THE NATIONAL ECOLOGICAL OBSERVATORY NETWORK:
OVERVIEW AND STRATEGIES FOR RADIATION MEASUREMENTS ACROSS THE CONTINENT

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NOAA ESRL GMAC Conference

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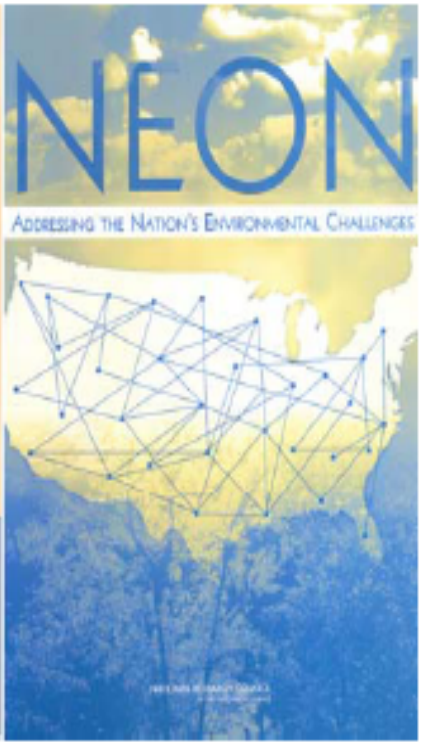
Grand Challenge Areas

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

NRC (National Research Council). 2001. Grand Challenges in Environmental Sciences. Washington DC: National Academies Press.



NRC (National Research Council). 2003. NEON: Addressing the Nation's Environmental Challenges. Washington DC: National Academies Press.

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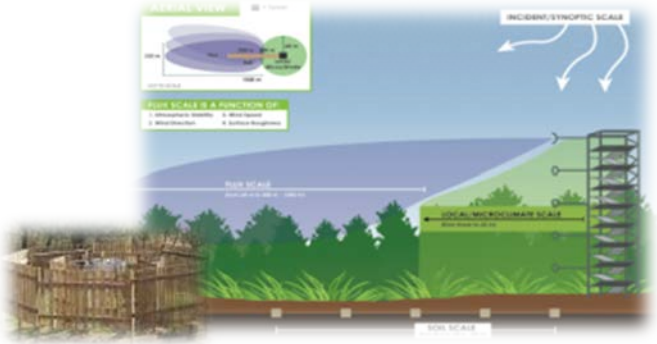
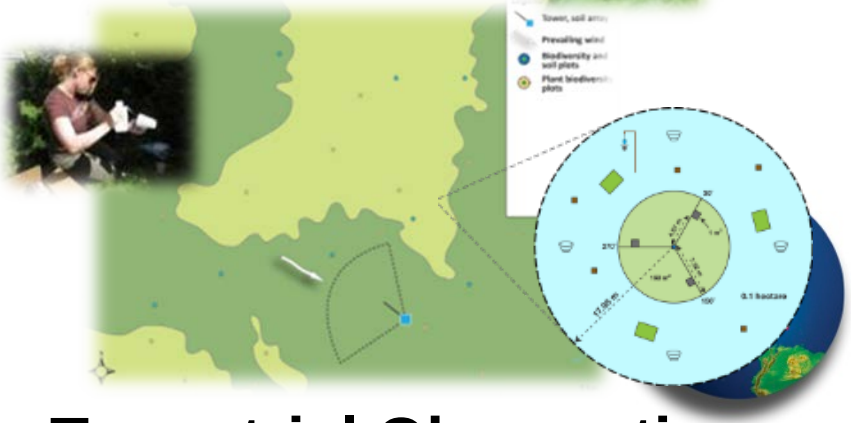
NEON Observation Platforms

