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neon
Operated by Battelle

RISE | September 26, 2026

Beyond the Tower: NEON as your Field Lab

General Outline

- NEON has operated at SRER since 2016 and is likely familiar to most attendees
- A brief introduction to who we are and what we do
- Leverage Domain 14 to advance your proposals, student fieldwork, and custom sensing research

What is NEON?

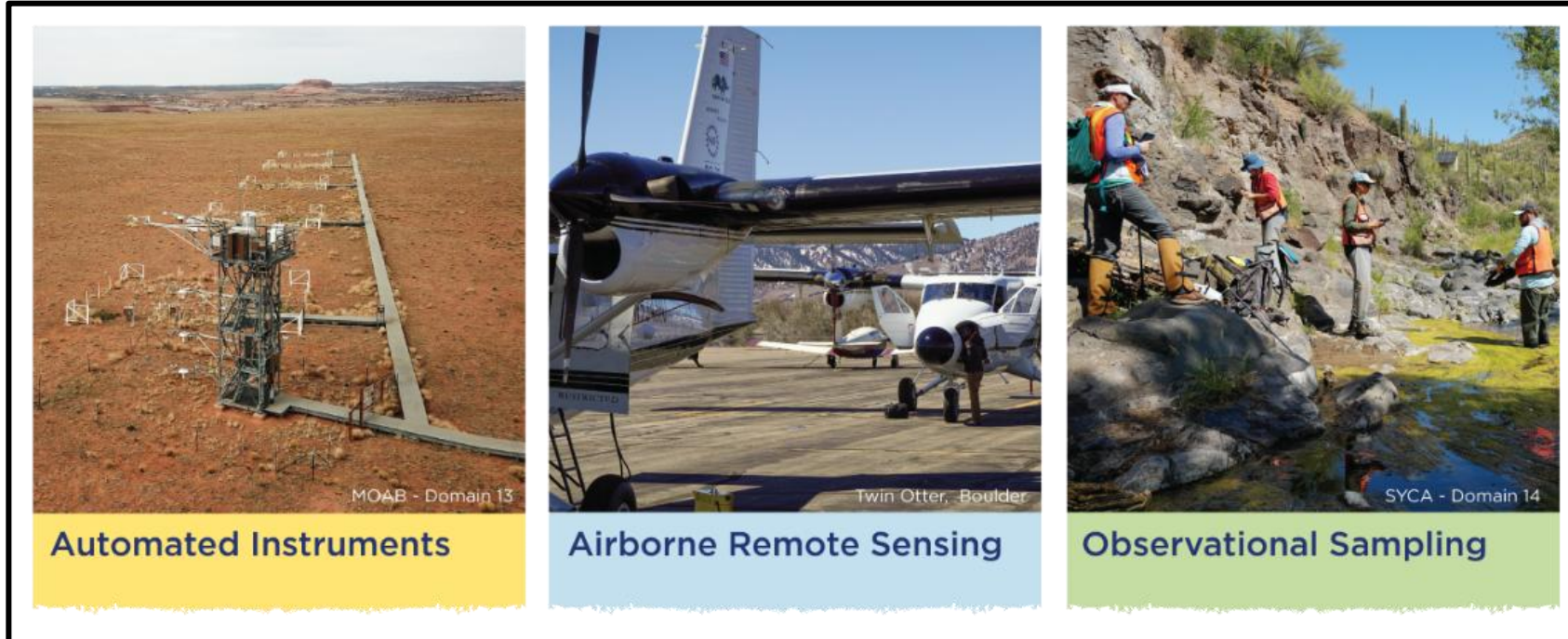


NEON is a continental-scale, long-term (30-year) Observatory, funded by **USNSF** and operated by **Battelle**



As operators, we **enable large-scale research through providing high-quality, interoperable data, samples, and infrastructure**

