

# Building the LTAR Data Portal



goodwater - NetCam SC IR - Thu Dec 24 2015 11:00:05 CST - UTC-6  
Camera Temperature: 27.0  
Exposure: 60

Susan McCarthy  
National Agricultural Library  
January 7, 2016

# Goals and Motivation for LTAR Data Portal

EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF SCIENCE AND TECHNOLOGY POLICY  
WASHINGTON, D.C. 20502

February 22, 2013

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: John P. Holdren  
Director

SUBJECT: Increasing Access to the Results of Federally Funded Scientific Research

## 1. Policy Principles

The Administration is committed to ensuring that, to the greatest extent possible and consistent with law and the objectives of the federal government, the results of federally funded scientific research are made available to and used by the scientific community. Such results include peer-reviewed publications, data, and other research products.

Scientific research supported by the Federal Government catalyzes economic growth and innovation, drives our economy. The results of that research become the basis for progress in areas such as health, energy, the environment, and national security.



THE DIRECTOR

EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF MANAGEMENT AND BUDGET  
WASHINGTON, D.C. 20503

May 9, 2013

M-13-13

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Sylvia M. Burwell  
Director

Steven VanRoekel  
Federal Chief Information Officer

## Implementation Plan to Increase Public Access to Results of USDA-funded Scientific Research

November 7, 2014

USDA

1. Federal Directives / mandates for open and machine readable access to Federally funded research results
2. For the science!

scholarly publications. It is critical that these services continue to be improved so that Federal actions do not have a negative effect on the availability of research results.

Managing information as an asset throughout its life cycle to promote openness and interoperability, and properly safeguard systems and information. Managing government information as an asset will increase operational efficiencies, reduce costs, improve services, support mission needs, safeguard personal information, and increase public access to valuable government information.

Making information resources accessible, discoverable, and usable by the public can help fuel entrepreneurship, innovation, and scientific discovery – all of which improve Americans' lives and contribute significantly to job creation. For example, decades ago, the Federal Government made both