Aquatic Instruments & Observations

Airborne Observations

Terrestrial Instruments



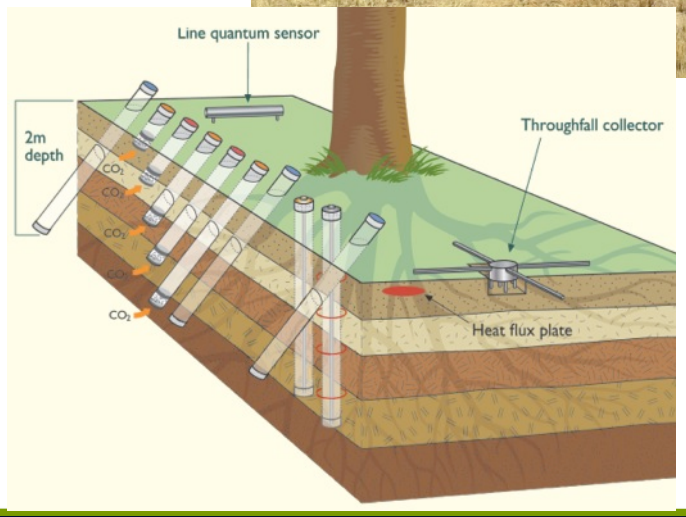


Terrestrial Observations

National Observatory with 20 Domains

Sensors

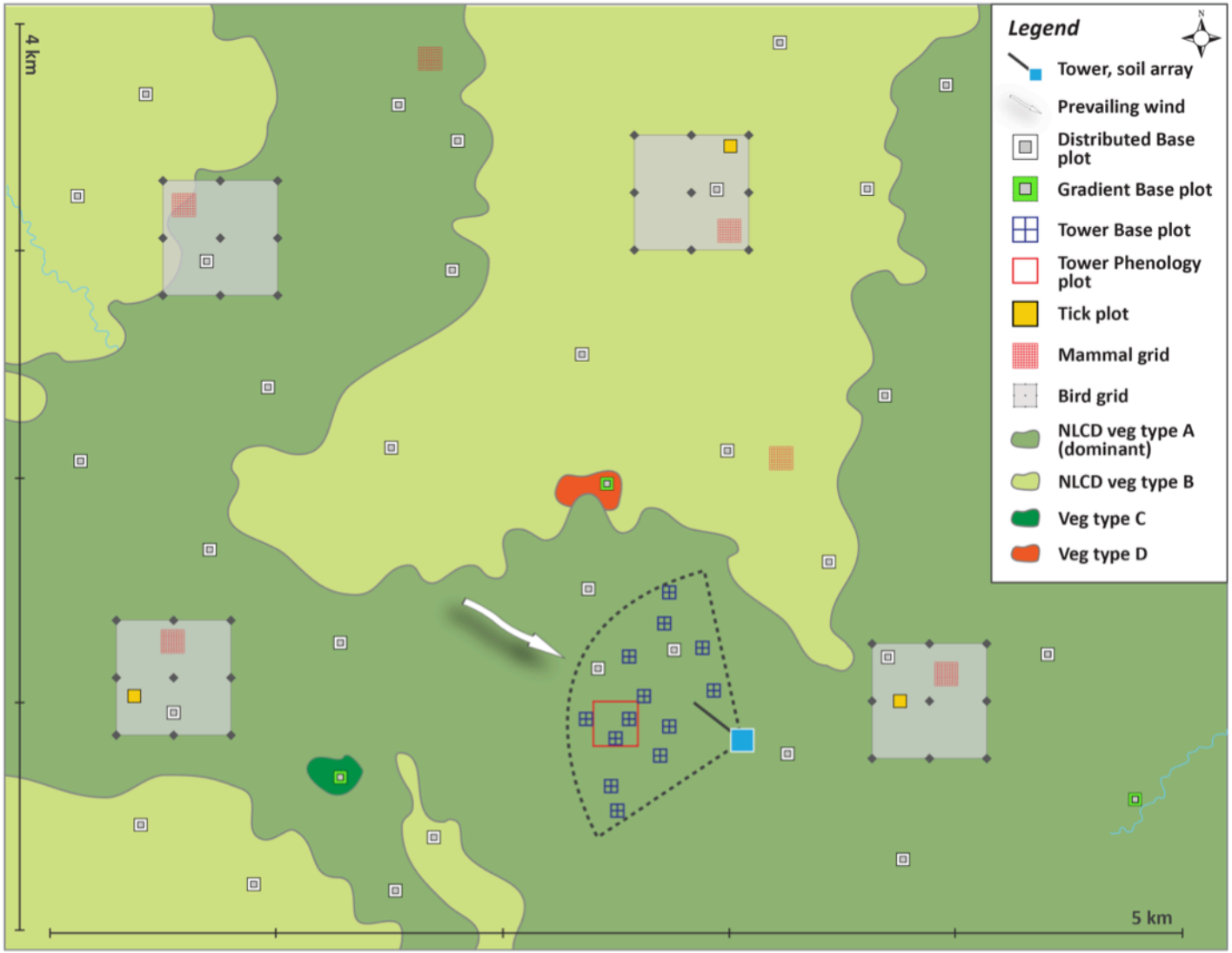
- Tower and Soil Array at all 60 sites
- 37 Instrument Assemblies
- Over 2000 measurements per core site at frequencies of daily, and ~0.1 to 40 Hz
  - Meteorology
  - Radiation
  - Atmospheric Chemistry and Air Quality
  - Dust and Aerosols
  - Fluxes of CO2, H2O, and Energy
  - Soil Measurements



