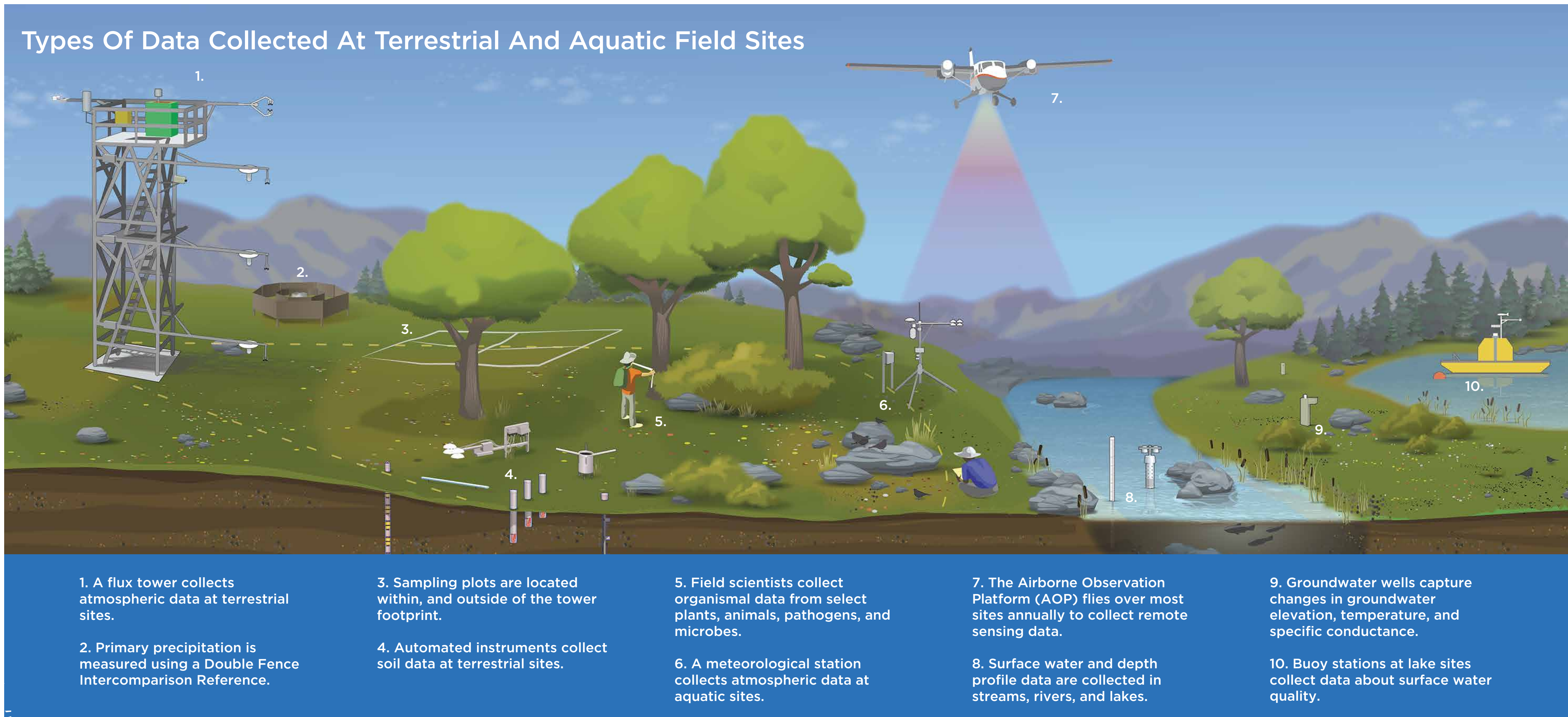


The NSF's National Ecological Observatory Network has 47 terrestrial field sites. Locations are representative of terrestrial features and habitats typical of regions across the United States within each NEON Domain and near to NEON's 34 freshwater aquatic field sites whenever feasible.

Data Collection Systems at Terrestrial Sites

Automated instruments • Observational Sampling • Airborne Remote Sensing

NEON data products are open access and can be used in conjunction with one another because they're gathered in close proximity to each other at a site. The data are also comparable among field sites so researchers can study connections and patterns across ecosystems, and then develop models to forecast environmental change locally, regionally and at a continental scale.