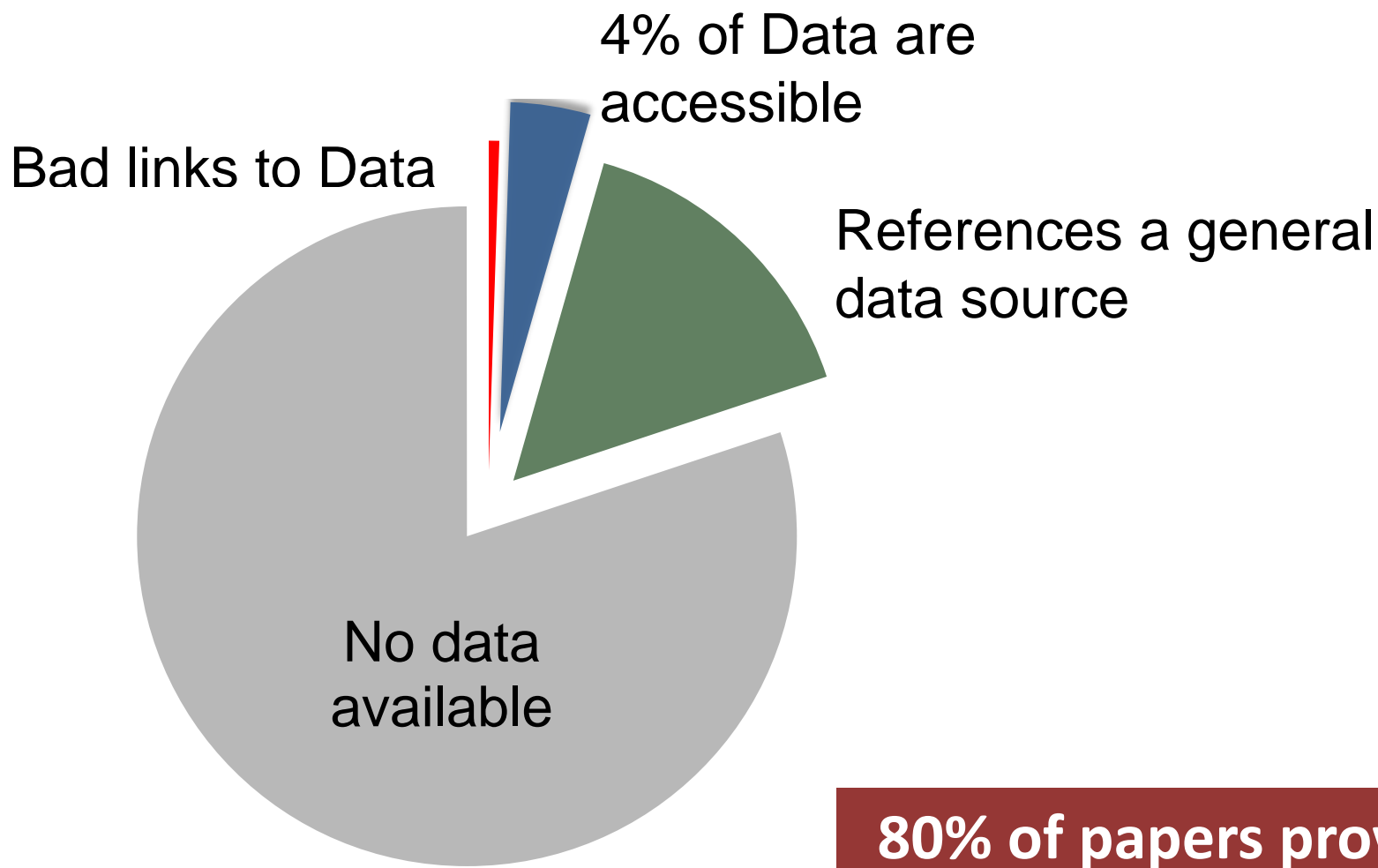
ates Department of Agriculture





# LTAR Publication-Related Data Loss

N=194 of ~500 citations in 2011 LTAR site proposals



**80% of papers provide  
no way to obtain data**

# Putting the “Long-Term” in LTAR Data

In order to have data of known quality for re-use in a new application...

*50 years from now, someone would need to:*

- Discover that the data exists;
- Find the data;
- Obtain and read the data;
- Determine the data's suitability for re-use

# Long-Term Data Requirements

- **Preserved** – data needs to be secured for the long-term
- **Discovered** – consistent application of standards-based metadata description
- **Accessed** -- available through standards-compliant Web services
- **Re-used** – multiple data output formats; adequate metadata including descriptions of intended use, limitations of use, and data quality

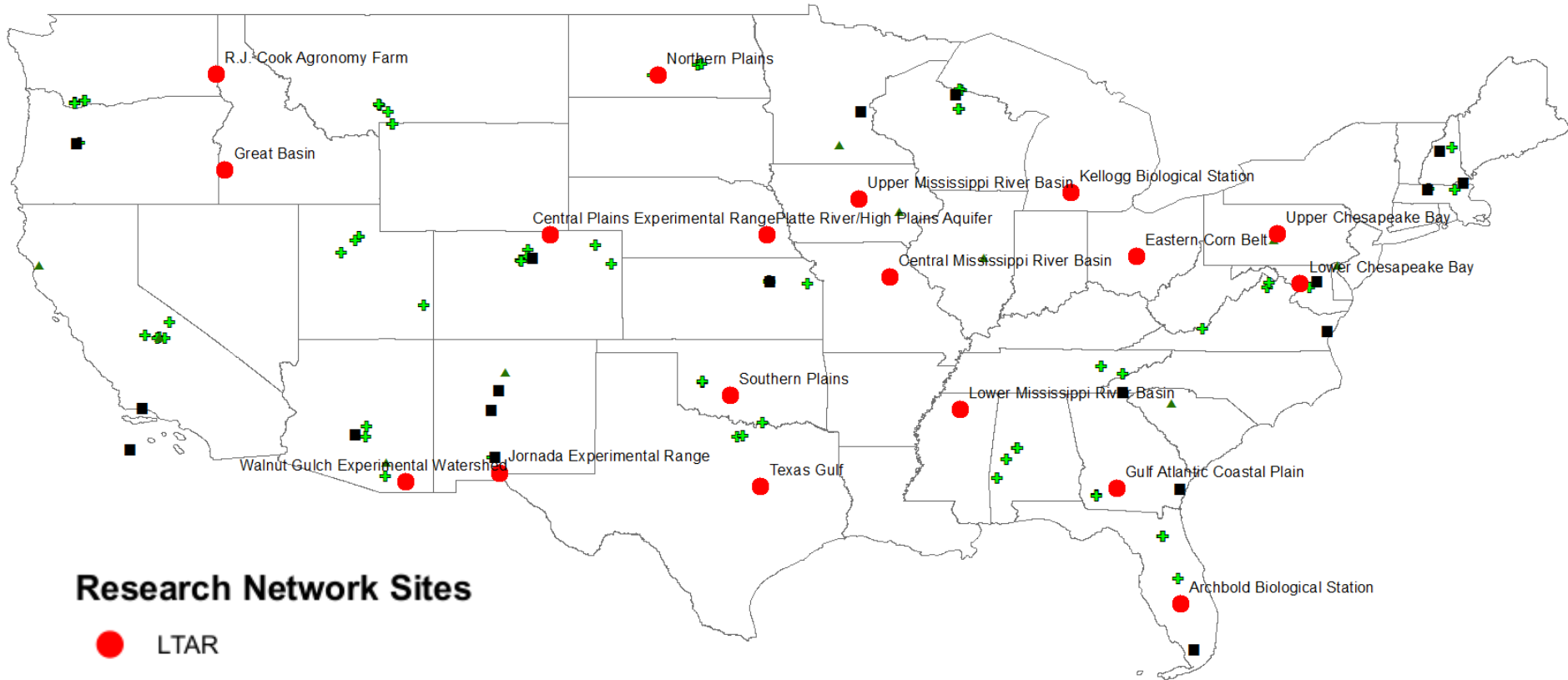
# Data Curation for the Long-Term

## *Archiving is not a back-up!*

- Initiating a data curation program at NAL:
  - In collaboration with the University of Maryland iSchool faculty and postdoc (R. Punzalan, A. Kreisberg)
  - Currently conducting a self-assessment
  - Developing requirements and recommendations