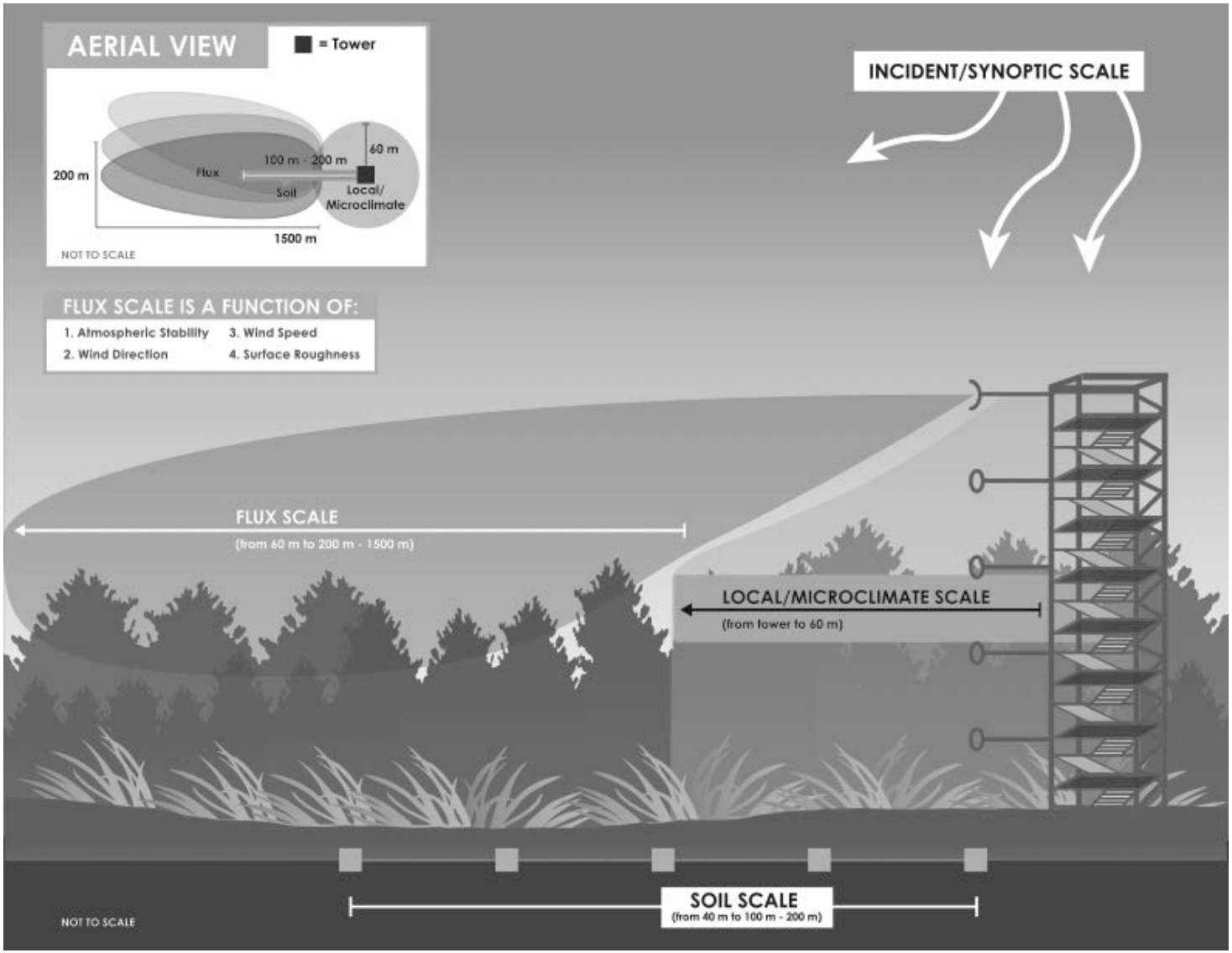
Radiation Measurements

- Radiation measurements standard at every site:
  - PAR
  - Net Radiometer
  - Direct & Diffuse Pyranometer
  - Primary Pyranometer
  - Camera Imagery
  - Sunphoto Spectrometers
- Aircraft camera images as well as LIDAR and hyperspectral imaging data products
- Citizen Science Synthesis

