

A black and white photograph of a mountain range. The mountains are rugged and rocky, with some snow or light-colored patches. In the sky, there is a bright, curved light streak that looks like a comet or a meteor. The overall tone is dramatic and natural.

# **GIS Cloud Solutions**

## **Exploring alternatives to desktop GIS**

**John Van Hoesen, Ph.D. • Green Mountain College**

**A computer won't clean  
up the errors in your  
manual of procedures.**

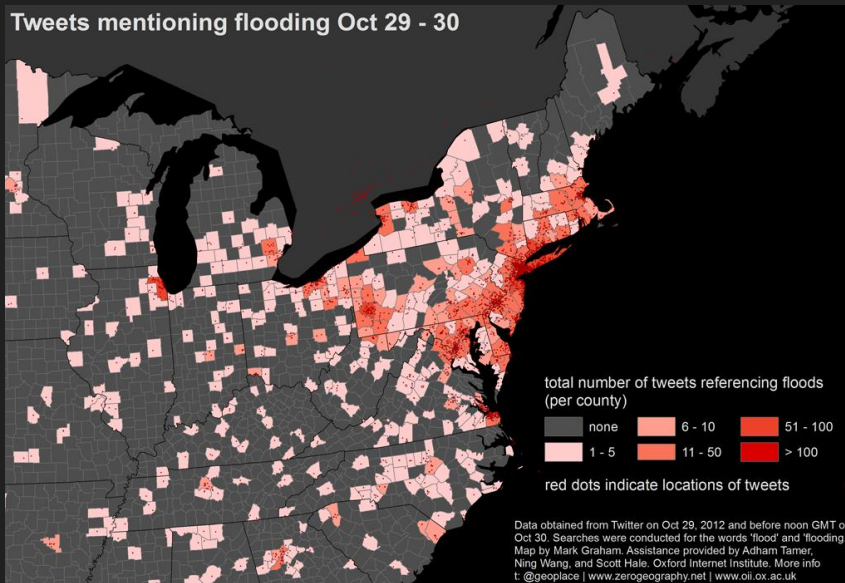
*Sheila M. Eby*

# Harnessing The GeoWeb

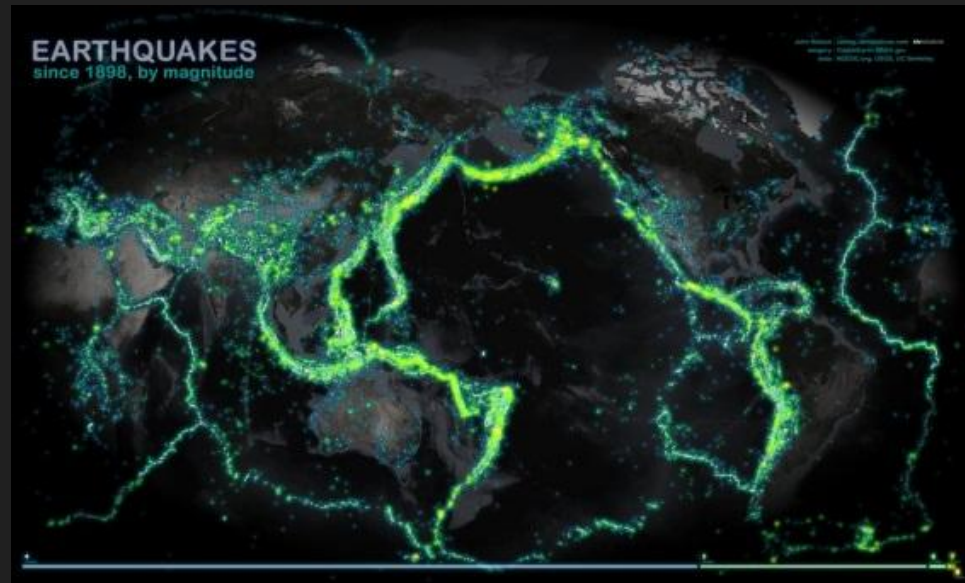
The GeoWeb can be more broadly considered the intersection of geospatial awareness and Web 2.0”

*Goodchild (2007)*

Tweets mentioning flooding Oct 29 - 30



<http://j-vh.me/16q9Yha>



<http://j-vh.me/13RUDXa>

# TileMill



**Node.js** - <http://nodejs.org/>

**Express.js** - <http://expressjs.com/>

**Backbone.js** - <http://j-vh.me/11QilJs>

**Mapnik** - <http://mapnik.org/>

**CartoCSS** - <http://j-vh.me/ZNonCf>

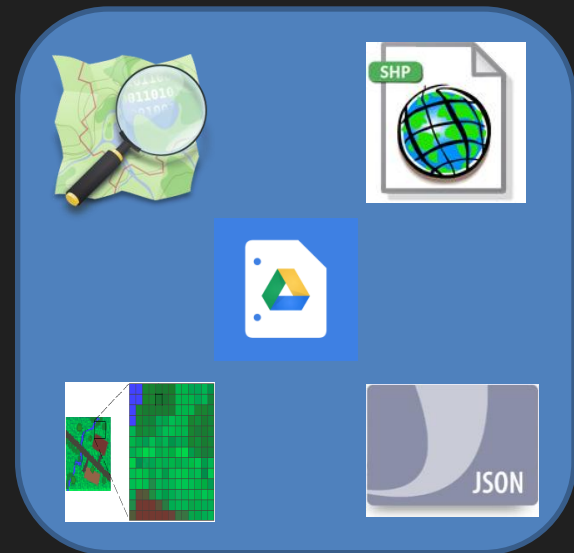


# MapBox.js

WMS

TileService

TileStream





- \*.PNG
- \*.SVG
- \*.PDF
- \*.MBTiles



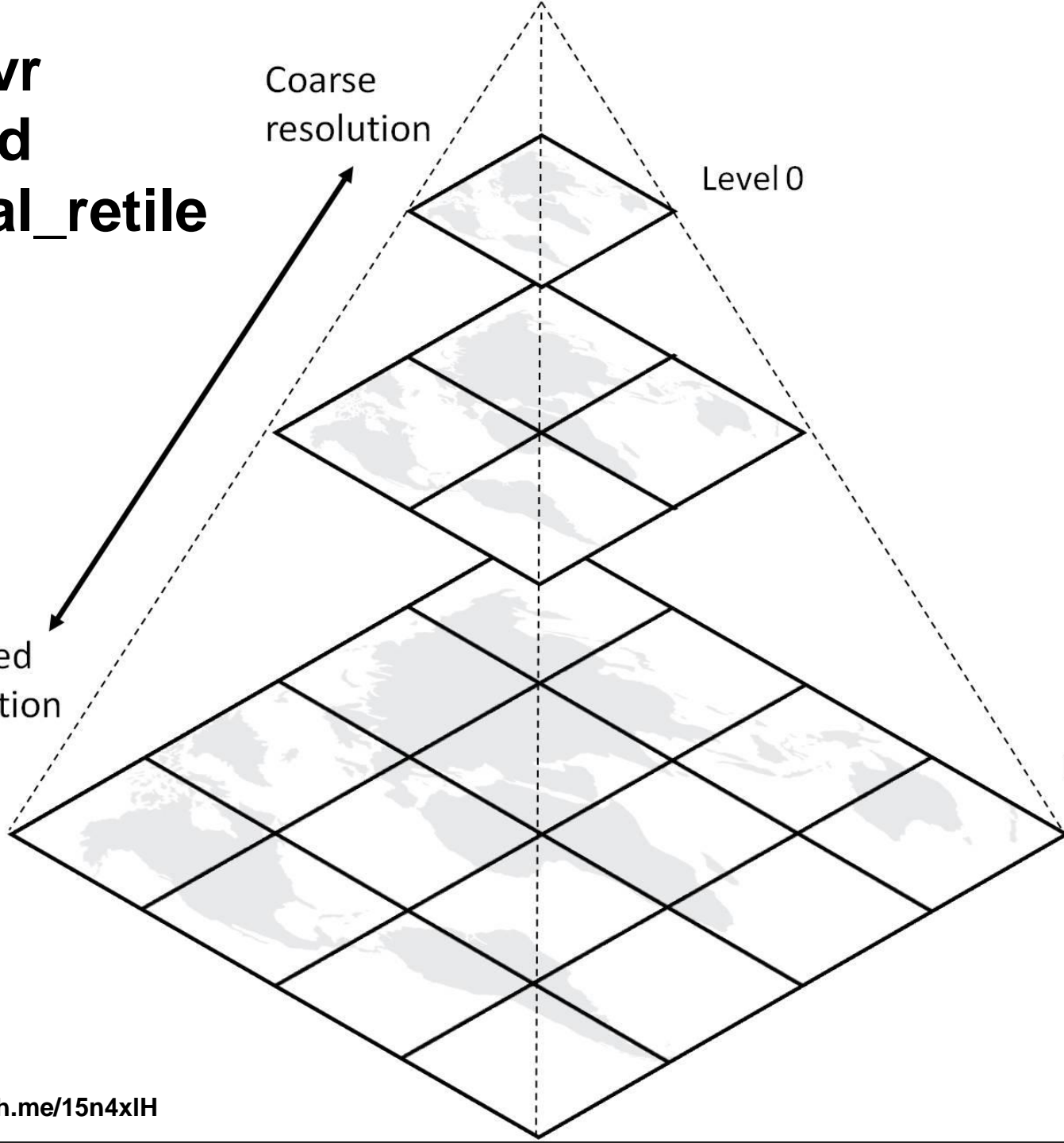
**\*.ovr**  
**\*.rrd**  
**gdal\_retile**

