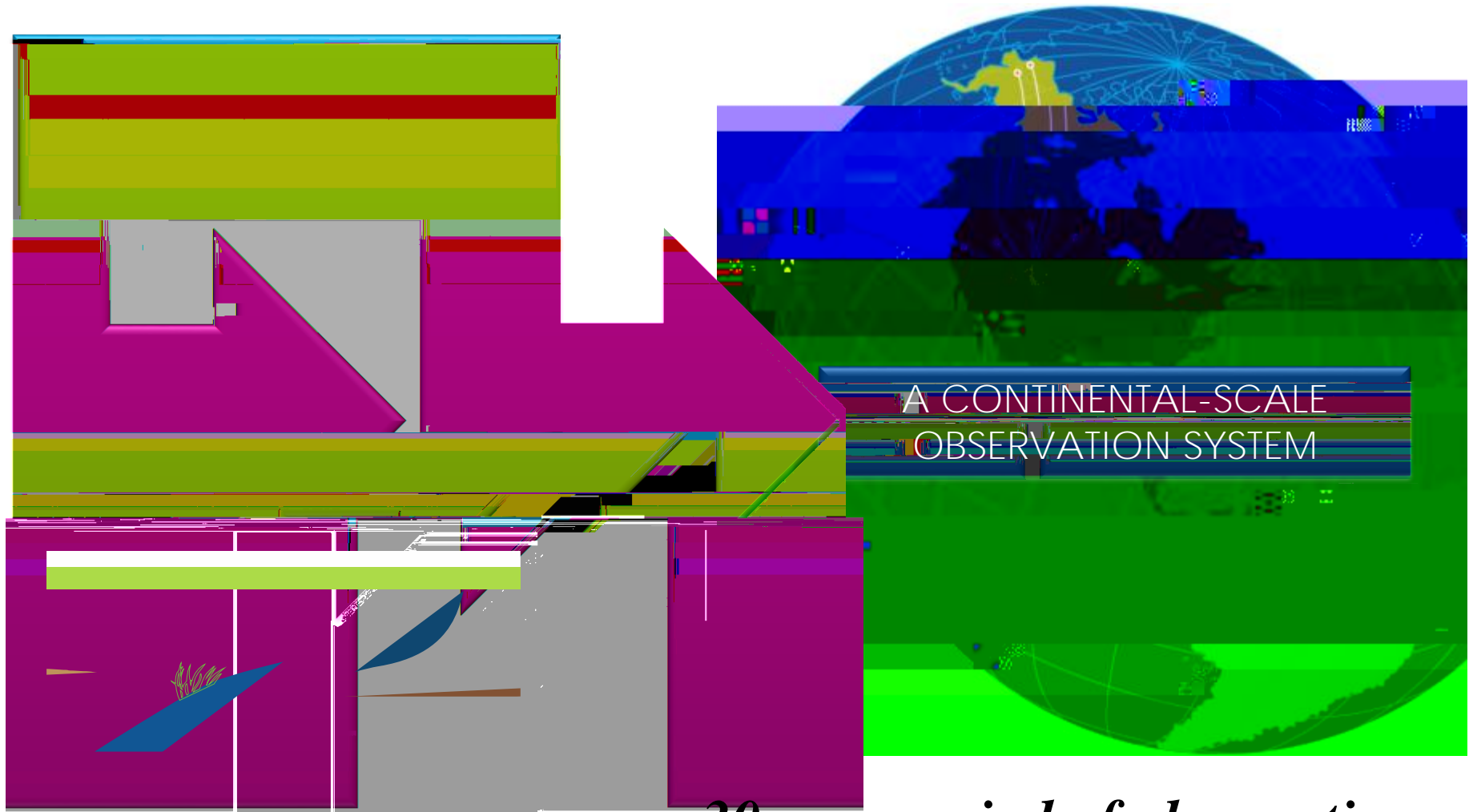
Dave Tazik & NEON Team

*Toolik Field Station Vision Workshop*

*Portland, OR 2-4 August 2012*



# A Continental Observation System



*30 year period of observation*

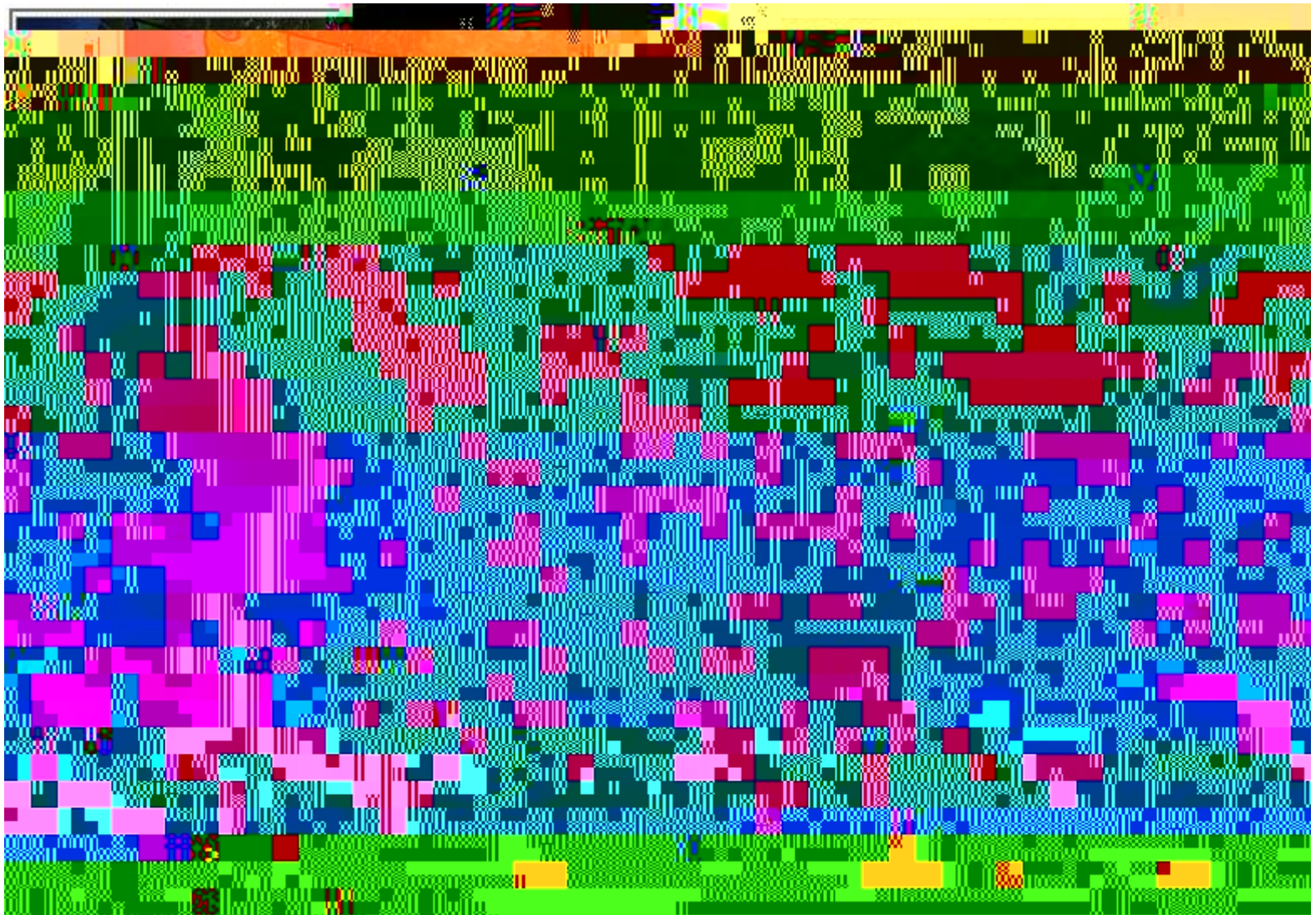
