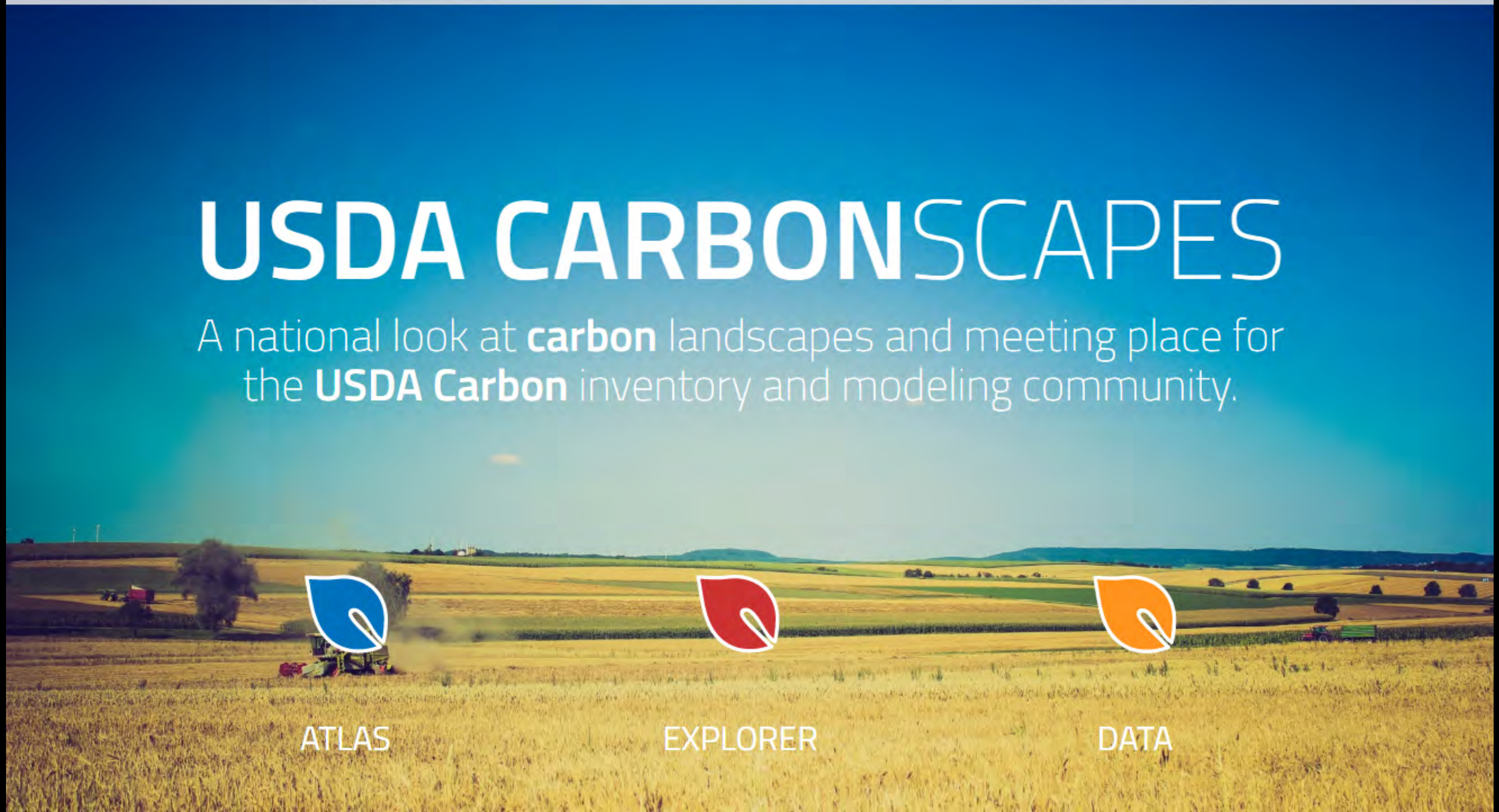
USDA CARBONSCAPES

A national look at **carbon** landscapes and meeting place for the **USDA Carbon** inventory and modeling community.



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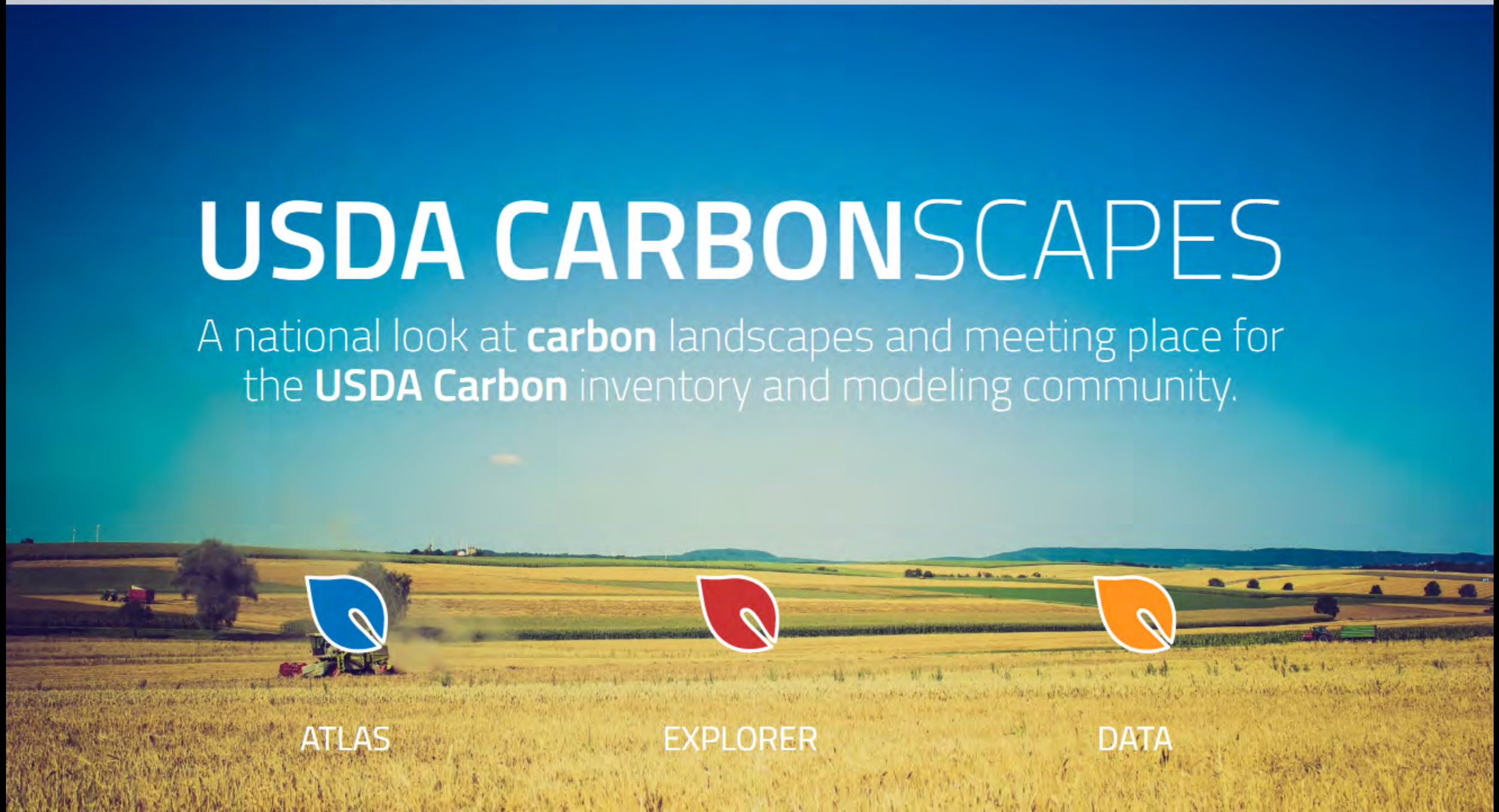

USDA CarbonScapes

A National Look at Carbon Landscapes and Meeting Place for the USDA Carbon Inventory and Modeling Community

James A. Thompson
West Virginia University, Division of Plant & Soil Sciences
Sharon W. Waltman
National Soil Survey Center-Geospatial Research Unit
Kurt Donaldson, Frank Lafone, Maneesh Sharma
West Virginia GIS Technical Center

USDA CarbonScapes

Project Goals

- Bring USDA scientists and models together with ready access to national digital map layers
- Improve assessments of soil/plant carbon sequestration to estimate the greenhouse gas emission offset potential from agricultural lands through modeling scenarios
- Use geoplatform principles (OMB Federal Geographic Data Committee http://www.geoplatform.gov) for efficient use/management of federal geographic or mapped data

USDA CarbonScapes

Purpose

- To provide a useful and easy-to-navigate web map application to educate and answer questions for stakeholders about USDA inventory, modeling, and mapping of terrestrial biosphere carbon pools across the landscape.

A curated view of terrestrial carbon in the US

USDA CarbonScapes

Answer questions such as:

1. How many million metric tons (MMT) of soil carbon or CO2-equivalents are in the upper meter of soil in your home county?
2. What is the CO2-equivalent per hectare (or per acre) for the C stock in the upper meter of soil in your home watershed (8-digit or 12-digit HUC)?
3. How many MMT of soil carbon are in the upper meter of soil in your favorite Major Land Resource Area (MLRA)?
4. How many acres of forest would it take in one year to sequester the mass of C in the upper meter of soil in MLRA 103 (Des Moines Lobe)?