Coarse  
resolution

Level 0

Detailed  
resolution

Level 1

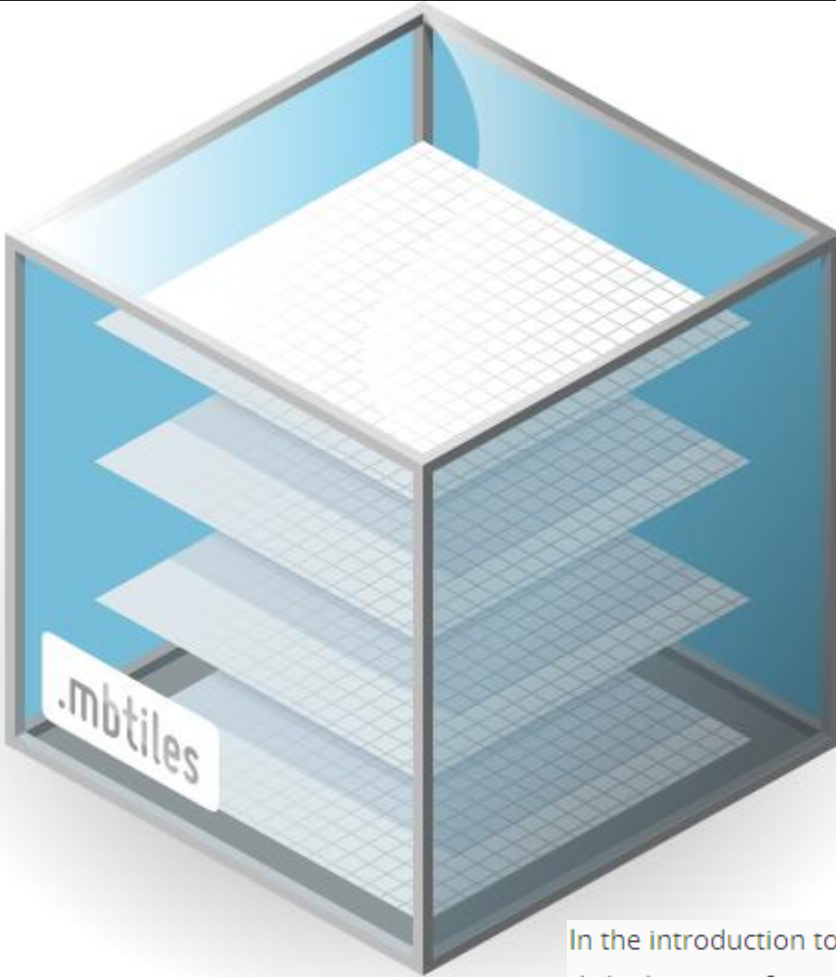


**64 x 64**  
**256 x 256**  
**(png or jpg)**





# Uses SQLite, minimizes redundancy, and stores interactivity



In the introduction to web maps we saw how tiles are referenced by their  $z/x/y$  coordinates. On disk, they are often stored literally in  $z$  and  $x$  subdirectories such that they have a filesystem path like `0/0/0.png`. MBTiles offers a functional equivalent to this -- the `tiles` table:

```
sqlite> SELECT * FROM tiles;
```

zoom_level	tile_column	tile_row	tile_data
5	13	23	[PNG data]
5	13	24	[PNG data]
5	14	23	[PNG data]
5	14	24	[PNG data]
5	15	25	[PNG data]

# Aliased

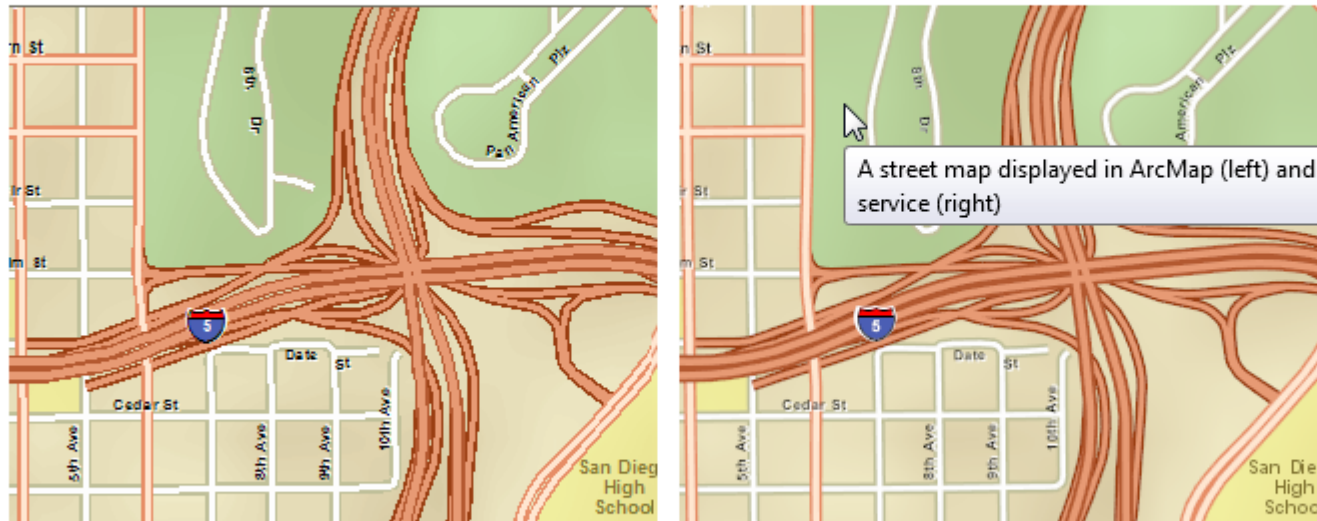


# Anti-Aliased

## Drawing differences between the ArcGIS drawing engines

[Resource Center](#)

Basemap layers and optimized map services in ArcGIS Server use a high-performance drawing engine to achieve better performance and draw what is supported.



*The optimized map service drawing engine (right) includes features such as anti-aliasing to improve appearance.*

Because this drawing engine is different from the drawing engine used in ArcMap or a standard map service, you should be aware of some important differences. The **Prepare** window provides warnings that inform you of many of these differences.

# Compositing Operations

If you've found yourself on this page, we're assuming you've

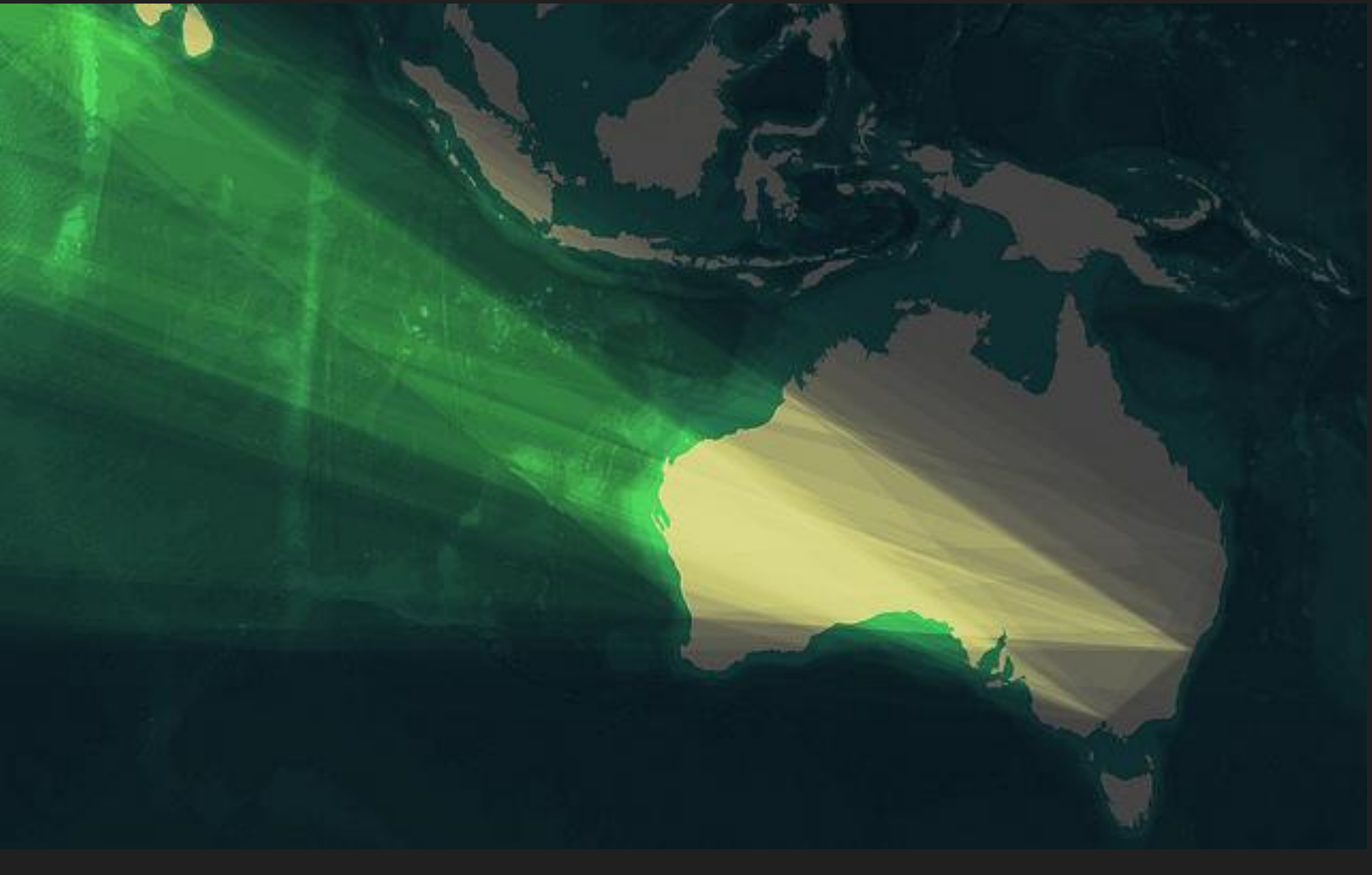
- ➔ [Installed TileMill](#) on your computer.
- ➔ [Reviewed Crash Course](#)

Compositing operations affect the way colors and textures of different elements and styles interact with each other.