# Long Term Agro-ecosystem Research (LTAR)



# LTAR Research

## Common Observatory Data (COfRe)

### Immediate and Near Term

- Meteorology
- Phenocam (camera)
- Hydrology
- Eddy flux: CO<sub>2</sub> and Non-CO<sub>2</sub> gasses
- Soil

### Long Term

- Biological

## Research Approach

### ***Common Experiment***

- Management Studies: Business as usual compared with Aspirational
- Crop and livestock

### ***Common Experiment Data***

- Management practices
- Results



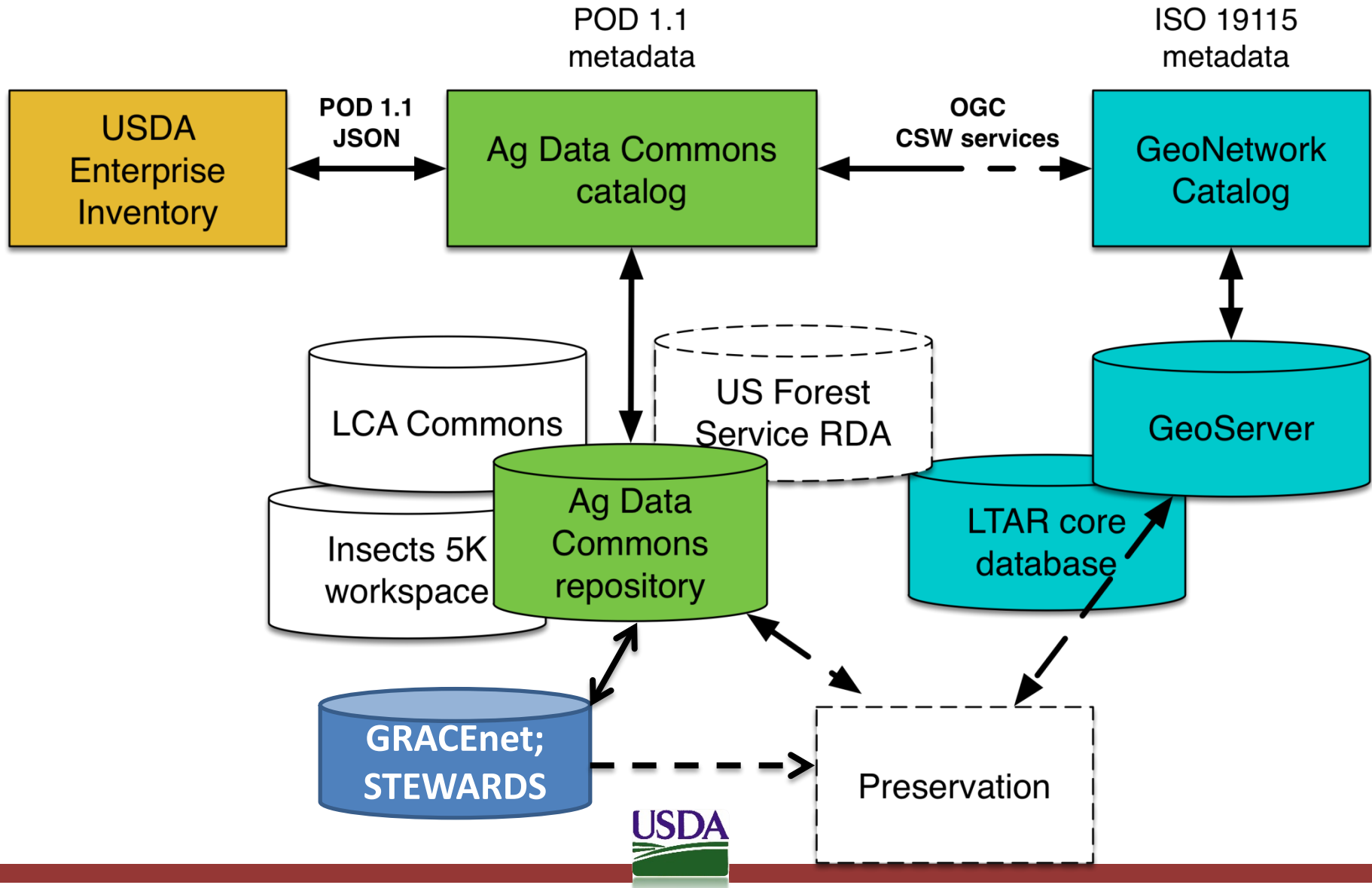
# Approach for LTAR Data Management

- Provide a central data catalog (registry) linking to wherever the data resides
- Describe the data for long-term re-use and discovery
- Leave existing data in specialized systems (STEWARDS, GRACENet, PhenoCam, etc.)
- Common Observatory data stored at NAL
- Preserve (curate) the data for the long-term