USDA CarbonScapes

www.carbonscapes.org

- CarbonScapes ATLAS
  - Presents information of specific C pools
  - Pre-summarized for various geographic units (counties, watersheds, MLRA)
  - Flexible reporting units
- CarbonScapes EXPLORER
  - Analyze/query models and data layers
  - Create maps and extract GIS data
  - Share geospatial links
- CarbonScapes DATA
  - Catalogs USDA terrestrial C data and model resources

CarbonScapes **ATLAS**

ATLAS

The USDA CarbonScapes Atlas summarizes reports for specific carbon pools in the landscape for C stock or C mass by particular area (county, watershed, and major land resources) within the conterminous United States. Click Atlas icon to learn more.

Launch Atlas

CarbonScapes ATLAS

- Provides SOC stock and mass estimates of five C pools
  - Forest aboveground
  - Forest belowground
  - Soil (0-30 cm)
  - Soil (0-100 cm)
  - Total
- Forest C derived from USDA-Forest Service Forest Inventory and Analysis (FIA) data
- Soil C derived from gSSURGO
- In the future, will be possible to add C stock, mass, and flux estimates provided by CEAP and other inventory/modeling sources for cropland and rangeland.

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CARBONSCAPES ATLAS

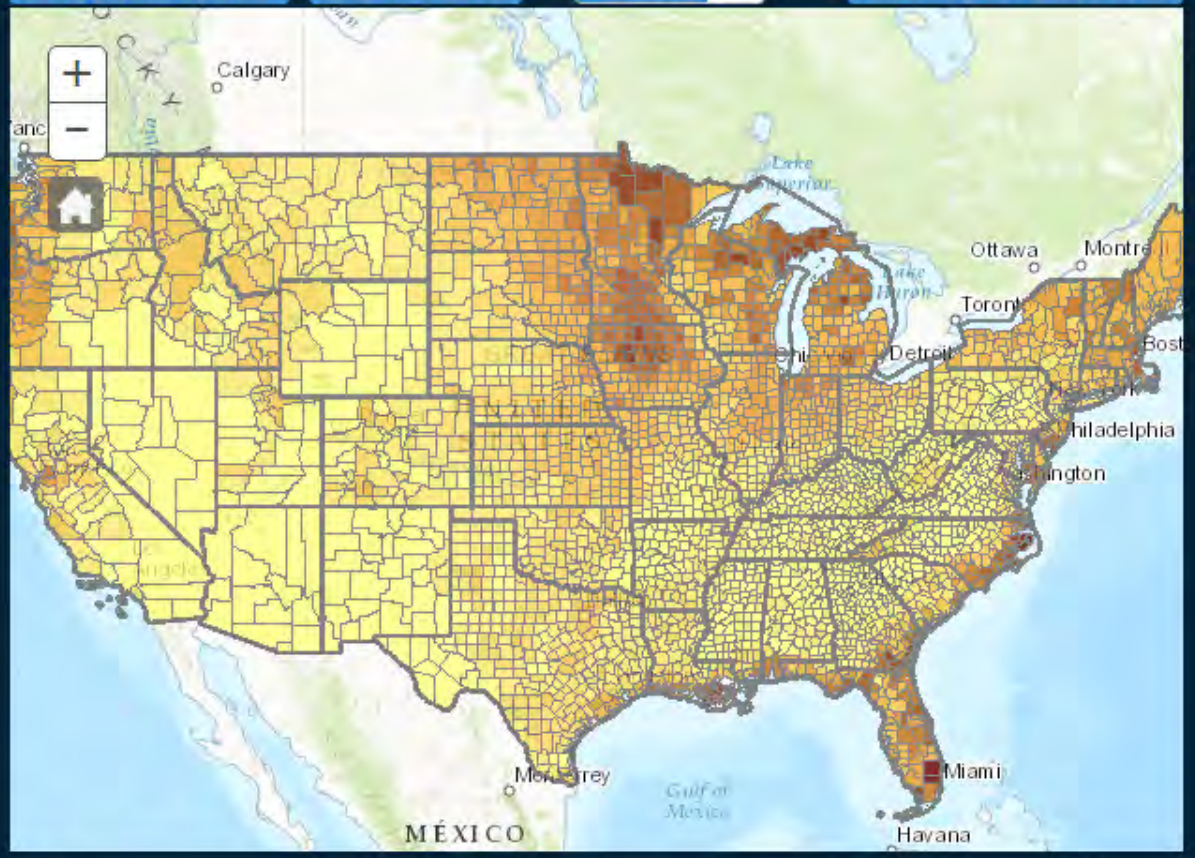
Enter ZIP Code e.g. 90210 Search

County: Geographic Area

Soil 0-100cm: Carbon Pool

Stock: Stock

Choose Carbon Units



Min Max

Opacity

Click the map on the left to discover Carbon potential for a particular area, such as county.

Map Controls

- Use the "Geographic Area" pull down to change to watersheds or ecological regions.
- Use the "Carbon Pool" drop down to find other stores of carbon in the soil or plant life.
- Use the "Stock" button to which between Stock, a measure of concentration, and Mass, a total measure.
- Use "Choose Carbon Units" to change the conversion factor for the carbon units.
- The +/- buttons zoom the map in and out and the "House" button returns the map to default.
- The "Opacity" slider changes the visibility of the data.