Without any compositing operations on a source it will just be painted directly over the destination – compositing operations allow us to change this. There are 33 compositing operations available in CartoCSS:

plus	difference	src
minus	exclusion	dst
multiply	contrast	src-over
screen	invert	dst-over
overlay	invert-rgb	src-in
darken	grain-merge	dst-in
lighten	grain-extract	src-out
color-dodge	hue	dst-out
color-burn	saturation	src-atop
hard-light	color	dst-atop
soft-light	value	xor









Editor



Projects



Manual



Plugins



Settings

+ New project



Energy Reality

Updated Mon May 6 4:17pm



Maryland Soil Data

Updated Fri Mar 22 7:27pm



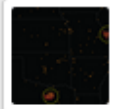
Monterey

Updated Fri Mar 1 6:00pm



Ocean Drilling Program Map

Updated Sat Mar 9 1:57pm



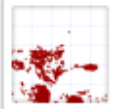
Oxengate

Updated Thu Mar 14 8:45pm



Plays

Updated Fri Mar 1 6:05pm



US Gas Shale Wells

Updated Sat Feb 23 12:58pm



VAAS Fellows

Updated Fri Feb 15 2:17pm



Vermont Surficial Geology (1970)

Updated Wed Mar 6 3:10pm





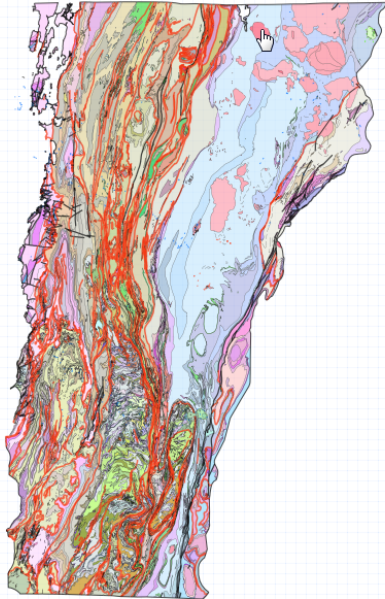
[ ] style.mss x +

```
1 @water:#9ce;
2 @land:#e8efe0;
3
4 Map { background-color:@land; }
5
6 #water {
7   polygon-fill:@water;
8   polygon-gamma:0.6;
9 }
10
11 #admin {
12   line-color:#603;
13   [maritime=1] { line-color:darken(@
14 }
```

- + ↺  
 ZOOM 8

Formation: Derby pluton

p6 E O S D C IP Tr J K T Pe Ne Q



The Bedrock Geologic Map of Vermont is the result of a cooperative agreement between the U.S. Geological Survey (USGS) and the State of Vermont. The State's complex geology spans 1.4 billion years of Earth's history. The new map comes 50 years after the most recent map of the State by Charles G. Doll and others in 1961 and a full 150 years since the publication of the first geologic map of Vermont by Edward Hitchcock and others in 1861. At a scale of 1:100,000, the map shows an uncommon level of detail for State geologic maps. Mapped rock units are primarily based on lithology, or rock type, to facilitate derivative studies in multiple disciplines.

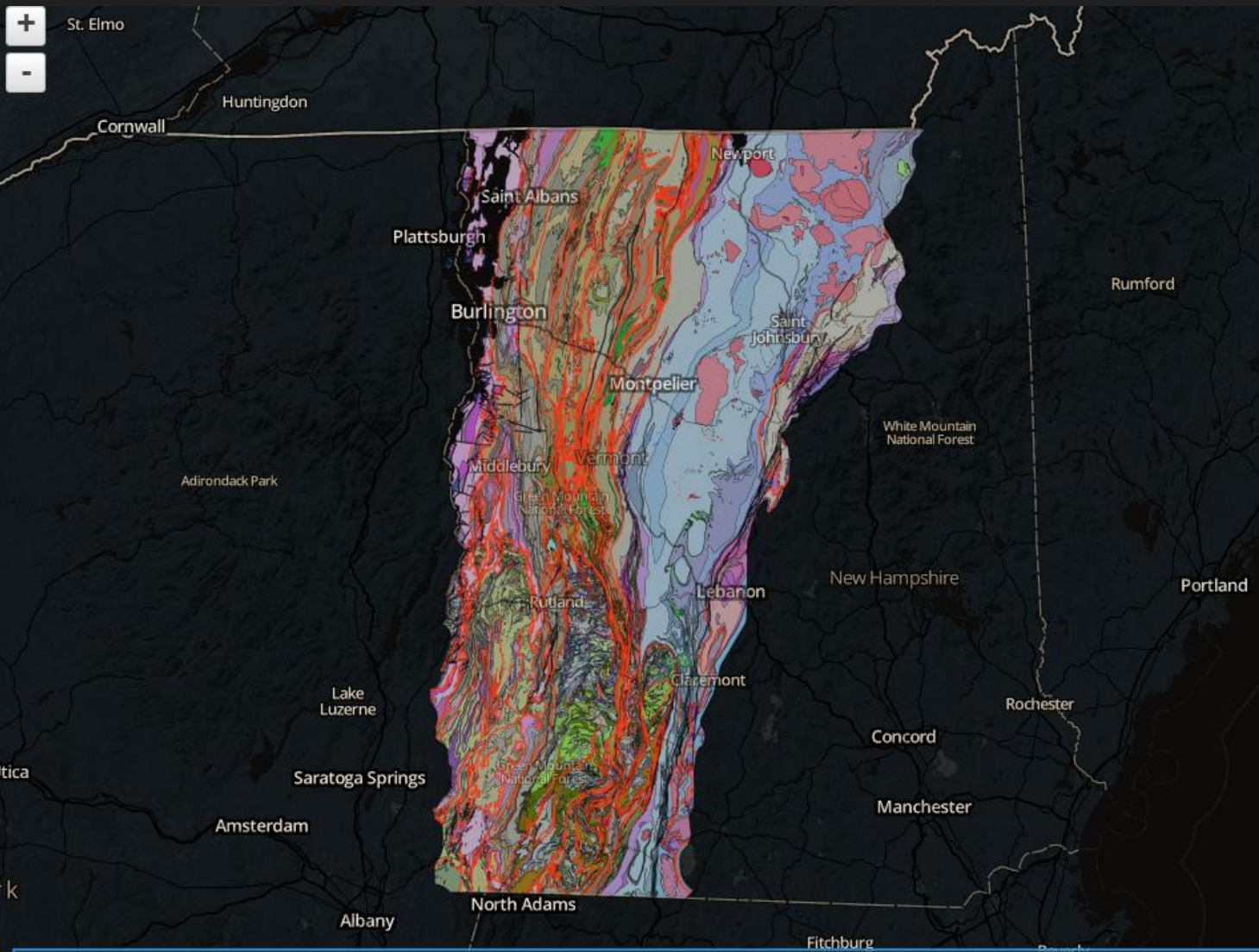
### Bedrock Geologic Map of Vermont (2012)

Save Export ↺

```

style.mss x +
1 /*****
2 This map was created using a variety of data layers obtained from
3 vcgi.org and http://pubs.usgs.gov/sim/3184/. RGB color values
4 were extracted from layers provided on the USGS site using
5 ArcGIS 9.3 and this script:
6 http://forums.esri.com/Thread.asp?c=93&f=1730&t=220177
7
8 Geologic symbols were created using standards found here:
9 http://ngmdb.usgs.gov/fgdc_gds/geolsymstd/download.php
10
11 Geologic colors for the legend were extracted from here:
12 http://pubs.usgs.gov/tm/2005/11B01/pdf/plate.pdf
13
14 Geology font is : FGDCGeoAge Regular
15
16 Layers compiled by John Van Hoesen (vanhoesenj@gmail.com)
17 *****/
18
19 #VTTowns { ::line {
20   line-width: 0.2;
21   line-color: #000000;
22 }
23 }
24
25 #Geochron [zoom > 8] {
26   marker-width: 6;
27   marker-fill: #000000;
28   ::labels {
29     text-name: "[RAD_AGE]";
30     text-face-name: "Arial Bold";
31     text-fill: #343434;
32     text-allow-overlap: true;
33     text-size: 12;
34     text-opacity: 0.7;
35   }
36 }
37
38 #VT_Contacts { ::line {
39   line-opacity: 0.7;
40   [TYPE = 'concealed'] { line-dasharray: 2,5; line-color: #000000; line-width: 0.25; }
41   [TYPE = 'contact'] { line-color: #000000; line-width: 0.25; }
42   [TYPE = 'dashed'] { line-dasharray: 5,2; line-color: #000000; line-width: 0.25; }
43   [TYPE = 'fault'] { line-color: #000000; line-width: 1.25; }
44   [TYPE = 'fault?'] { line-color: #000000; line-width: 1.25; }
45   [TYPE = 'high angle'] { line-color: #000000; line-width: 1.25; }
46   [TYPE = 'normal fault'] { line-color: #000000; line-width: 1.25; }
47   [TYPE = 'strike slip'] { line-color: #000000; line-width: 1.25; }
48   [TYPE = 'scratch'] { line-width: 1.0; }
49   [TYPE = 'thrust open'] { line-color: #FA3411; line-width: 1.5; }
50   [TYPE = 'thrust solid'] { line-color: #FA3411; line-width: 1.5; }

```



## Surfaces and Depths: Vermont Geology

An exploration tool for Vermont's bedrock geology, surficial geology and soil types. More information available at the [Office of the State Geologist](#)