NEON's Linked Collection Systems



Standardized, colocated methods across 81 sites

DATA PRODUCTS 180+



ASU Arizona State University **Biorepository**

100,000+
SAMPLES ADDED PER YEAR

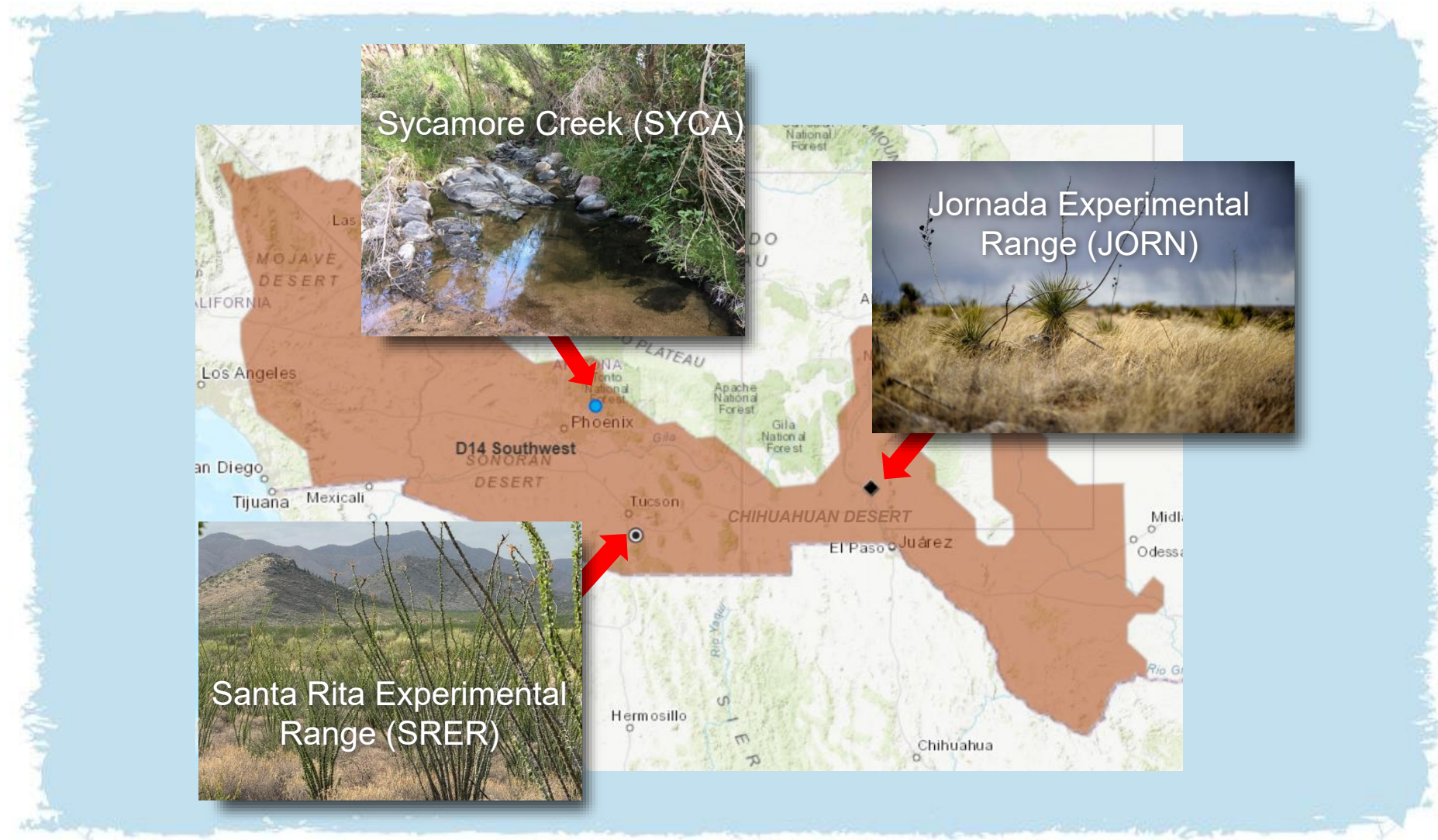
Where is NEON?

Provider of Open, FAIR Data, Samples, & Infrastructure for Open Science

- A US NSF large facility
- Distributed observatory pointed at **Earth**, at the biological systems of our planet