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CARBONSCAPES ATLAS

Enter ZIP Code e.g. 90210 Search

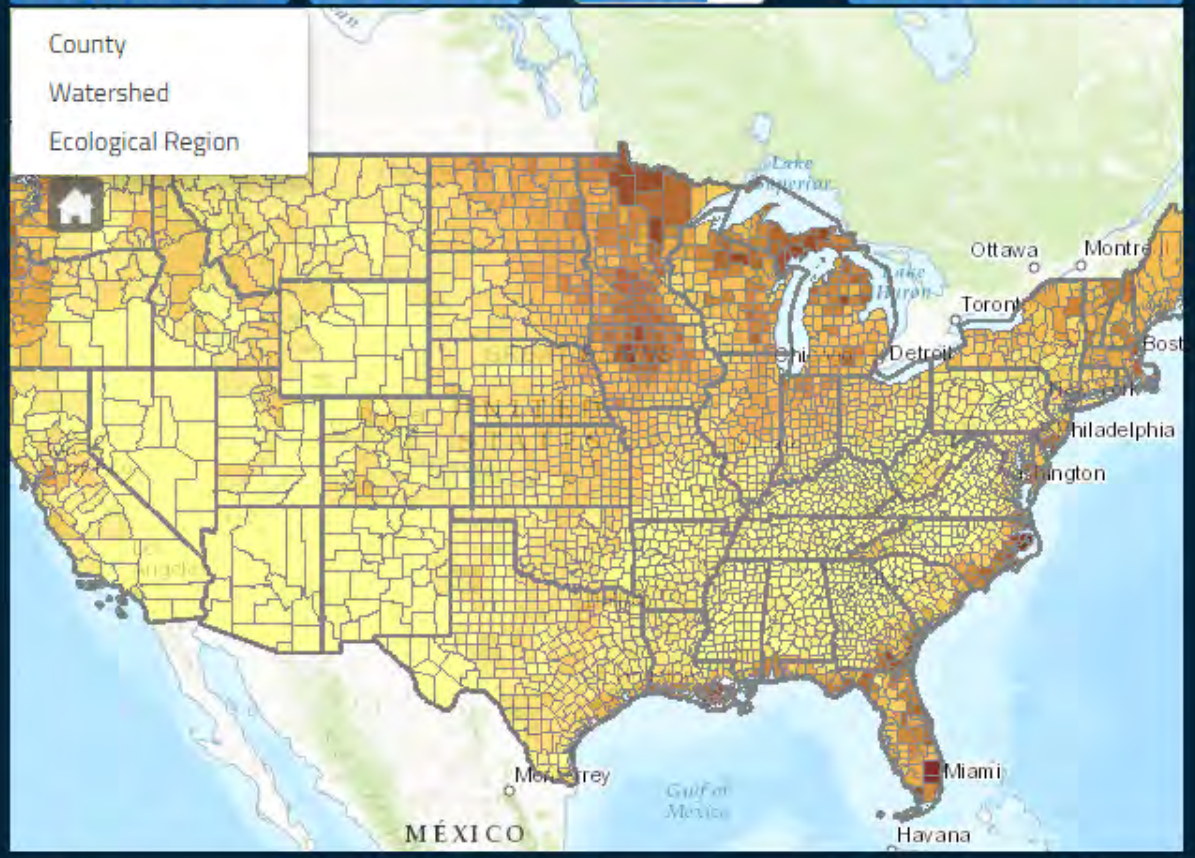
County: Geographic Area

Soil 0-100cm: Carbon Pool

Stock: Stock

Choose Carbon Units

- County
- Watershed
- Ecological Region



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CARBONSCAPES ATLAS

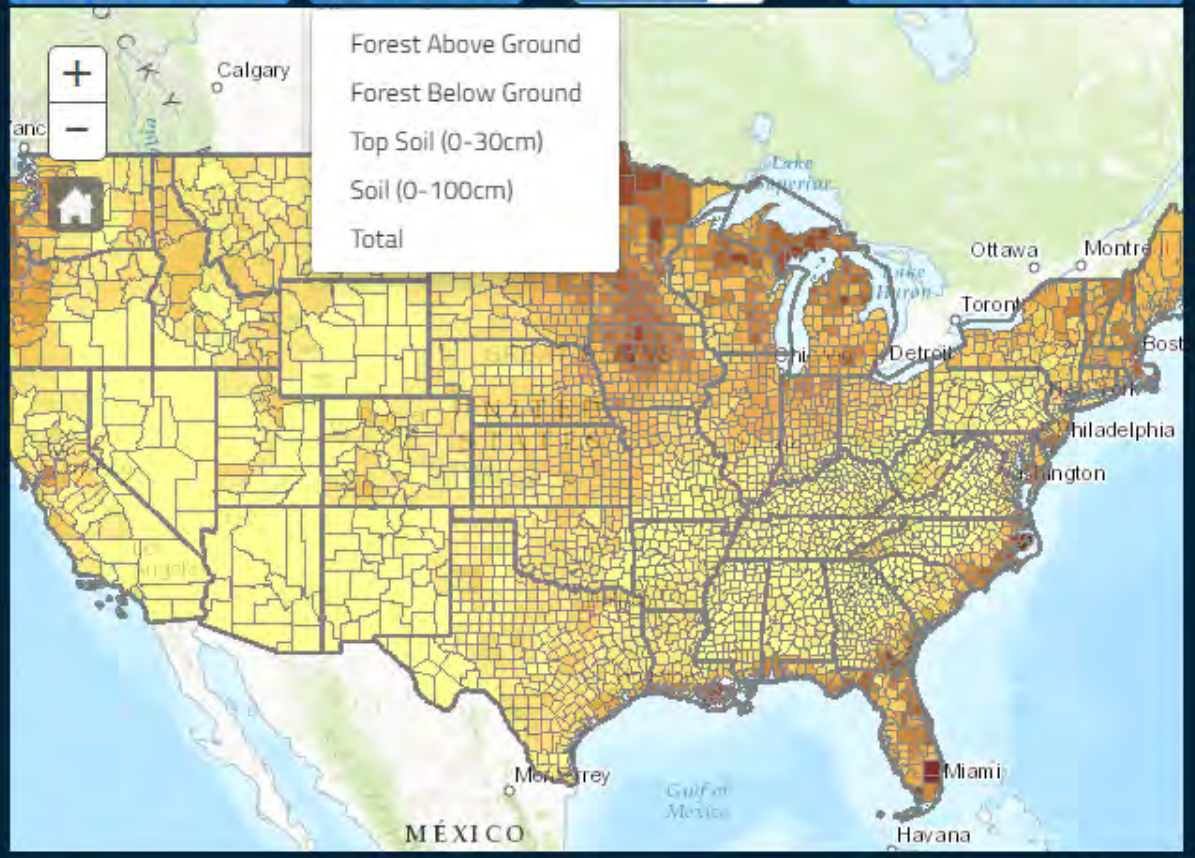
Enter ZIP Code e.g. 90210 Search

County: Geographic Area

Soil 0-100cm: Carbon Pool

Stock: Stock

Choose Carbon Units



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CARBONSCAPES *ATLAS*

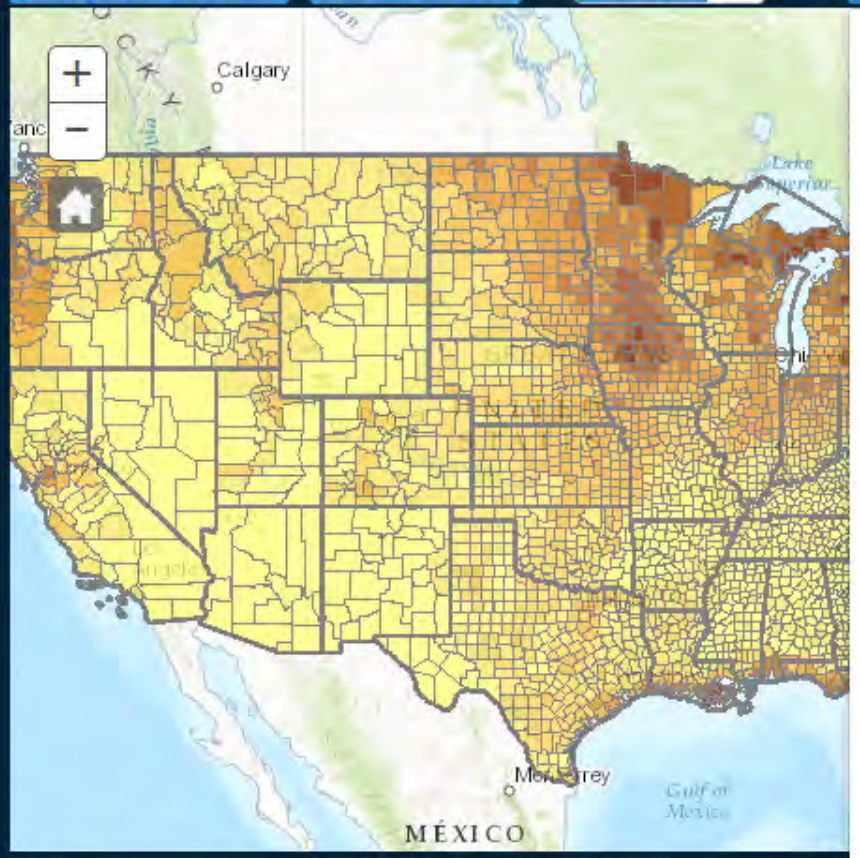
Enter ZIP Code e.g. 90210 Search

County: Geographic Area

Soil 0-100cm: Carbon Pool

Stock: Stock

Choose Carbon Units



Min Max

English Units C Stock

US Tons C per acre

Pounds or lbs C per acre

English Units CO2-e Stock

US Tons Carbon Dioxide Equivalent per acre

Pounds or lbs Carbon Dioxide Equivalent per acre

International Units C Stock

Megagrams C per hectare

Tonnes C per square kilometer

Tonnes C per hectare

Kilograms C per hectare

Kilograms C per square meter

Grams C per square meter

International Units CO2-e Stock

Million Metric Tonnes CO2-e per hectare

Million Metric Tonnes CO2-e per square kilometer

Megagrams CO2-e per hectare

Tonnes CO2-e per hectare

Tonnes CO2-e per square kilometer

Click the map on the left to discover Carbon potential for a particular area,

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arbon Units" to change the
tor for the carbon units.
ns zoom the map in and out
e" button returns the map to