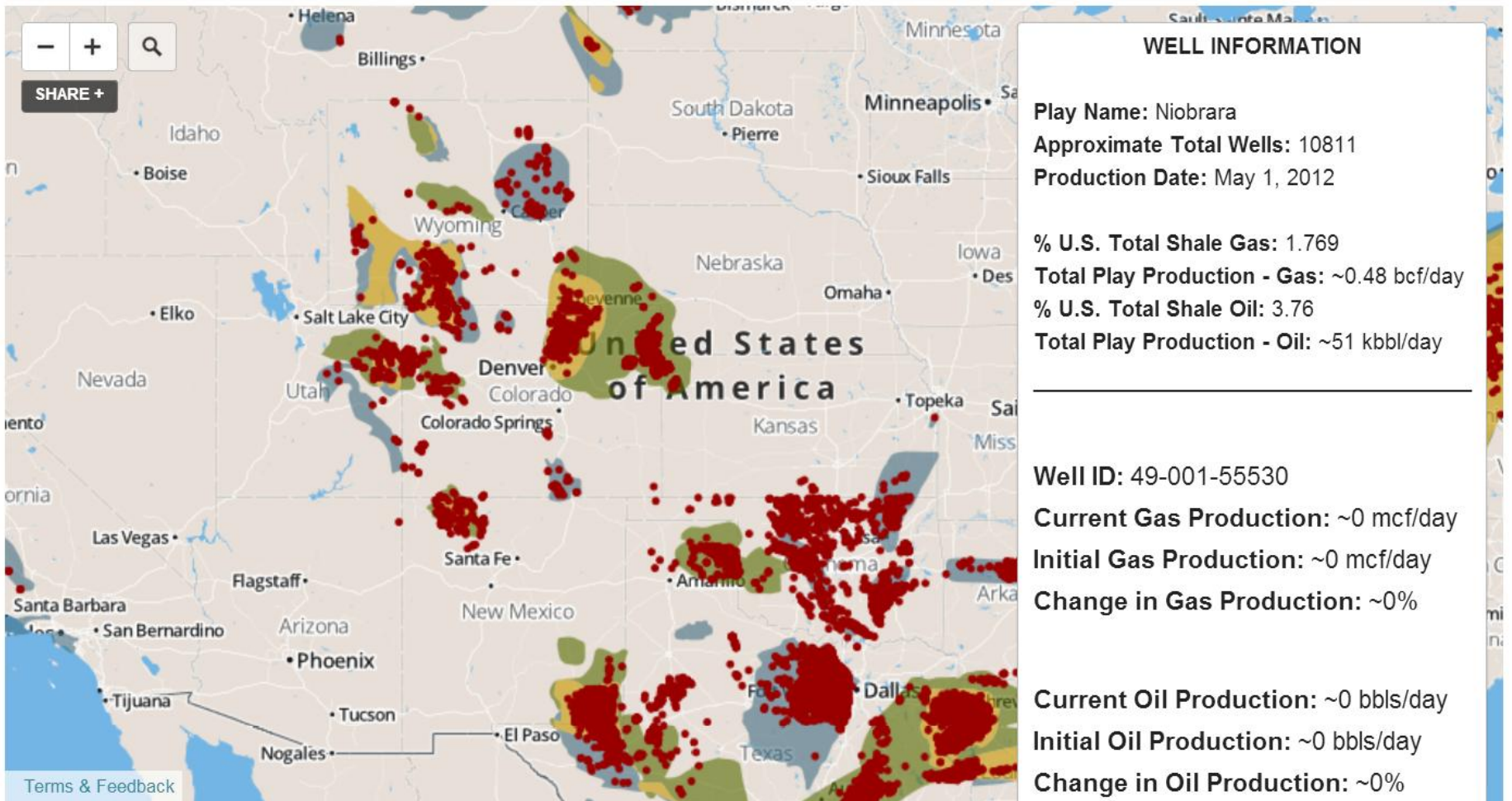
- [Bedrock Geology](#)
- [Surficial Geology](#)
- [Soil Types](#)

The Bedrock Geologic Map of Vermont is the result of a cooperative agreement between the U.S. Geological Survey (USGS) and the State of Vermont. The State's complex geology spans 1.4 billion years of Earth's history. The new map comes 50 years after the most recent map of the State by Charles G. Doll and others in 1961 and a full 150 years since the publication of the first geologic map of Vermont by Edward Hitchcock and others in 1861. At a scale of 1:100,000, the map shows an uncommon level of detail for State geologic maps. Mapped rock units are primarily based on lithology, or rock type, to facilitate derivative studies in multiple disciplines.



## Drill, Baby, Drill by Post Carbon Institute

Over 63,000 shale gas and shale oil (tight oil) wells in the U.S. Mouse over any well to find production data on both the well and the play as a whole.



## INTERACTIVE MAP

# How fast is LAFD where you live?

An analysis by the [Los Angeles Times Data Desk](#)

Enter an address in the Los Angeles city limits

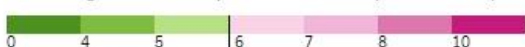
GO

Rescuers are expected to arrive to nearly all 911 calls within six minutes, a national standard LAFD leaders concede they routinely fail.

The Times analyzed more than a million runs by the Fire Department over the last five years and found that what Angelenos can expect often depends on where they live. You can read about the causes and patterns [in the Times story](#).

Use this map to compare the LAFD's performance across L.A.

### Average full 911 response in minutes (2007-2012)



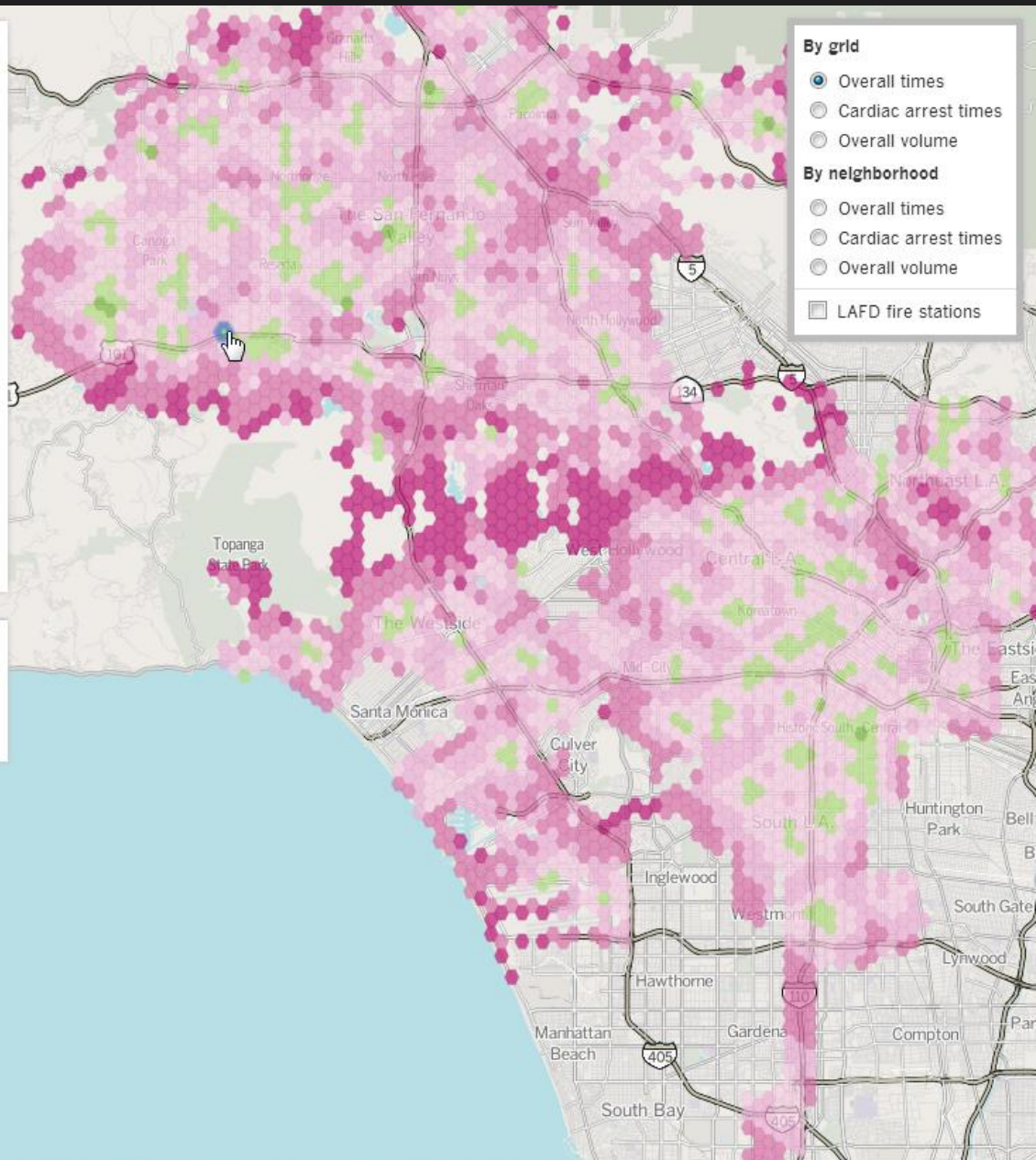
[National standards](#) say most responses should be under 6 minutes