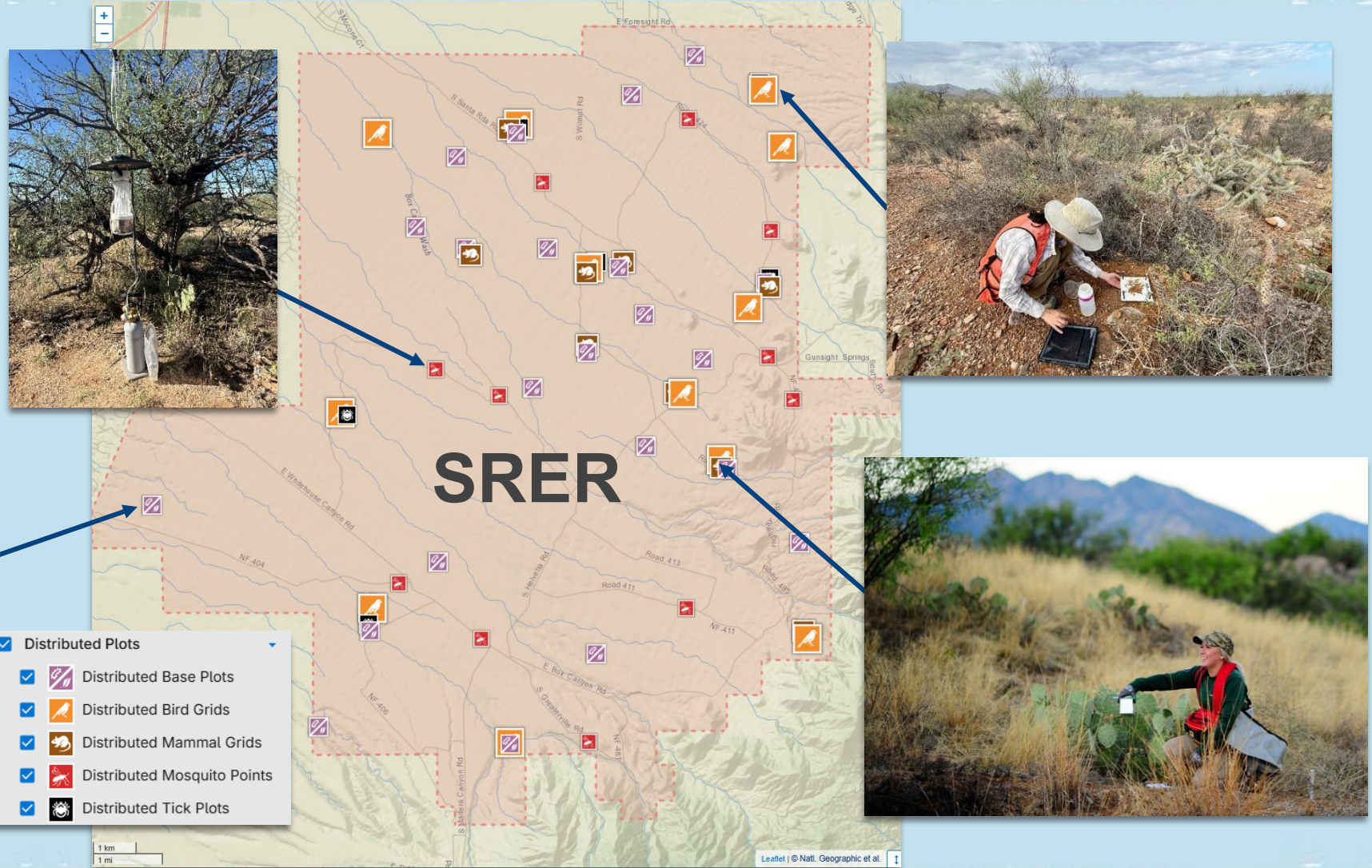
Domain 14 (Desert Southwest)