slider changes the visibility of

CARBONSCAPES ATLAS

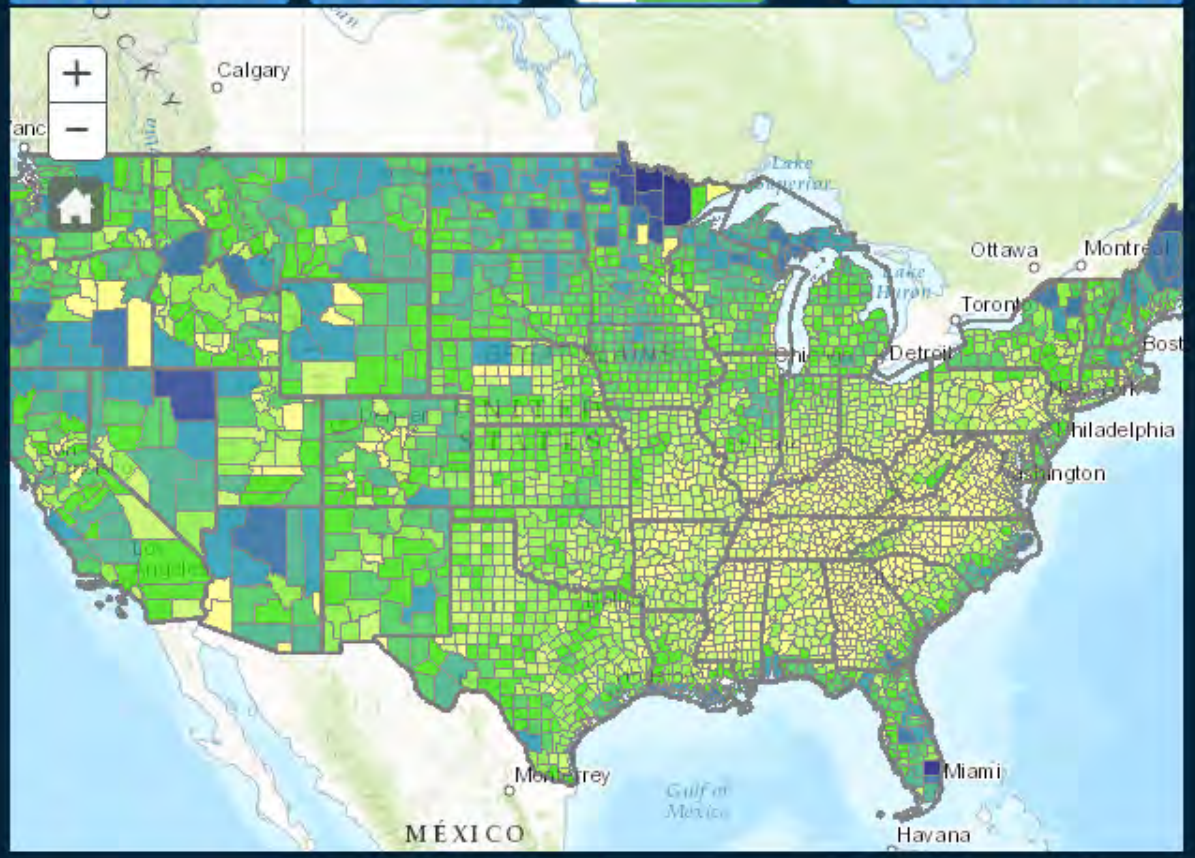
Enter ZIP Code e.g. 90210 Search

County: Geographic Area

Soil 0-100cm: Carbon Pool

Mass: Mass

Choose Carbon Units



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CARBONSCAPES *ATLAS*

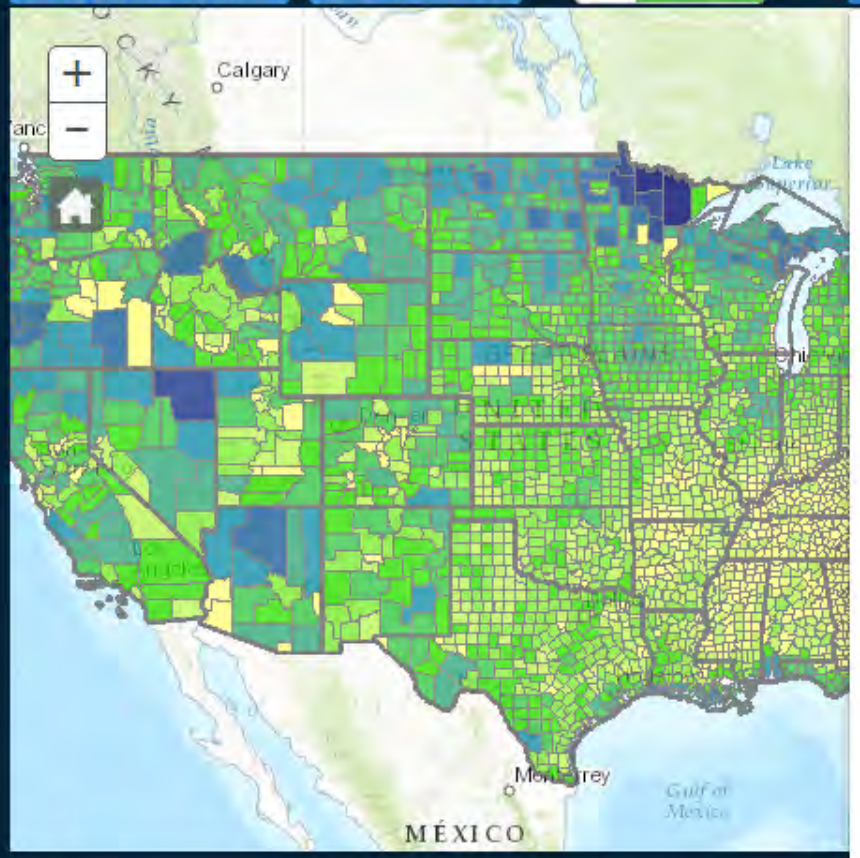
Enter ZIP Code e.g. 90210 Search

County: Geographic Area

Soil 0-100cm: Carbon Pool

Mass: Mass

Choose Carbon Units



Min Max

International Units Mass C

- Grams Carbon
- Megagrams C
- Metric tonnes C
- Teragrams C
- Million Metric Tonnes C
- Megatonnes C
- Petagrams C
- Gigatonnes C
- Teratonnes C

International Units Mass CO2-e

- Grams CO2-e
- Megagrams CO2-e
- Metric tonnes CO2-e
- Teragrams CO2-e
- Million Metric Tonnes CO2-e
- Megatonnes CO2-e
- Petagrams CO2-e
- Gigatonnes CO2-e

Click the map on the left to discover Carbon potential for a particular area, ch as county.

ap Controls

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- The +/- buttons zoom the map in and out and the "House" button returns the map to default.
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CARBONSCAPES ATLAS

Essex County; New York

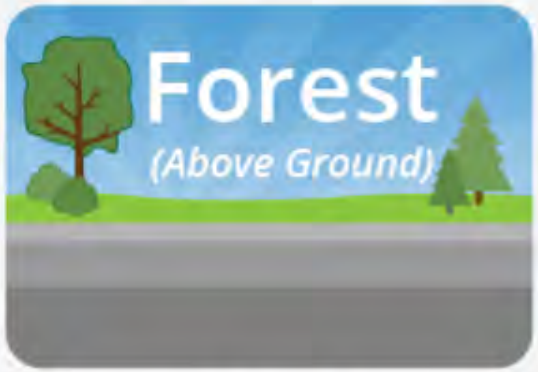
Enter ZIP Code 12946 Search

County: Geographic Area

Forest Above: Carbon Pool

Stock: Stock

Choose Carbon Units



95 Megagram C per hectare

All counties have between a minimum of 6 and a maximum of 1,685 Megagram C per hectare

0 500 1000 1500 2000 2500

90th Percentile of all counties

0 20 40 60 80 100

Click To Learn More

Min Max

Opacity

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CARBONSCAPES ATLAS

Essex County; New York

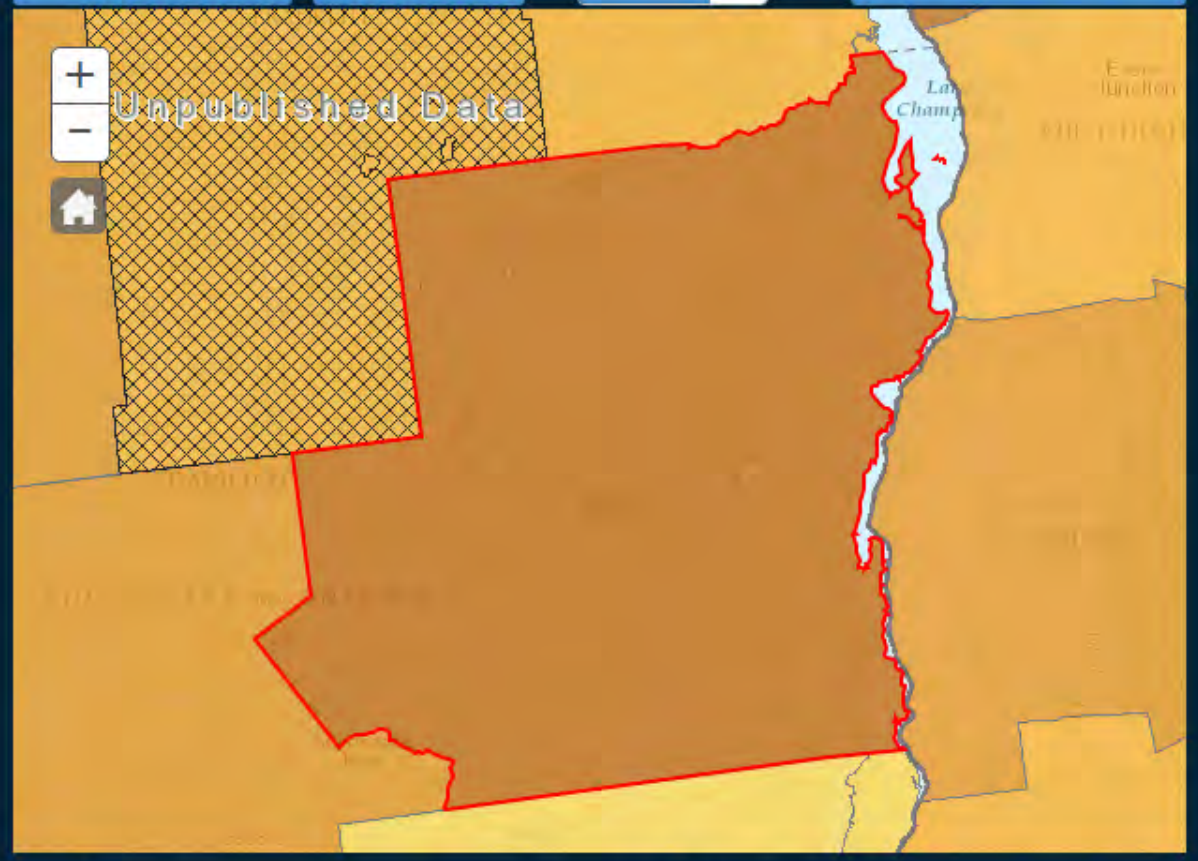
Enter ZIP Code 12946 Search

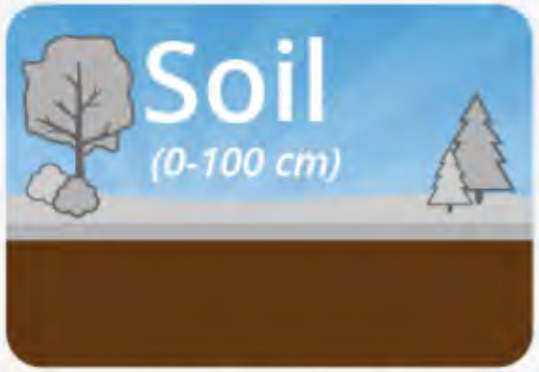
County: Geographic Area

Soil 0-100cm: Carbon Pool

Stock: Stock

Choose Carbon Units





208 Megagram C per hectare

All counties have between a minimum of 8 and a maximum of 1,018 Megagram C per hectare

0 250 500 750 1000 1250

70th Percentile of all counties

0 20 40 60 80 100

Click To Learn More

Min Max

Opacity

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CARBONSCAPES ATLAS

Essex County; New York

Enter ZIP Code 12946 Search

County: Geographic Area

Soil 0-100cm: Carbon Pool

Mass: Mass

Choose Carbon Units

Min Max

Opacity

96 Million Metric Tonnes C

74,418,409
Passenger Vehicles Emissions Per Year

48,622,757
Homes' Energy Use For One Year

289,743,805
number of acres of forest to capture that amount of carbon in one year

