

North American Drought Monitor & Working Toward Cloud -based Processing and Visualization of Climate and Satellite Data for Advanced Drought and Natural Resource Monitoring

Rocky Bilotta , Physical Scientist

NIDIS U.S. Drought Portal

ISciences, L.L.C. / NOAA National Centers for Environmental Information

Justin Huntington , Research Professor

Desert Research Institute, Western Regional Climate Center

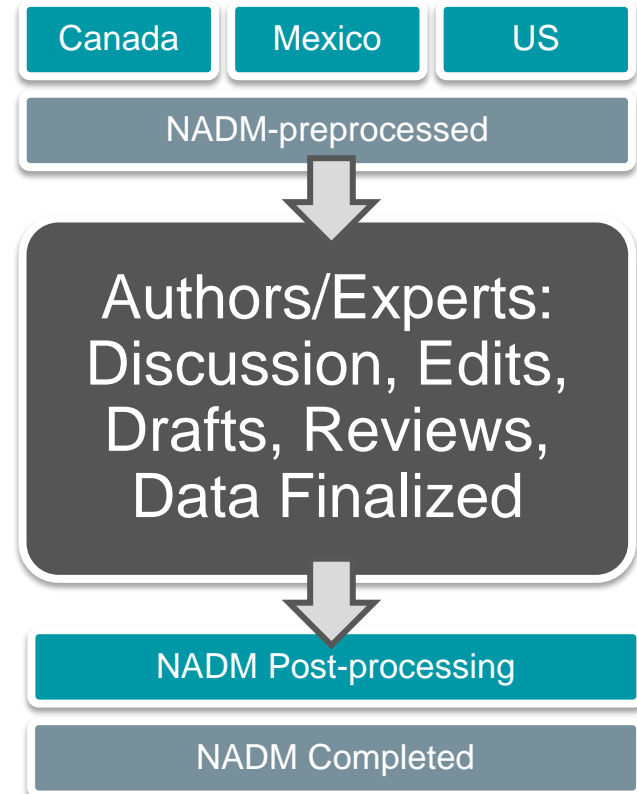
Monthly NADM Process

Python/ArcPy process (2 steps):

- Preprocess
 - Ingest, clean, merge, package data for authors
- Post-process
 - Ingest, project, statistics, package, push data to public

Index of /pub/data/nidis/shapefiles

Name	Last modified	Size	Description
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Monthly NADM Process

Reconstruction of NADM for March 2006

North American Drought Monitor

March 31, 2006

Released: Friday, April 14, 2006

<http://www.ncdc.noaa.gov/nadm.html>

Analysts:

Canada - Dwayne Chobanian*
Ted O'Brien
Mexico - Miguel Cortez
U.S.A. - C. Tankersley &
L. Love Brotch
David Miskus*
Brad Rippey*

(* Responsible for collecting analysis input & assembling the NADM map)

Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

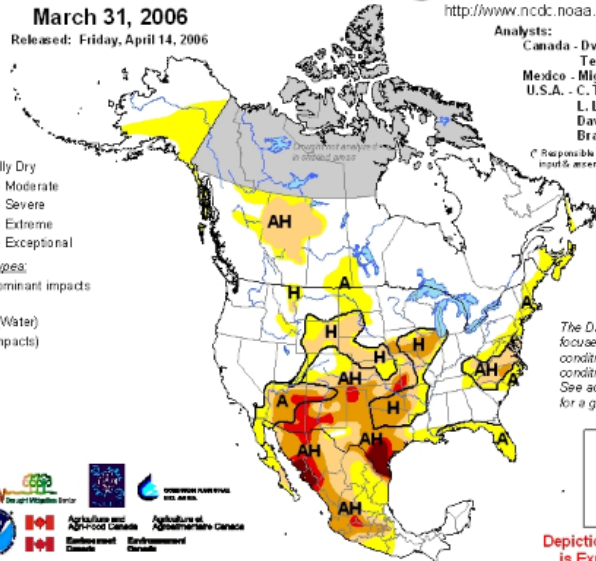
Drought Impact Types:

Delinates dominant impacts

A = Agriculture

H = Hydrological (Water)

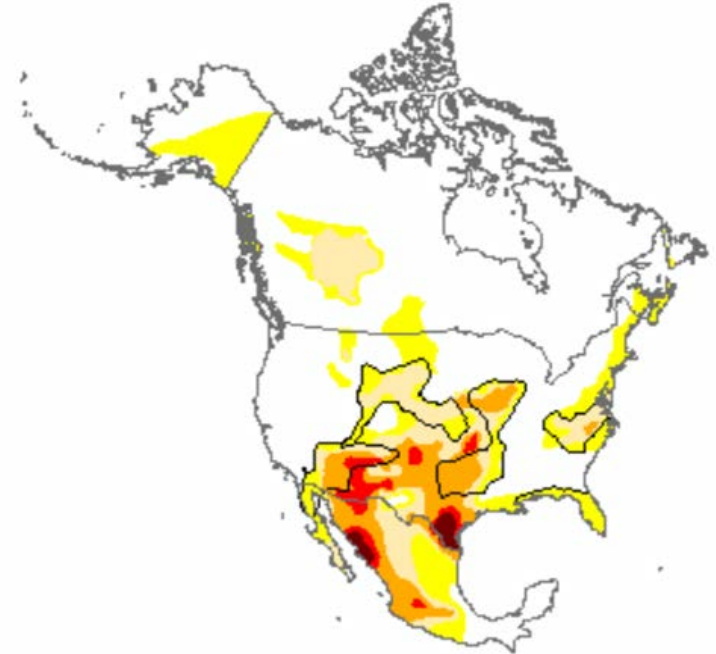
(No type = Both impacts)



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text for a general summary.



Depiction for Canada is Experimental



*Other missing months – August 2003 & February 2004

GIS/Data Automation

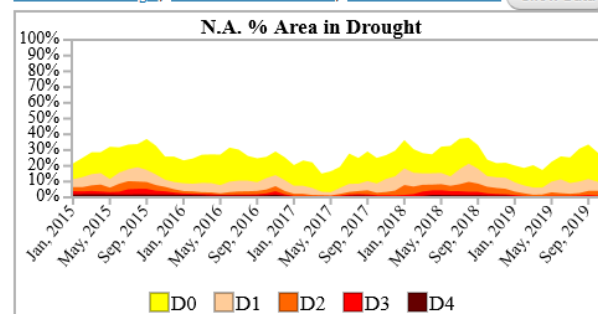
Linux, Conda, Python, & GIS Tools

- Automate the ingest & processing of data

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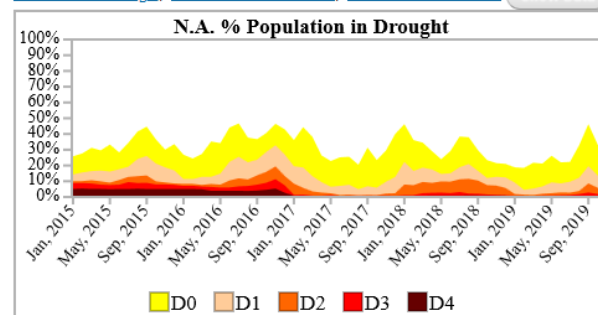
Area Drought

[Download Image](#), [Download as JSON](#), [Download as XML](#) [Show Data](#)