*... to enable understanding*

# An Integrated Observing System





# Where

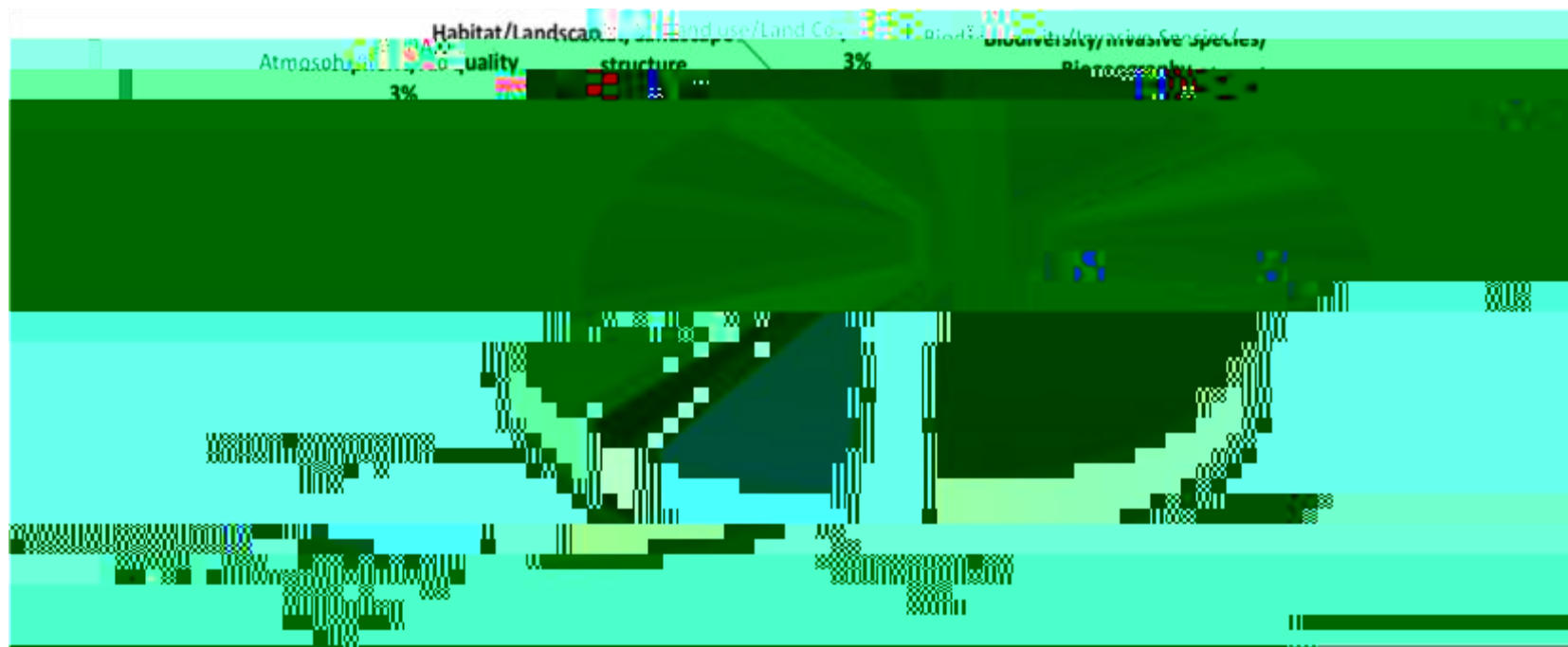


# Observing Ecological Change

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- Representative sampling
- Replication of gradients
-