From 2007-2012:  
318 total responses

Medical 94% Fire 6%

5 min., 39-second average response

Avg. dispatch 1:23 Avg. arrival 4:16  
21 seconds faster than national standards





DEMO

<http://j-vh.me/1aBiisW>

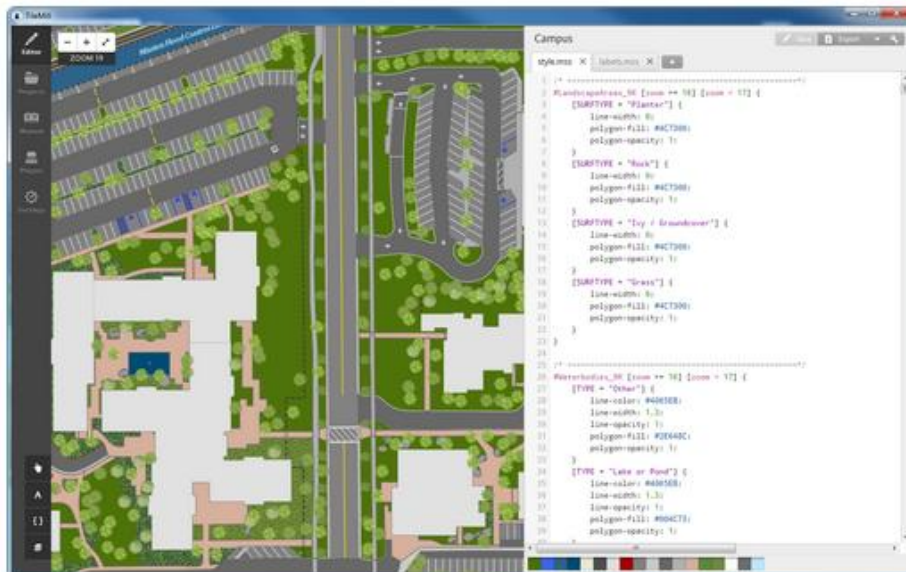
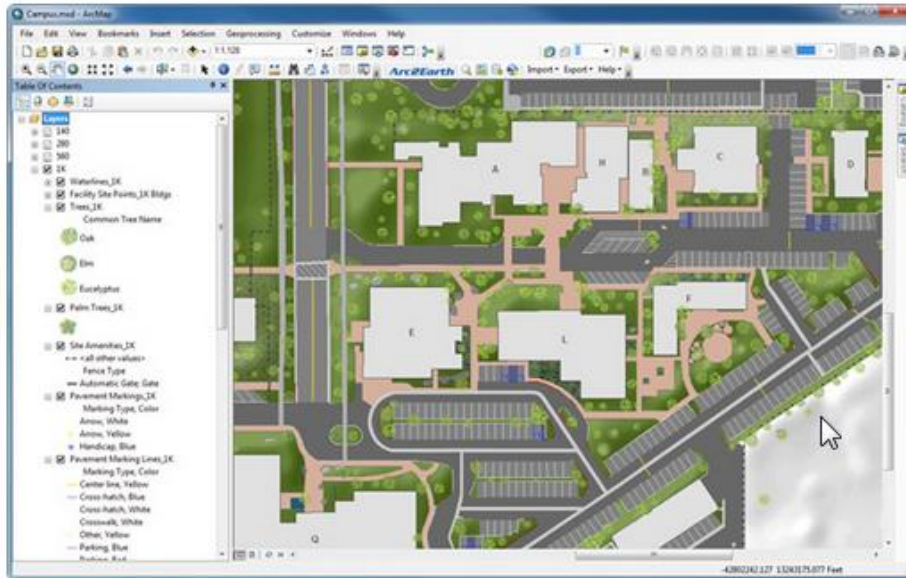
# Arc2Earth

## Create Map Tile Caches

Dramatically improve the time it takes to display complex maps. Create map title caches for Google Maps, Leaflet, OpenLayers, ArcGIS Server and Mapbox.

- Export tiles to a local machine, your MapBox account or Amazon S3
- **Command Line Tools:** Integrate tile creation and maintenance into your own workflow
- **Multi Cutters:** Automatically use multiple tile cutter processes on multi-core CPUs
- **Change Detection:** Minimize tile maintenance time with automatic routines to detect where data has changed in your cache
- Open your MXD Documents in TileMill using TileMill Connect. Converts your entire map into CartoCSS.
- **Tile Formats:** Google, Bing, ArcGIS Server, MBTiles (MapBox, TileStream) and TMS

[Learn More...](#)



# Why Bother?

- **FANTASTIC** customer support
- **Creative control = cartography!**
- **It is FAST**
- **You CAN** run remotely
- **Hosted (yes, eventually costs \$)**
- **Mapbox.js is flexible and evolving**
- **HTML5 compliant w/devices**

# CartoDB



VISUALIZE

ANALYZE

DEVELOP

DOCUMENTATION

PRICING

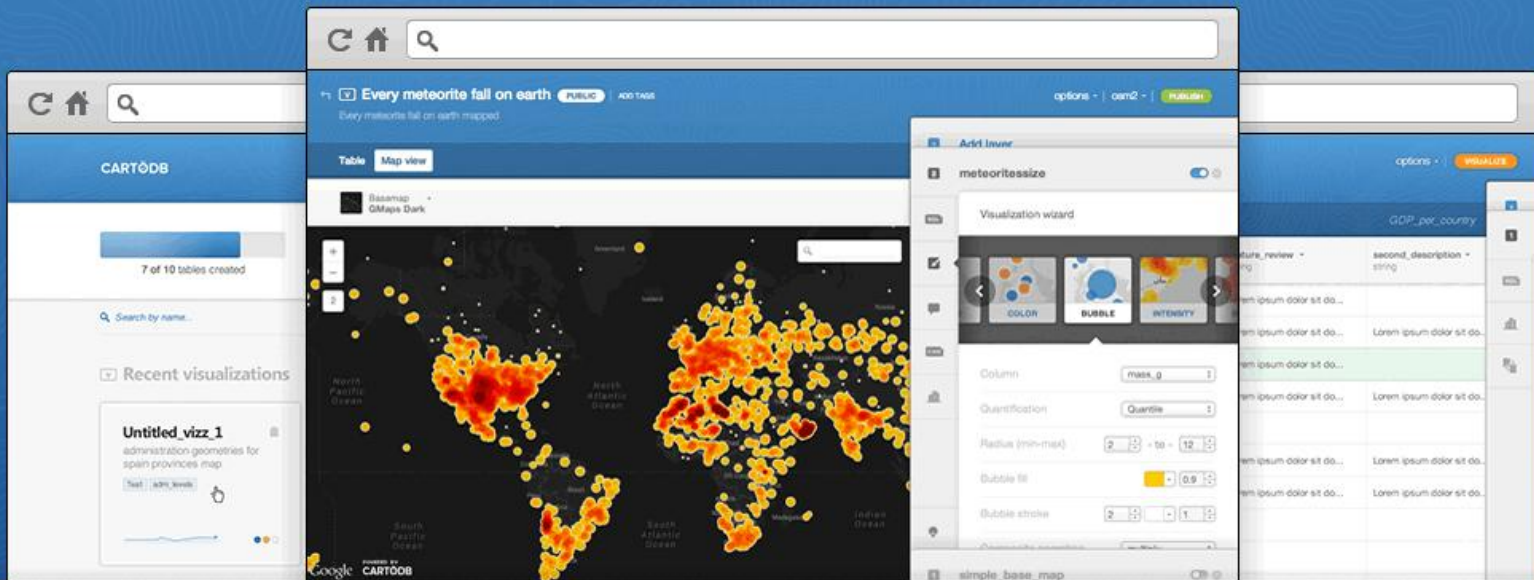
SIGN IN

## We help people visualize and analyze geospatial data

From polygons to points. From hundreds to millions. No limits with CartoDB.

See how

Get started



# CartoDB

<code>.CSV .TAB *</code>	Comma-separated values and Tab delimited file
<code>.SHP **</code>	ESRI shapefiles
<code>.KML, .KMZ</code>	Google Earth format
<code>.XLS, .XLSX ***</code>	Excel Spreadsheet
<code>.GEOJSON</code>	GeoJSON
<code>.GPX</code>	GPS eXchange Format
<code>.OSM, .BZ2</code>	Open Street Map dump
<code>.ODS</code>	OpenDocument Spreadsheet
<code>.SQL</code>	Experimental SQL format dumped from CartoDB

Table Map view

cartodb_id	the_geom	cartodb_georef_status	city	count	date	papers	registrati	state	year	years
number	geometry	boolean	string	number	date	number	number	string	number	string
1	-74.0071, 40.7146	true	New York	null	1889-10-01	null	60	New York	1889	1889
2	-83.0028, 39.9620	true	Columbus	1	1891-10-01	0	23	Ohio	1891	1891
3	-71.0567, 42.3587	true	Boston	null	1893-10-01	null	51	Massachusetts	1893	1893
4	-75.1625, 39.9523	true	Philadelphia	null	1895-10-01	26	57	Pennsylvania	1895	1895
5	-77.0320, 38.8904	true	Washington DC	null	1896-10-01	41	76	null	1896	1896
6	-74.0071, 40.7146	true	New York	null	1898-10-01	43	77	New York	1898	1898
7	-73.7552, 42.6516	true	Albany	1	1900-10-01	30	51	New York	1900	1900
8	-90.1996, 38.6277	true	St Louis	null	1904-10-01	38	49	Missouri	1904	1904
9	-75.6912, 45.4218	true	Ottawa	null	1905-10-01	51	39	Ontario	1905	1905
10	-74.0071, 40.7146	true	New York	null	1906-10-01	86	133	New York	1906	1906
11	-76.6093, 39.2906	true	Baltimore	null	1908-10-01	72	157	Maryland	1908	1908
12	-80.3635, 40.9342	true	Pittsburg	null	1910-10-01	42	95	Pennsylvania	1910	1910
13	-77.0320, 38.8904	true	Washington DC	null	1911-10-01	null	140	null	1911	1911
14	-74.6587, 40.3499	true	Princeton	1	1914-10-01	63	266	New Jersey	1914	1914

Navigation sidebar with icons for home, search, SQL, chart, and other tools.

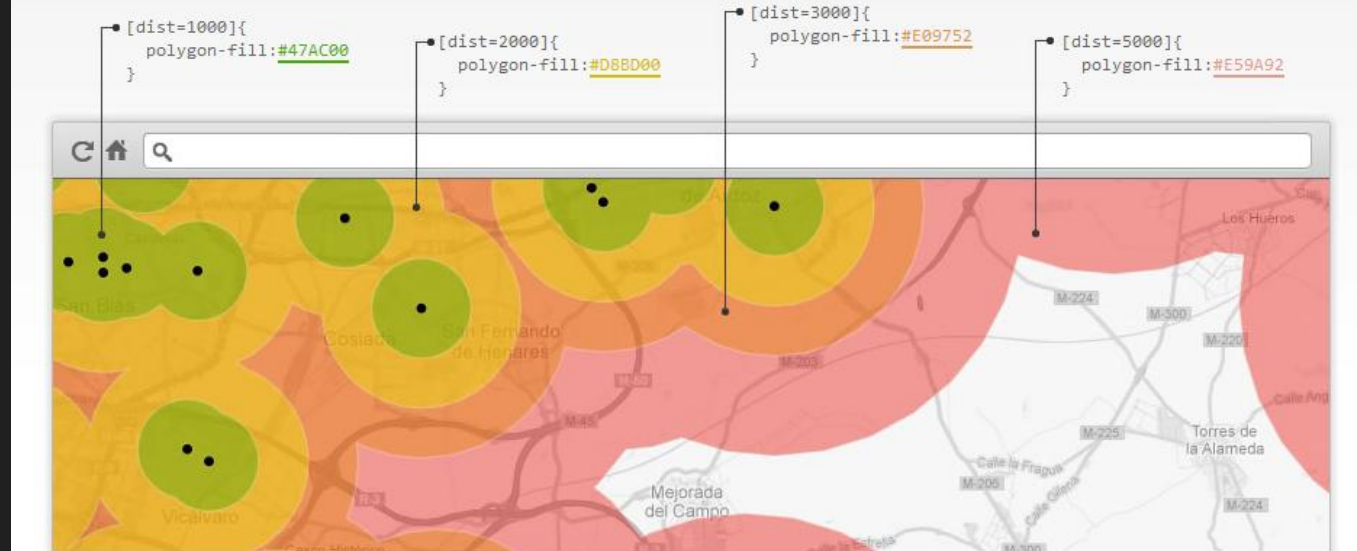




## Advanced styling with CartoCSS

Squeeze all the power of CartoCSS. If you know how to use CSS to style websites, you already know how to use CartoCSS to style your maps. CartoCSS language is an easy, flexible, and powerful way to making a better looking map and to analyze visually your geospatial data.