## LTAR Data Under Management

- 1) Near real-time CORE
- 2) Publication-related datasets
- 3) Aerial Imagery

# LTAR Data IT Infrastructure @ NAL



# Two Interconnected Systems

## Ag Data Commons

### *System for Agricultural data*

- Central registry for USDA data
  - Link to data residing outside of the Ag Data Commons
- Provide a repository for data without logical “home”
- Provide citable DOI’s
- Feed USDA Enterprise Inventory >>> Data.gov

## Geospatial Data System

### *System LTAR CORe and GIS-based data*

- Central registry – GIS data
- Robust descriptive information
  - Enhanced discovery and display for GIS data
  - Automatic feed to Ag Data Commons >> ... >>> Data.gov
  - Cross-site linkage
  - Citable DOI’s





# <https://ltar.nal.usda.gov/>



Long-Term Agroecosystem Research

[Data Home](#)

[About LTAR](#)

[Real-Time Meteorology](#)

[Real-Time Cameras](#)

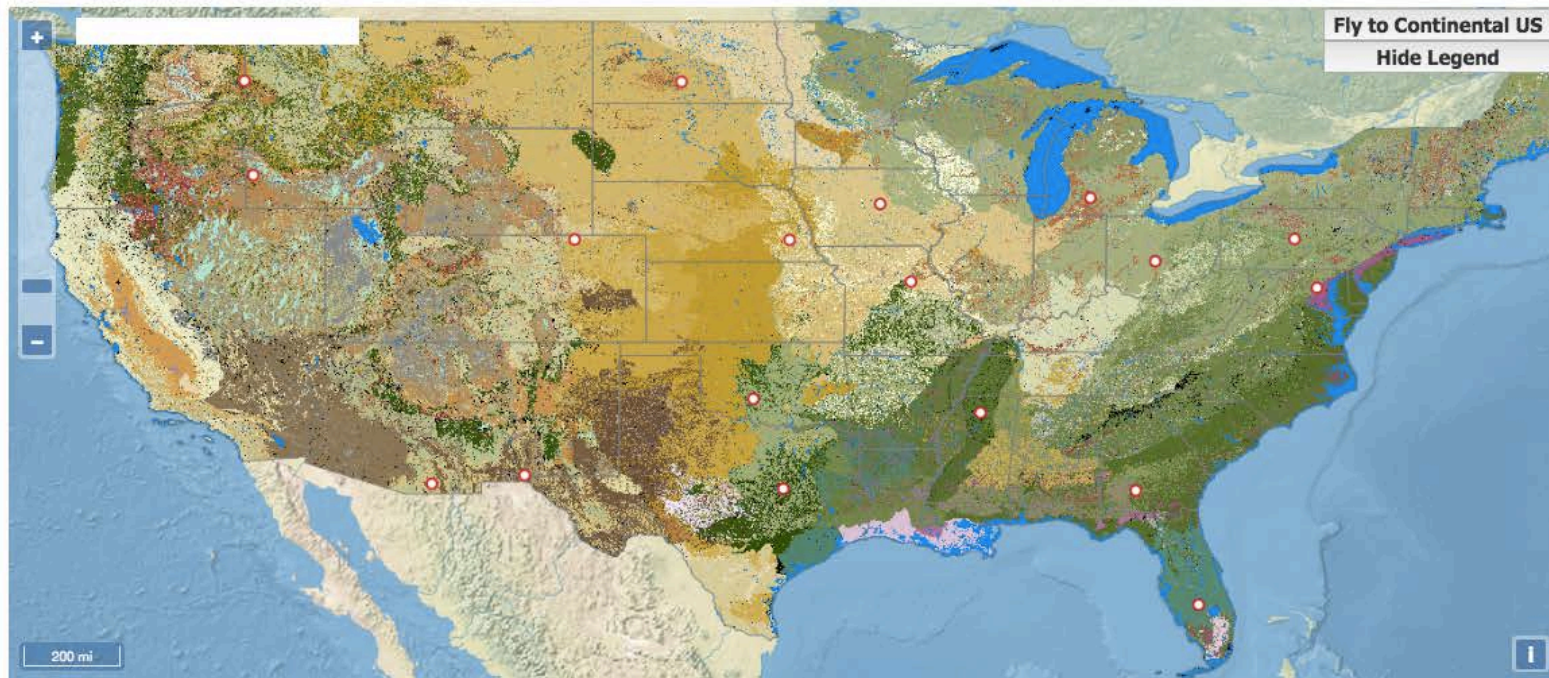
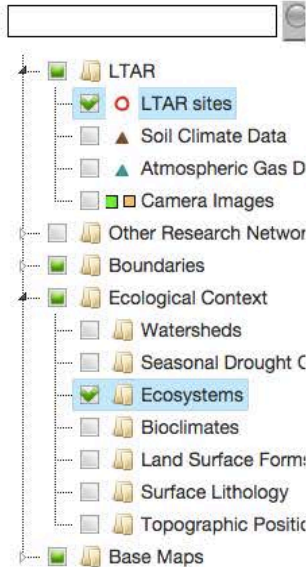
[Published Data and Articles](#)

Alpha Pilot Version

## Long-Term Agroecosystem Research Data Overview

The USDA Agricultural Research Service (ARS) Long-Term Agroecosystem Research network consists of 18 Federal and university agricultural research sites with an average of over 50 years of history. The goal of this research network is to ensure sustained crop and livestock production and ecosystem services from agroecosystems, and to forecast and verify the effects of environmental trends, public policies, and emerging technologies.

