



National Ecological Observatory Network

Introduction

The National Ecological Observatory Network (NEON) is a National Science Foundation (NSF) sponsored, continental-scale research platform designed to understand the impacts of climate change, land use change, and invasive species on ecology. NEON investigates the interactions between the biosphere (living systems) and geological, hydrological and atmospheric systems and processes; and identifies how these systems and processes respond to change. Causes (such as changes in climate and land use) and consequences (changes in biodiversity, hydrology, etc) are measured to establish a link between cause and effect.

Long-term, standardized data collections are performed at 81 sites across 20 eco-climatic domains throughout the United States. Each domain includes a terrestrial core site and one or two relocatable sites. Nineteen domains include aquatic sites. Data is collected using equipment installations, field surveys, and remote sensing. Rocky Mountain National Park (RMNP), located within the Central Plains eco-climatic domain, hosts a relocatable terrestrial site.

NEON at RMNP

The NEON relocatable site at RMNP was approved under a park-specific Environmental Assessment (EA) in 2011. The 82 foot (49.5 meter) meteorological (MET) tower was built in 2013. This NEON R-20 facility is located on the Leiffer property, a small NPS parcel outside the main park boundaries on the eastern side of the park. It encompasses a 4.7 acres area with a site infrastructure footprint of 0.2 acres (Figure 1).

The facilities include the MET tower equipped with sensors to monitor atmosphere-related processes, a soil sampling array system, an instrument hut, a locked gate, and parking area. The tower is collocated with an EPA Clean Air Status and Trends Network (CASTNET) air quality monitoring installation. The facility is temporary and is anticipated to be removed within ten years of its installation date. NEON technicians visit the site every two weeks.

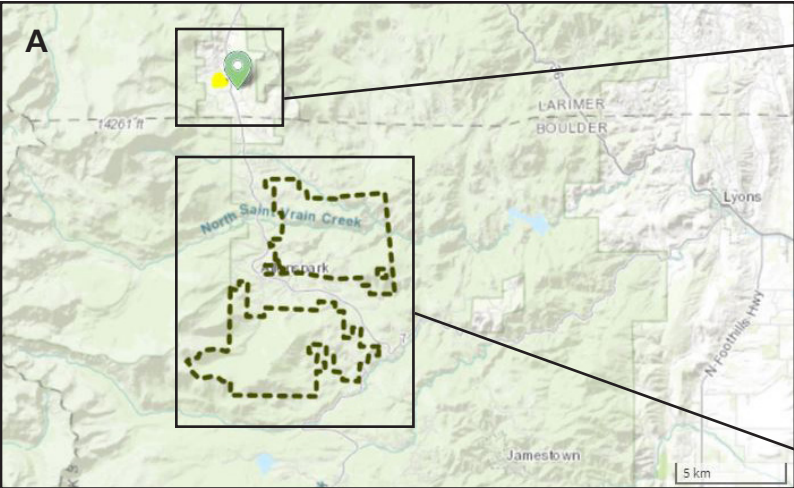
Sensors, located at different heights along the MET tower, collect and track data on a range of variables, including temperature, barometric pressure, wind, carbon dioxide, water vapor, radiation, particulates, and visible light. The soil arrays collect data on soil moisture, temperature, carbon dioxide concentrations, and other variables.

Besides the MET tower, which continually collects data, NEON has also conducted field based surveys, collection sampling, and remote sensing work at and around the RMNP facility. In 2011, soil, beetles, and mosquitos sampling was conducted around the tower. This effort was a preliminary step in determining field plot locations. Since 2017, terrestrial field surveys within nine plots around the tower are conducted annually. Information on vegetation structure, production, above and below ground biomass, phenology, and species diversity is collected as part of these surveys. Also, flights are flown over the NEON site to collect LiDAR and other remote sensing data.

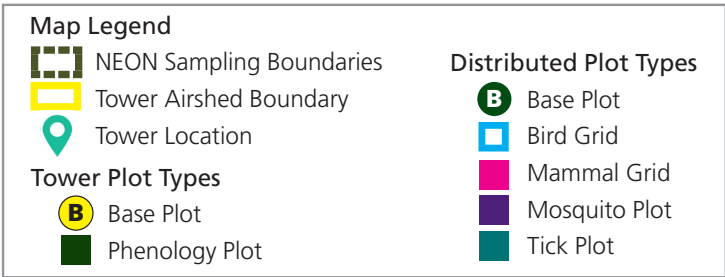


Figure 1. The 82' (49.5m) NEON R-20 MET tower (top) and soil sampling array (bottom) are located within a ponderosa pine forest stand. RMNP was selected as a relocatable site within the Central Plains eco-climatic domain to investigate the transportation of pollution (from the Front Range), and dust deposition (from the Great Basin), to higher elevations. *Photos courtesy of NEON.*

Figure 2. Rocky Mountain National Park (CASTNET-RMNP) NEON Field Site Map (A) include the tower site (B) and corresponding sampling areas (C). Note: only the tower site is located on NPS property. The other sampling sites are located on US Forest Service land.