# NEON Data Products



- ~ 1600 Level 0 data products (primary observations) • ~ 75 Level 2 (rectified) & Level 3 (common gridded)
  - Raw voltages from sensors*
  - Information on collected flora/fauna(e.g. counts)*
  - External DNA or chemical analysis*
  - Raw LiDAR returns*
  - Gap-filled one-minute air temp (L2)*
- ~ 540 Level 1 data (QA/C, minimally processed)
  - One-minute average air temperature*
  - Site-level species composition*
  - Georectified LiDAR*



# NEON Observing Systems

- **Terrestrial**

- Organismal (TOS)
- Instrumental (TIS)

- **Aquatic**

- Organismal (AOS)
- Instrumental (AIS)

- **Airborne (AOP)**

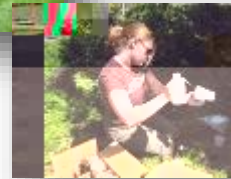
- **Research: *Stream***

***Ecological Observation***

***Network*** (STREON)



*Field Sampling*



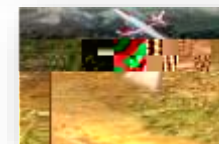
*Towers*



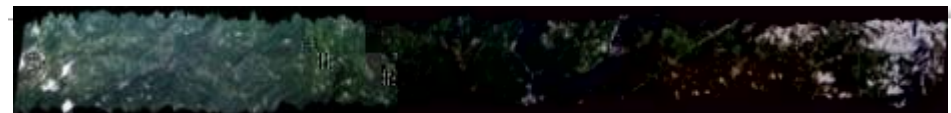
*Surface and ground water*



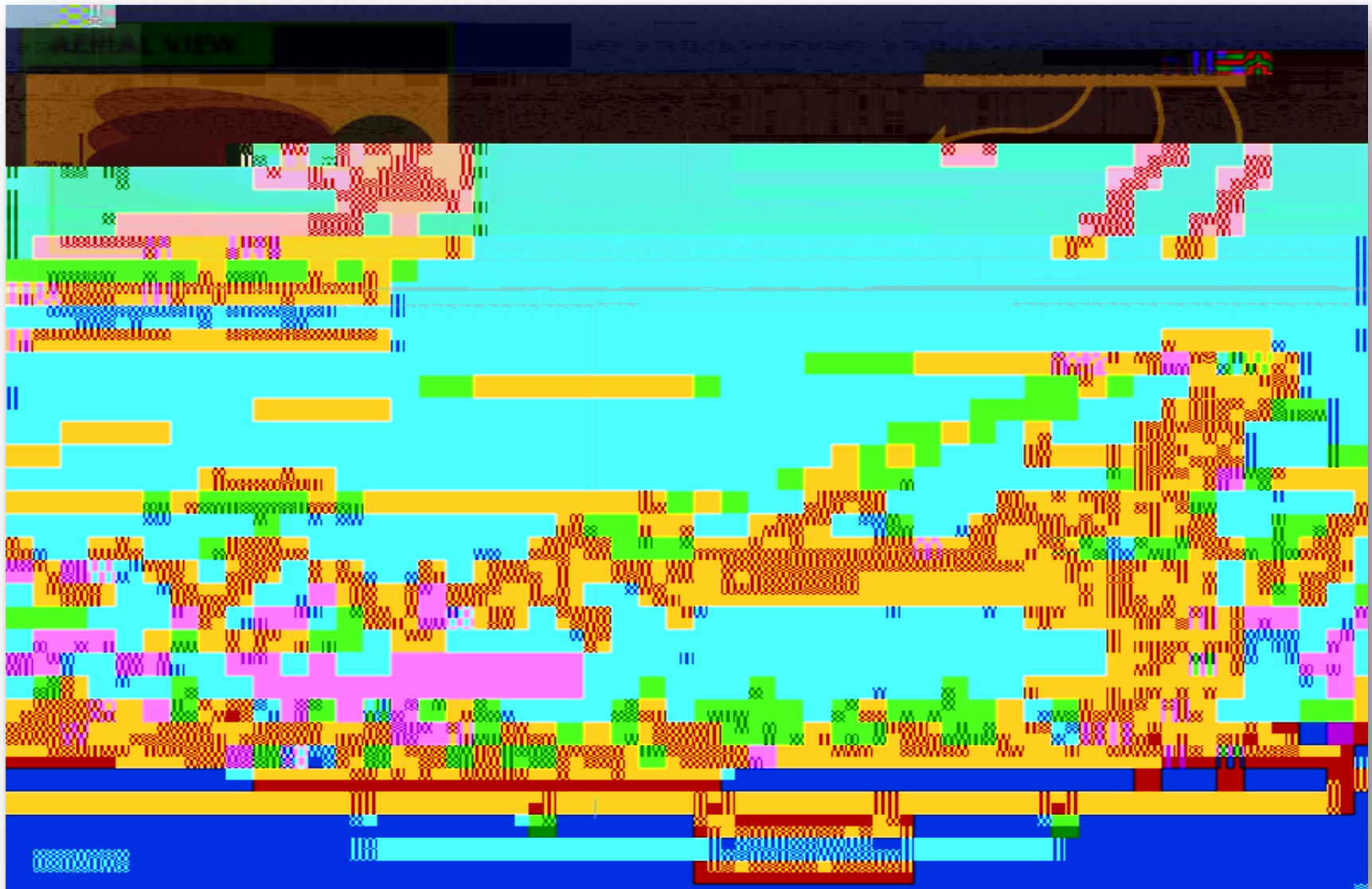
*Satellite Data*



*Airborne Remote Sensing*



# TIS Ì Terrestrial Instrument System



# Atmospheric Measurements

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## **Ecosystem carbon, water and energy balance**