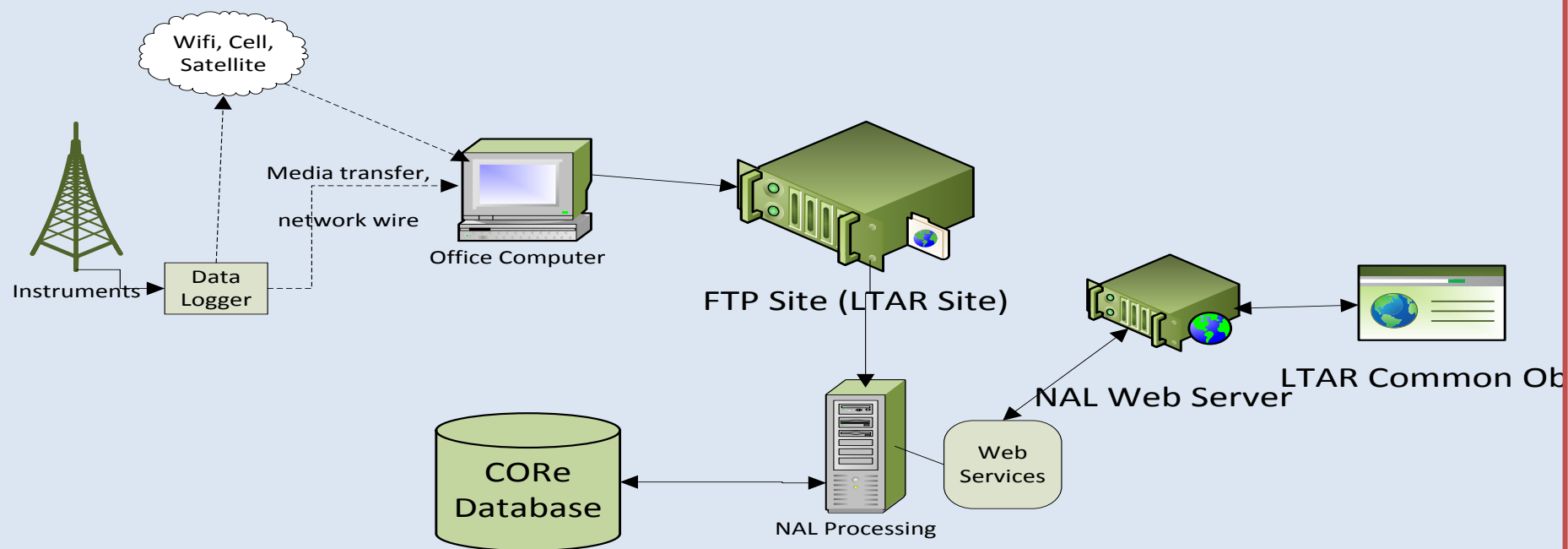
### Display Options



Click on the LTAR sites on the map to see more information about each site. Other national ecosystem research networks are available on the map to show how LTAR contributes to nation-wide coverage. The map also links for LTAR data available through the Ameriflux, Soil Climate Analysis Network, and PhenoCam research data networks.