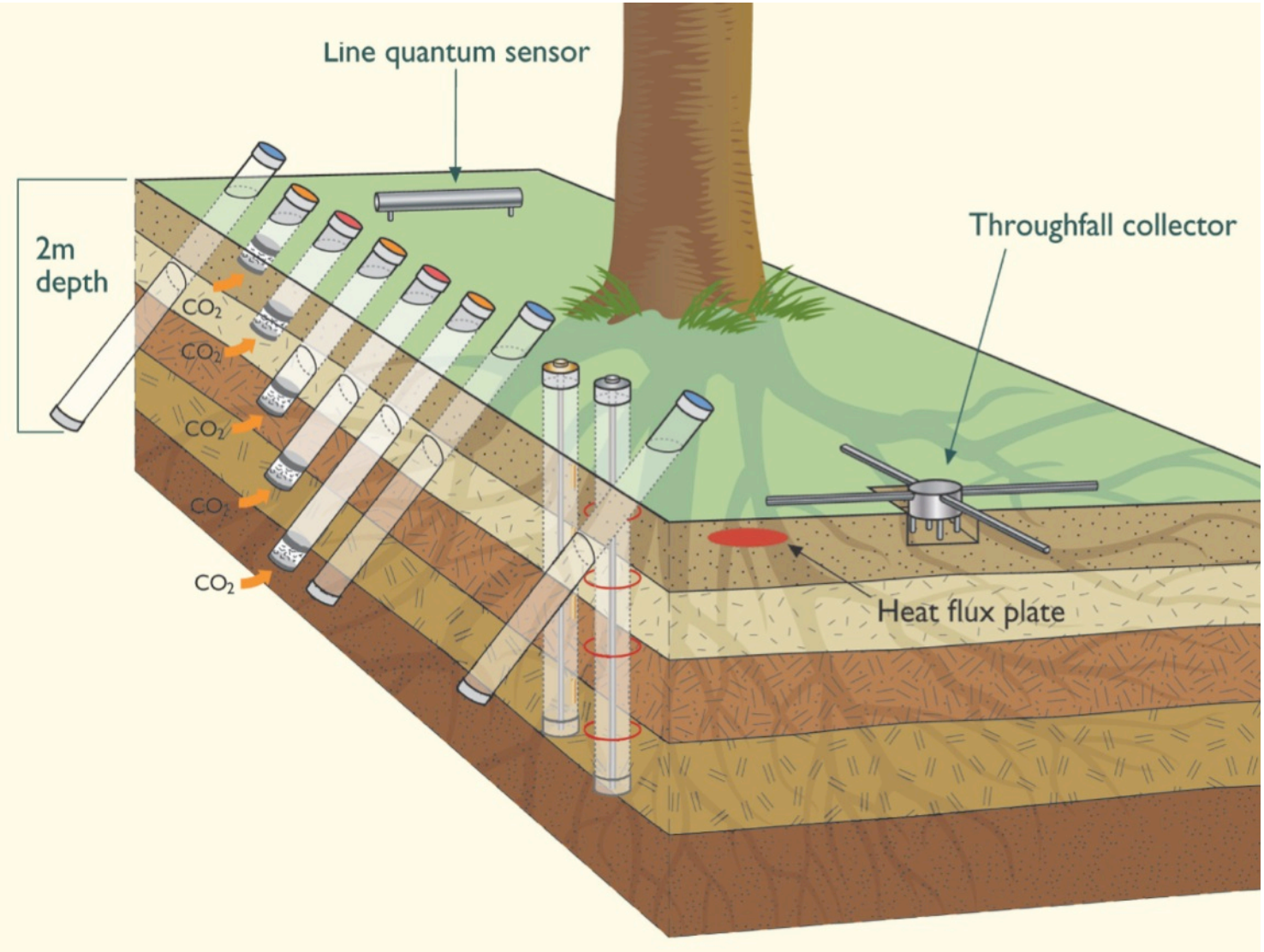
Terrestrial NEON Site Schematic



Tower Measurements

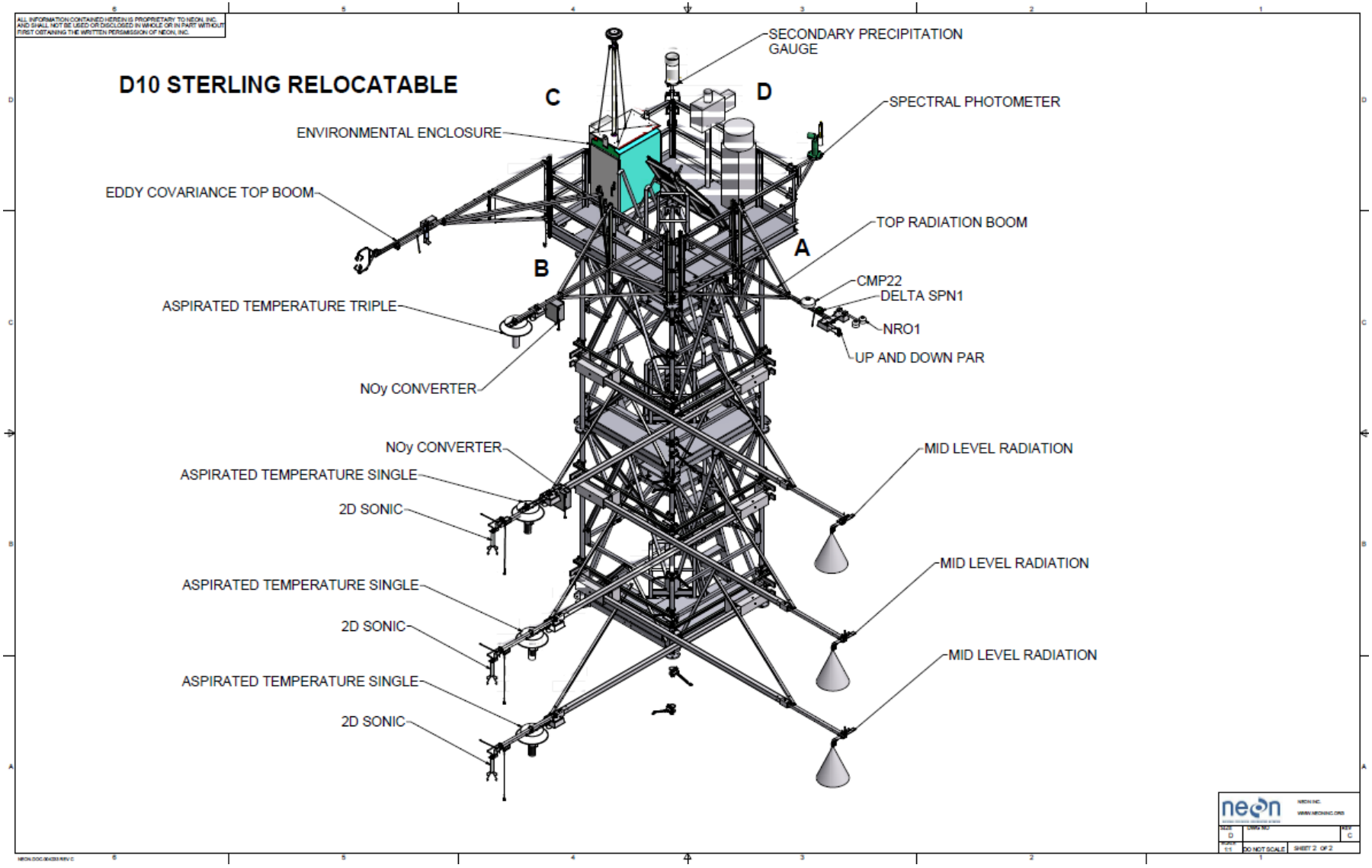


Soil Measurements



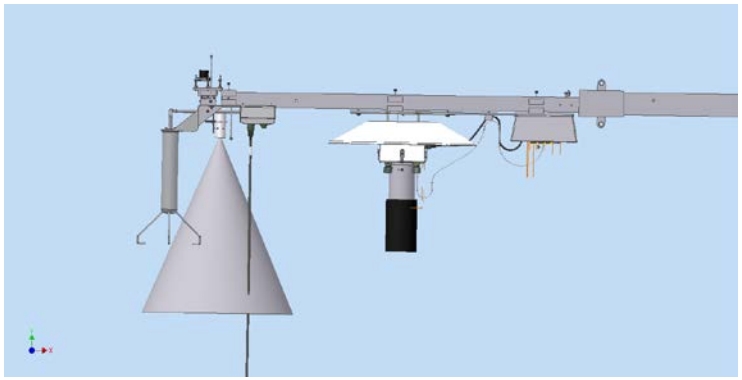
Images of NEON sites

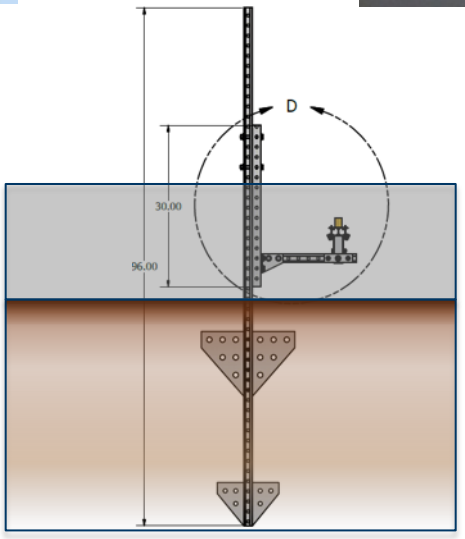
Tower Sensor Configuration

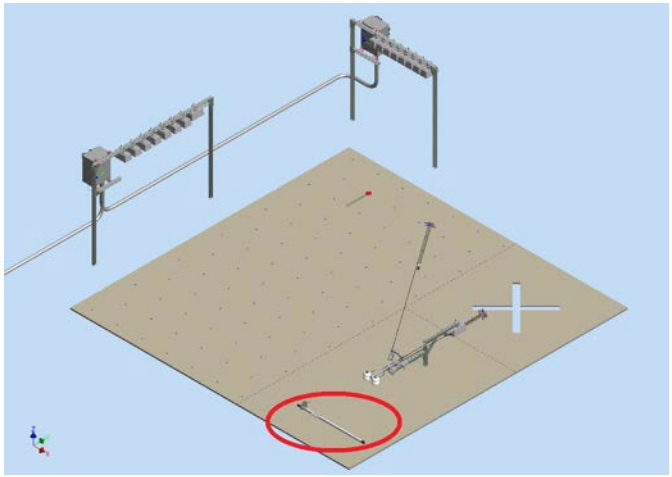