- Temperature
- Humidity

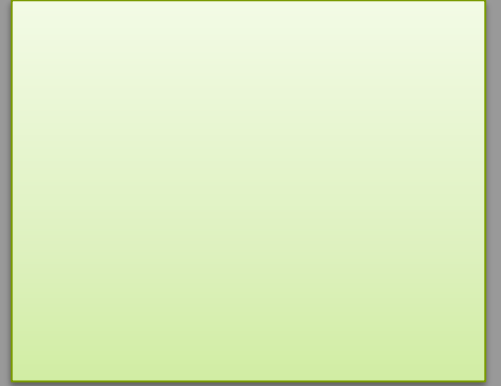
**Calibration for remotely sensing**    Correct AOP for effects of incoming solar radiation, aerosols and water vapor



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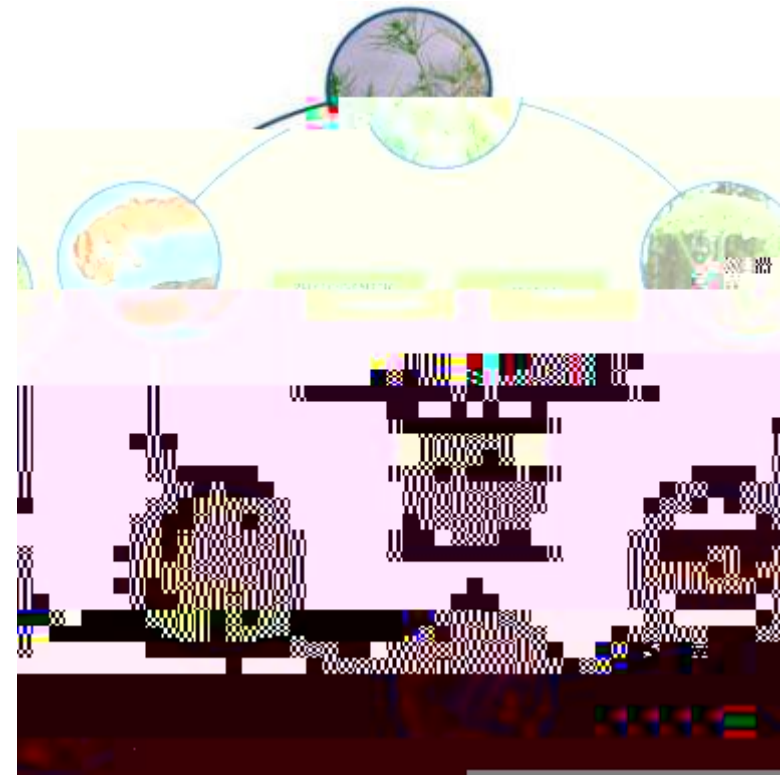
- **Plant biodiversity**





# Aquatic Observation System (AOS)

- **Algae**
- **Aquatic macrophytes, bryophytes and lichens**
- **Aquatic microbes**
- **Zooplankton**
- **Aquatic invertebrates**
- **Fish**
- **Aquatic habitat**
- **Sediment chemistry**
- **Water chemistry**



# Aquatic Instrument System (AIS)

- **Aquatic**

- Temp<sub>water</sub>, DO, turbidity, pH, conductivity
- Chromophoric dissolved organic matter
- Chlorophyll
- Discharge/water level
- Nutrient Analyzer – nitrate, phosphate, ammonia
- Photosynthetically active radiation (PAR)

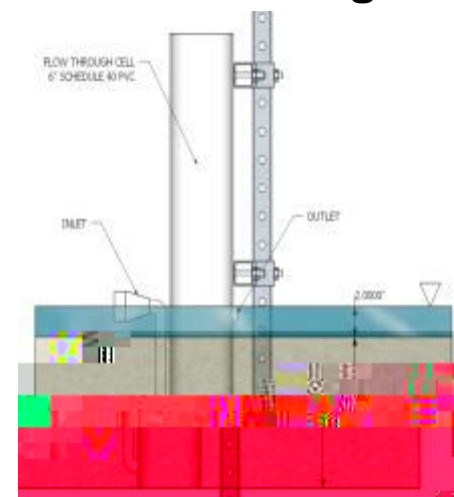
- **Bank-side Micrometeorology**

- Temp<sub>air</sub>, precipitation, barometric pressure, PAR, net radiation
- Wind speed and direction
- Camera

