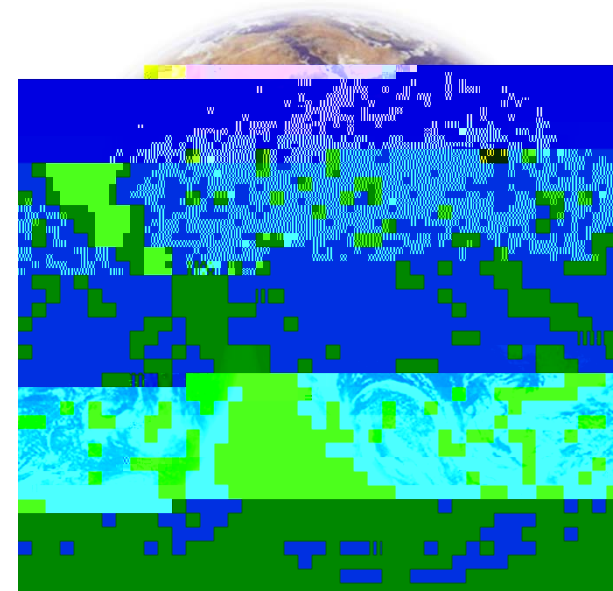


# The National Ecological Observatory Network



2/6/2017

# Overview



## Development / Overview of a Distributed Observatory

- Distilling Questions
- Key Design Elements of Observatory

## Ecological Forecasting

- philosophy

## Engagement Activities that we need help with



# Key Elements of Ecological Forecasting

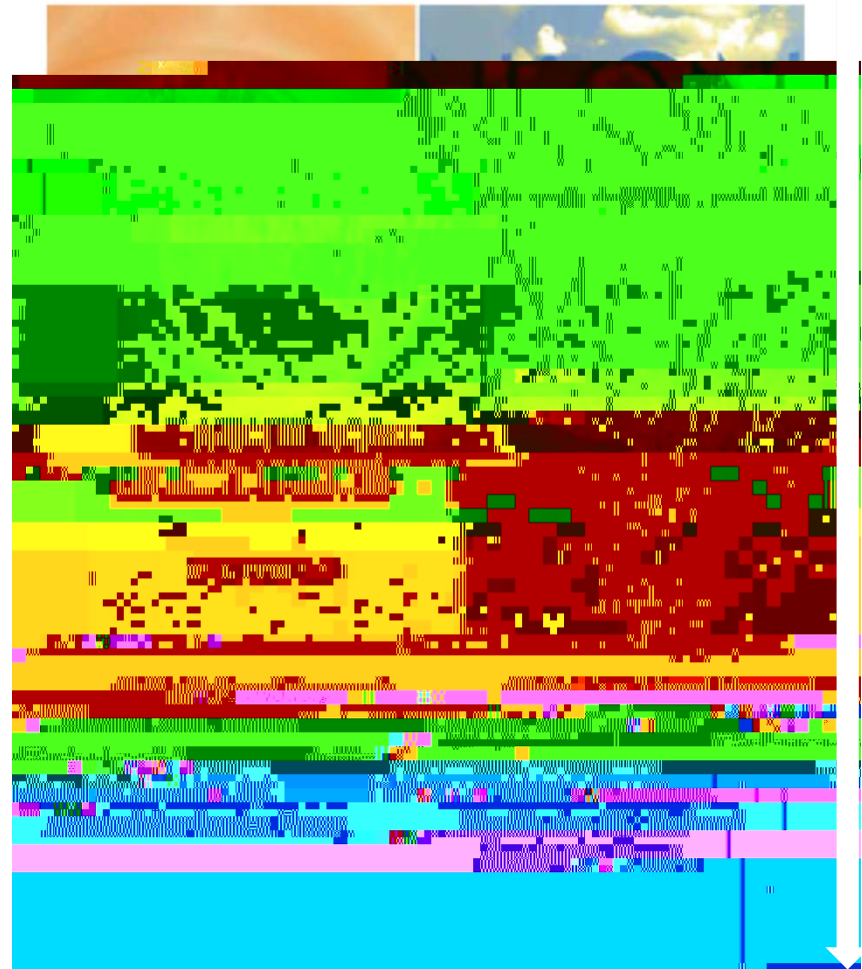
The overarching goal of NEON is ***to enable understanding and forecasting*** of climate change, impacts of land use change, and invasive species on continental-scale ecology ***by providing infrastructure*** to support research in these areas.