# CORe Meteorological Data Flow



# LTAR CORe Data Status

## Current Status

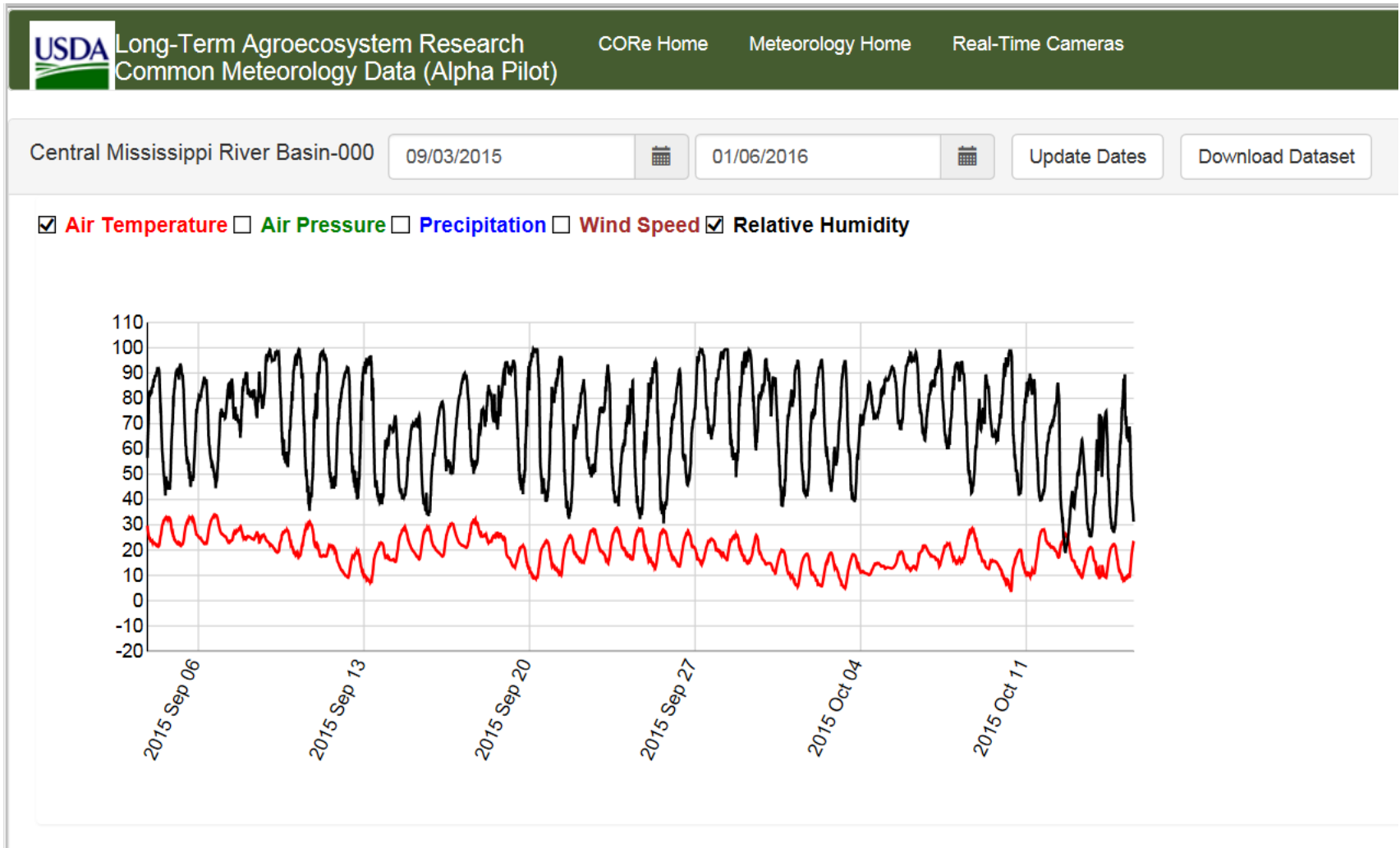
- Meteorological Data:
- Near Real-Time Data for 11 stations at 7 LTAR locations
- Test batch data from 4 stations at 2 LTAR locations
- Phenocam images for 18 cameras at 7 LTAR sites
  - Phenocam network performs image analysis to measure seasonal changes (spectrum)

## Future Value-Enhancements

- Respond to environmental events (e.g. flooding)
  - Tie-in LTAR data (graphic display of cumulative precipitation)
  - Create a news feed
- Build out API Web services
  - ability to automatically serve downloads
- ***And....***

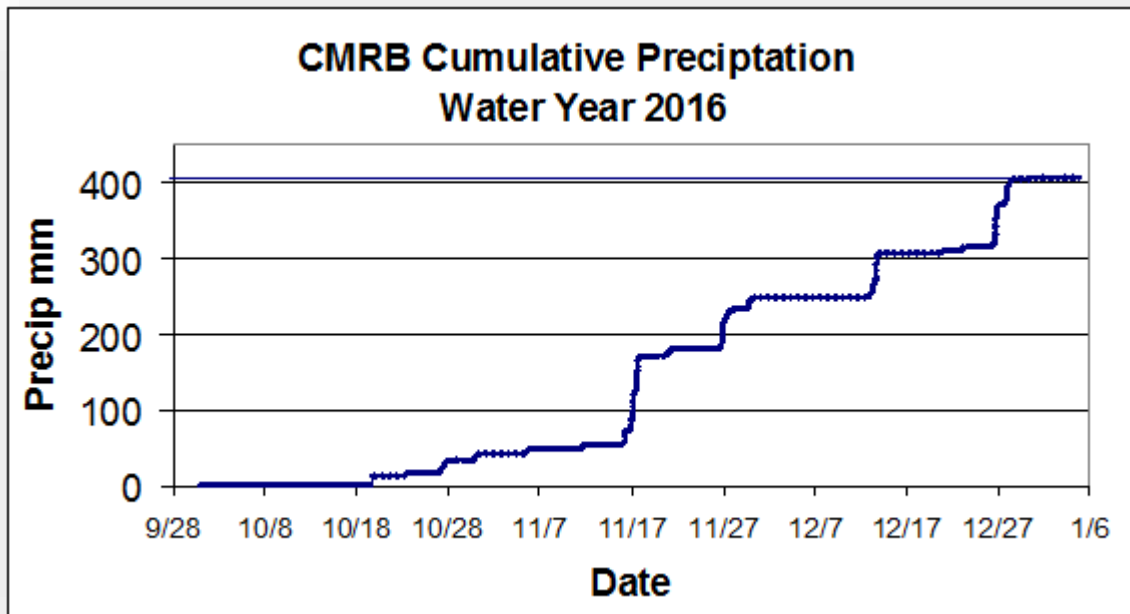


# Near Real-Time Meteorological Data



# Future Enhancements

- Greatly enhanced information visualization and user interaction with data
- Possible timely news features



Cumulative precipitation at Central Mississippi River Basin LTAR site (Columbia, MO) ties into the current flooding in Missouri (and downstream)





## Highlighted Program: Long Term Agroecosystem Research

A network of 18 research sites around the U.S. are collecting long-term data on agriculture, climate change, ecosystems and natural resource conservation. These data are vital to developing safe and sustainable agricultural production systems.