Photosynthetically Active Radiation

Li-Cor Li-191 Quantum Line Sensor: soil plots

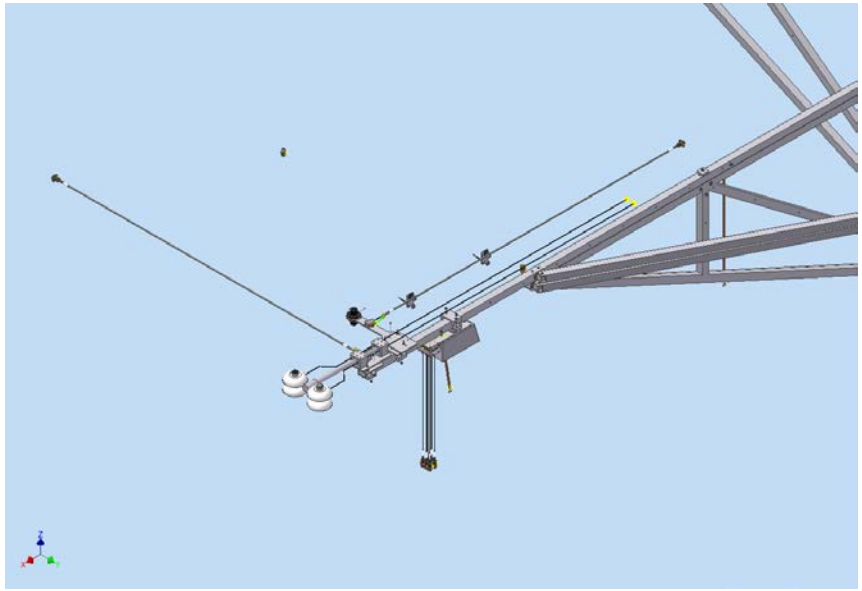


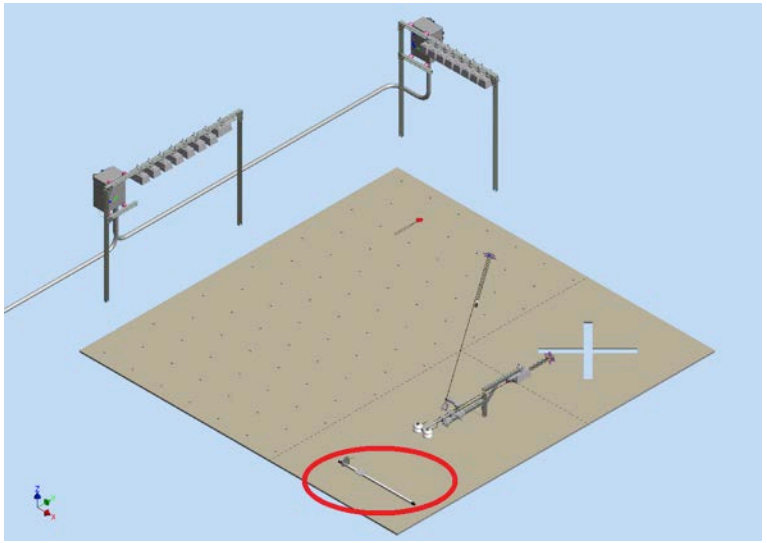




Kipp & Zonen PQS1: tower profile and aquatic sites (400-700 nm)

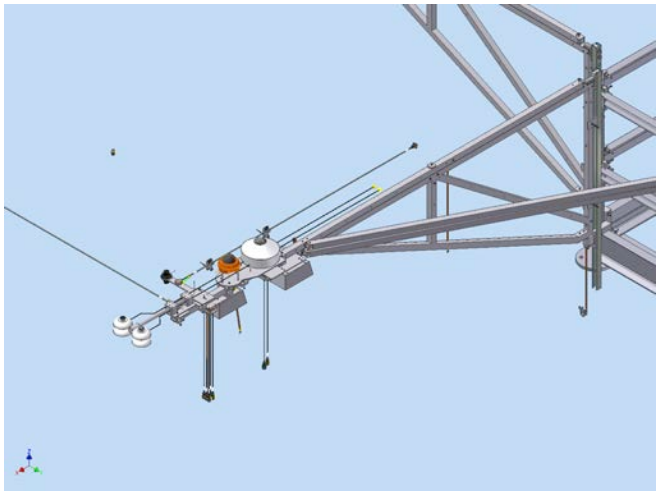
Net Radiometer





Hukseflux NR01: tower top and soil plots (285-3000 nm and 4.5-40 µm)