What's on the Ground (and in the Air) at SRER

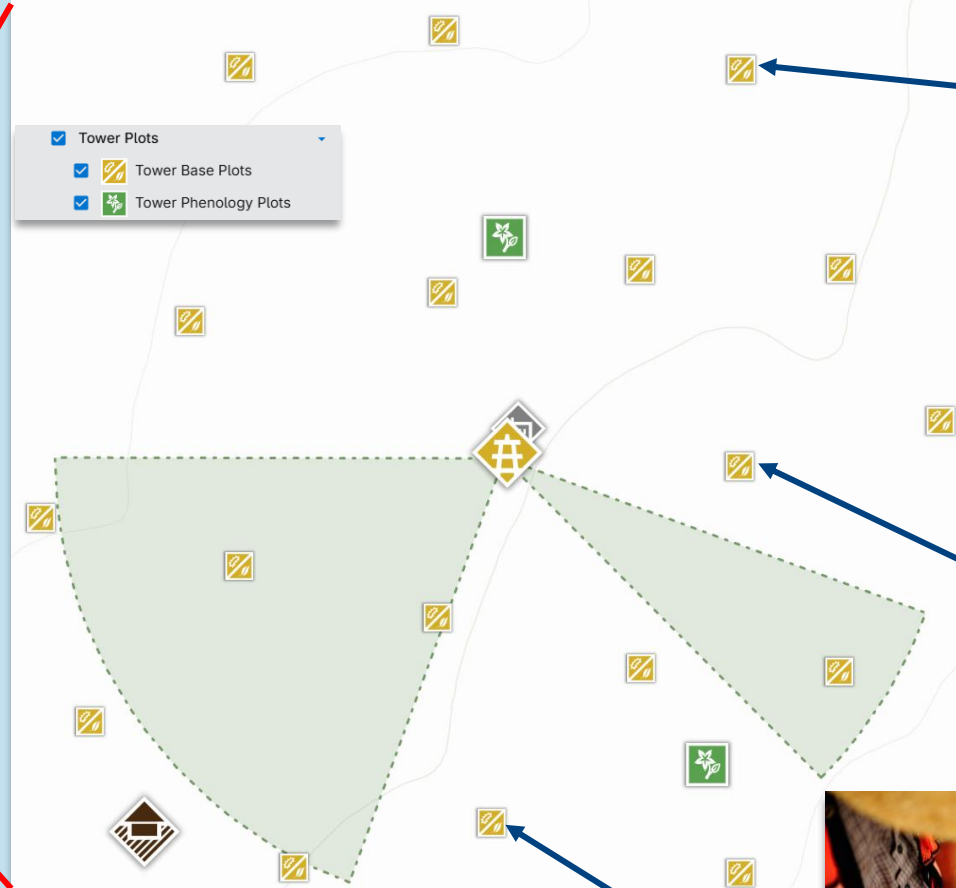
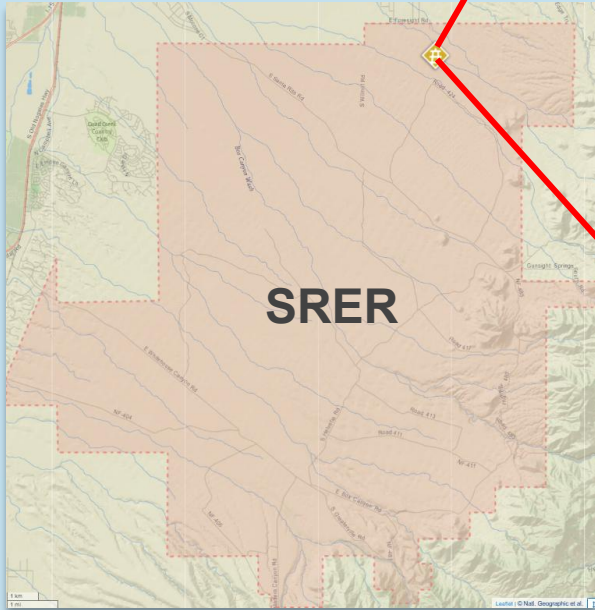
NEON Distributed Plots at SRER

Describe organisms, ecological processes, and biomass variation at the scale of the entire field site