Search Ag Data Commons



### Topics



Agricultural Products



Agroecosystems & Environment



Animals & Livestock



Bioenergy



Food & Nutrition



Genomics & Genetics



Maps & Multimedia



Plants & Crops

### Highlighted Datasets



Scientists are using the Blue Berry Genomics Database (BBGD) to investigate which genes are involved in acclimation to cold in blueberries.



The Baylor College of Medicine recently sequenced and annotated the *Oncopeltus fasciatus* genome as part of the 15k pilot project.



What is the role of pathogens in Honey Bee Colony Collapse Disorder? Deep RNA sequencing was used to study microbial diversity and seek answers.

# LTAR Data @ Ag Data Commons

[Home](#) / Long Term Agroecosystem Research Landing

## Long Term Agroecosystem Research Overview

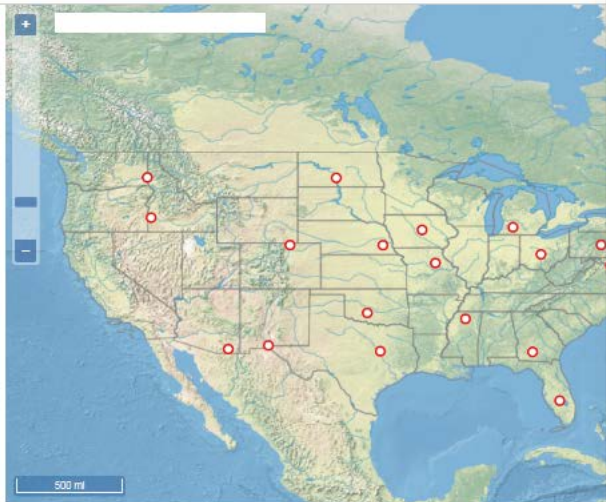
Agriculture faces tremendous challenges in meeting multiple, diverse societal goals, including a safe and plentiful food supply, supplying sources of bioenergy, improving water/air/soil quality, and maintaining biodiversity. The LTAR network enables long-term resource regions to address these challenges. The goal of this research network is to ensure sustained crop and livestock production, agroecosystems, and to forecast and verify the effects of environmental trends, public policies, and emerging technologies. The array of clients, partners, and stakeholders with four basic outcomes:

1. Agroecosystem productivity is sustainably enhanced by the development and application of new technologies
2. Mitigation and adaptation of agroecosystems to climate change is improved by more accurate predictions of resource response
3. Stronger linkages to other long-term research networks improves conservation and environmental quality in agriculture
4. The socio-economic viability of, and opportunities for, rural communities are enhanced through educational outreach by

For the fully interactive version of this LTAR data explorer visit <https://ltar.nal.usda.gov>.

### Display Options

- ☒ Natural Earth
- ☐ Native Lands
- ☒ States
- ☐ Counties
- ☐ Ecosystems
- ☐ Bioclimates
- ☐ Land Surface Forms
- ☐ Surface Lithology
- ☐ Topographic Position
- ☐ Ag Stat District
- ☐ Farm



Click on the LTAR sites on the map to see more information about each site. Other national ecosystem research networks are contributing to nation-wide coverage. The map also links for LTAR data available through the Ameriflux, Soil Climate Analysis Network.

## LTAR Research Sites

Data from the following LTAR sites are presented. They are related to topics such as agricultural sustainability, climate change, ecosystem services, and natural resource conservation at the watershed or landscape scale.

- Archbold Biological Station (ABS), Venus, FL
- Cook Agronomy Farm (CAF), Pullman, WA
- Central Mississippi River Basin (CMRB), Columbia, MO
- Central Plains Experimental Range (CPER), Cheyenne, WY; Fort Collins, CO; Nunn, CO
- Eastern Corn Belt (ECB), Columbus, OH; West Lafayette, IN
- Gulf Atlantic Coastal Range (GACP), Tifton, GA
- Great Basin (GB), Boise, ID; Burns, OR
- Jornada Experimental Range (JER), Las Cruces, NM
- Kellogg Biological Station (KBS), southwestern MI
- Lower Mississippi River Basin (LMRB), Oxford, MS; AR; LA; MO
- Northern Plains (NP), Mandan, ND
- Platte River-High Plains Aquifer (PRHP), Lincoln, NE
- Southern Plains (SP), El Reno, OK
- Texas Gulf (TG), Riesel, TX
- Upper Chesapeake Bay (UCB), University Park, PA
- Upper Mississippi River Basin (UMRB), Ames, IA; MN; WI
- Walnut Gulch Experimental Watershed (WGEW), Tucson, AZ; Tombstone, AZ
- Lower Chesapeake Bay (LCB), Beltsville, MD

## Datasets

107 datasets

Search...