- **Groundwater**

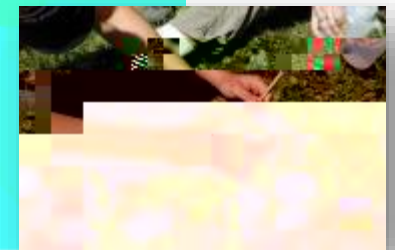
- Temperature, level and conductivity

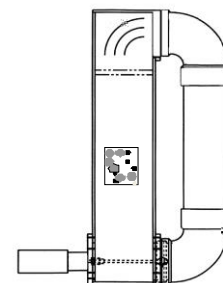
## Sensor Design





# AOS/AIS AQU/STREON





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## Spectrometry

- Vegetation biochemistry & biophysical properties
-

# The NEON Imaging Spectrometer

Continuous wvl coverage from 380 to 2510 nm

High signal-to-noise ratio

(2x improvement over AVIRIS)

5 nm spectral sampling

1 mrad IFOV (1m GSD @ 1000 m flight altitude)

High degree of uniformity across wvl's and field

SWIR coverage provides information on

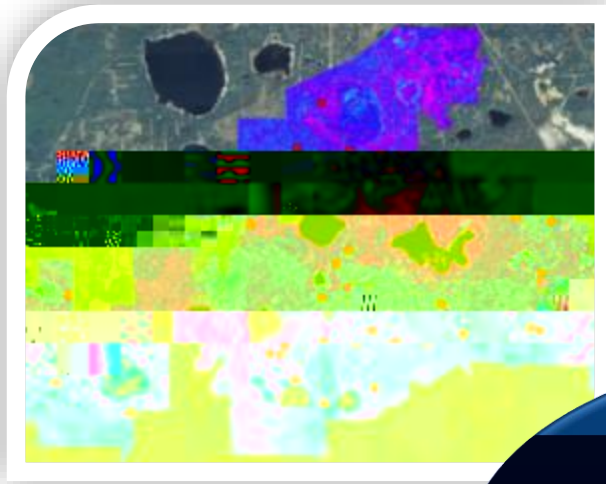
canopy moisture & nitrogen

discrimination of non-photosynthetic components