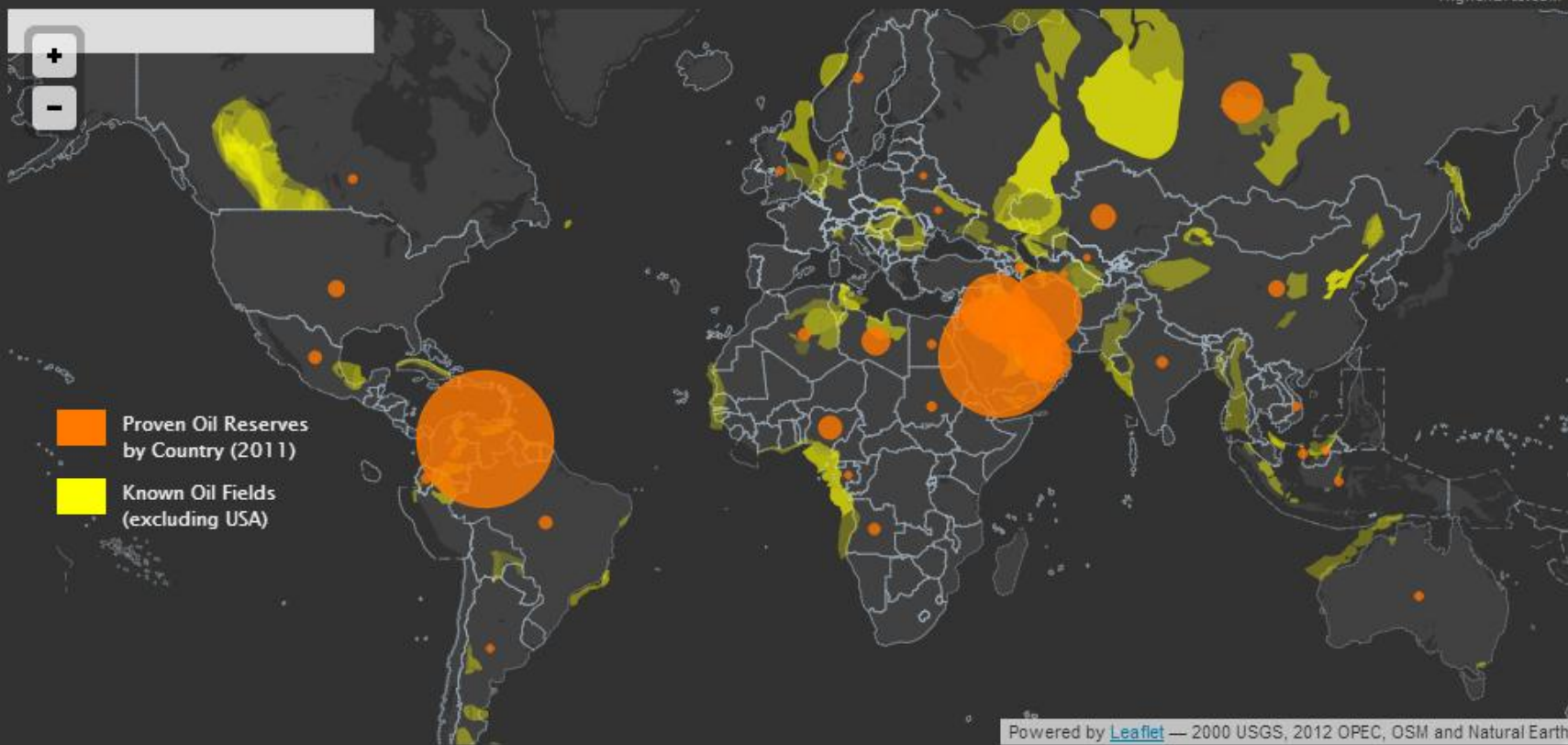
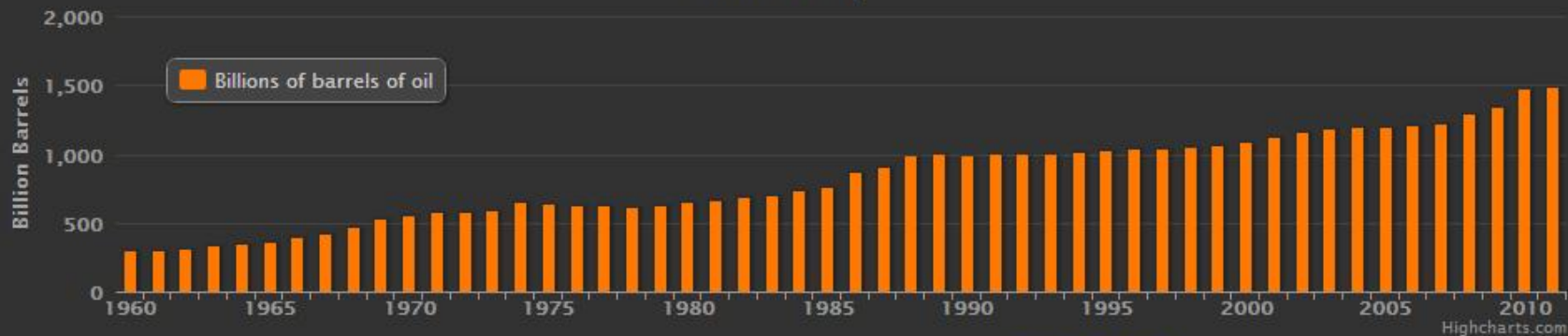
```
#significant_month [ mag >= 7.0] {
  marker-width: 20;
  marker-fill: #dd0a2e;
  marker-line-color: #dd0a2e;
  marker-line-width: 0;
  marker-line-opacity: 1;
  marker-opacity: 0.9;
  marker-placement: point;
  marker-type: ellipse;
  marker-allow-overlap: true;
  marker-clip: false;
  marker-multi-policy: largest;
}
#significant_month [ mag <= 7.0] {
  marker-width: 15;
  marker-fill: #e16514;
  marker-line-color: #e16514;
  marker-line-width: 0;
  marker-line-opacity: 1;
  marker-opacity: 0.9;
  marker-placement: point;
  marker-type: ellipse;
  marker-allow-overlap: true;
  marker-clip: false;
  marker-multi-policy: largest;
}
#significant_month [ mag <= 6.5] {
  marker-width: 10;
  marker-fill: #f9cb1d;
  marker-line-color: #f9cb1d;
  marker-line-width: 0;
  marker-line-opacity: 1;
  marker-opacity: 0.9;
  marker-placement: point;
  marker-type: ellipse;
  marker-allow-overlap: true;
  marker-clip: false;
  marker-multi-policy: largest;
}
```



<http://0to255.com/>

# Global Oil Reserves: 1960–2011

Source: OPEC.org







# Mapping The Lexicon of Sustainability

Put brief description here?.

Add To The Map Here




# Lexicon Sighting (Responses) ☆

File Edit View Insert Format Data Tools Form Help Last edit was seconds ago





 \$ % 123 ▾ Arial ▾ 10 ▾ **B** *I* A ▾          

fx | Timestamp

	A	B	C	D	E	F	G
1	Timestamp	Word	Location	Category	Theme		
2	9/17/2013 14:16:40	organic	Asheville, North Carolina	Food and Agriculture	Land Ownership		
3	9/17/2013 14:29:18	organic	Poultney, Vermont	Food and Agriculture	Local		
4	9/17/2013 14:31:33	organic	Chicago, Illinois	Food and Agriculture	Land Ownership		
5	9/17/2013 16:09:33	tiling	ames, iowa	Food and Agriculture	Ecological Farming		
6	10/2/2013 12:07:18	Terrior	Full Belly Farm, CA	Food and Agriculture	Local		
7	10/2/2013 12:10:40	CSA	Boulder, CO	Food and Agriculture	Local		
8	10/2/2013 12:16:58	Food Hub	Richland, WA	Food and Agriculture	Local		
9	10/2/2013 12:28:07	GMO	Lundberg, CA	Food and Agriculture	Certification		
10	10/2/2013 12:30:55	Local v. Organic	Montgomery, AL	Food and Agriculture	Certification		
11	10/2/2013 12:31:28	Local v. Organic	Salisbury, MD	Food and Agriculture	Certification		
12	10/2/2013 12:33:40	Fair Trade v. Direct Trade	Athens, GA	Food and Agriculture	Certification		
13	10/2/2013 12:35:26	Fair Trade v. Direct Trade	Wandering Goat, OR	Food and Agriculture	Certification		
14	10/2/2013 12:40:01	Antibiotic Free	Inglewood, CA	Food and Agriculture			
15	10/2/2013 12:40:02	Antibiotic Free	Inglewood, CA	Food and Agriculture			
16	10/2/2013 12:41:37	Grassfed	Skagit Valley, WA	Food and Agriculture			