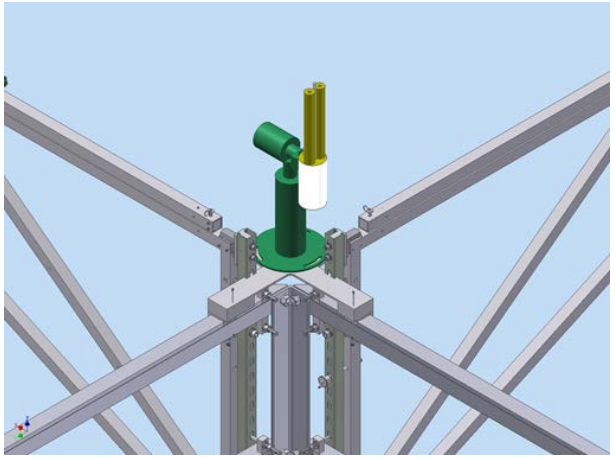
Pyranometers

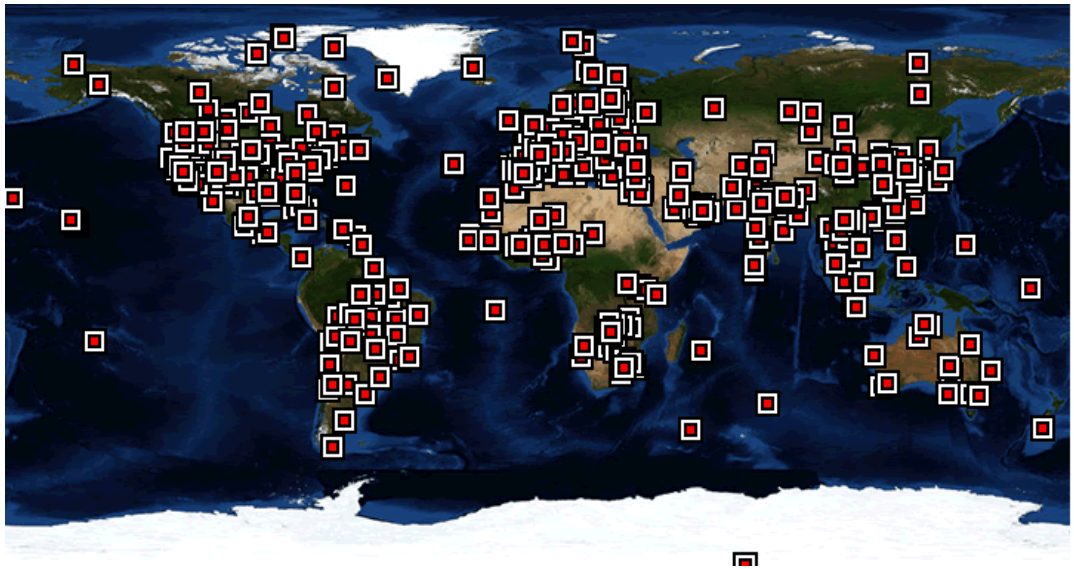


Kipp & Zonen CMP22: Primary Pyranometer ISO Standard (200 to 3600 nm)

Dynamax SPN1: Direct & Diffuse Pyranometer (400-2700 nm)