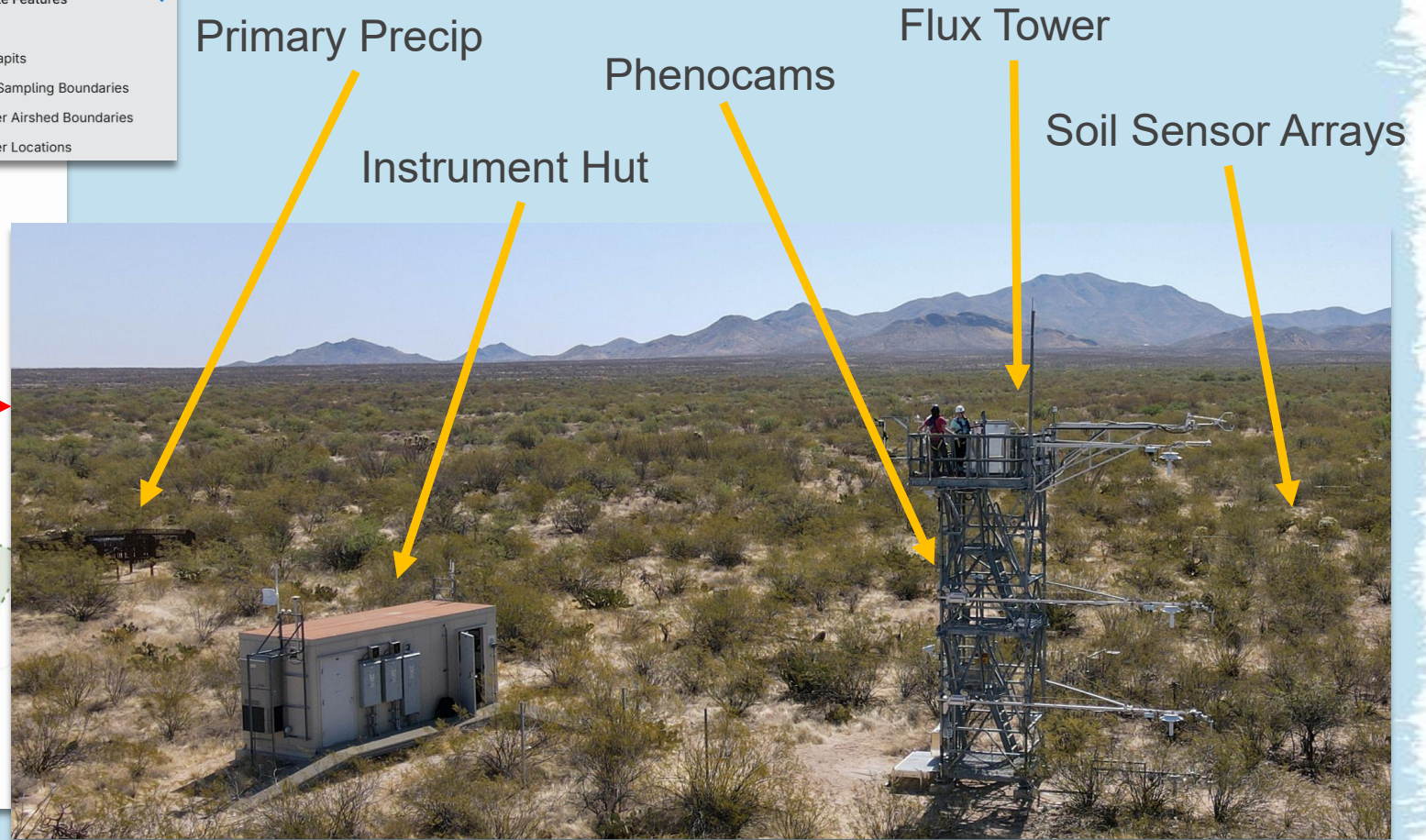
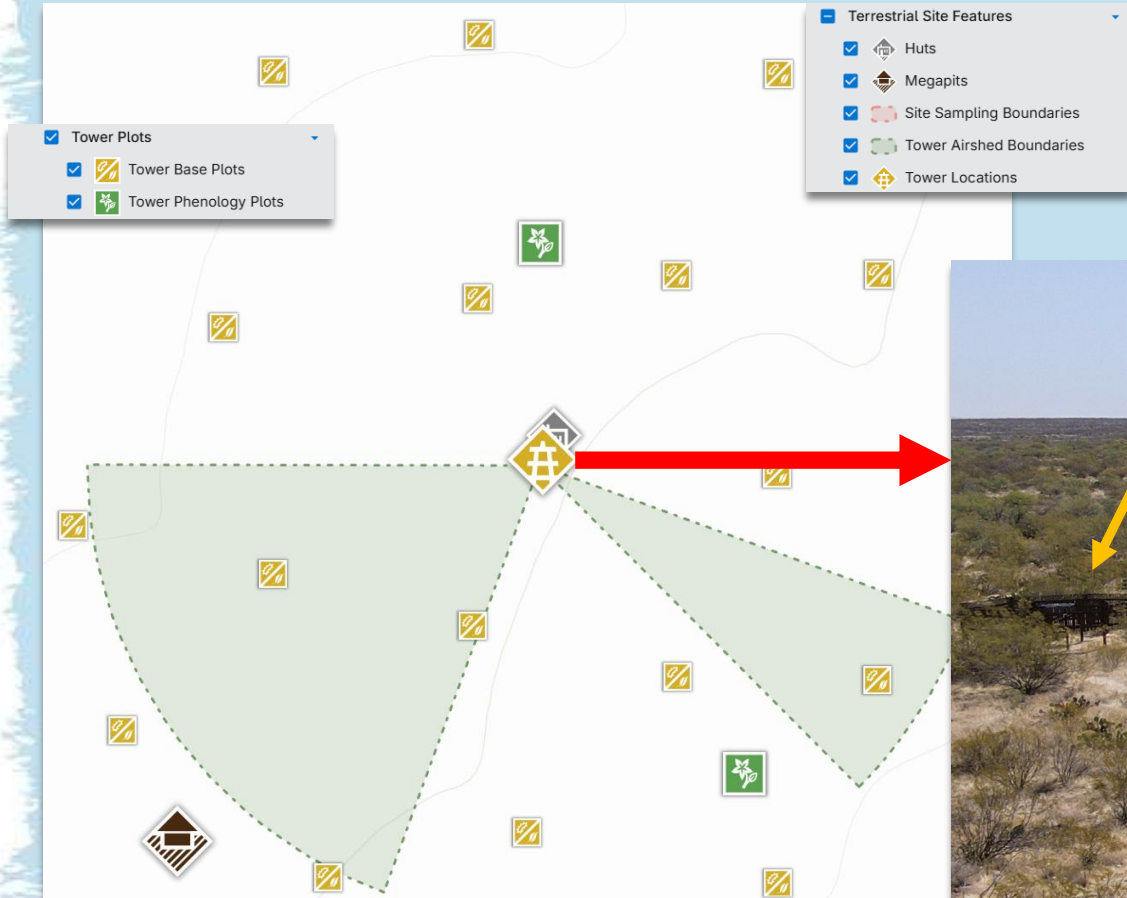