**DEMO**

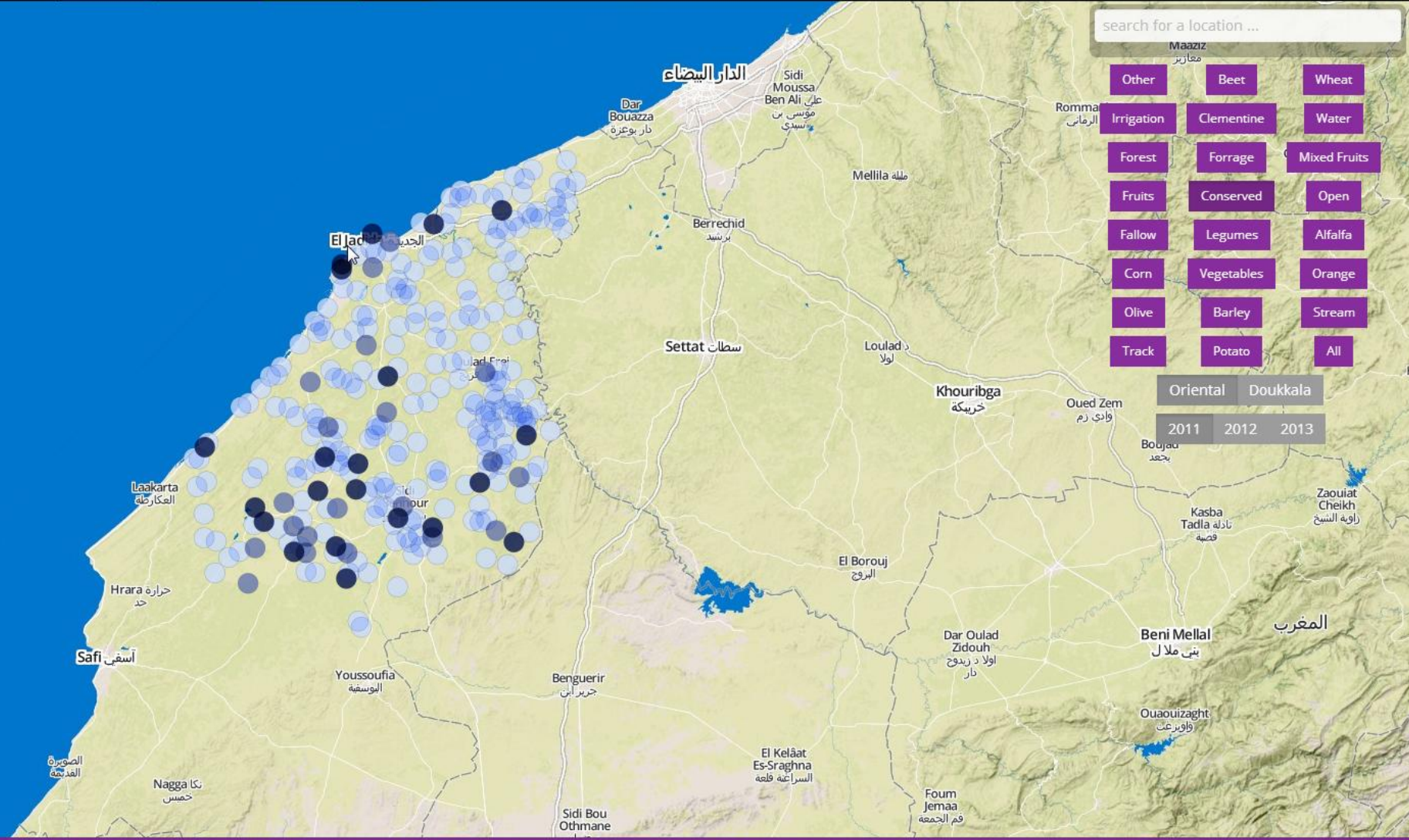


search for a location ...

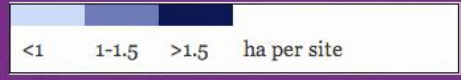
- Maaziz
- Other
- Beet
- Wheat
- Irrigation
- Clementine
- Water
- Forest
- Forrage
- Mixed Fruits
- Fruits
- Conserved
- Open
- Fallow
- Legumes
- Alfalfa
- Corn
- Vegetables
- Orange
- Olive
- Barley
- Stream
- Track
- Potato
- All

Oriental Doukkala

2011 2012 2013



Conserved, 2011



# Why Bother?

- Also FANTASTIC customer support
- Creative control = cartography!
- PostGIS in the browser = SQL
- You can run it from anywhere
- Hosted (yes, eventually costs \$)
- CartoDb.js is flexible and evolving
- HTML5 compliant w/devices

# GitHub


GitHub

Search or type a command

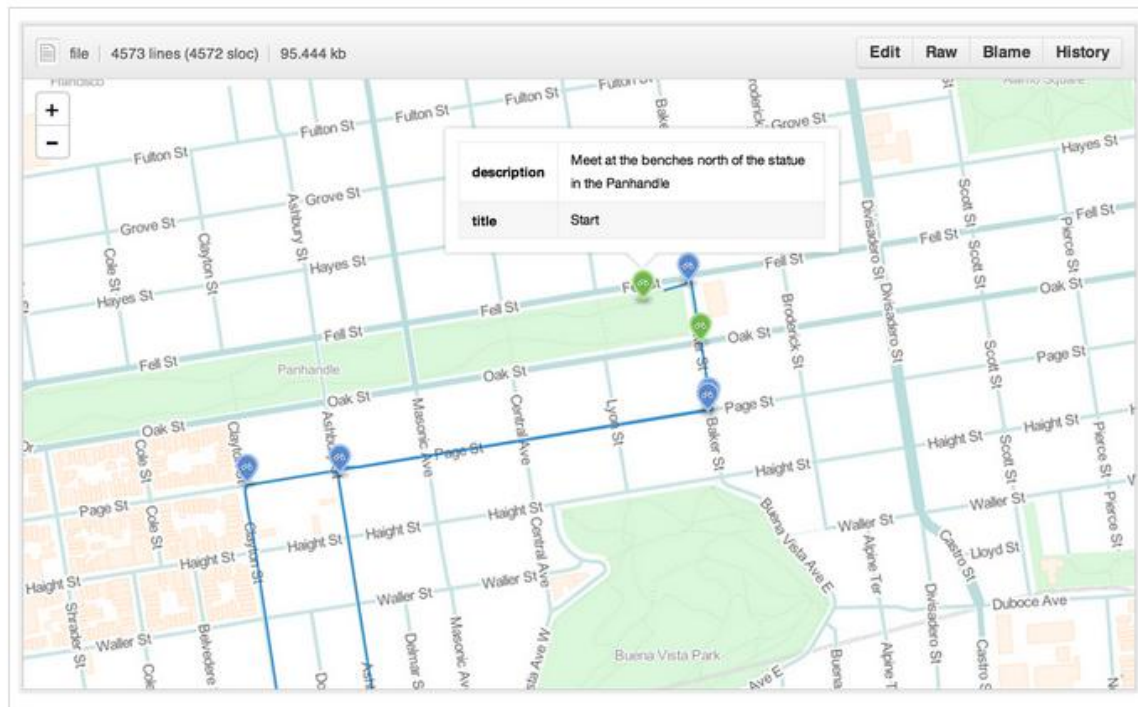


Explore Features Enterprise Blog

## 🏠 There's a map for that

📅 June 13, 2013  benbalter  New Features

Not long ago, we began [rendering 3D models](#) on GitHub. Today we're excited to announce the latest addition to the visualization family - geographic data. Any `.geojson` file in a GitHub repository will now be automatically rendered as an interactive, browsable map, annotated with your geodata.