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CARBONSCAPES ATLAS

Upper Hudson

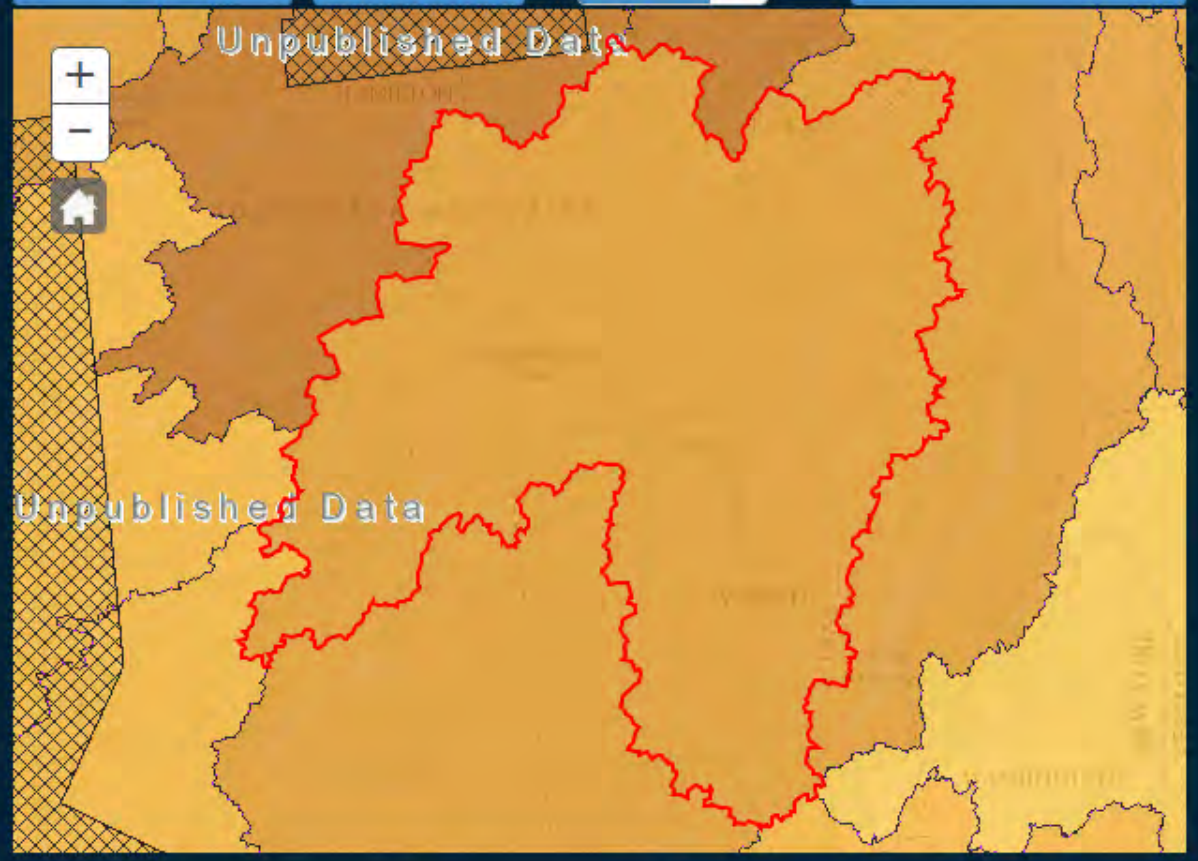
Enter ZIP Code 12946 Search

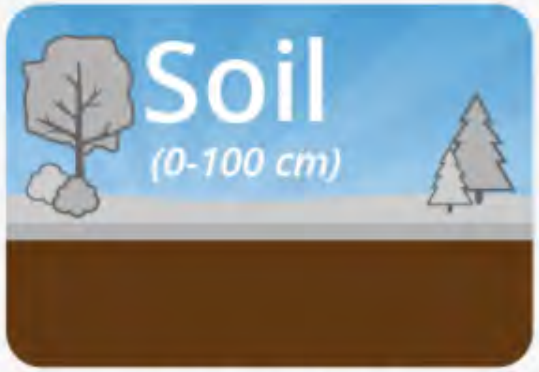
Watershed - Huc8: Geographic Area

Soil 0-100cm: Carbon Pool

Stock: Stock

Choose Carbon Units





163 Megagram C per hectare

All watersheds have between a minimum of 6 and a maximum of 1,013 Megagram C per hectare

0 250 500 750 1000 1250

60th Percentile of all watersheds

0 20 40 60 80 100

Click To Learn More

Min Max

Opacity

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CARBONSCAPES ATLAS

Northeastern Mountains

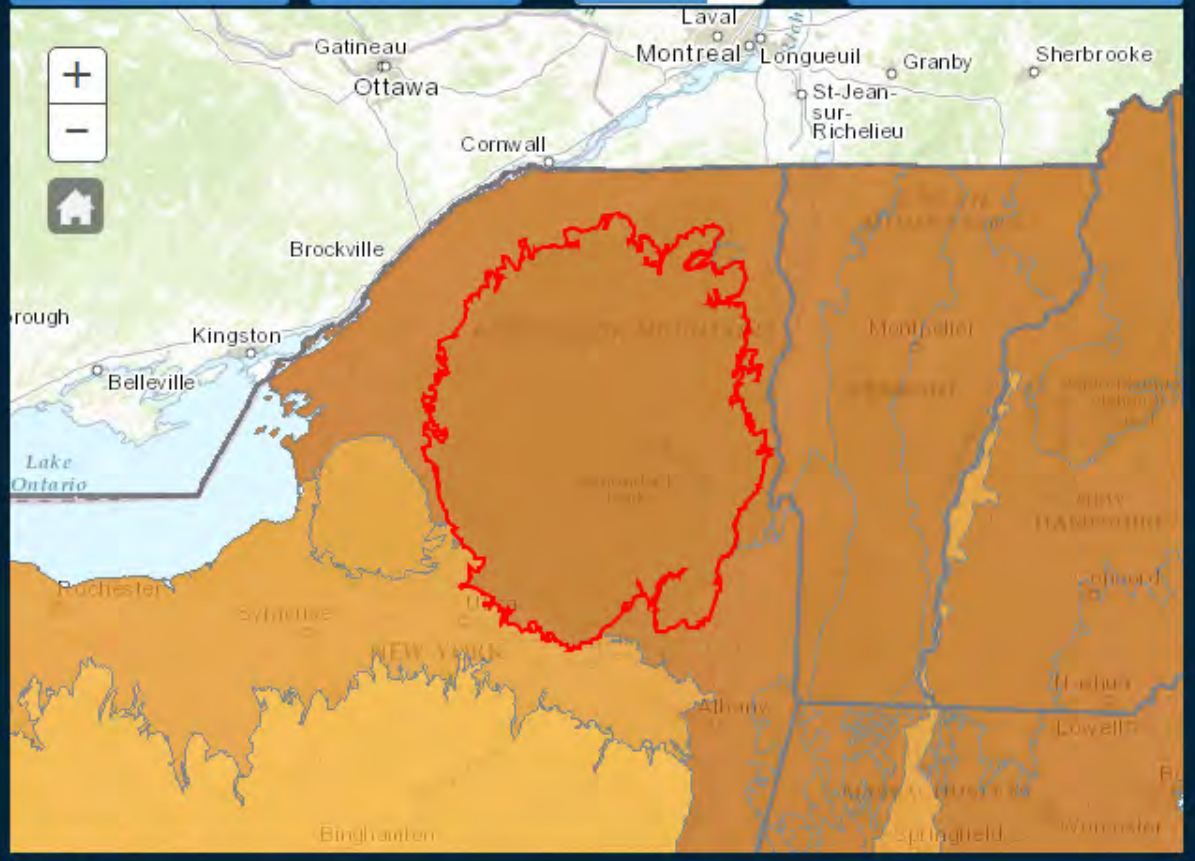
Enter ZIP Code 12946 Search

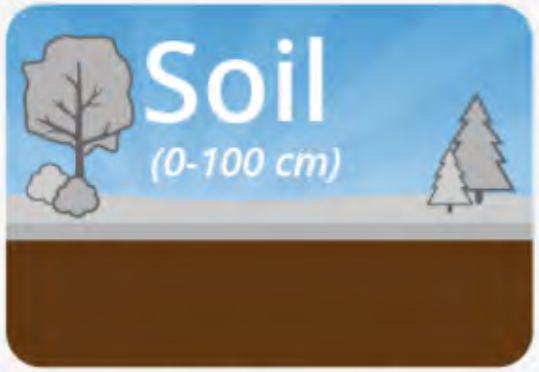
Ecological Region: Geographic Area

Soil 0-100cm: Carbon Pool

Stock: Stock

Choose Carbon Units





145 Megagram C per hectare

All ecological regions have between a minimum of 12 and a maximum of 717 Megagram C per hectare

0 200 400 600 800 1000

70th Percentile of all ecological regions

0 20 40 60 80 100

Click To Learn More

Min Max

Opacity

CarbonScapes **EXPLORER**

EXPLORER

The CarbonScapes Explorer provides advanced users more in-depth tools to visualize and analyze carbon models and associated map layers as well as create maps, share geospatial links, and extract GIS data. Click Explorer icon to learn more.