NEON Tower Plots at SRER

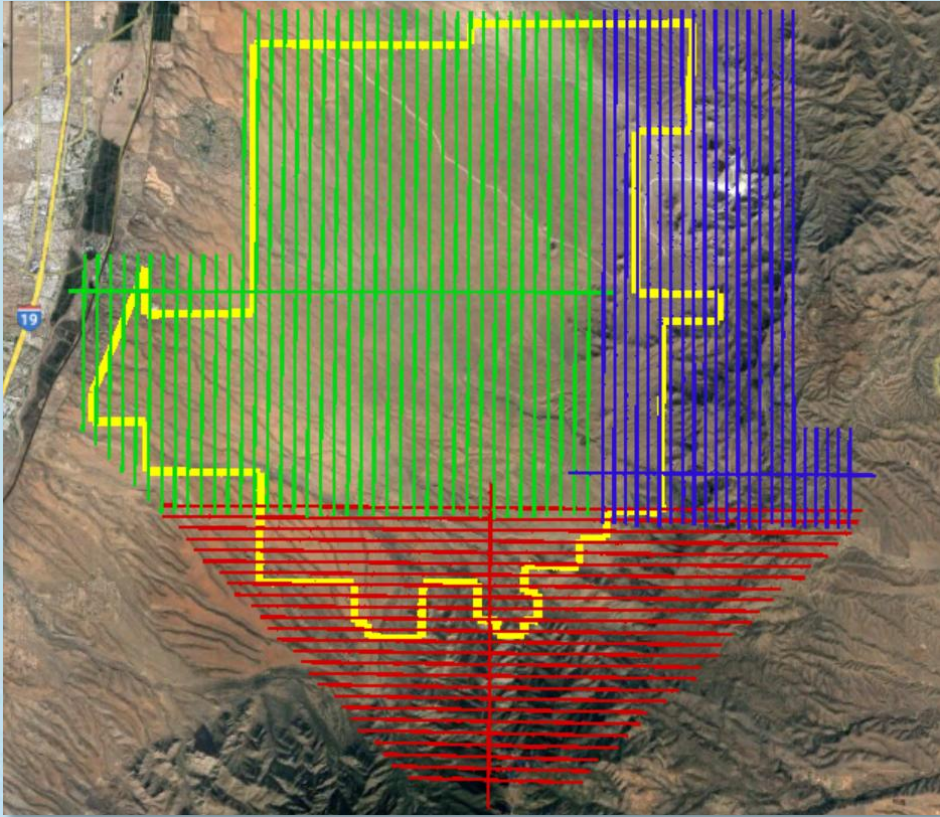
*Linking ground observations
with atmospheric and flux
sensor data*