**Information infrastructure:** Consistent, continental, long-term, multi-scaled data-sets and data products that provide a context for research and education.

**Physical Infrastructure:** A research platform for investigator-initiated sensors, observations, and experiments.

# NRC Grand Challenge Areas

1. Biodiversity
2. Biogeochemical cycles
3. Climate change
4. Ecohydrology
5. Infectious disease
6. Invasive species
7. Land use





# (Notes) Design Criteria

**Trace to questions that were developed by the user communities**

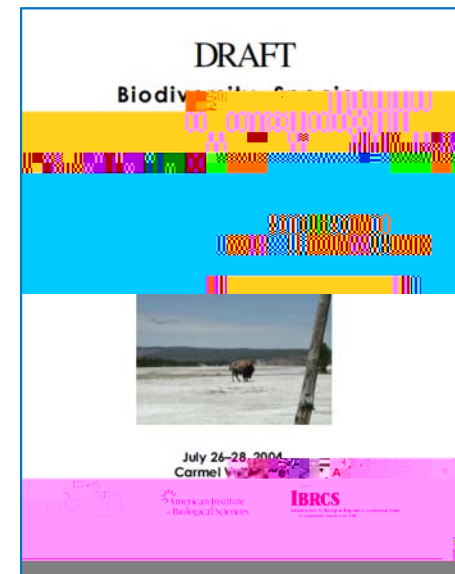
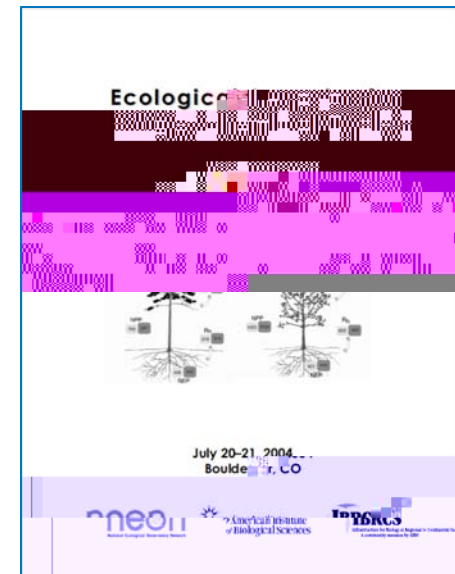
**Enable an ecological forecasting**