Launch Explorer

CarbonScapes EXPLORER

- Provides advanced users with in-depth tools to visualize and analyze C data layers and model outputs
- Includes many USDA C related models and map layers

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Layers | Comparison Slider | Time Series | Find | Overview Map | Share | Print | Export

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Layers

Data Types: Model Scenario | Data | Reference Data

Layer Name	Opacity
Reference	
Model Scenario	
Data	
Soil Survey	
Crop Change	
Crops	
Crops + Land Cover	
Model Results - COLE	
Forest Inventory & Analysis (FIA)	
Climate - 1971-2000 normal	

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Layers

Data Types: Model Scenario | Data | Reference Data

Layer Name	Opacity
Reference	
Model Scenario	
Model Results - CCT	
Carbon Calculation Tool (County)	
Carbon Calculation Tool (State)	
Data	
Soil Survey	
Crop Change	
Crops	
Crops + Land Cover	
Model Results - COLE	
Forest Inventory & Analysis (FIA)	
Climate - 1971-2000 normal	

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Layers

Data Types: Model Scenario | Data | Reference Data

Layer Name	Opacity
Reference	
Model Scenario	
Data	
Soil Survey	
County level SOC stock 0-100cm (FY 2014 gSSURG	
County level SOC stock 0-30cm (FY2014 gSSURGO)	
FY 2014 SSURGO Data Availability	
HUC-8 level SOC stock 0-100cm (FY 2014 gSSURG	
MLRAlevel SOC stock 0-100cm (FY 2014 gSSURGO	
Soil Organic Carbon (gSSURGO 2014) 0-100cm	
Soil Organic Carbon (STATSGO2) 0-100cm	
Crop Change	
Crops	
Crops + Land Cover	
Model Results - COLE	
Forest Inventory & Analysis (FIA)	

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Layers

Data Types: Model Scenario | Data | Reference Data

Layer Name	Opacity
Reference	
Model Scenario	
Data	
Soil Survey	
Crop Change	
Cropland Change Detection - 2009 to 2010 (Detail)	
Cropland Change Detection - 2009 to 2010 (Generic	
Crops	
Cropland Data Layer - 2008	
Cropland Data Layer - 2009	
Cropland Data Layer - 2010	
Crops + Land Cover	
Cropland Data Layer/National Land Coverage Merge	
Model Results - COLE	
Forest Inventory & Analysis (FIA)	
Climate - 1971-2000 normal	

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Layers

Data Types: Model Scenario | Data | Reference Data

Layer Name	Opacity
Crops + Land Cover	
Model Results - COLE	
Forest Above Ground Carbon	
Forest Below Ground Carbon	
Forest Biomass	
Forest Down Dead Carbon	
Forest Floor Carbon	
Forest Soil Organic Carbon	
Forest Standing Dead Carbon	
Forest Total Carbon	
Forest Understory Above Ground Carbon	
Forest Understory Below Ground Carbon	
Forest Inventory & Analysis (FIA)	
Forest Inventory and Analysis	
Climate - 1971-2000 normal	

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Layers

Data Types: Model Scenario | Data | Reference Data

Layer Name	Opacity
Reference	
Model Scenario	
Data	
Soil Survey	
Crop Change	
Crops	
Crops + Land Cover	
Model Results - COLE	
Forest Inventory & Analysis (FIA)	
Climate - 1971-2000 normal	
PRISM Precipitation - 1971-2000 Monthly Normal	
PRISM Temperature Max - 1971-2000 Monthly Normal	
PRISM Temperature Mean - 1971-2000 Monthly Normal	
PRISM Temperature Min - 1971-2000 Monthly Normal	

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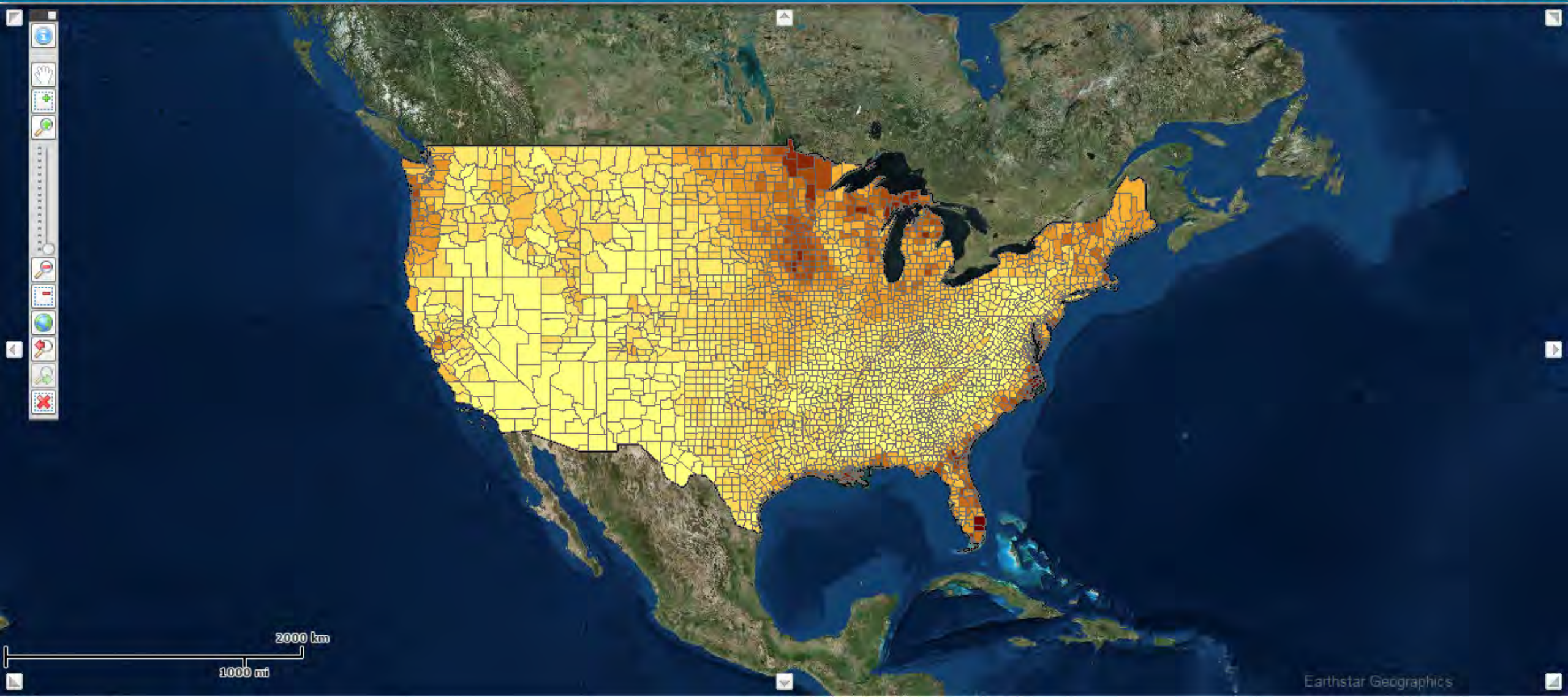

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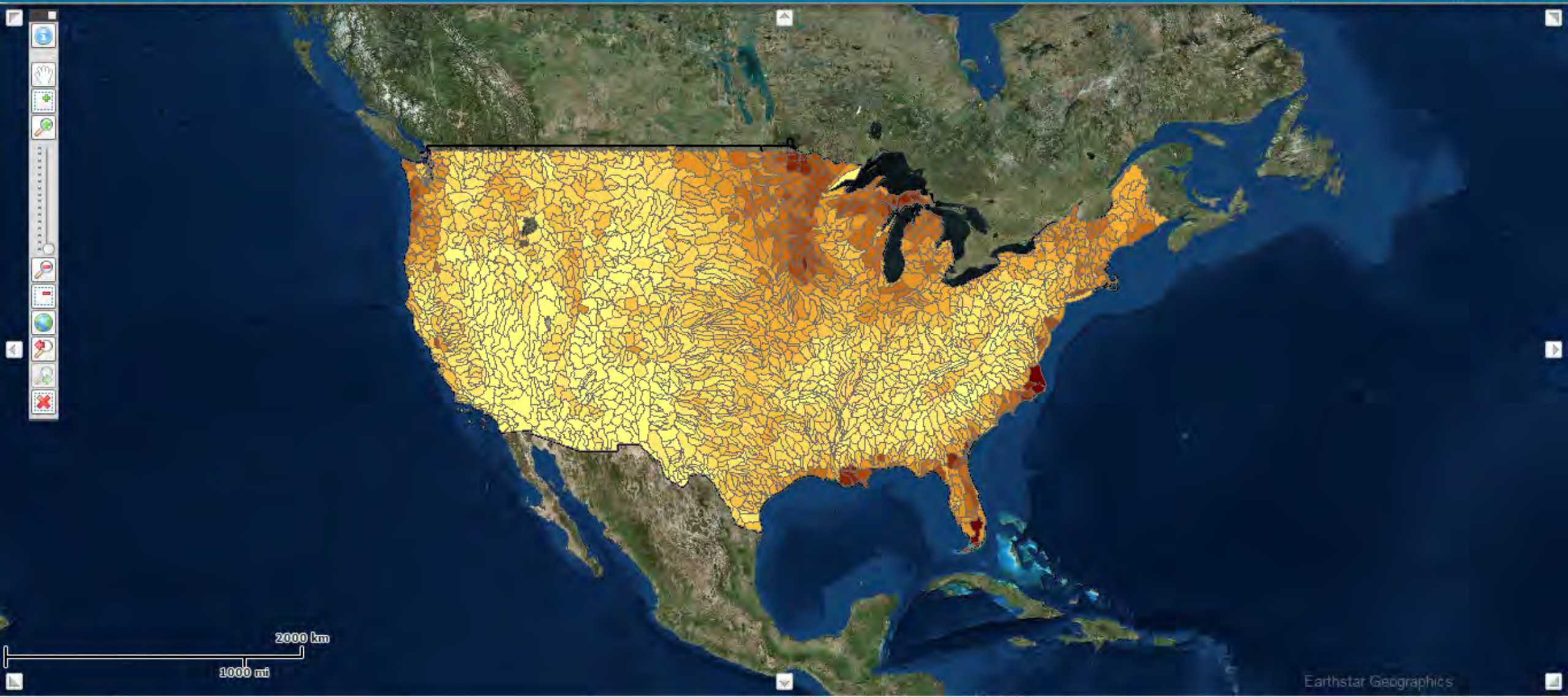