NEON Physical Infrastructure at SRER



NEON Airborne Infrastructure at SRER



AOP Flight box coverage at SRER



- Imaging Spectrometer
- LiDAR
- Hi Res Camera



NEON Imaging Spectrometer

Operational Capabilities – NEON Infrastructure

- **120/240V power** with outlets in the hut, soil arrays, and tower
 - Lower voltage Power over Ethernet switches throughout
- Hut is **climate controlled**, securely locked, and has additional gas cylinder storage capacity
- **Network connection** options with IT support
- **24/7 infrastructure access**
 - Fall protection rescue training for PIs and students to enable tower access without NEON staff
- Airborne Observation Platform **Twin Otter Payloads**
- **NEON's continuous background measurements**

Operational Capabilities – NEON Staff

- Field Science maintains instruments and collects samples, specimens, and data across NEON domains through field sampling and field observations
- NEON Science, Engineering, Network, Quality Management, Permitting, and Safety teams provide key support
- In addition to **background collections** (i.e., 180+ free data products), we implement a variety of **PI driven research** that leverages the NEON platform
- **When paired with our data, it's the most powerful part of NEON**

The Legacy Link

- 897 publications since 1902 of research performed at or with data from the Santa Rita Experimental Range (2025)
- 76 NEON-related publications (2017-2025) tagged NEON data from SRER
- SRER-NEON partnership brings additional science visibility to SRER



How to Use NEON Infrastructure

NEON Research Support Services (NRSS)

Ideas to Implementation

- **NEON data** can't single-handedly address all proposed research questions
- Researchers can apply to the NEON Research Support Services program to access:
 - Observational Sampling Infrastructure
 - Sensor Infrastructure
 - Airborne Observation Platform
 - Field Site Coordination
- Start a conversation or apply here: ResearchSupport@BattelleEcology.org

Sensor Mounting and NEON Infrastructure Access

Past examples:



Trembath-Reichert (ASU): Atmospheric Microbes



Arable (commercial): agriculture sensor testing



RavenStar (Battelle): communications testing with field sensors



Zimmerman (USFCA): Soil CO₂ flux

Sensor Mounting and NEON Infrastructure Access

- Falco (Dark Sky International): night sky light pollution
 - Sensor installation, power, and network connection to data



SRER night sky data in Grafana dashboard

Sensor Mounting and NEON Infrastructure Access

- Merideth (UA): *in situ* H_2 soil fluxes in ecosystems under various moisture regimes
- Fudyma (UA): use of VOCs as real-time indicators of plant-driven microbial function



H_2 soil flux chamber (1 of 8) presently deployed near the NEON tower



Network of subsurface probes extending from the hut to creosote bushes near the NEON tower



Soil moisture/temp probe (left), VOC probes (right)

Sensor Mounting and NEON Infrastructure Access

- Meredith/Fudyma projects major components

- Soil Chambers and H₂ probes
- **Gas chromatograph**
- Calibration gasses and pumps

Installation and operational support:
Juliana Gil Loaiza (UA)
Robert Bordelon (UA)

- Soil moisture/temp/VOC probes
- **Mass spectrometer**
- Calibration gasses and pumps



Before



After

Offsite infrastructure

- **NEON-Biosphere 2 partnership** for broadening community engagement through the understanding of ecosystem patterns and fluxes of Biosphere's 2 mangrove ecosystem



Instrument hut outside B2



MDP and aquatic sensors



Sonde calibration

NEON Plot Access and Beyond

- Extra sample collections within and outside of NEON plots
- Installing and operating additional research on the range



Soil samples collected from NEON plots for PNNL at SRER (2025)



Deploying seismic arrays at SRER (2023)



Physical Specimen Archiving

~100,000 / year
65 sample types
> 5,800 taxa

- Small mammals
- Fish
- Ground beetles
- Mosquitos
- Ticks
- Zooplankton
- Benthic macroinvertebrates
- Vascular plants, algae, bryophytes and lichens
- Soil microbes
- Soil
- Dust
- Wet deposition
- ...many more