Inherently adopts **a cause and effect paradigm**

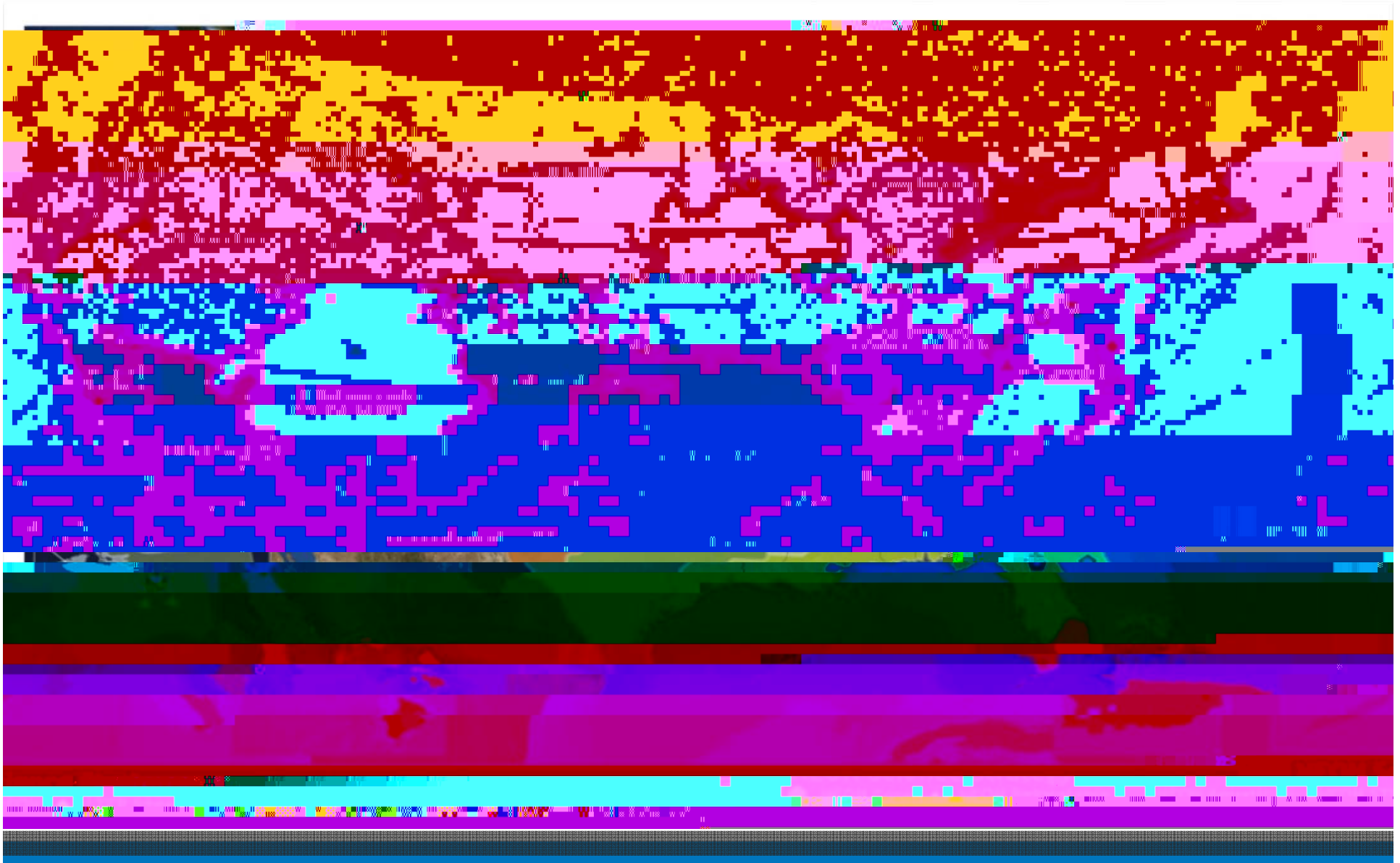
Design to scale, questions that may be germane to specific sites, but **designed to ask questions among sites (local-regional-continental)**

Designed to be **Consistent, 30-y Long Term, datasets**

- **>130 data products**
- **Terrestrial and Aquatic Ecological Processes**
- **Abiotic Drivers**
- **Remote Sensing**