Population Drought

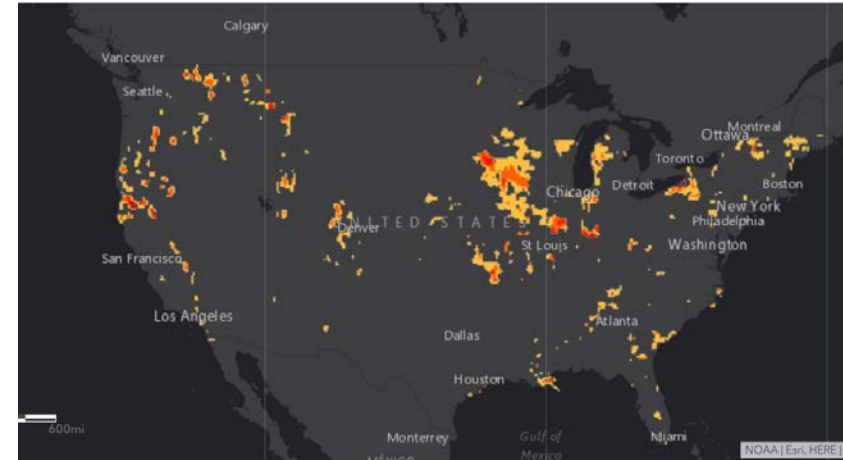
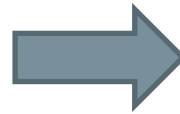
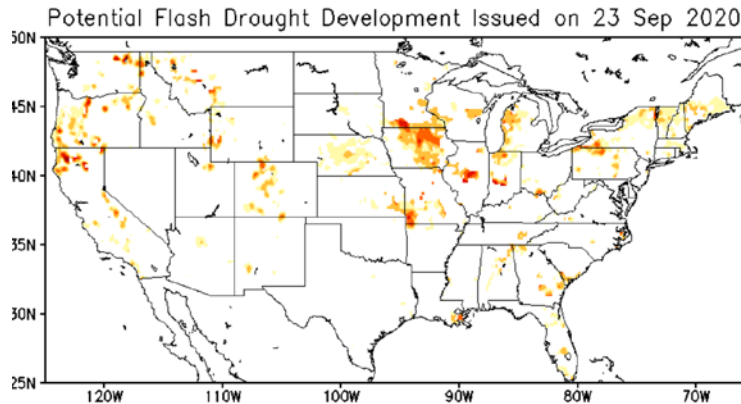
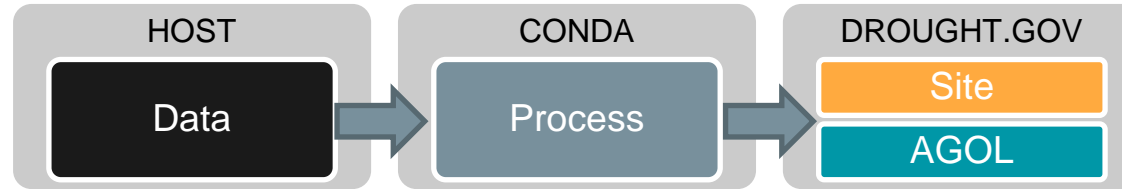
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GIS/Data Automation

Linux, Conda, Python, & GIS Tools

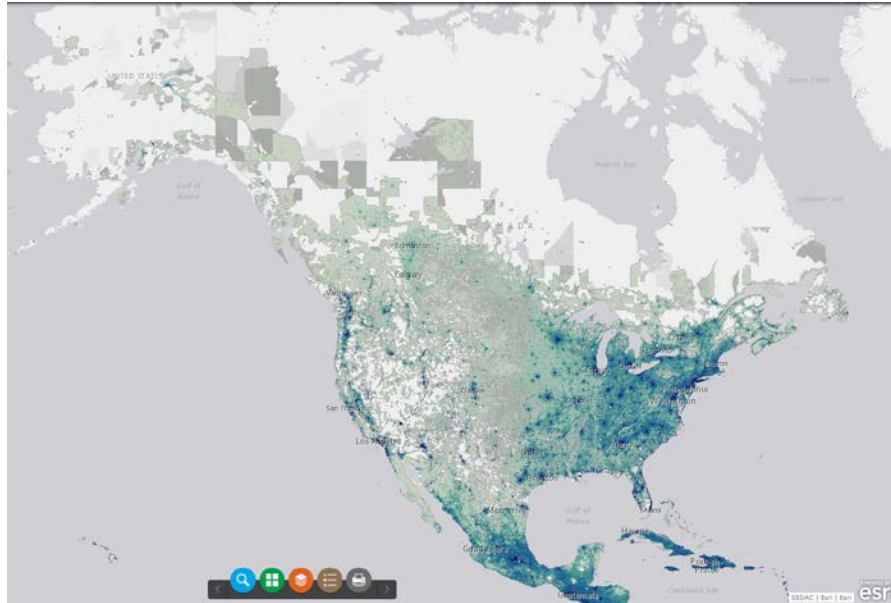
- Automate the ingest & processing of data



GIS/Data Automation

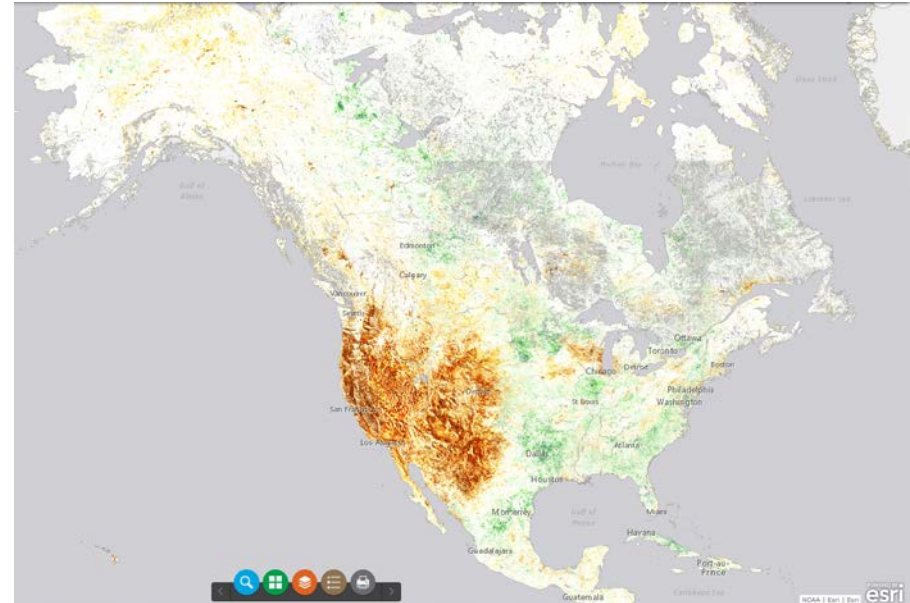
Linux, Conda, Python, & GIS Tools

Global Population



Socioeconomic Data and Applications Center

Evaporative Stress Index (12wk)