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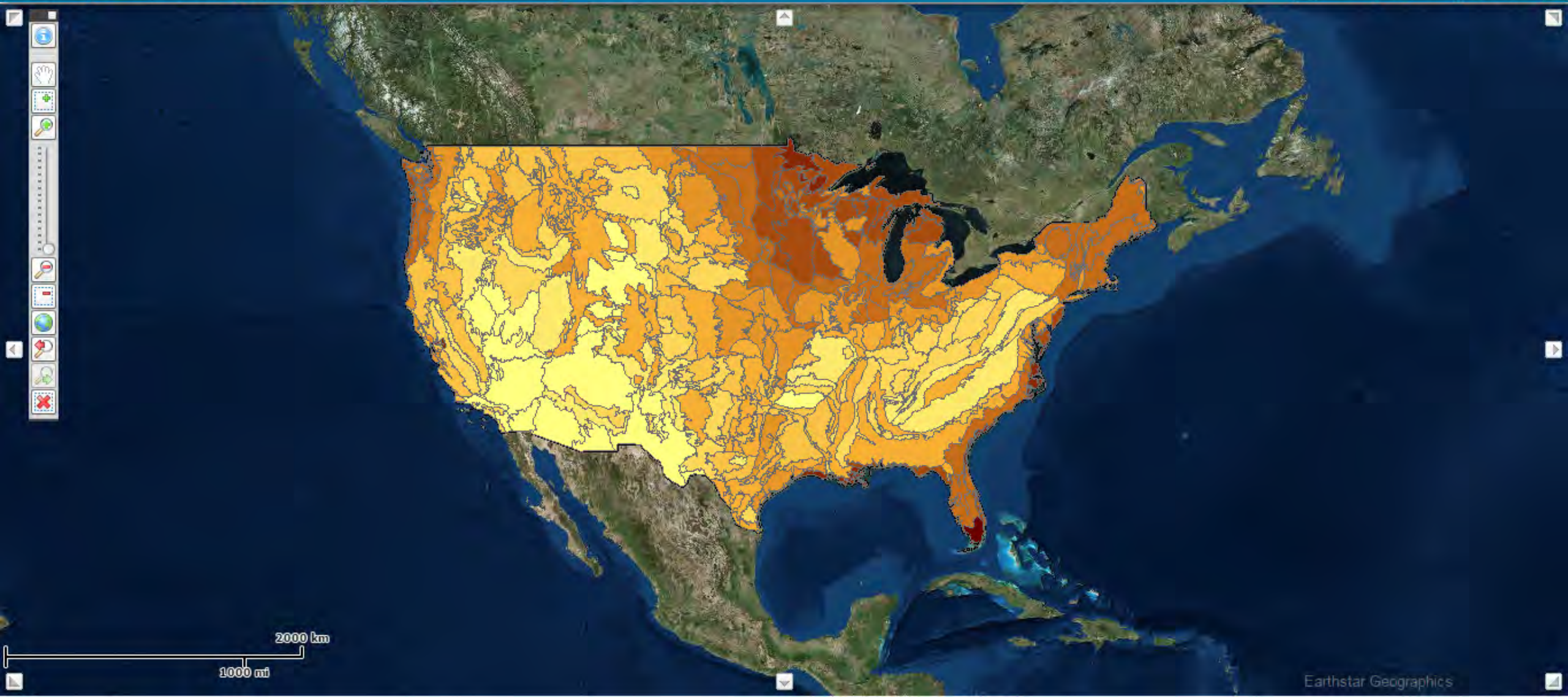

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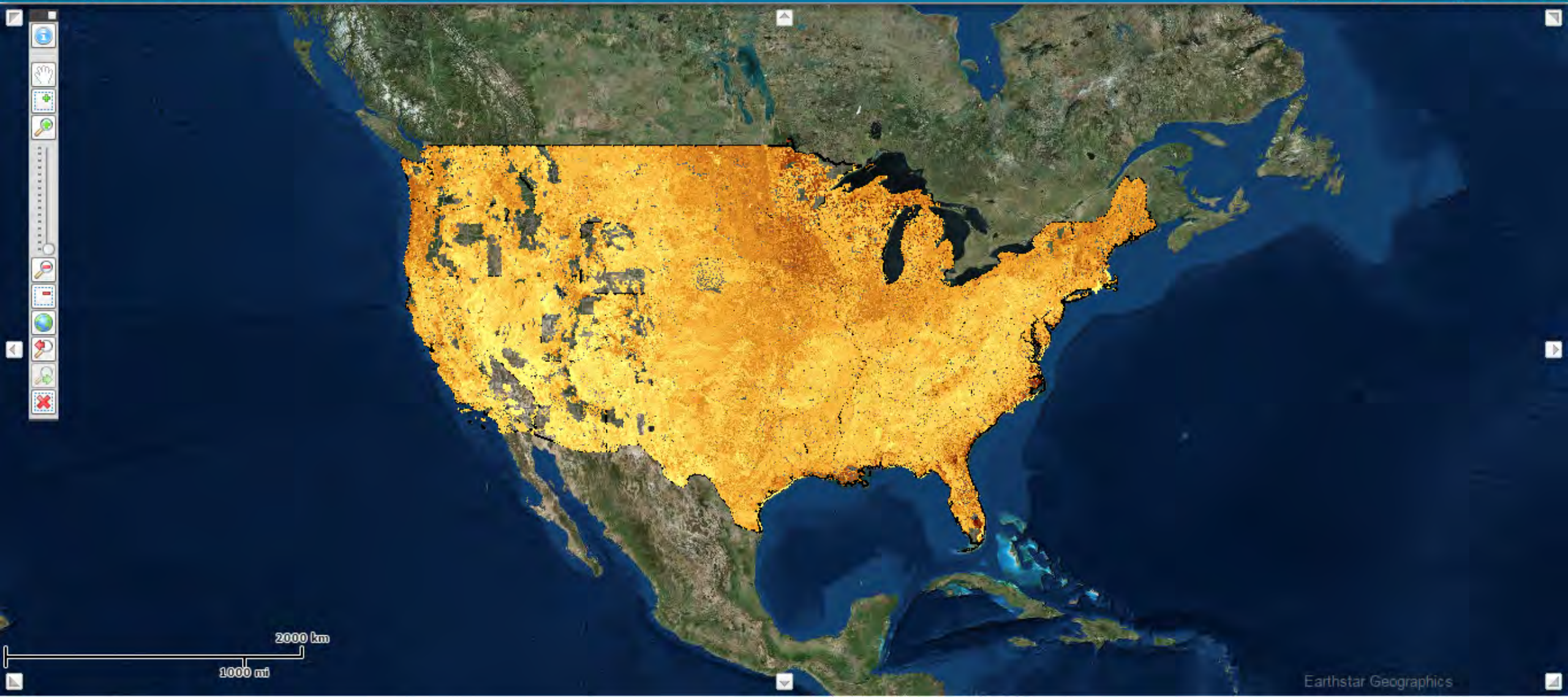

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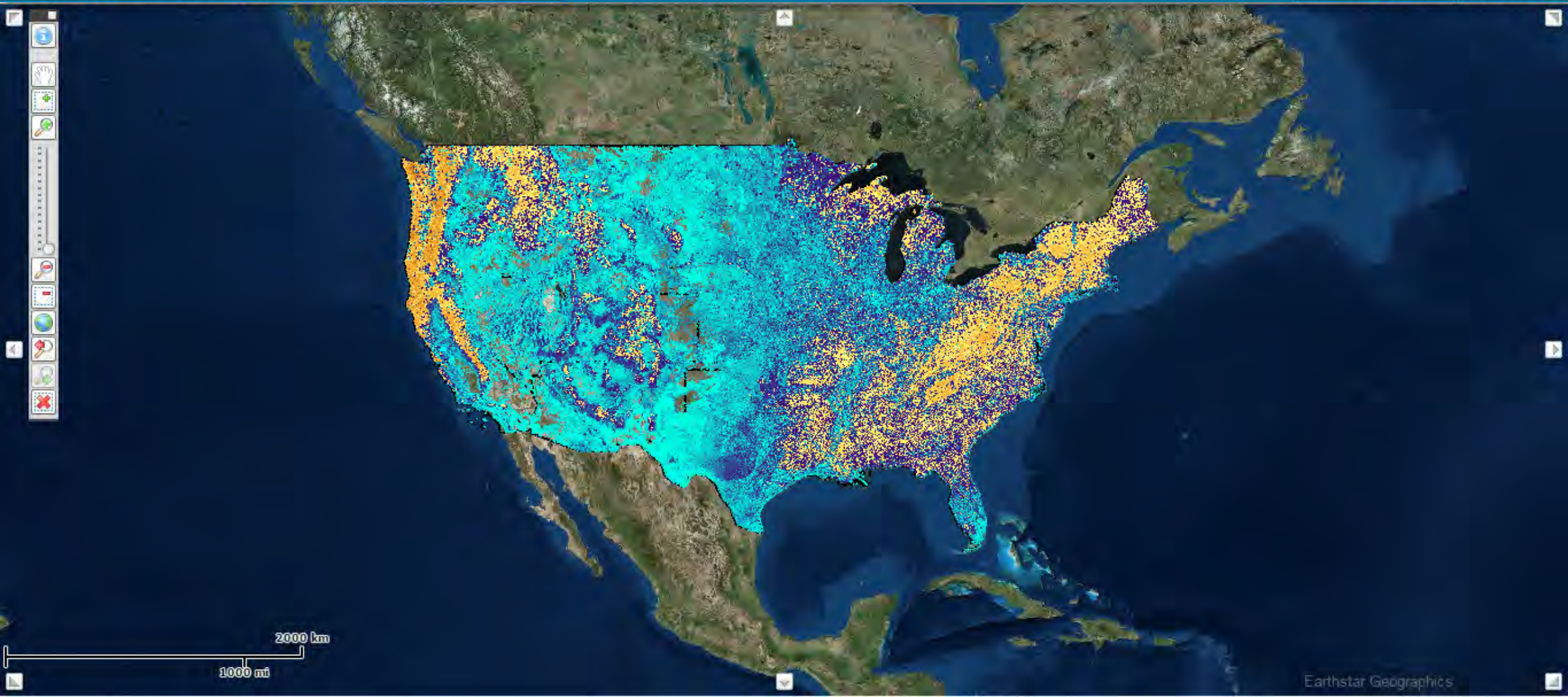