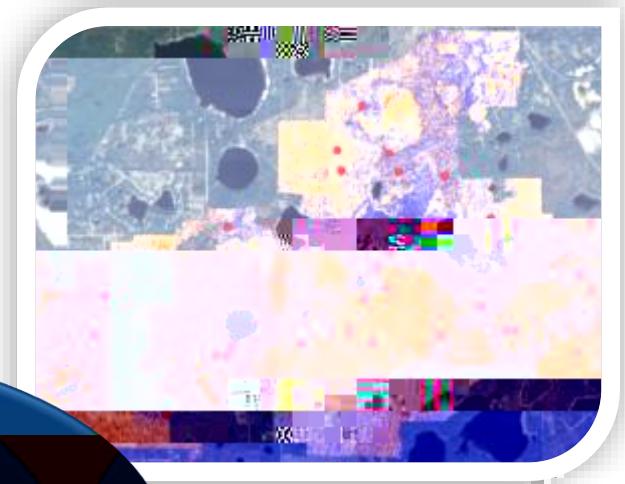
## Status

- NISDVU delivered and operational
- NIS-1 due 4/13; NIS-2 due 8/13

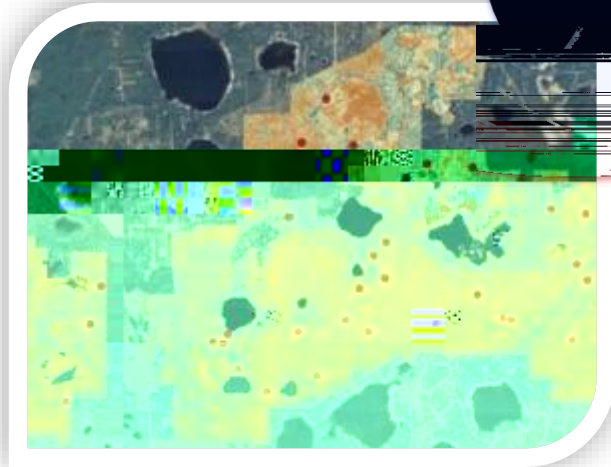
**Nitrogen**



**Lignin**



Scaling  
Terrestrial  
Observations



**Leaf area index**

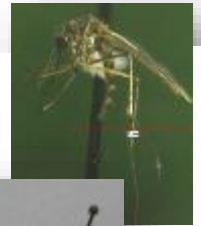


**Canopy height**

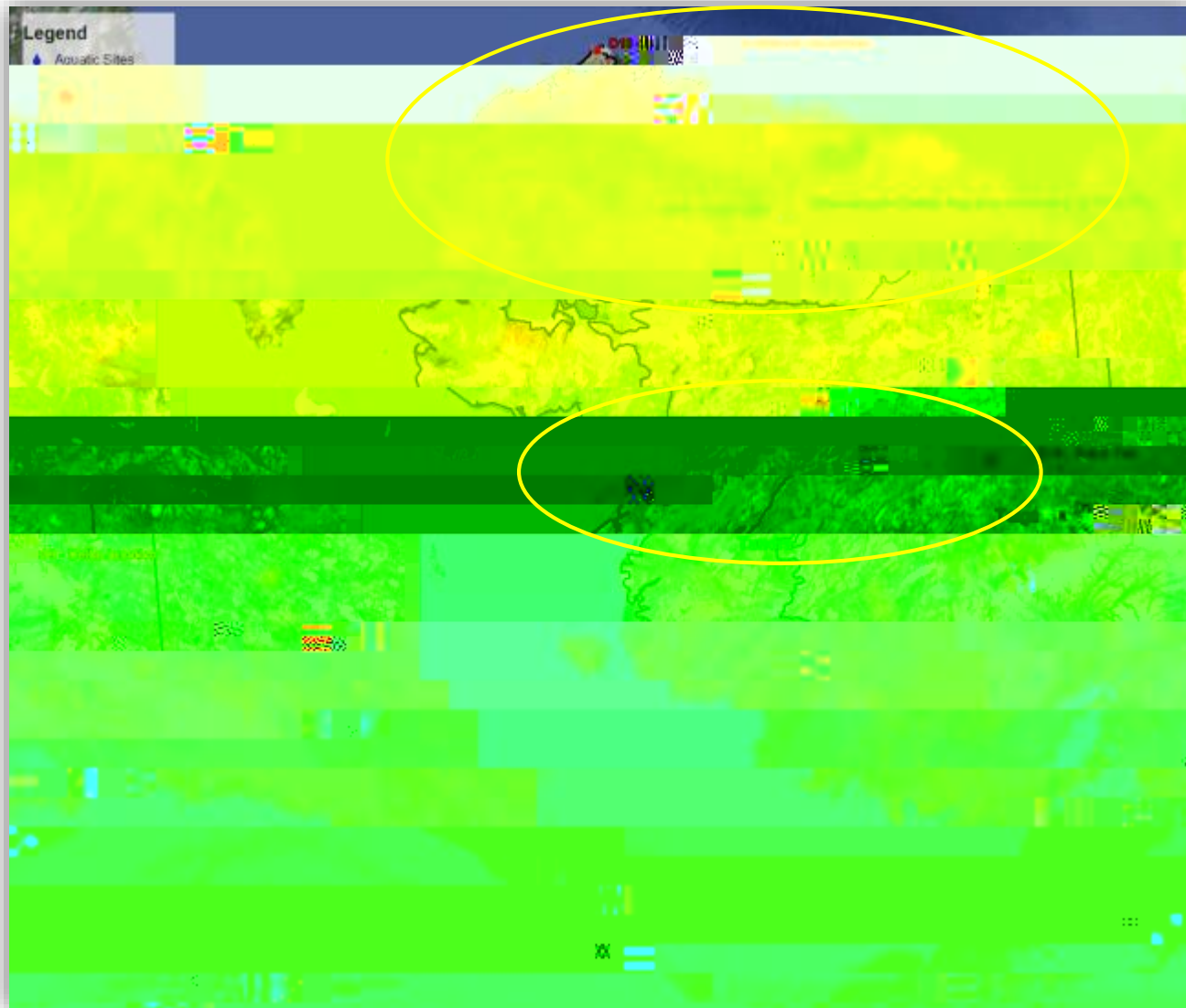


# NEON Ì Generated Natural History Collections

- Voucher collections of sentinel taxa
- Analytical samples
  - Replicates for future re-analysis
  - For external PI-driven research needs
  - Storage in case of funding shortfalls
- Vascular plants and algae
- Animal tissues and genomic extracts
- Microbial communities
- Soils and sediments