NASA

GIS/Data Automation

Raster Tiles Examples

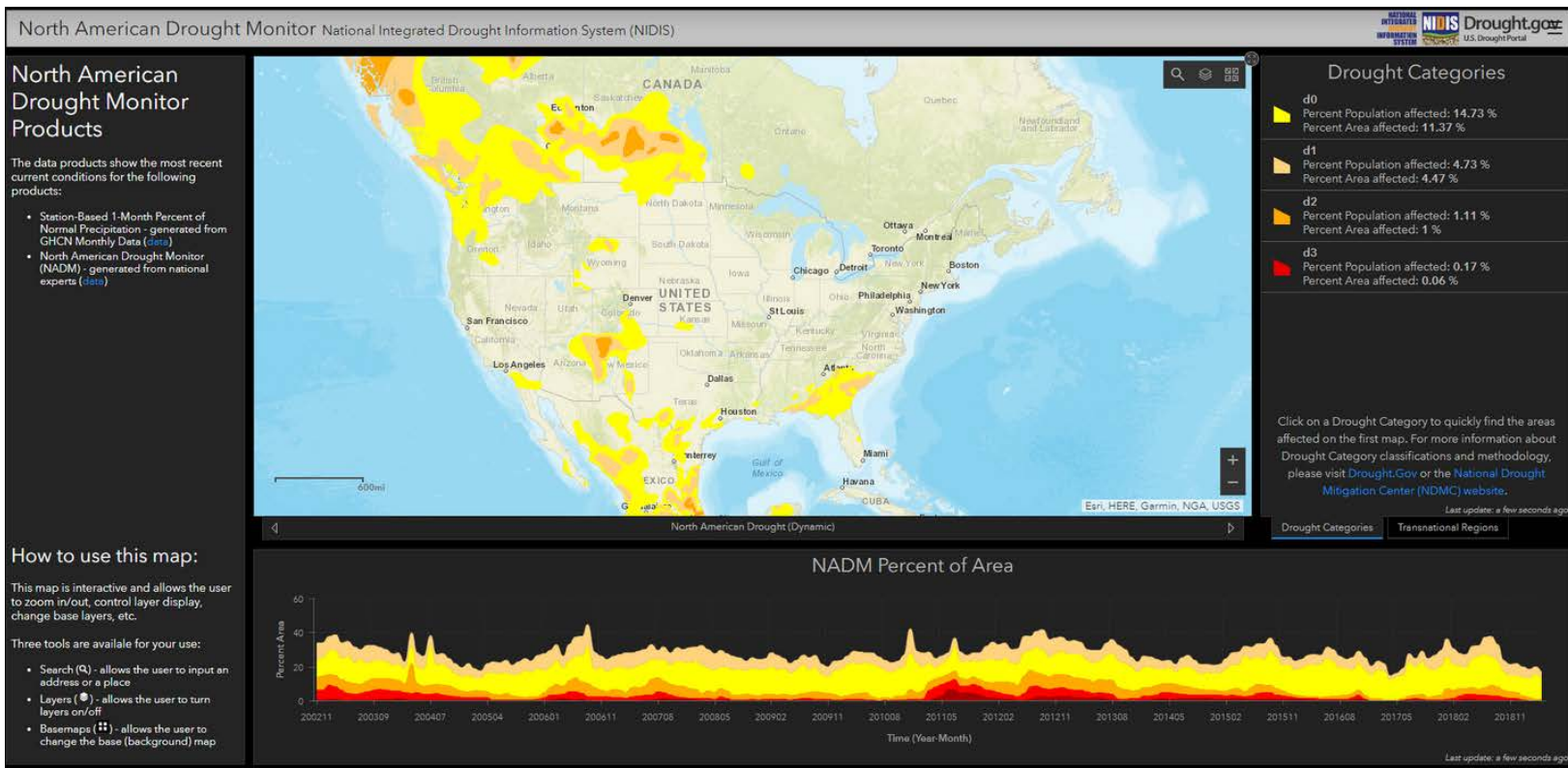
- Gridded Population
- GPCC Drought Index
- GPCC SPI
- GPCC SPEI
- Evaporative Stress Index
- Evaporative Demand Drought Index
- Vegetation Health Index
- VegDRI/QuickDRI
- ...more and counting!

<https://www1.ncdc.noaa.gov/pub/data/nidis/tile/>

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ArcGIS Online

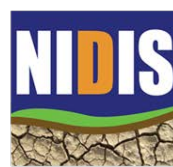
NADM Dashboard



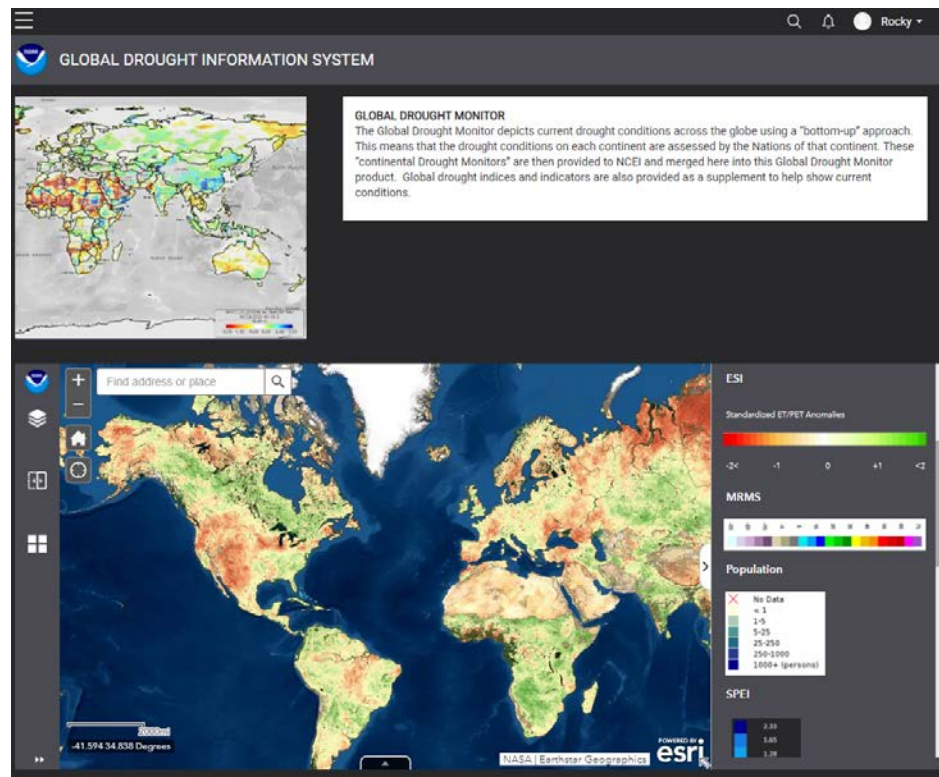
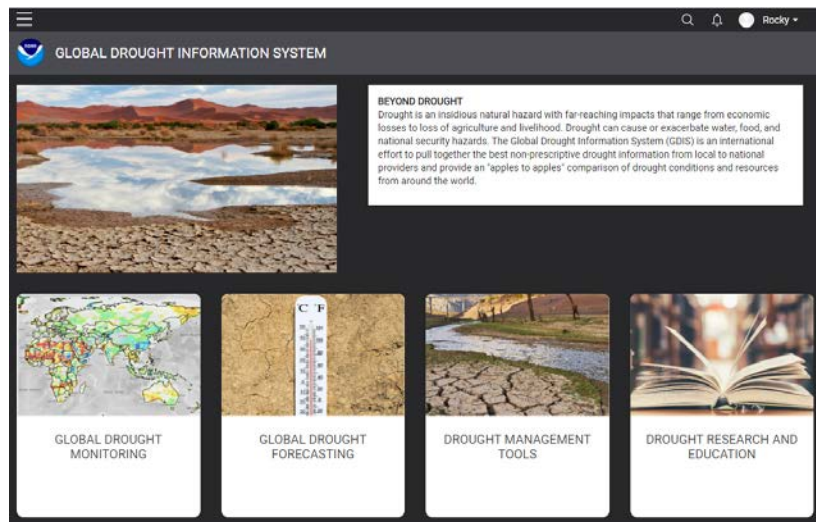
ArcGIS Online