Date changed

Desc

Apply

Reset

Upper Washita River Experimental Watershed: Nutrient Water Quality Data

<https://data.nal.usda.gov/long-term-agroecosystem-research>



# Publication-related LTAR Data

## Publications Related

- LTAR site proposal references were reviewed for related data
  - 194 of more than 500 citations were reviewed
  - These citations are cross referenced to full-text papers in PubAg



4% of  
Data are  
accessible

**107 LTAR-Data  
Records in Ag Data  
Commons (including  
records for other  
network data, e.g.  
SCAN)**

# Aerial Imagery

- More than 600 images from Mandan, ND and Cheyenne, WY; NAL:
  - Digitized the images
  - Created metadata records
- Under development: image comparison tools
- Expected public release this fiscal year



# Aerial Imagery: Sneak Peek

**USDA** Long-Term Agroecosystem Research


## Long-Term Agroecosystem Research

The USDA Agricultural Research Service (ARS) Long-Term Agroecosystem Research (LTAR) network has been in place over 50 years of history. The goal of this research network is to verify the effects of environmental trends, public policies, and

**Display Options**

- ☒ LTAR
- ☒ LTAR sites
- ☐ Soil Climate
- ☐ Atmospheric
- ☐ Camera Image
- ☒ Aerial Imagery
- ☐ Other Research
- ☐ Boundaries
- ☐ Ecological Context
- ☐ Watersheds

### Aerial Image Comparison



The interface displays two side-by-side grayscale aerial photographs for comparison. The left image is labeled 'Aerial\_AZY\_2001' and the right image is labeled 'Aerial\_AZY\_1963'. A red circle highlights a specific area in the 1963 image, likely indicating a point of interest or change in land use. The interface includes a 'Display Options' panel on the left with various layers and a 'Zoom' slider at the bottom.

**Land occupation 1963**

# Aerial Imagery: Sneak Peek

**USDA** Long-Term Agroecosystem Research

## Long-Term Agroecosystem Research

The USDA Agricultural Research Service (ARS) Long-Term Agroecosystem Research (LTAR) network has been in operation over 50 years of history. The goal of this research network is to monitor and verify the effects of environmental trends, public policies, and agricultural practices on the land.

**Display Options**

- ☐ LTAR
- ☒ ☐ LTAR sites
- ☐ Soil Climate
- ☐ Atmospheric
- ☐ Camera Image
- ☒ Aerial Image
- ☐ Other Research
- ☐ Boundaries
- ☐ Ecological Context

**Aerial Image Comparison**

**Aerial\_AZY\_1963**

**Aerial\_AZY\_2001**



The image shows a side-by-side comparison of aerial photographs of the same area. The left image is labeled 'Aerial\_AZY\_1963' and the right image is labeled 'Aerial\_AZY\_2001'. A red circle is drawn around the 'Aerial\_AZY\_1963' label. The images show a river or stream flowing through a landscape with fields and some buildings. The 2001 image shows more developed areas, including what appears to be a baseball field and more buildings.

**Land occupation 2001**

# Aerial Imagery: Before & After

Spyglass shows 2001 image over the 1963 base

USDA Long-Term Agroecosystem Research

## Long-Term Agroecosystem Research

The USDA Agricultural Research Service (ARS) Long-Term Agroecosystem Research (LTAR) network has been studying the same landscapes over 50 years of history. The goal of this research network is to verify the effects of environmental trends, public policies, and land use changes.

Display Options

- ☐ LTAR
- ☒ ☐ LTAR sites
- ☐ Soil Climate
- ☐ Atmospheric
- ☐ Camera Image
- ☒ Aerial Image
- ☐ Other Research
- ☐ Boundaries
- ☐ Ecological Context
- ☐ Watersheds

### Aerial Image Comparison

Aerial\_AZY\_1963

Aerial\_AZY\_2001



The image shows a side-by-side comparison of two aerial photographs of the same landscape. The left image is labeled 'Aerial\_AZY\_1963' and the right image is labeled 'Aerial\_AZY\_2001'. A red circle is drawn around a specific area in the 1963 image, highlighting a cluster of buildings or structures. The 2001 image shows the same area with significant changes in land use and vegetation. The interface includes a 'Display Options' panel on the left with various checkboxes and a 'Spyglass' tool for zooming in on specific areas.

# Immediate Next Steps for LTAR Data

- Continue to add new LTAR sites with near real-time meteorological data
- Coordinate QA/QC processes for LTAR-wide comparability (ARS statisticians)
- Establish a means to collect “station event” metadata (sensor calibration; wildlife interference; major weather events, etc.)
- Publish the Mandan and Cheyenne aerial images



# LTAR Project Acknowledgements

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Jocelyn McNamara -- NAL – KSD contractor

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