TERRESTRIAL OBSERVATIONAL SAMPLING

Sampling plots are established within the flux tower airshed, as well as throughout the dominant land cover/vegetation types identified at each field site. All data and archival samples collected are open access.



Soils & Soil Microbes

- Soil physical properties (Distributed initial characterization)
- Soil physical properties (Distributed periodic)
- Soil microbe biomass
- Soil microbe community composition
- Soil microbe group abundances

Terrestrial Plants

- Plant phenology observations
- Plant presence and percent cover
- Digital hemispheric photos of plot vegetation
- Herbaceous clip harvest
- Litterfall and fine woody debris sampling
- Non-herbaceous perennial vegetation structure
- Root sampling (Megapit)
- Root sampling tower plots
- Woody plant vegetation structure
- Coarse downed wood bulk density sampling
- Coarse downed wood log survey

Ticks, Mosquitoes and Ground Beetles

- Ticks sampled using drag cloths
- Mosquitoes sampled from CO₂ traps
- Ground beetles sampled from pitfall traps

Birds & Small Mammals

- Breeding landbird point counts
- Small mammal box trapping

Pathogens

- Rodent-borne pathogen status
- Tick-borne pathogen status
- Mosquito-borne pathogen status

DNA & Meta-Barcode Sequences

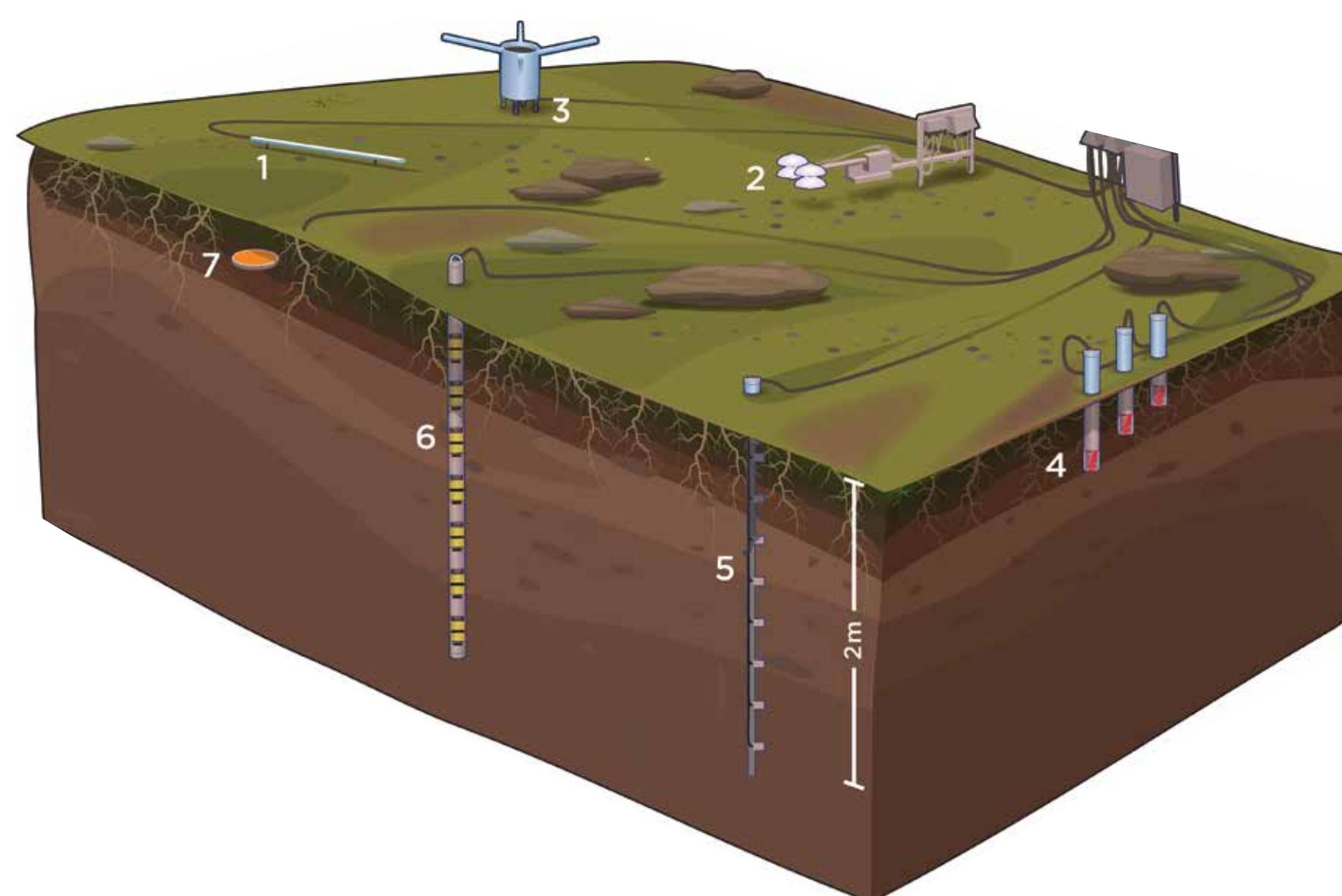
- Small mammal DNA barcodes
- Mosquito DNA barcodes
- Ground beetle DNA barcodes
- Soil microbe marker genes
- Soil microbe metagenomes