Global Drought Information System

NATIONAL
INTEGRATED
DROUGHT
INFORMATION
SYSTEM

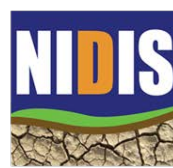


Drought.gov
U.S. Drought Portal

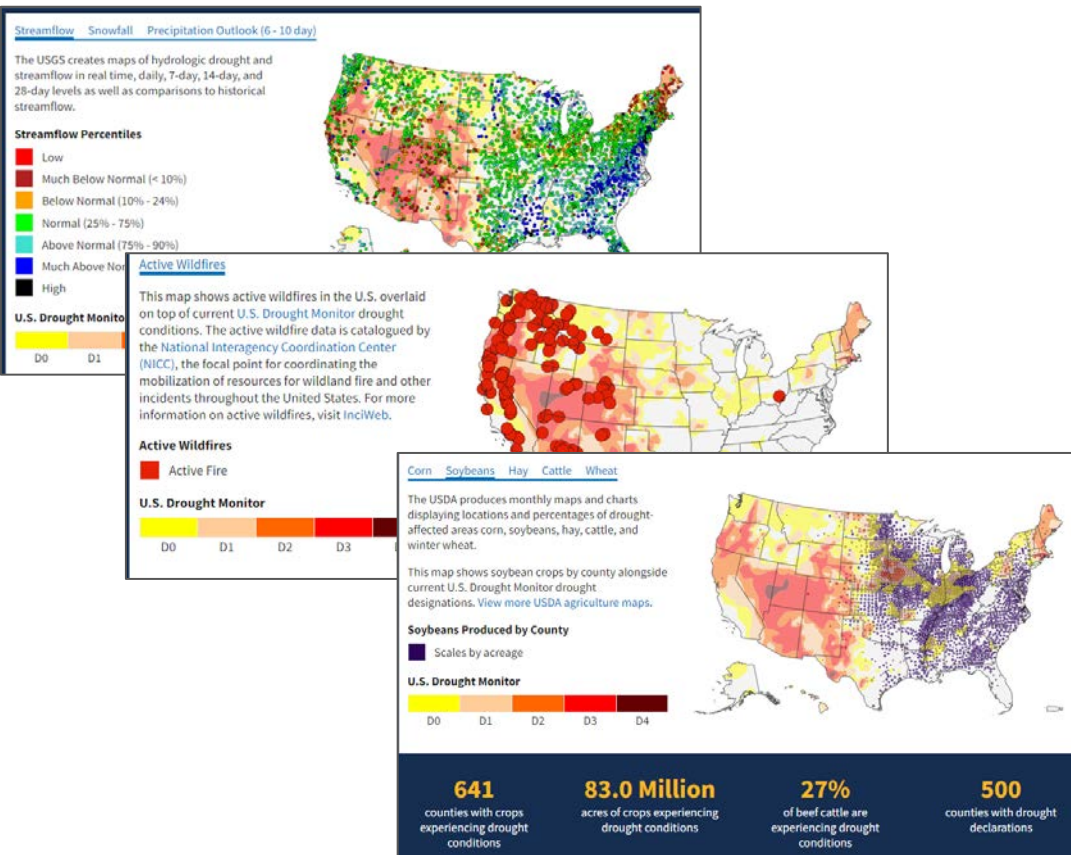


New Drought.gov

NATIONAL
INTEGRATED
DROUGHT
INFORMATION
SYSTEM



Drought.gov
U.S. Drought Portal



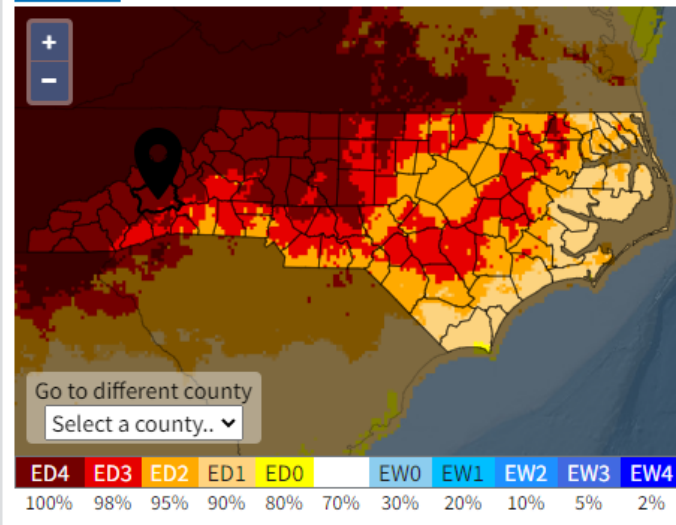
Future Conditions for Buncombe County

Evaporative Demand (EDDI)

01/27/20 Updated weekly

EDDI is an experimental tool that can serve as an indicator of both rapidly evolving "flash" droughts (developing over a few weeks) and sustained droughts (developing over months but lasting up to years).

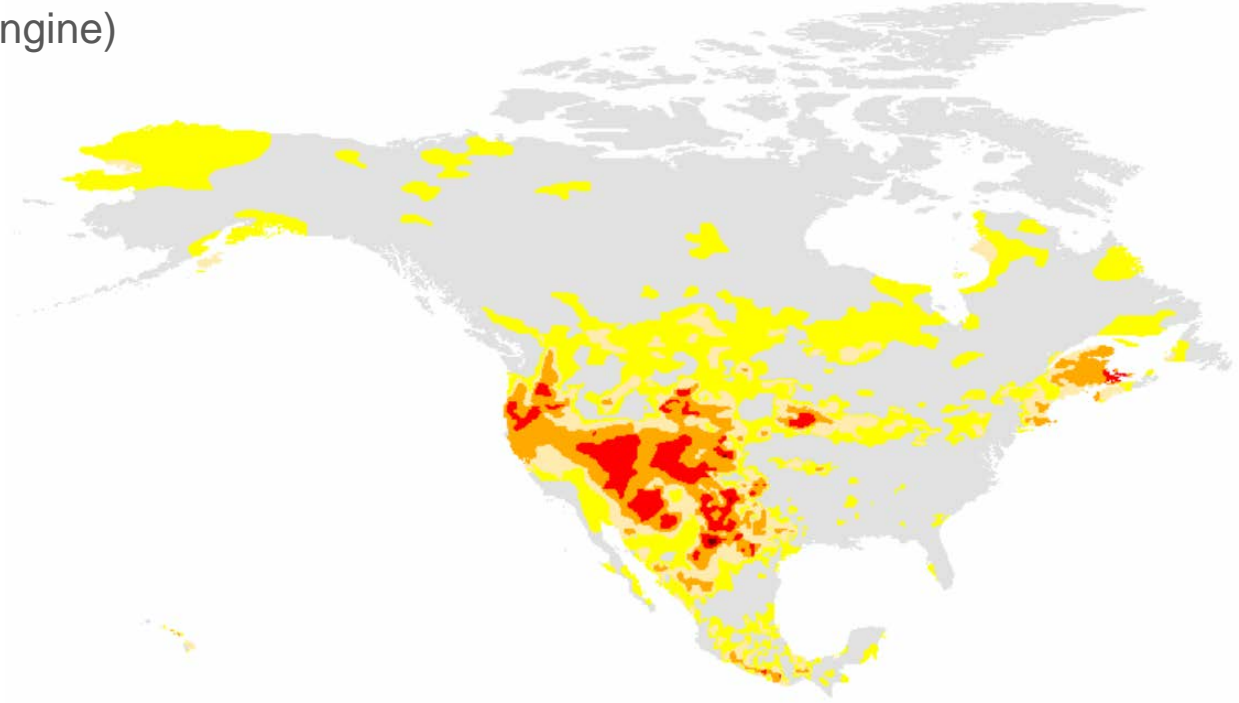
[Two Week](#) [One Month](#)



Gridded NADM (newest)