# Continental Eco-climatic Domains of NEON





# NEON Domain Design Addresses Several Themes

Agriculture



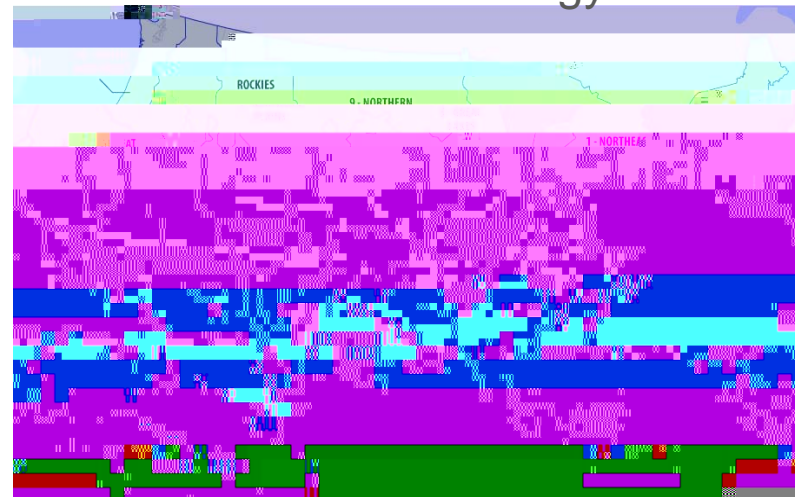
Forest systems



Climate/Ecohydrology



Invasion biology

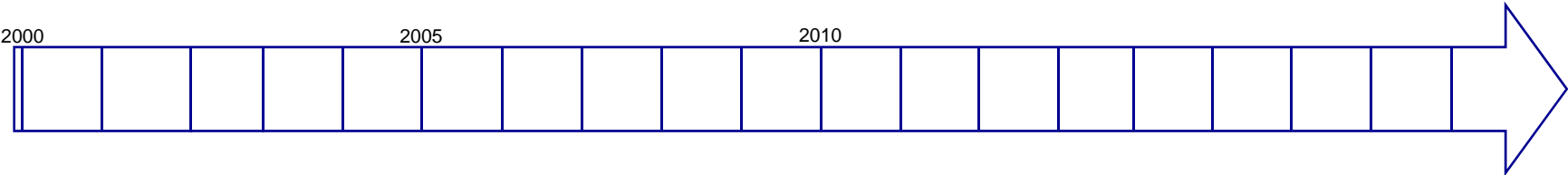


# NEON Alaska Design (incl. D19 D18)

- **Grand Challenge Areas (NRC / NAS)**
- **Ecohydrology** is the main Domains(s) themes, re. **permafrost dynamics**
  - originally Poker Flats w/ fire theme as well
  - originally sites positioned along the haul road
- Why is the NEON tower over there?, why is it so big?
  - Older glacial geomorphology – Sagavanirktok
  - scaling / compare / contrast
  - permanent structure (stairs), stability reqs, uniformity among sites
- D19 **Toolik Lake** - permafrost - tussock acidic tundra (core)
- D19 **Barrow BER** - permafrost - wet polygonal tundra
- D18 **Caribou-Poker** - discontinuous permafrost - black spruce
- D18 **Healy (8-mike lake)** - degrading permafrost - alpine tundra
- D18 **Delta Junction** - non-permafrost - black and white spruce

# Development of Distributed Observatory

## *NEON Development Timeline*



# NEON Program Status

## General Scope:

- Complete Construction of NEON Dec 2017
- Conduct Initial Operations
- Establish Long Term Observatory Plan

## Descope activities:

-



# NEON impacts and leverages other US agencies

AeroNet (NASA)  
AmeriFlux (DOE)  
US Climate Reference (NOAA)  
Critical Zone Observatory (NSF)  
Long-Term Ecological Research (NSF)

Forest Inventory Assessment (USDA)  
Agricultural Research Service (USDA)  
Long-Term Agroecosystem Research (USDA)

# Concluding Remarks

- NEON *Construction will be complete* at end of year, initial *operations has begun, data are beginning to flow.*

## Communication Communication Communication

- Strong need to establish the venues and processes for in-site science integration
- *further develop, build, engage and work* with User communities
- NEON must further develop ‘observatory’ communication skills with their colleagues, stakeholders in *a more nimble manner* (and vice versa).
- (personally)