Biogeochemical

- Soil chemical properties (Distributed initial characterization)
- Soil chemical properties (Distributed periodic)
- Soil inorganic nitrogen pools and transformations
- Soil stable isotopes (Distributed periodic)
- Plant foliar physical and chemical properties
- Plant foliar stable isotopes
- Litter chemical properties
- Litter stable isotopes
- Root chemical properties
- Root stable isotopes

Soil Plot Sensors

NEON installs an array of five soil plots within or near the flux tower's footprint and in the locally dominant (1 km² scale) soil type of each terrestrial field site. Soil plots are typically spaced up to 40 m apart.



Soil Measurements and Frequencies

1 Photosynthetically active radiation (PAR)	1Hz	4 CO ₂ concentrations	.1Hz
2 Net-shortwave & net-longwave radiation	1Hz	5 Soil temperature	.1Hz
3 Precipitation	.5Hz	6 Soil moisture & salinity	.1Hz
		7 Heat flux	.1Hz

NEONScience.org

Meteorological Measurements at Terrestrial & Aquatic Sites

Measurement	Sensor	TERRESTRIAL SITES (frequency/location)			AQUATIC SITES (frequency/location)	
		Tower Top	Lower Levels	Soil Array	On Bank Met Station	Above Water Met Station
Global shortwave radiation	Kipp and Zonen CMP22 Pyranometer	1 Hz (only core sites)	⊘	⊘	⊘	⊘
Direct and diffuse shortwave radiation	Delta-T Devices SPN1 Sunshine Pyranometer	1 Hz	⊘	⊘	⊘	⊘
Net-shortwave and net-longwave radiation (4-component)	Hukseflux NRO1 Net Radiometer	1 Hz	⊘	1 Hz (only longwave)	1 Hz	30 s
Photosynthetically Active Radiation (PAR)	Kipp & Zonen PQS 1 PAR Quantum Sensor (additional downward-facing sensor at tower top)	1 Hz	1 Hz	⊘	1 Hz	30 s
Photosynthetically Active Radiation (PAR) - quantum line	Licor LI-191-01 Quantum Line Sensor	⊘	⊘	1 Hz	⊘	⊘
Spectral sun photometer - calibrated sky radiances	CIMEL Electronique - CE318N-EBS9	15 min	⊘	⊘	⊘	⊘
Air temperature	Thermometrics Climate RTD 100 Ω Probe, housed within a Met One 076B fan aspirated radiation shield (triplet probes in tower top shield)	1 Hz	1 Hz	⊘	1 Hz	1 min
IR biological temperature	Apogee SI-111 infrared (IR) temperature sensor	⊘	1 Hz	1 Hz	⊘	⊘
Relative humidity	Vaisala HUMICAP Humidity and Temperature Probe - HMP 155	1 Hz	⊘	1 Hz	1 Hz	1 min
Barometric pressure	Vaisala - BAROCAP Digital Barometer PTB330	⊘	1 Hz	⊘	1 Hz	1 min
Precipitation/Primary - Double Fence Intercomparison Reference (DFIR)	Belfort AEPG II 600M weighing gauge	0.1 Hz (20 sites)			0.1 Hz (four sites)	