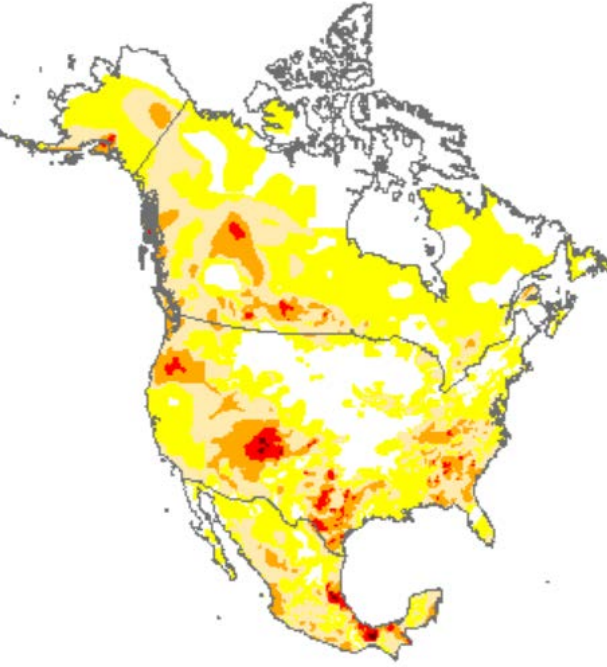
Rasterized to WGS84 & Albers Equal Area

WGS84 (for Climate Engine)

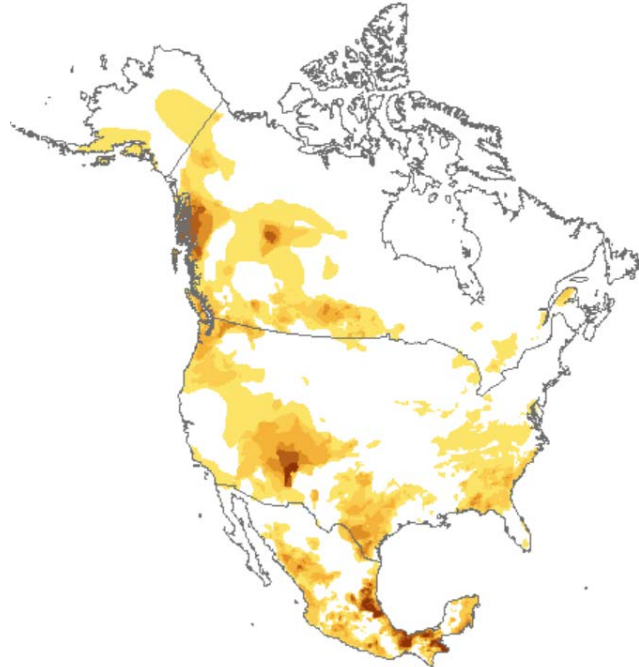


Gridded NADM (newest)

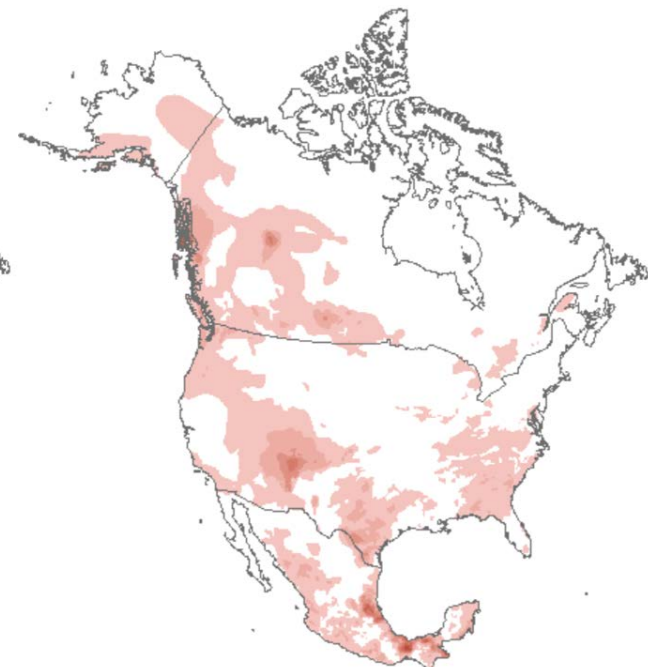
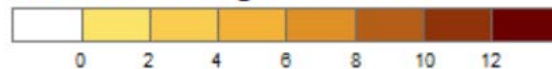
Albers Equal Area (5km = more than 852,000 grids)



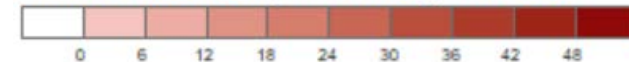
Maximum USDM Drought Category



Months in Drought over 2019

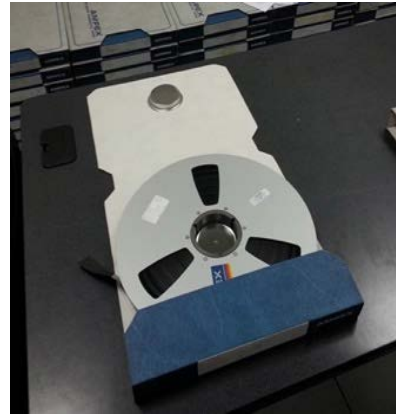


Cumulative Drought Intensity for 2019

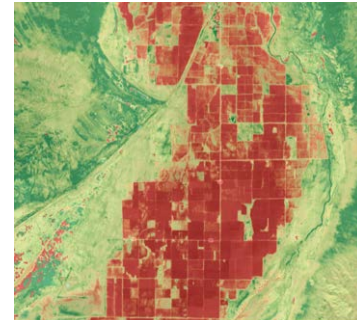
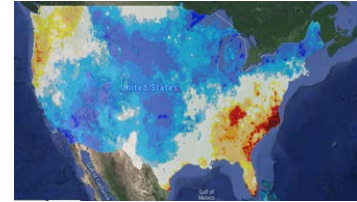
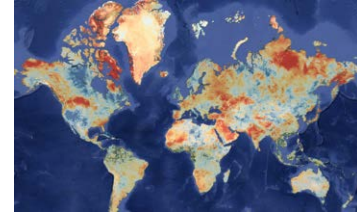


We've Come a Long Way....