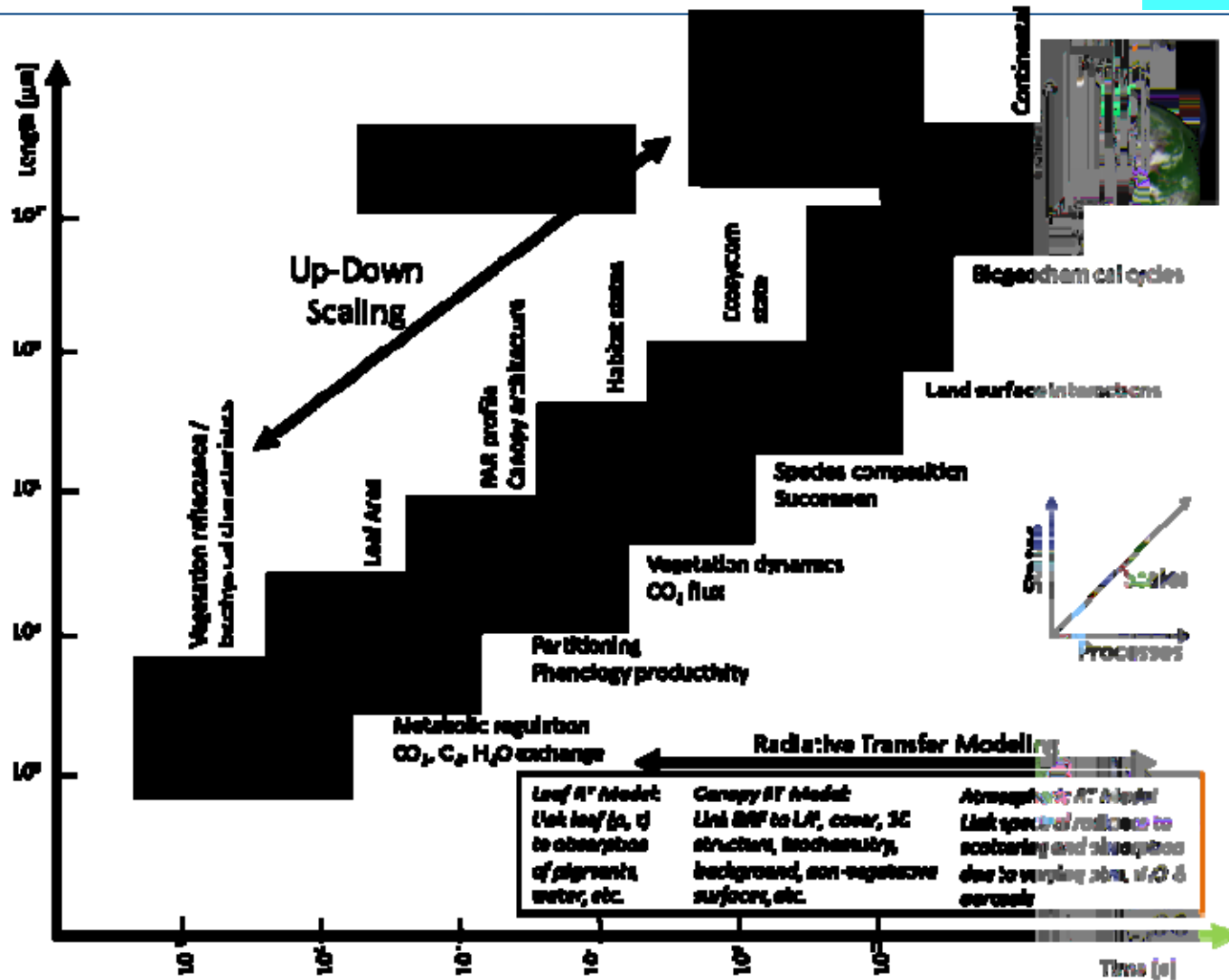
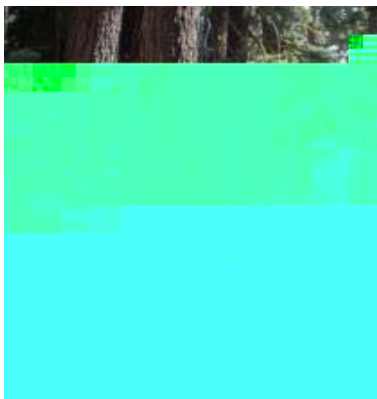
# Thank You !!

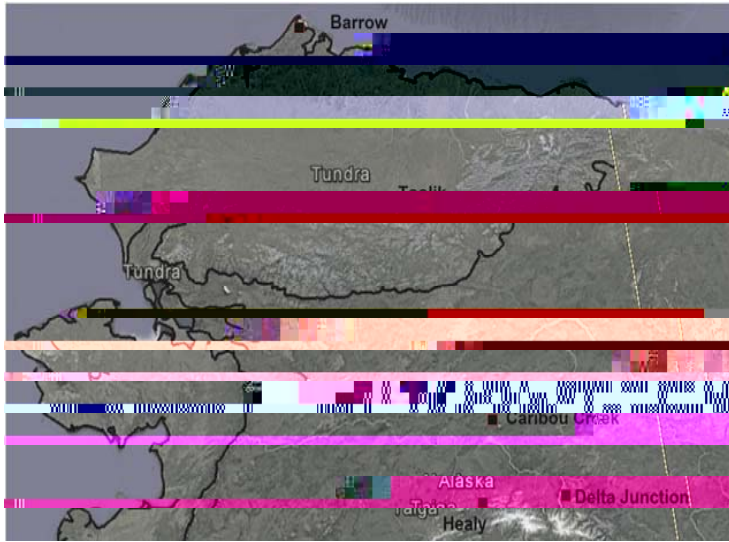




BACKUP

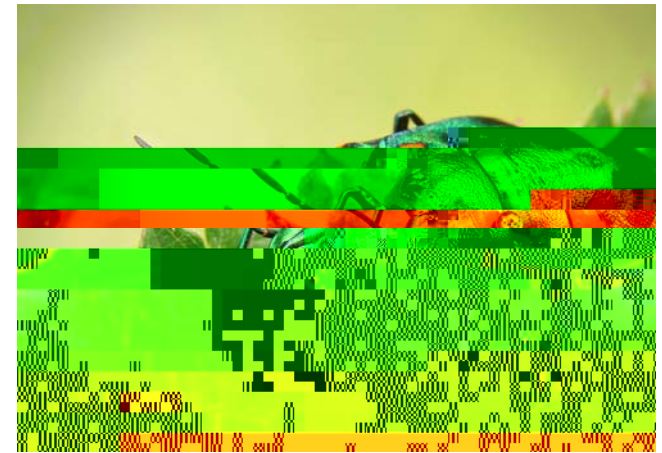
# NEON Captures and Integrates Ecological Data at Multiple Scales