Precipitation/Secondary	Met One 372 tipping bucket (non-heated) and 379 tipping bucket (heated)	On event (37 sites)	⊘	⊘	On event (six sites)	⊘
Precipitation/Throughfall	Met One 372 tipping bucket (non-heated)	⊘	⊘	When event occurs	⊘	⊘
2D wind speed and direction	Gill - Wind Observer II; Extreme Weather Wind Observer; RM Young 05108-45 Wind Monitor-HD Alpine (buoy); Honeywell HMR 3330 (buoy)	⊘	1 Hz	⊘	1 Hz	-4 s
3D wind speed, direction and sonic temperature	Campbell Scientific. CSAT-3 3-D Sonic Anemometer	20 Hz	⊘	⊘	⊘	⊘
3D wind attitude and motion reference	Xsens North America Inc. MTI-300-2A5G4 Attitude Heading Reference System	40 Hz	⊘	⊘	⊘	⊘
CO ₂ and H ₂ O concentration & flux	LI-COR - LI7200 gas analyzer	20 Hz	⊘	⊘	⊘	⊘
CO ₂ and H ₂ O concentration (storage/profile)	LI-COR - LI840A	1 Hz	1 Hz	⊘	⊘	⊘
CO ₂ atmospheric isotopes (storage/profile)	PICARRO - G2131-i isotopic CO ₂ analyzer	1 Hz	1 Hz	⊘	⊘	⊘
H ₂ O atmospheric isotopes (storage/profile)	PICARRO - I2130-i isotopic H ₂ O analyzer	1 Hz (21 sites)	1 Hz (21 sites)	⊘	⊘	⊘
Wet deposition chemistry and precipitation isotopes	N- Con Systems Company Wet Deposition Collector, Manufacture Model No: NEON 00-127-7	2 wks (37 sites)	⊘	⊘	⊘	2 wks (seven sites)
Phenology images	Startot NetCam SC CAM-SECSIR-B	15 min	15 min	⊘	15 min	

Additional measurements only at D10 & D13 terrestrial sites (MOAB, ONAQ, NIWO, RMNP, STER, CPER):
Dust and particulate size distribution (TSI DustTrak model: 8533EP): 1 Hz; Particulate mass (Ecotech HiVol 3000): 2 wks

AIRBORNE REMOTE SENSING SURVEYS

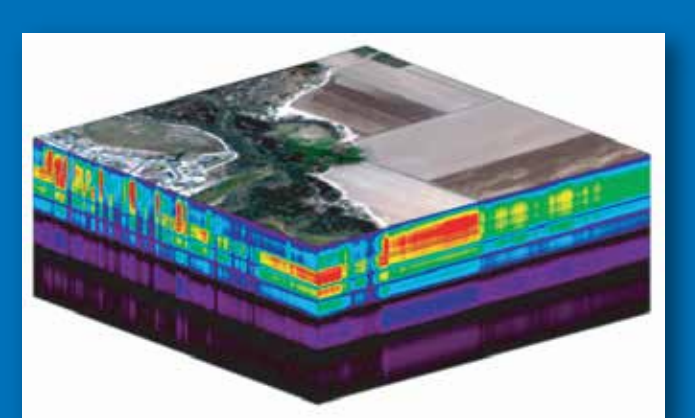
A NEON Airborne Observation Platform (AOP) is an array of instruments installed into a light aircraft to collect high resolution remote sensing data.

Collection of AOP data is synchronized with data collected on the ground at each site and takes place at peak greenness for each field site. Instruments include a discrete and waveform lidar, a hyperspectral imaging spectrometer, and a high resolution digital camera.

All data are open access. NEON has three AOPs that are used to capture data over NEON field sites and collect research-specific flight campaign data requested by the community.



Above: a point cloud from the lidar system.



Above: a hyperspectral cube from the spectrometer.



Left: an ortho-rectified and mosaicked aerial photo.