1985

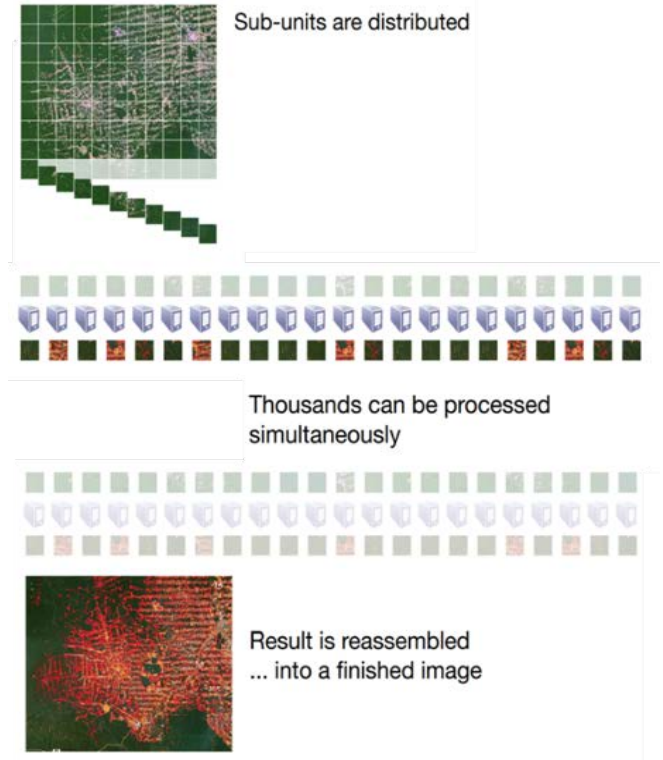


2020

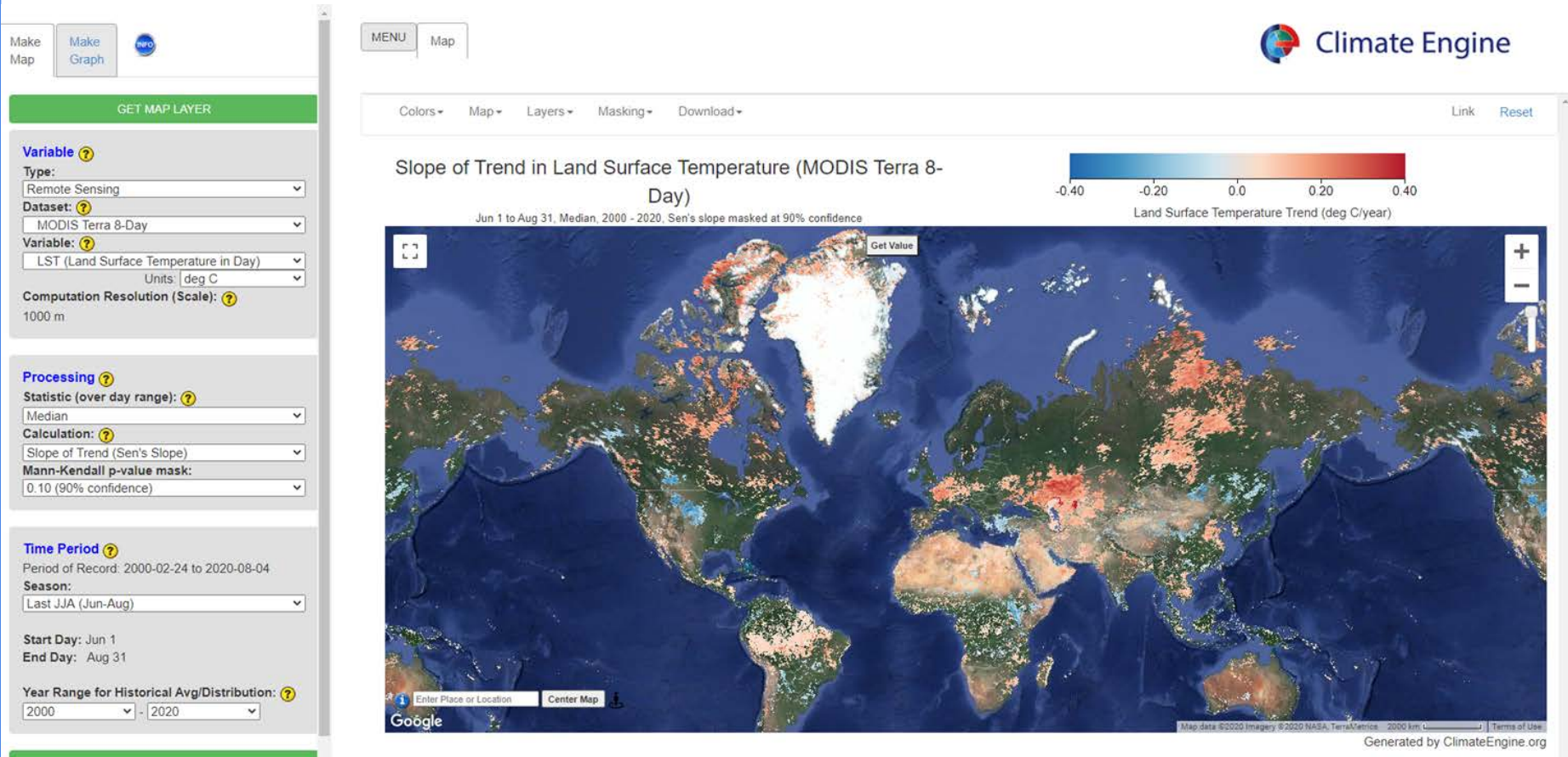


Bringing Algorithms to the Data Instead of Data to the Algorithms

Google Earth Engine

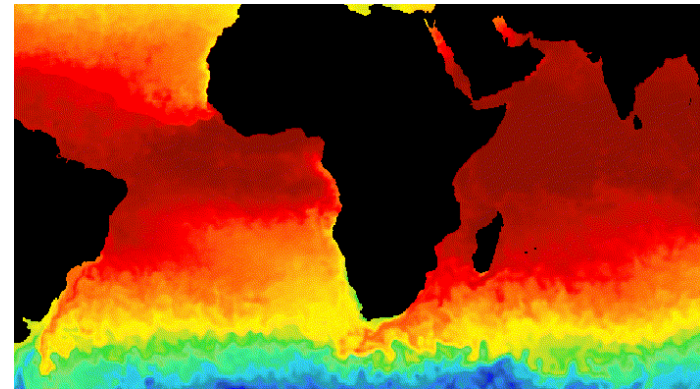
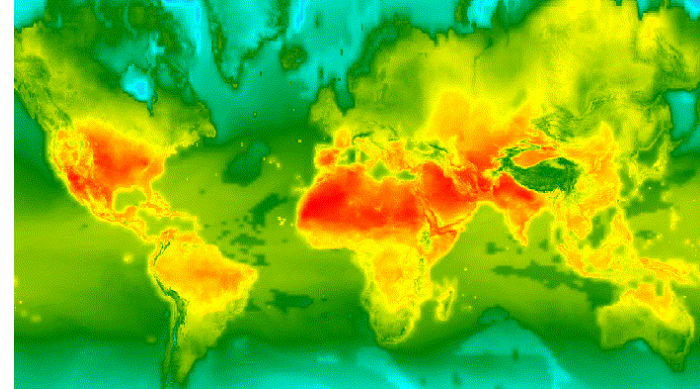


From Archives to Answers that Programmers and Non-Programmers can Obtain



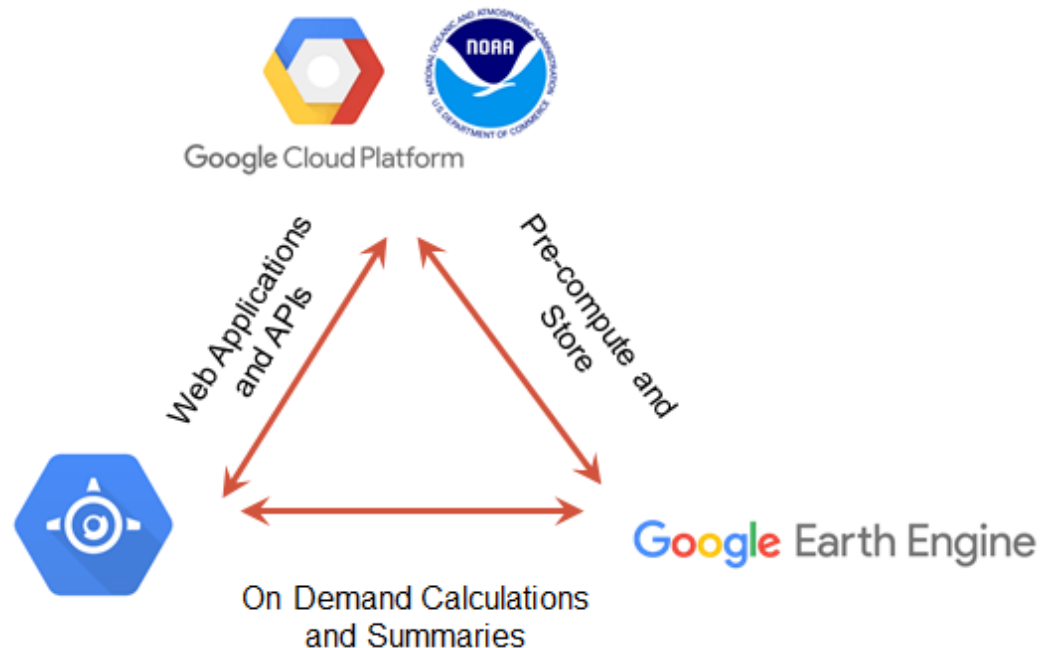
Available Data, Products, Stats... (and growing)