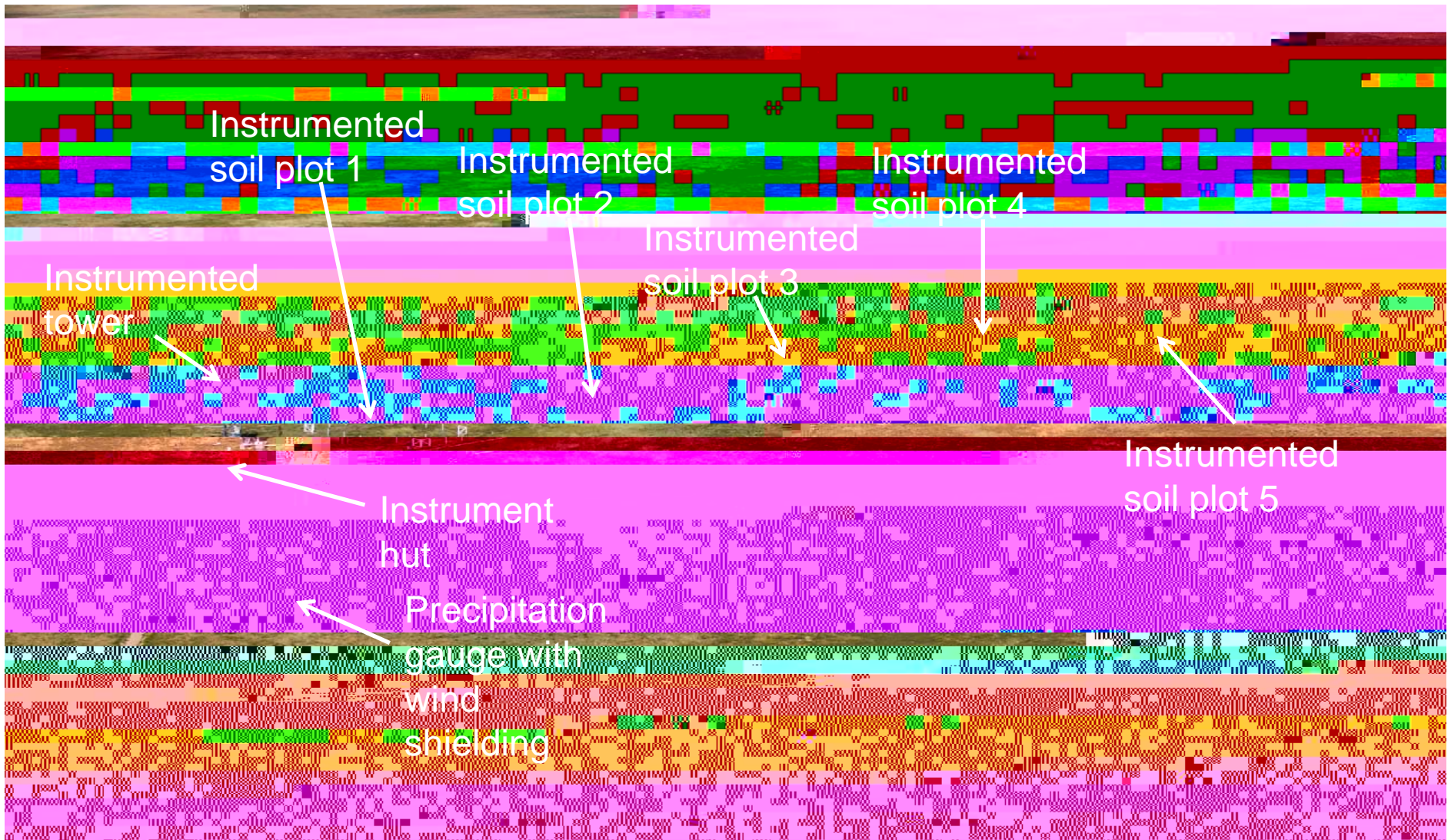
# Biological Data Based on NEON Observations and Collections