Map from <http://www.neonscience.org/field-sites/field-sites-map/RMNP>



NEON Data—Available to you!

NEON is continually making the data collected from the towers, field sampling, aerial flights, and satellites available. Interested in seeing what is available? Got to: <https://www.neonscience.org/field-sites/field-sites-map/RMNP> and select the Browse Data button. From there, you can see the types of data collection associated with the RMNP site. To explore the data, go to: data.neonscience.org/static/browse.html and select the RMNP site. Here are a couple examples of what you can find:

Atmospheric Data

Temperature, wind direction, radiation, and precipitation are just some of the data available to view in graph form. First, select the 'View Time Series' button for the variable you are interested in. Then choose 'RMNP' as the site, and the specific month and measurements you are interested in.

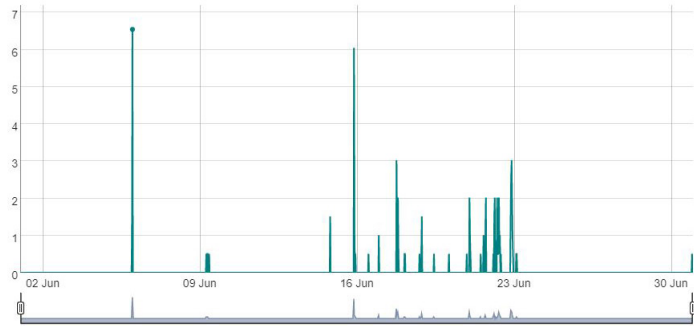
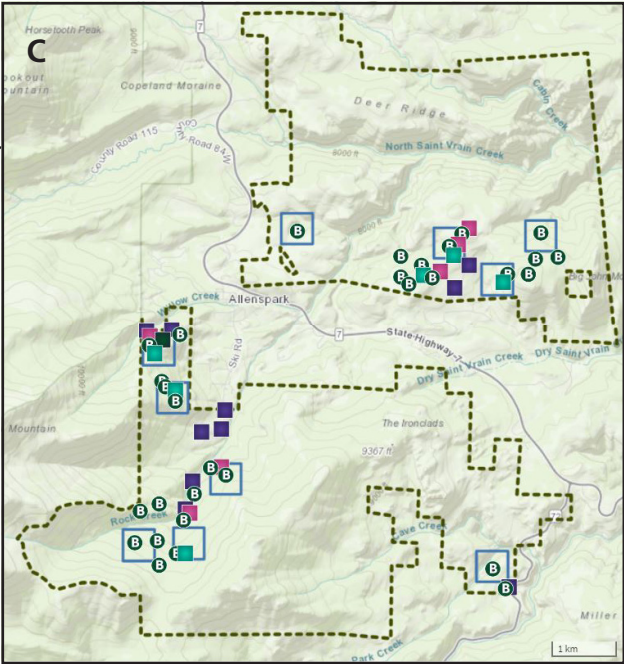


Figure 3. June 2019 precipitation data (in mm) collected from the tower.



Phenology and Snow Depth

The RMNP tower has two 'phenocams', one at the top of the tower to look at the timing of vegetation color change above canopy, and another towards the base to look at vegetation below the canopy and snow depth. Photos are collected every 15 minutes and can be accessed through <https://data.neonscience.org>. Search under *phenology images* and *snow depth and understory phenology images* to get to the PhenoCam site. From there, click on the Gallery to access photos from across the country, including RMNP.

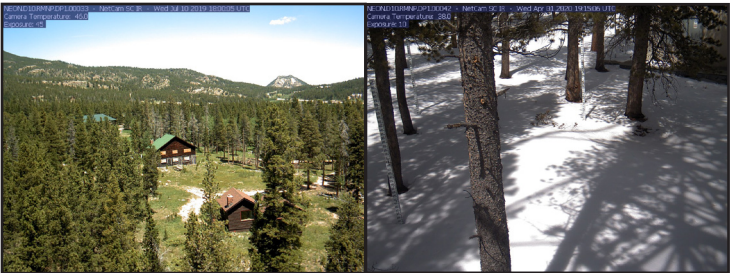


Figure 4. Photos taken from the phenocam at the top of the RMNP tower on July 10, 2019 (L) and from the lower camera on April 1, 2020 (R) document vegetation conditions and snowfall.

For more information on NEON: www.neonscience.org