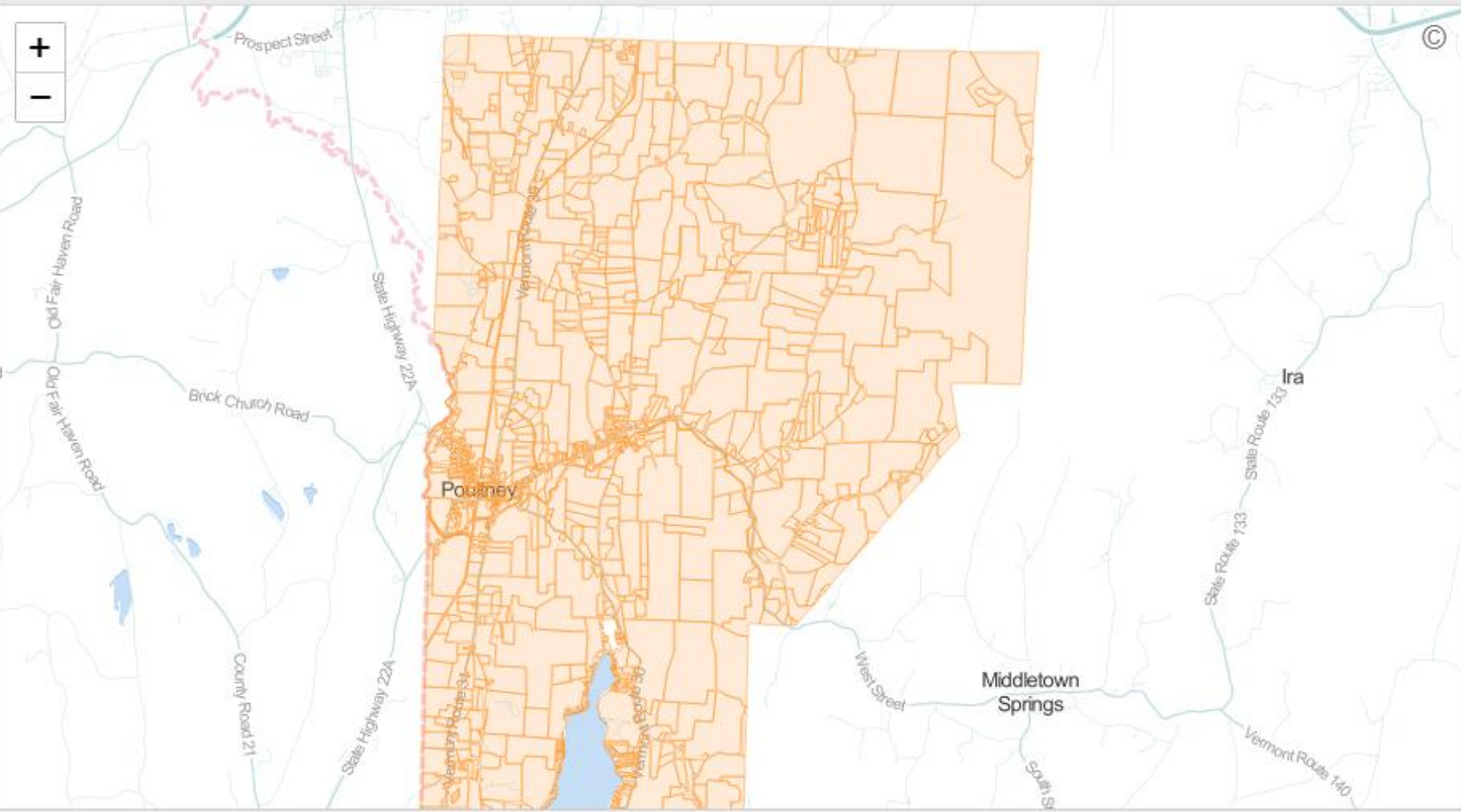


wboykinm 4 months ago to epsg:4326

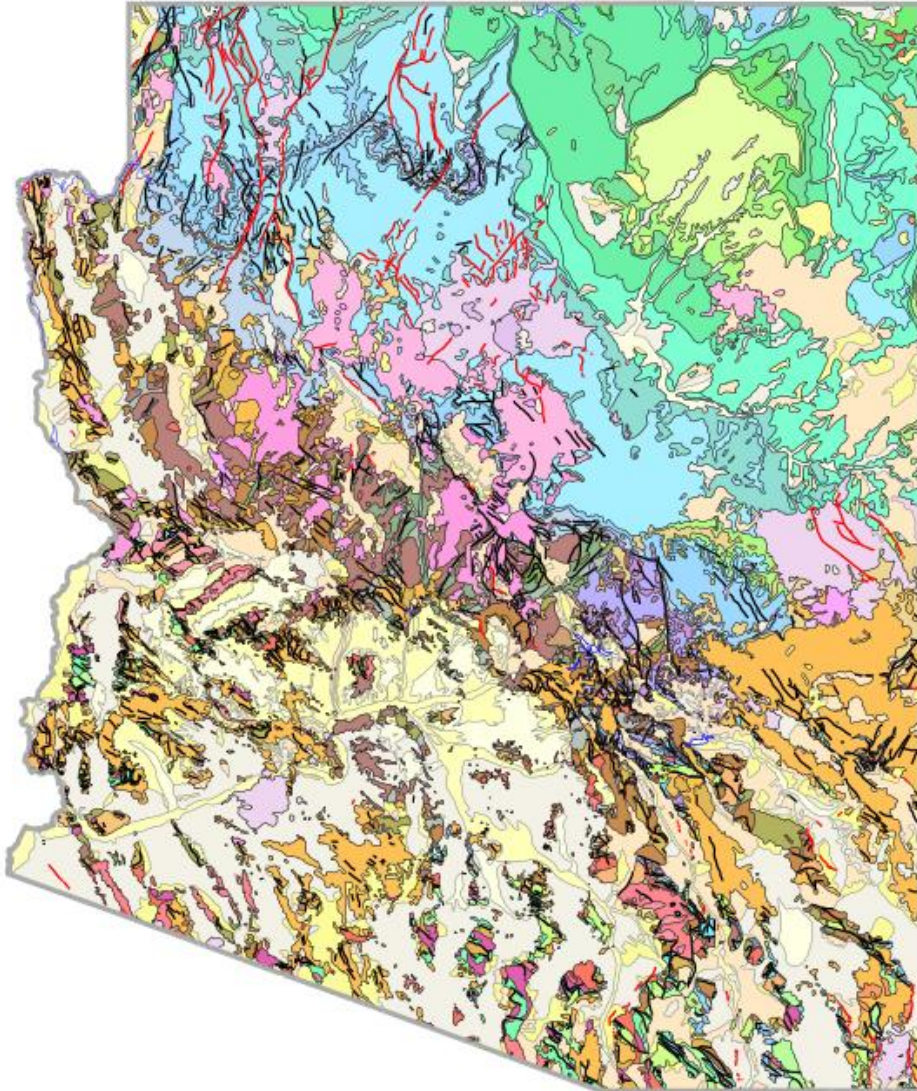
1 contributor

file | 2263.602 kb

geojson.io Open Raw History Delete



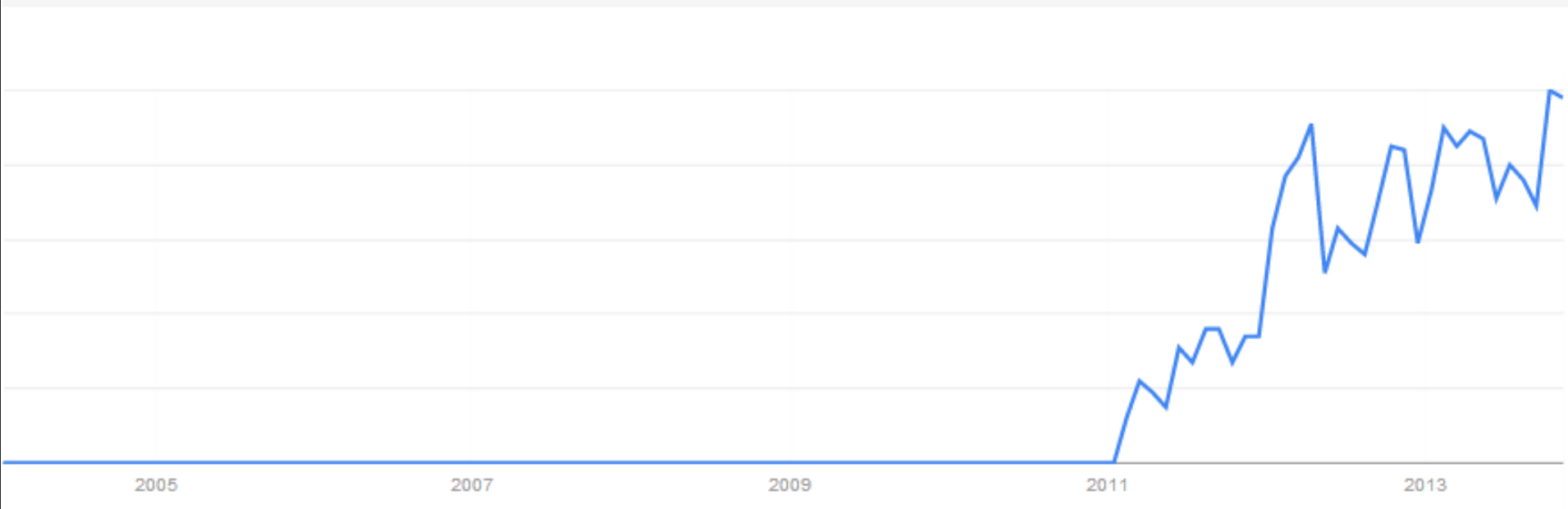
# The Geologic Map of Arizona



Interest over time ?

# TileMill

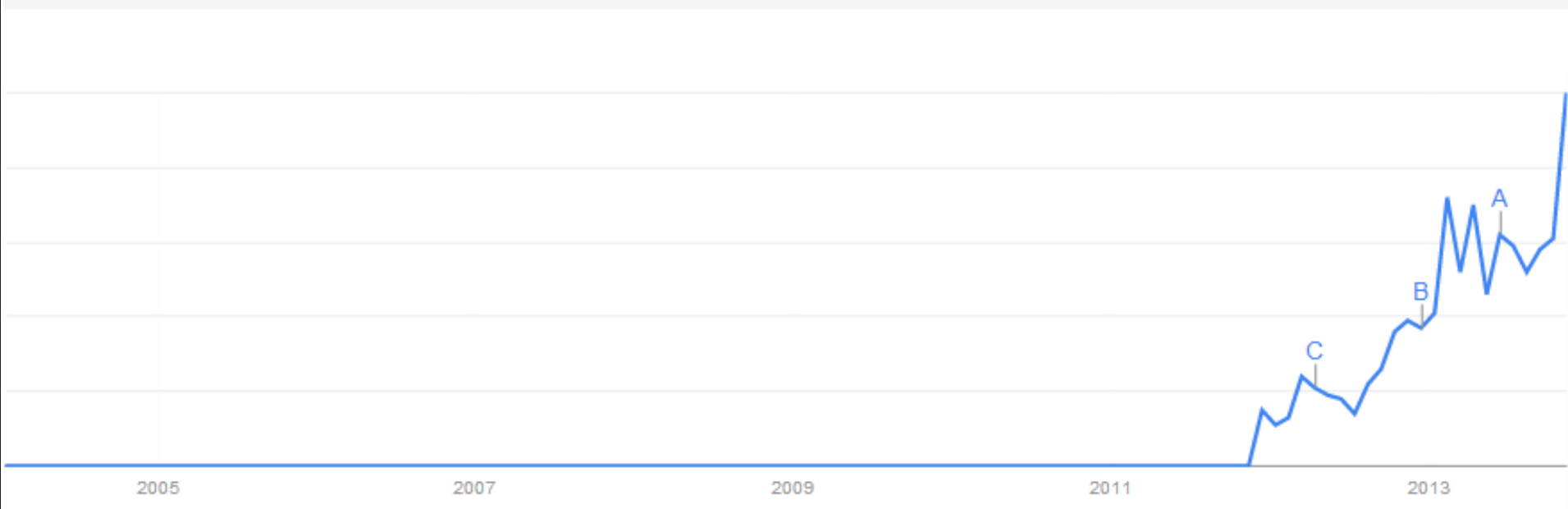
News headlines ?  Forecast ?



Interest over time ?

# CartoDB

News headlines  Forecast ?





**BACK  
TO  
THE FUTURE**