- Biodiversity
- Population Dynamics
- Productivity
- Phenology
- Infectious Disease
- Biogeochemistry
- Microbial Diversity and Function
- Ecohydrology
- **\*\*Sentinel Species\*\***





# Terrestrial Platform (D10 – Central Plains, CO)



# Aquatic Platforms Include Groundwater and

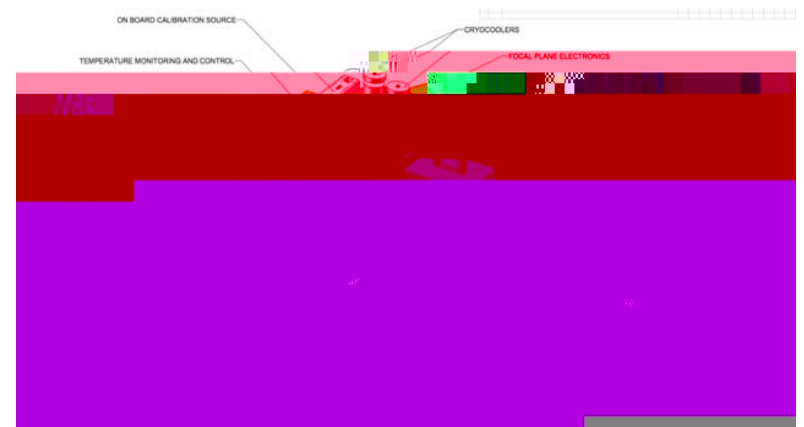
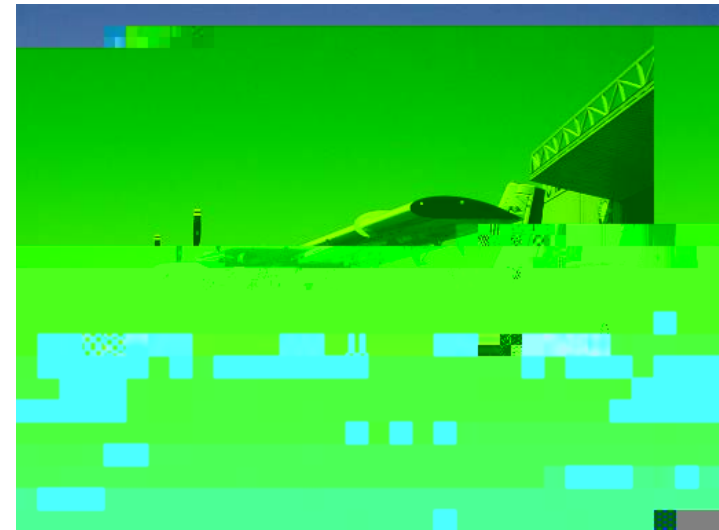
# Airborne Observation Platform (AOP) Provide High Fidelity Aerial Imaging of Sites

*f* Three airborne remote sensing payloads:

- Waveform-LiDAR altimeter
- Imaging spectrometer
- High-resolution digital camera
- GPS-Inertial measurement unit

*f* Leased Twin Otter aircraft

*f* Instrumentation maintenance and calibration facility





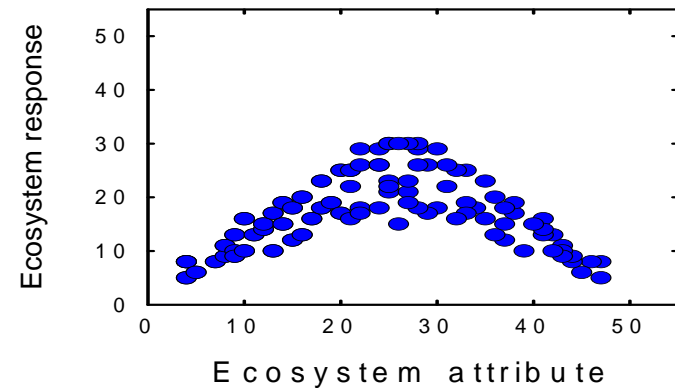
# NEON Ensures Consistent Long Term Data