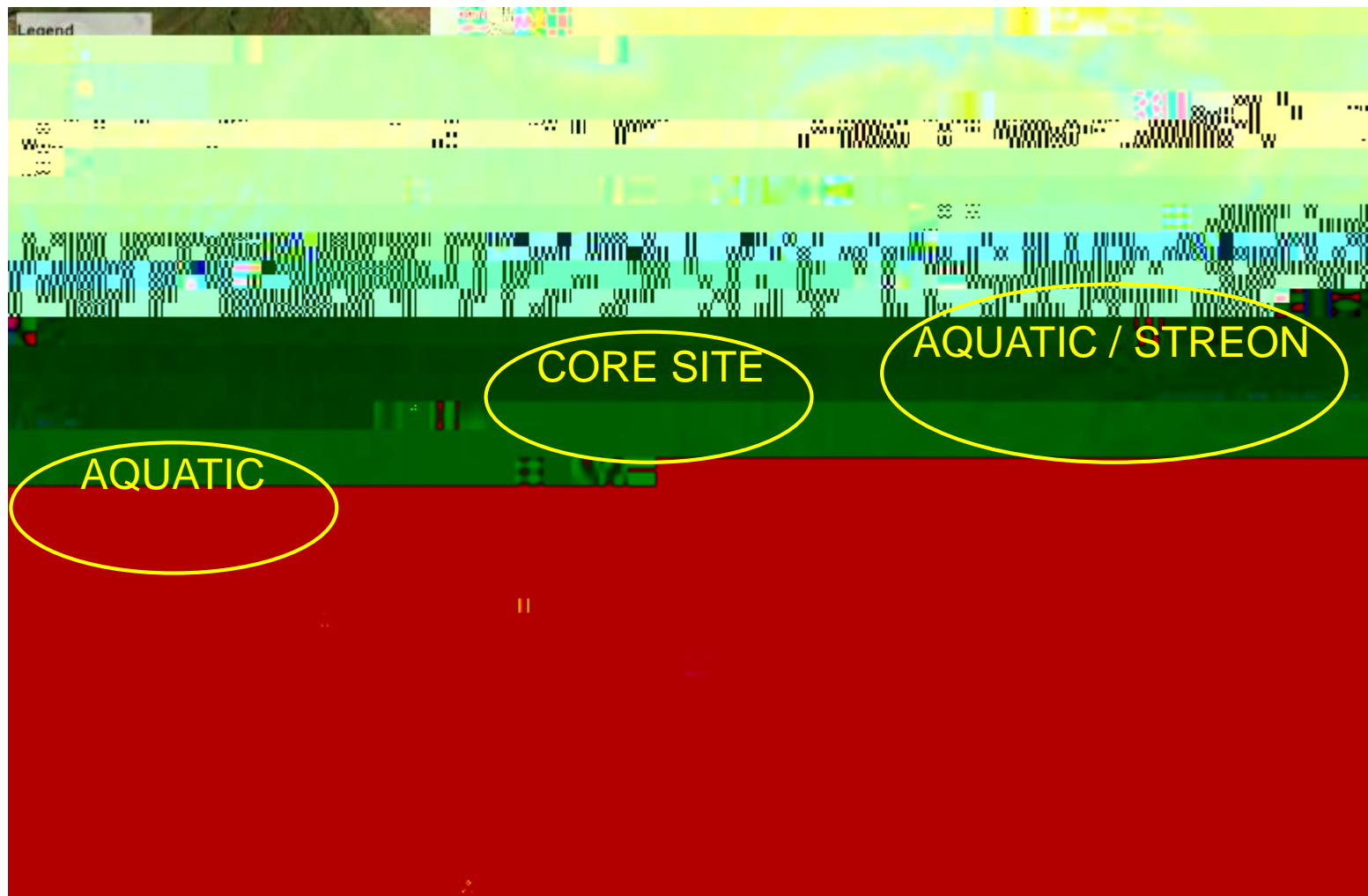


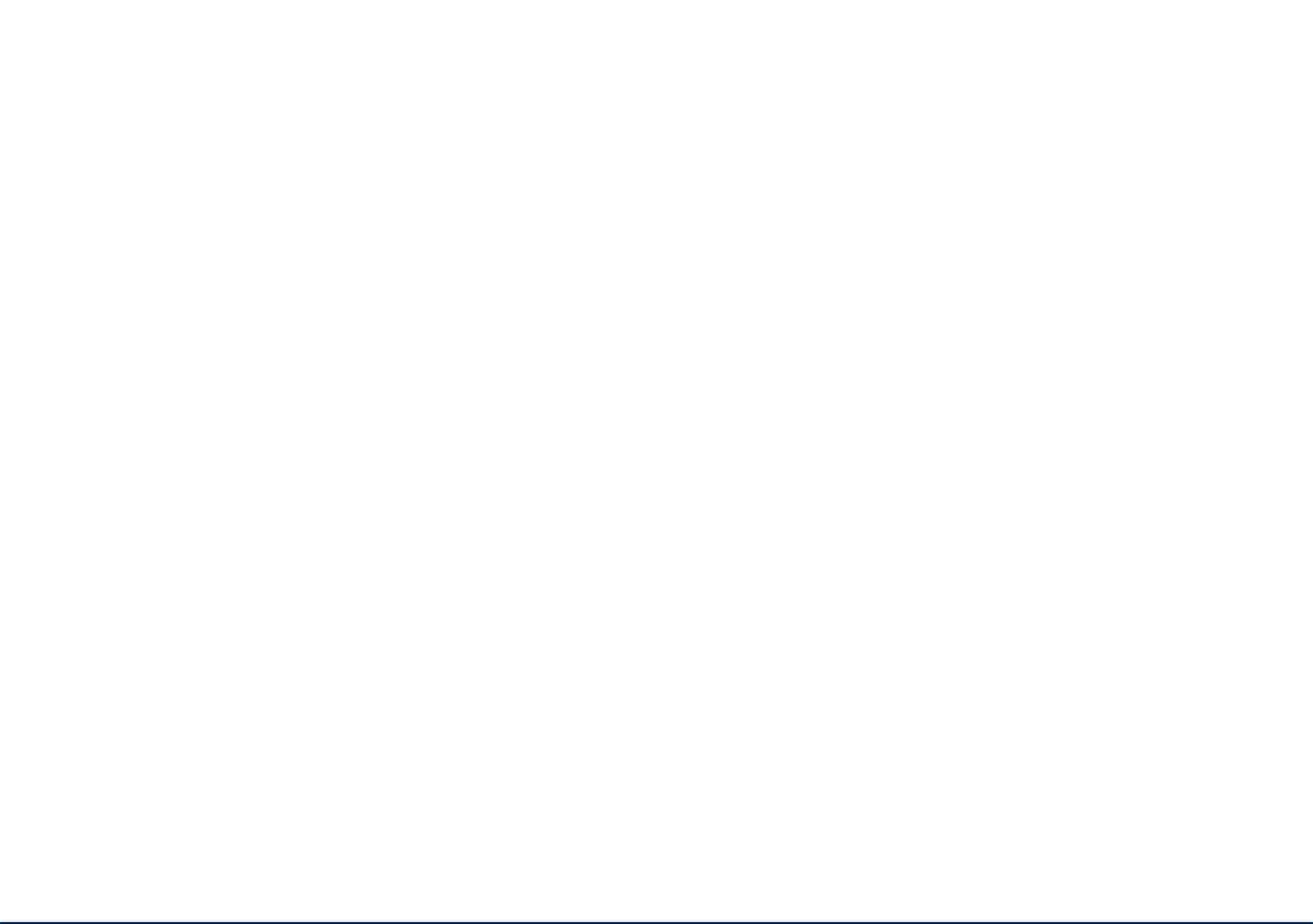
# NEON Ì ALASKA





# Toolik Site





# Major Milestones\*\*

- Construction mobilization & staging Feb 2015
- Civil infrastructure complete Jul/Aug 2015
- Field operations deployment May 2015 earliest
- Terrestrial instrumentation Sep 2016
- Aquatic/STREON instrumentation Sep 2016