CarbonScapes EXPLORER

Analysis Tools

Layers:
Select display layers

Comparison Slider:
Compare different layers

Time Series:
Visualize temporal changes in a data layer

Find:
Find specific data in a layer

Overview Map:
Provides overview of the location of main map

Navigation Tools

Access carbon information for a specific area. Result is displayed in new panel

Zoom in and Zoom out- use the cursor to pan and zoom in/out.

Click and draw box to zoom in your area

Click the globe to zoom out to original extent of map

Previous extent

Next extent

Sharing Tools

Share hyperlink of the map

Print map

Export data

Help

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Comparison Slider

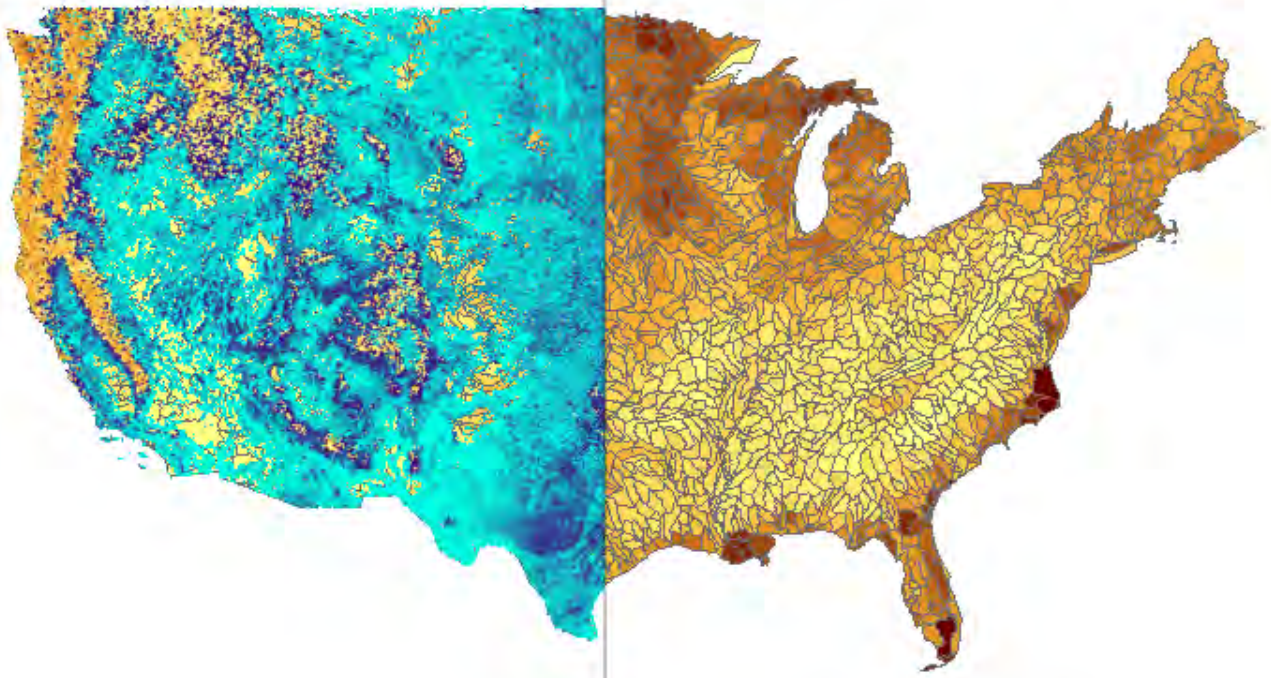
Swipe Layer: Forest Above Ground Carbon

Base Layer: HUC-8 level SOC stock 0-100cm

Load Map

Show Counties Layer

Show States Layer



0 10 20 30 40 50 60 70 80 90 100

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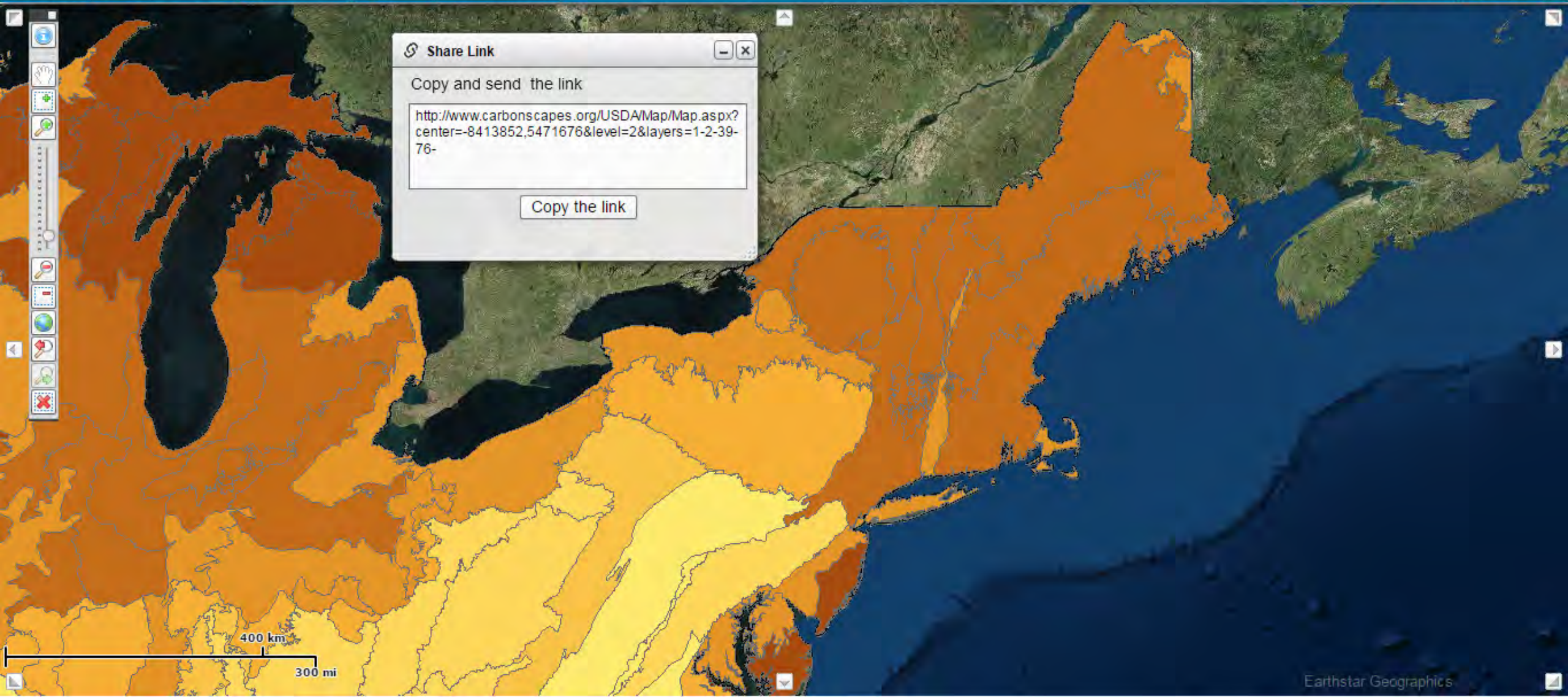

CarbonScapes **DATA**

DATA

The USDA CarbonScapes Data catalogs and links users to USDA terrestrial carbon data and model resources published on Data.gov and other web sites.

Launch Data

CarbonScapes DATA

- Catalogs and provides easy access for users to USDA terrestrial C data and model resources
- Links to data.gov and other related websites

CARBONSCAPES *DATA*

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Gridded Soil Survey Geographic Database (gSSURGO-30) 0-100cm depth g C per sq meter - Conterminous US

Type	Location
View or Download	CarbonScapes Explorer
Web Map Service	CarbonScapes Explorer
Metadata	Data.gov
Description	USDA Website
View or Download	USDA Website

Forest Inventory Analysis (FIA)

Type	Location
View or Download	CarbonScapes Explorer
Web Map Service	CarbonScapes Explorer
Metadata	Data.gov
Description	USDA Website
View or Download	USDA Website

About **USDA CarbonScapes**

The goal of USDA CarbonScapes is to provide a useful and easy to navigate web map application to educate and answer questions for stakeholders about USDA inventory, modeling, and mapping of terrestrial biosphere carbon across the landscape.

USDA NRCS Funded CESU 68-7482-13-511

A collaboration between the USDA and West Virginia University

Quick Links

- User Feedback

- Flyer
- Quick Start Guide
- Webinar

- Overview (video)
- Atlas and Data(video)
- Explorer(video)

carbonscapes.org