- Satellite Data - Landsat, Sentinel, MODIS, VIIRS, GOES, Planet, more...
- Climate/Weather Data - MERRA2, CFS, ECMWF/ERA5, CHIRPS, GLDAS, NARR, NLDAS, RTMA, gridMET, PRISM, DAYMET, TerraClimate, USDM, NADM, more...
- Variables - ppt, solar, temp, humidity, wind, PET, LST, snow depth and water content, more...
- Products - dozens of indices (drought, snow, vegetation, fire, water)
- Stats - max, min, mean, median, std, percentiles, counts, trends, climos



Why Climate Engine Matters for NOAA and other agencies

- Cloud-native tool for working with NOAA data in the cloud
- Can read Gridded CF-NetCDF from any Google Data Bucket (AAFC, BDP, NESDIS, and more)
- API, Data Export and interoperability with GIS, including NOAA GeoPlatform



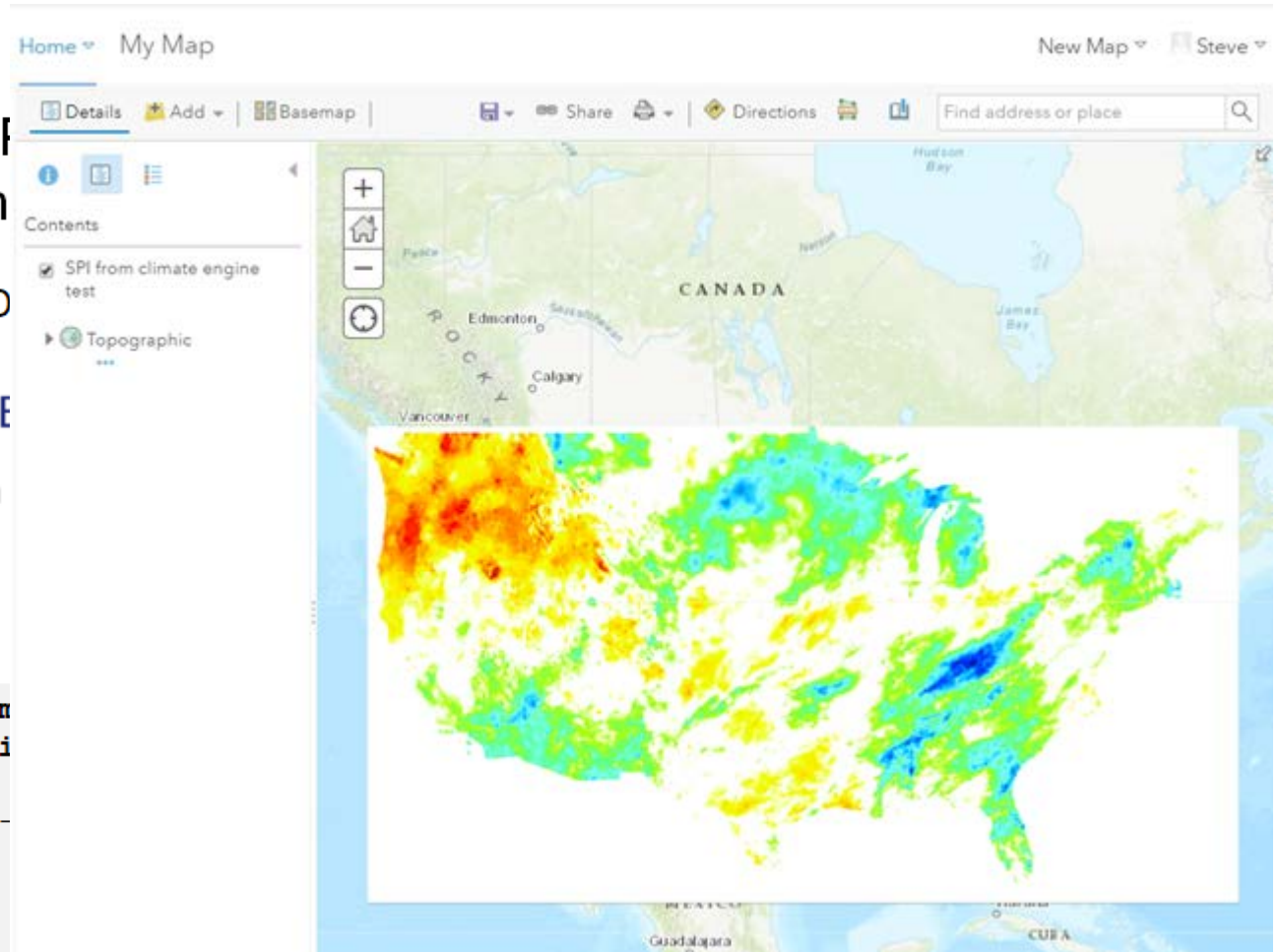
Example

NOAA Geof
(ArcGIS On

- Example – D



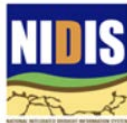
```
# 1. Get Data from  
curl -o $outfi  
  
gdaldem color-  
  
gdal2tiles.py
```



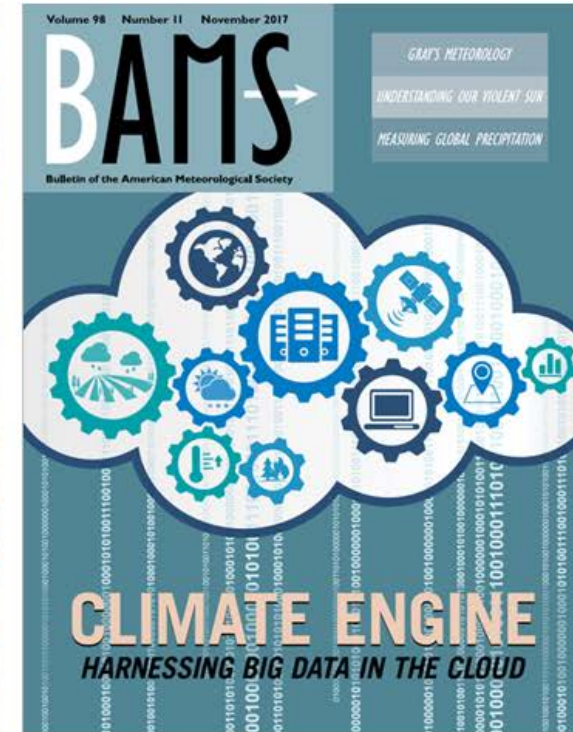
Outreach and Trainings

“Climate Engine leverages a powerful computational server network to provide geospatial data and statistical analysis in a lightweight, web-based user interface. This allows users with limited resources access to previously overwhelming datasets, and provides tools for analysis of vegetation, climate, hydrology, and trends at local, regional, continental or global scales.”