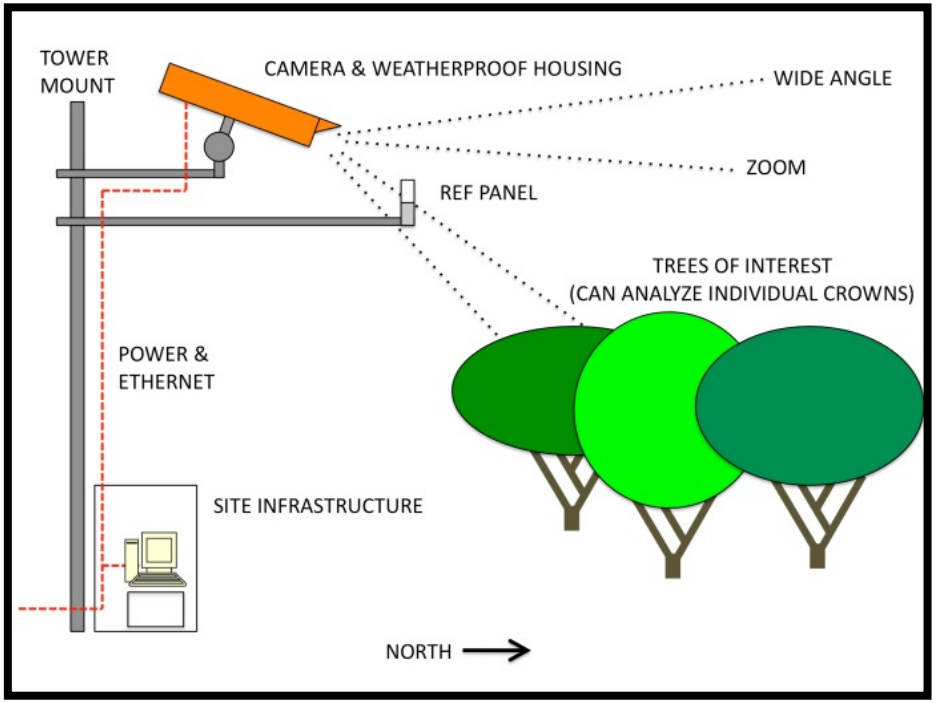
Sunphoto Spectrometer

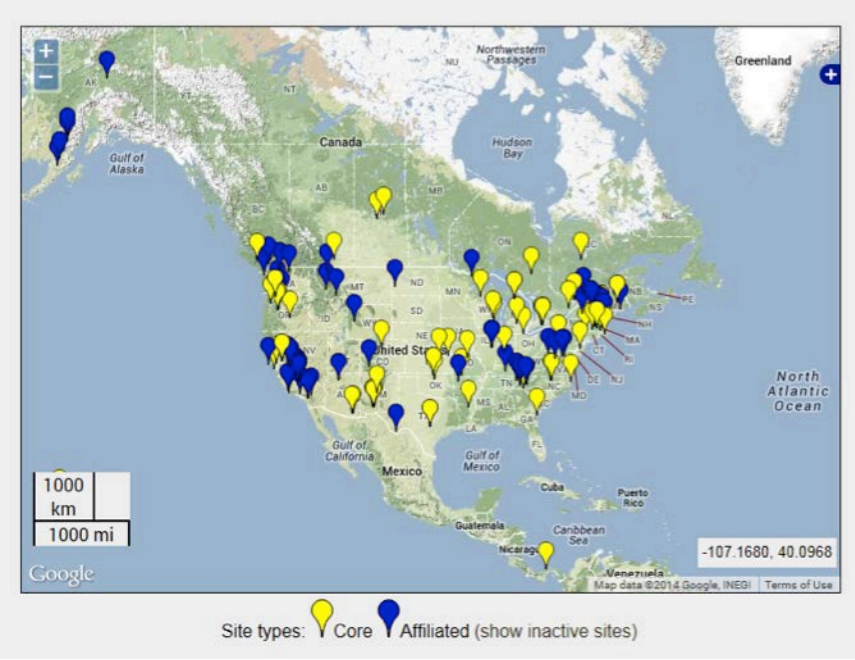


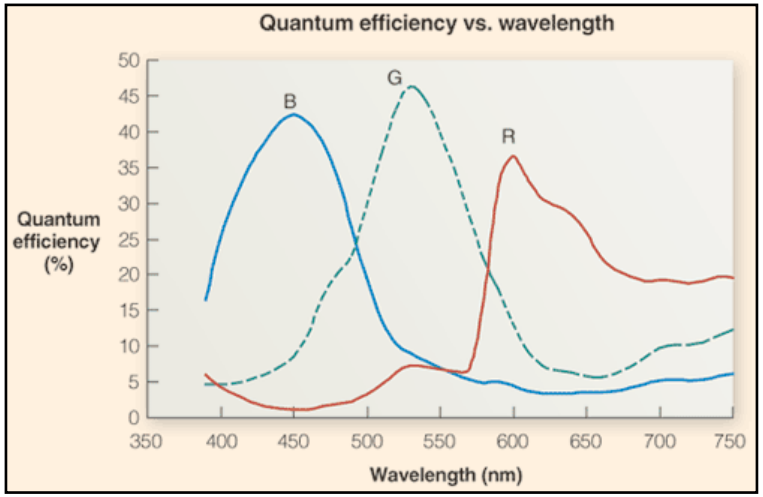


Cimel CE-318N: Scattering and AOD (340-1640 nm bands)