**\*\*Tentative and subject to change**



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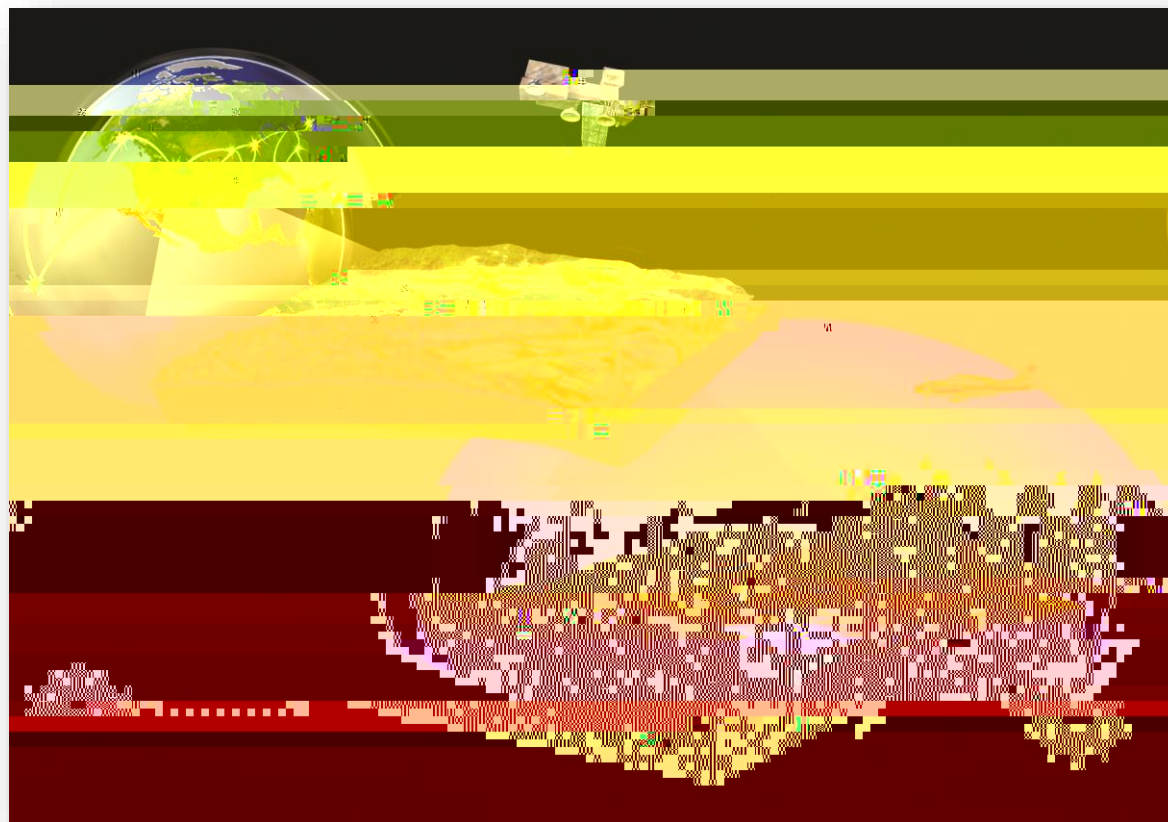
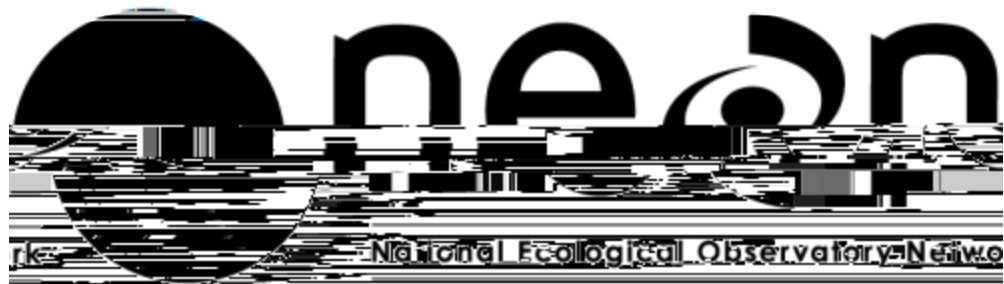
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# Operations

- **Instrument maintenance:** 2-3 days every other week year round
- **Organismal sampling:**
  - Terrestrial: 30-50 plots during summer season
  - Aquatic: stream, lake, and STREON
  - Observations: Sentinel taxa
  - Sample removal – some soil, sediment, water, plant and animal materials
- **Airborne Observations:** once per year during peak greenness

# Lab Equipment

- drying oven(s)
- refrigerator
- freezer
- ultralow
- high-precision balance
- not so high precision balance
- grinding mill
- centrifugal mill
- muffle furnace
- fume hood
- microscope? (may transport samples back to Fairbanks)
- temporary sample storage
- field equipment storage
- flammables storage
- corrosives storage
- biohazard/hazardous waste storage
- gas cylinder storage ? maybe
- dry ice readily available (may need a machine to make this)
- DI water readily available (may need a DI water system)



The National Ecological Observatory Network is a project sponsored by the National Science Foundation and managed under cooperative agreement by NEON Inc.