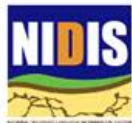
— Marty Landsfeld, FEWS NET,
University of Santa Barbara, Geography
Department



Contact: Justin.Huntington@dri.edu; <https://ClimateEngine.org>



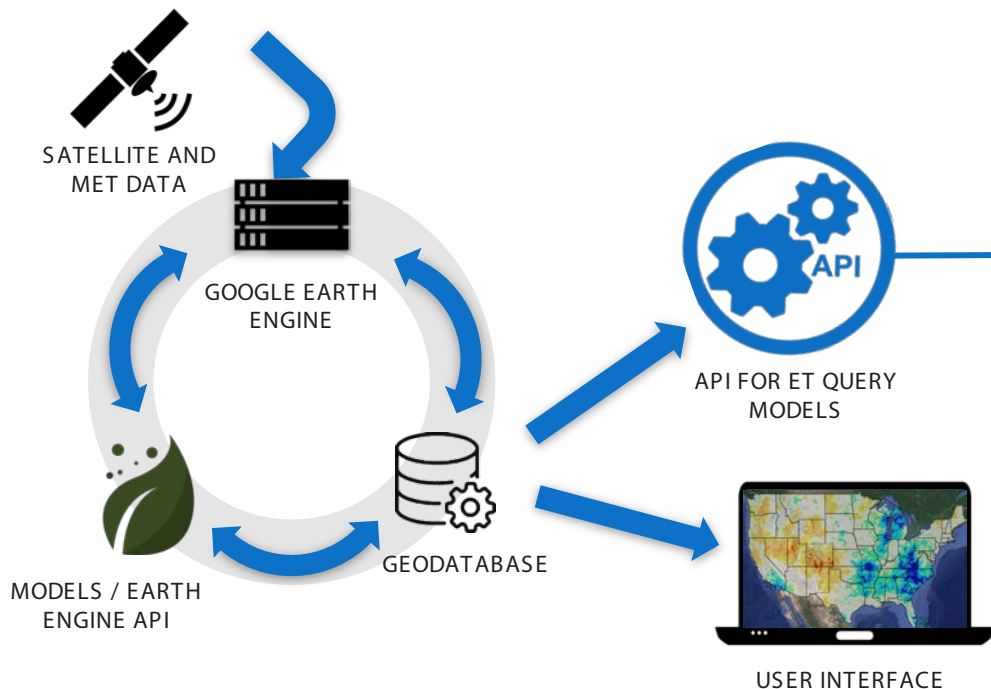
Primary Funders and Partners: Katherine Hegewisch, Britta Daudert, Charles Morton, John T Abatzoglou, Daniel McEvoy and Tyler Erickson



Google Earth Engine

Climate Engine API & Integration with Other Software

Goal: Increase access to consistent, accurate, scientifically based satellite and climate data for a range of applications



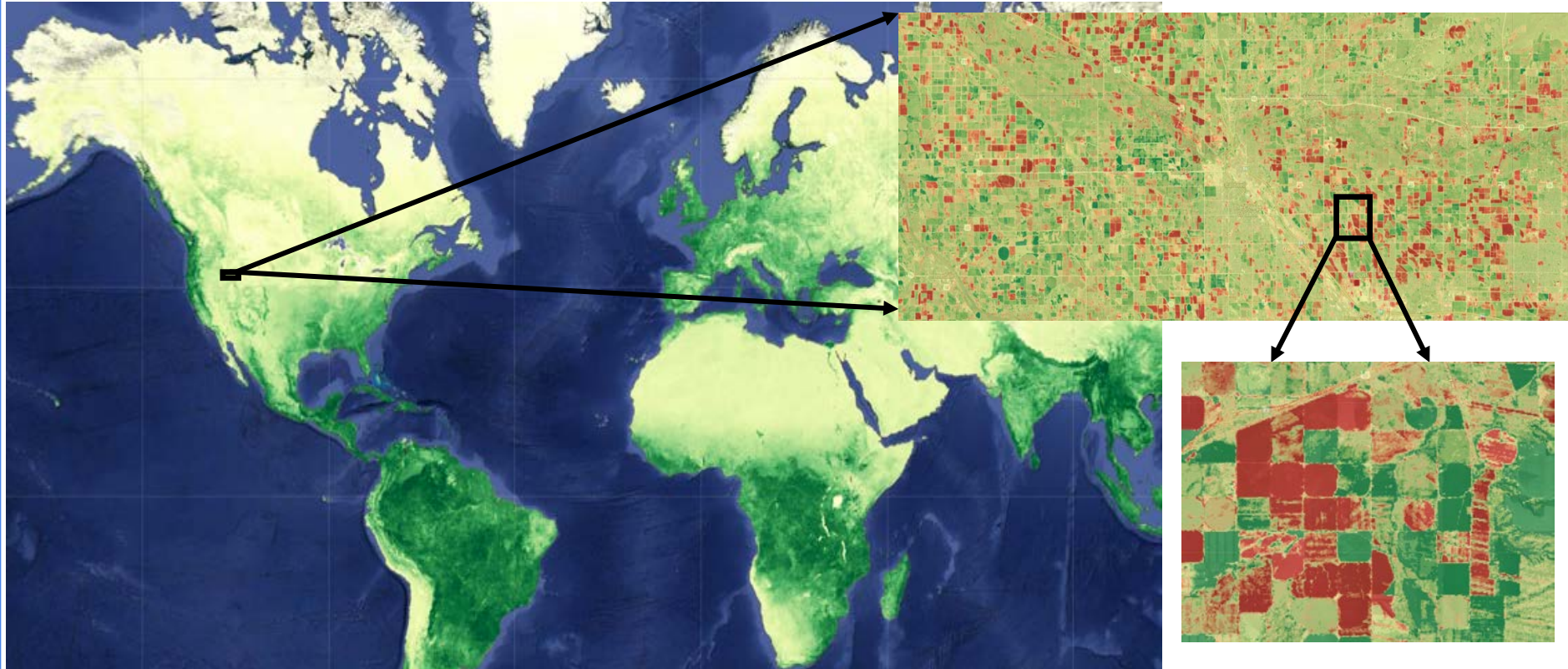
Federal, State, Local Agencies
Data access via APIs

Resource Management Apps
Rangelands, Forests,
Agriculture

Early Warning Systems
Drought, Fire, Water

Global -> Regional -> Field scales; Custom Time Periods; No Downloading of Entire Archives to Answer Simple Questions

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Climate Engine API



API for access to operational data and products

- Rasters -> cloud optimized geotiffs (COGs)
- Time series -> csv, json, geojson

Introduction

Registration

Authentication

Examples

API Services

- Raster Maps API
 - Parameters
 - Example
 - Response
- Time Series API
 - Parameters
 - Example
 - Response

Parameter Lists

- Products
- Variables
- Geometries

Automating Downloads

- Single Requests
- Multiple Requests

API Introduction

Welcome to Climate Engine's API! You can use this API to access all the data available in the [ClimateEngine.org](https://climateengine.org) web tool.

Our APIs are REST APIs which can be made via a simple HTTP request. The base URL for all requests is the following:

```
https://app.climateengine.org/api?
```

We provide two API services:

- TimeSeries API: download time series data in JSON format
- Raster Maps API: download gridded raster map data in geoTiff format.

To finish the request, query parameters must be added onto the base URL and separated by ampersands (&). For example, all requests must include an API key for authentication.

Registration

You must register with Climate Engine in order to make API requests.

Click the button below to start the registration process and to be emailed a key to be included with your request.

Register

Authentication

Authentication is done via an API key. You will receive an API key by email after registering with Climate Engine.

In your URL request, you should provide your API key as a parameter in the query string, as done below.

```
https://app.climateengine.org/api?API_key=[API_key]
```

Note: the above request is not finished. The API_service needs to be filled in. Also, the API_key is but one required parameter in the query string (i.e. that which comes after the ? in the URL).

Parameters	Requirement	Description, Example
API_key	Required	A string of numbers and characters which is a key to identify your request Example: <code>&API_key=[API_key]</code>

You should insert your key into the placeholder [API_key] in the above URL.