 = includes associated genomic data

ASU Arizona State University
neonscience.org/samples



Low-Barrier Pathway for Students and Researchers

NEON as a bridge to a thesis, grant, or dissertation

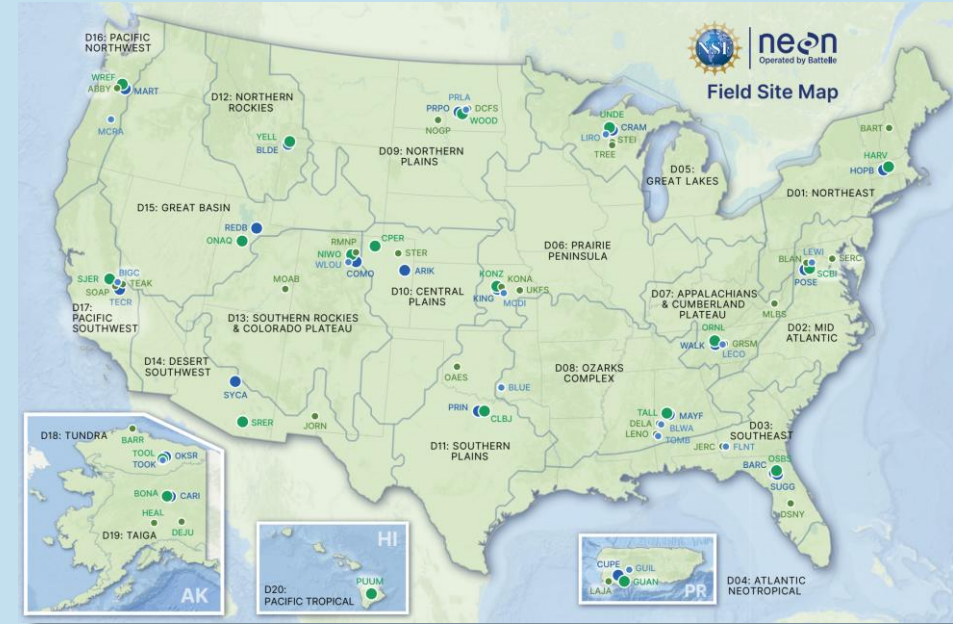
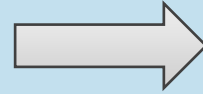
Path forward

- **Co-locate sampling with NEON:** align your own field protocols with NEON's scheduled site visits (e.g., sampling plant chemistry or soil microbes in tandem with NEON crews)
 - **The Value Add:** Your data gets paired with continuous background data
- **Field Access & Logistics Support:** experienced and early-career researchers can navigate permits, logistics, and site safety through NEON
- **NSF Proposal "Broader Impacts" & Facilities:** a letter from our team showing you're leveraging NEON infrastructure adds massive weight to your proposal's feasibility
- **Early career students:** get hands-on, paid operational experience as a seasonal tech or field ecologist

Behind the Curtain in D14

Operational Realities

Continental synchronization: The power of the network



- **Choreographed Execution:** Every protocol in D14 is synchronized in real time across 81 field sites nationwide.
- **Standardization at Scale:** Identical methods from Alaska to Puerto Rico remove methodology as a variable in continental ecology.
- **The Payoff for Your Research:** Instantly pair your local SRER datasets with cross-domain, macro-system research questions.

Operational Reality: Standardized Protocols vs. Desert Dynamics



- **Nature Doesn't Read the Field Manual:** monsoon storms, fire, rapid ecohydrological shifts, extreme summer heat windows, and even snow
- **Data Integrity at the Edge:** adapting rigid national protocols to extreme local environments without sacrificing data quality
- **Your Operational Foundation:** we handle the site permitting, safety protocols, and harsh field logistics so your project doesn't have to start from scratch



Call to Action & Discussion

The Invitation

- To bring things full circle: my main message today isn't just that NEON is at Santa Rita. It's that this infrastructure is *yours* to build on.
- The infrastructure, the tower, the permit structures, and **the long-term baseline data we're adding to SRER's century-long research legacy** are intended to be open-access springboard built specifically for the dryland research community.
- My goal as Domain Manager is to make sure this platform works for *you*.

Contact: akaram@battelleecology.org

Thank you!

Santa Rita Experimental Range, AZ



neon
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[Learn more](#)