***NEON data are needed to discover and understand temporal patterns and processes that are hidden by short-term approaches***

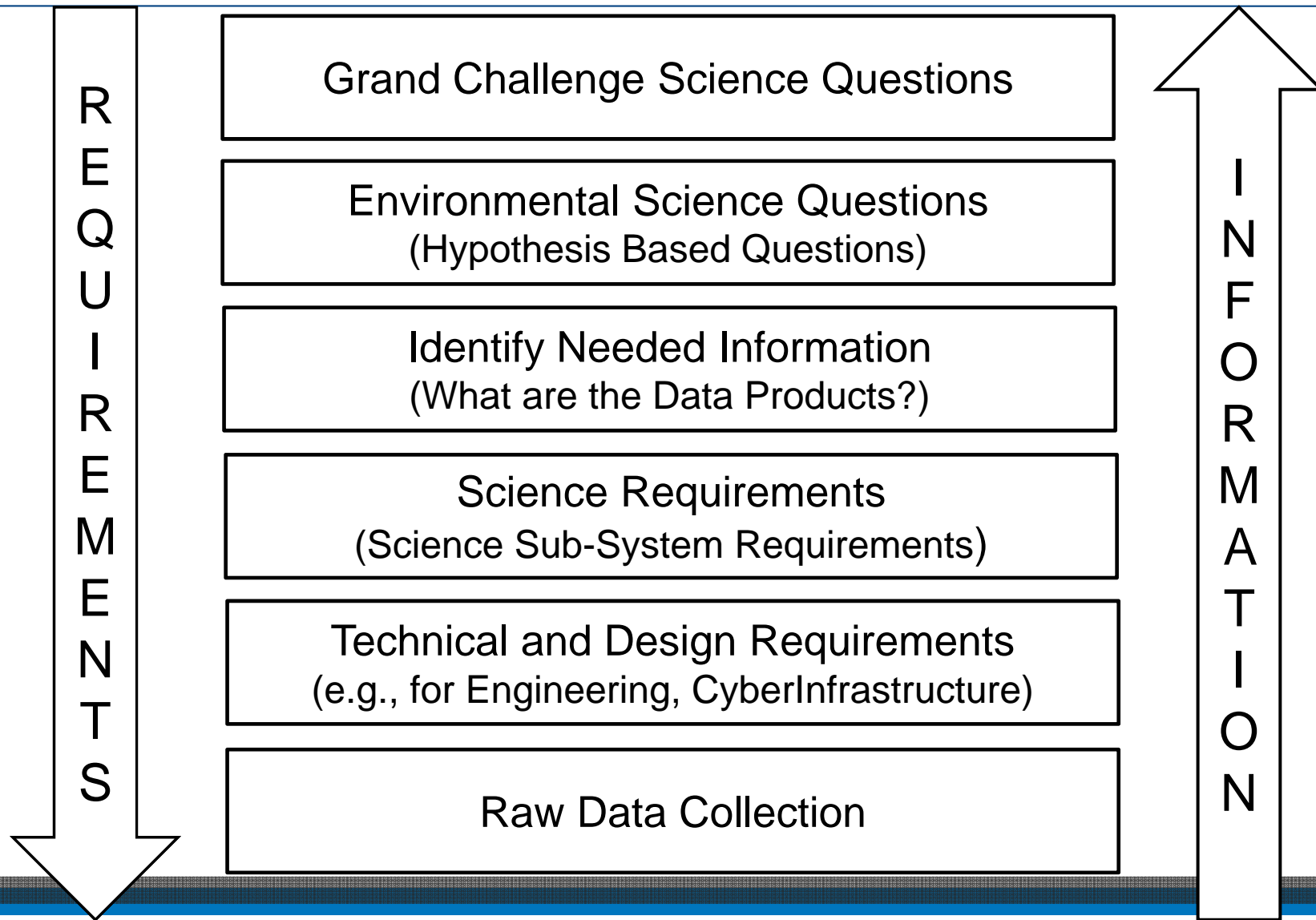
**“There is a serious contradiction between the time scales of many ecological phenomena and the support to finance their study.”**

**“...high-quality data over the long term will allow generalization of ecological research results and theory over scales of time...great enough to evaluate disturbances to our ecosystems...”**

**-Callahan 1984 BioScience**



# NEON's Scientific / System Engineering Approach



# GARTNER TYPE CYCLE