Phenology Cameras

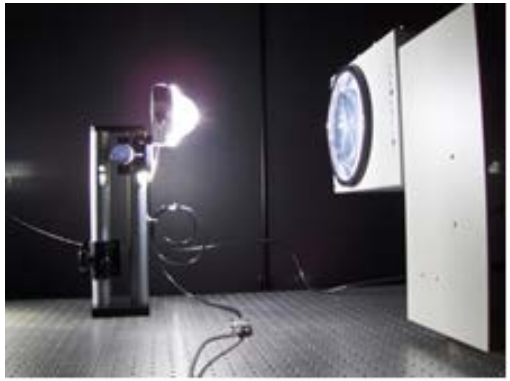


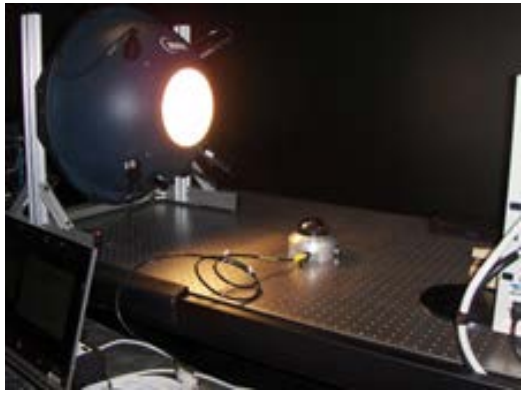




StarDot NetCam SC: 1280 x 960

Calibration and Validation

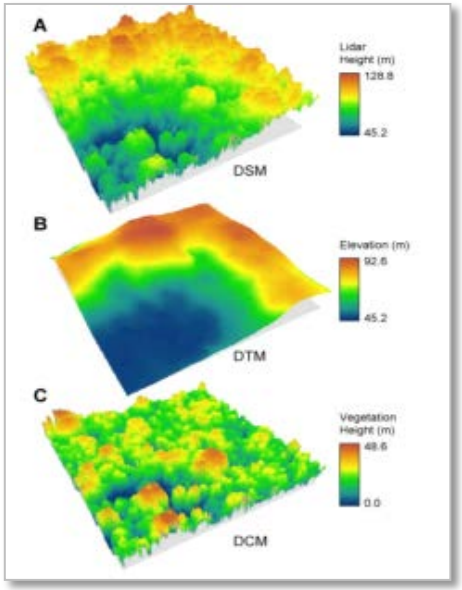




Airborne Observing Platform

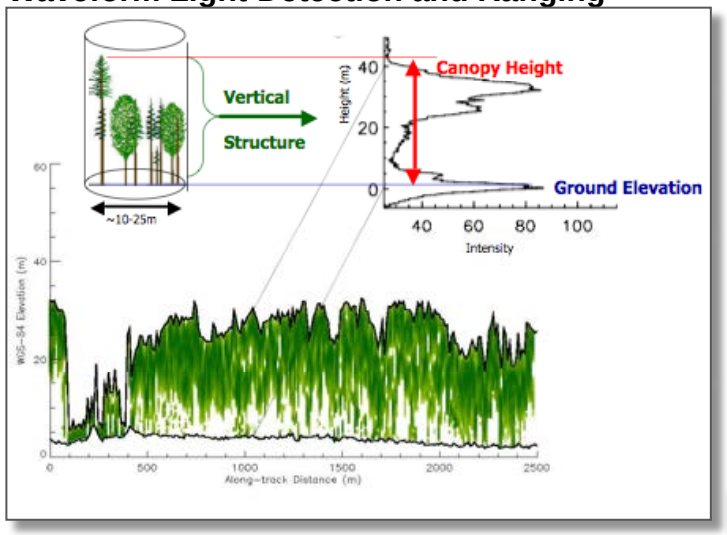
•Aircraft with specially mounted instrumentation will fly routine patterns over all NEON sites and surrounding areas (~300km^2 range) approximately once per year to collect detailed aerial data about the regional landscape and vegetation.

•Each site fly-over will last approximately four hours, with planes flying at an altitude between three and five thousand feet. All flights will be coordinated with the site host.



Integrated Radiation Measurements

Waveform Light Detection and Ranging



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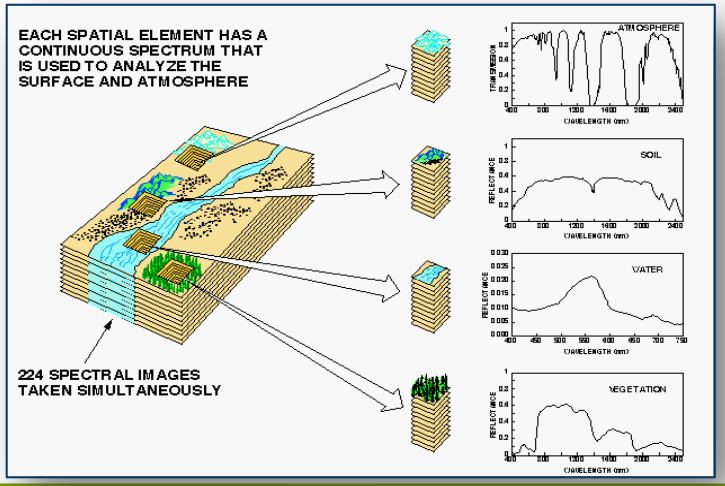
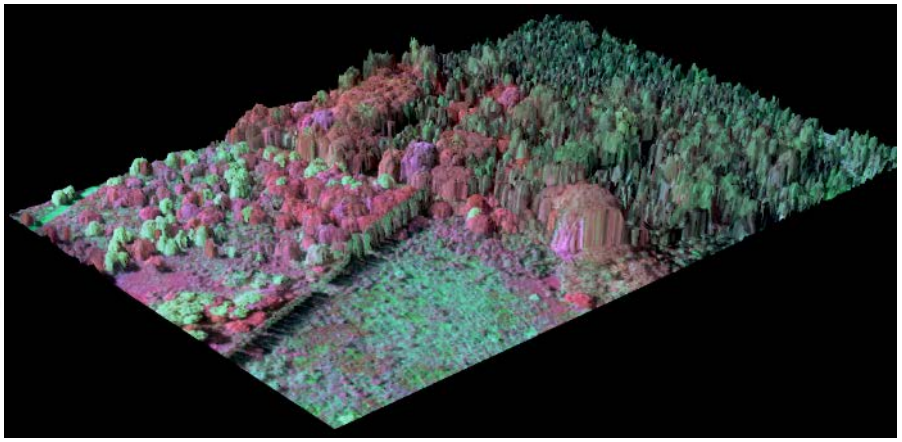
High-fidelity Imaging Spectroscopy



What are we after?

- Detailed chemical, structural and taxonomic information on ecosystems at fine spatial resolution



- Sampling at the scale of individual organisms (~1m) over 100's of sq. meters around NEON sites
- Bridge the scales from organisms (i.e., trees or shrubs) as captured by plot sampling, to stand scale observations as measured from flux towers, to the scale of satellite based remote sensing

Preliminary Data!!

data.neoninc.org

Level 1 Data Product	Availability
Triple Aspirated Temperature	2 Sites
Single Aspirated Temperature (Profile)	2 Sites
Barometric Pressure	2 Sites
Photosynthetically Active Radiation (Profile)	2 Sites
Biological Temperature on Tower	2 Sites
Incoming/Reflected Photosynthetically Active Radiation	2 Sites
Biological Temperature in the Soil Array	2 Sites
Photosynthetically Active Quantum Line Radiation	2 Sites
2D Wind (Profile)	Summer 2014
Secondary Precipitation (tower top)	Summer 2014
Net Radiation (tower top)	Summer 2014
Direct & Diffuse Shortwave Radiation (tower top)	Summer 2014

National Ecological Observatory Network™

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

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