

Globalization of the US: From Digital Research Project to Digital Library Service

Fall 2014 Digital Library Brown Bag, 10 December 2014

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Happy Birthday, Nick!



The Project



Konstantin Dierks

Associate Professor of History, IUB

- Teaching
- Book
- Exhibition at Lilly Library, through Dec. 18
- Symposium
- Digital exhibition
- Map

The Funding

Online exhibition & map partially funded by the Office of the Vice Provost of Research at Indiana University-Bloomington through the Collaborative Research and Creative Activity Funding Award.

Additional support for the exhibition & map came from the Lilly Library and from the Wells Library Digital Collection Services.

The People

Digitization and Metadata

Kara Alexander, Digital Media Specialist for Digital Collections Services, IU Libraries

Caitlyn Smallwood, Digital Imaging Specialist for Digital Collections Services, IU Libraries

Peggy Griesinger, Graduate Assistant for Digitization, Lilly Library, IU Libraries, geocoding and metadata

Zachary Downey, Public Services Assistant, Lilly Library, IU Libraries, digital photography

Carson Day, Photographer, Lilly Library, Indiana University Libraries, digital photography

The People

Development and Design

Shaun Akhtar, Cataloging and Metadata Specialist II, Dartmouth College Library

Lynn Carlson, GIS/Systems Manager, Geological Sciences, Brown University

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The Map



Map Requirements

- Support display of historical maps
- Plot multiple facets/data categories
 - Markers (points on a map)
 - Shapes (polygonal regions)
- Display contextual information (metadata)
- Navigate the map via facets and a timeline

Map Metadata

Globalization Metadata Unified Template (Development) ☆

File Edit View Insert Format Data Tools Add-ons Help All changes saved in Drive

Comments Share

```
{ "type": "FeatureCollection", "features": [ { "type": "Feature", "properties": { }, "geometry": { "type": "Polygon", "coordinates": [ [ [ [ 9.60205078125, 54.85131525968609 ], [ 6.7919921875, 54.939765758658936 ], [ 8.8330078125, 54.07228265560386 ], [ 8.50341796875, 53.74871079688987 ] ] ] ] ] ] }
```

	E	F	G	H	I	L	M	N	O
1	Description	Start Year	End Year	Date Range	Historic Location	Present Location	Present Lat	Present Lon	GeoJSON
2	Treaty of Peace, Friendship, Commerce, and Navigation	1850		All treaty years: 1850	Brunei	(on Borneo island)	4.8903399	114.9420013	{ "type": "FeatureCollection"
3	Treaty of Amity and Commerce	1785		All treaty years: 1785, 1799, 1828, 1852	Prussia	(historical Prussia)	52.5014076	13.4023285	{ "type": "FeatureCollection"
4	Treaty of Amity and Commerce	1799		All treaty years: 1785, 1799, 1828, 1852	Prussia	(historical Prussia)	52.5014076	13.4023285	{ "type": "FeatureCollection"
5	Treaty of Commerce and Navigation	1828		All treaty years: 1785, 1799, 1828, 1852	Prussia	(historical Prussia)	52.5014076	13.4023285	{ "type": "FeatureCollection"
6	Convention for the Mutual Delivery of Criminals, Fugitives from Justice	1852		All treaty years: 1785, 1799, 1828, 1852	Prussia and other states in G	(historical Prussia and v	52.5014076	13.4023285	{ "type": "FeatureCollection"
7	Treaty of Commerce and Navigation	1840		All treaty years: 1840, 1846, 1855, 1861	Hanover	(within modern German	52.3722687	9.7381496	{ "type": "FeatureCollection"
8	Convention for the Mutual Abolition of the Droit d'Aubaine and Taxes on Emigration	1844		All treaty years: 1844	Grand Duchy of Hesse	(within modern German	49.8534012	8.6465197	{ "type": "FeatureCollection"
9	Convention for the Mutual Abolition of the Droit d'Aubaine and Taxes on Emigration	1844		All treaty years: 1844	Wurttemberg	(within modern German	48.7676697	9.1719198	{ "type": "FeatureCollection"
10	Convention for the Mutual Abolition of the Droit d'Aubaine and Taxes on Emigration	1845		All treaty years: 1845, 1853	Bavaria	(within modern German	48.1390991	11.5144997	{ "type": "FeatureCollection"
11	Convention for the Mutual Abolition of the Droit d'Aubaine and Taxes on Emigration	1845		All treaty years: 1845	Saxony	(within modern German	51.0536308	13.7408104	{ "type": "FeatureCollection"
12	Convention for the Mutual Abolition of the Droit d'Aubaine and Taxes on Emigration	1846		All treaty years: 1846	Nassau	(within modern German	50.0845985	8.2422895	{ "type": "FeatureCollection"
13	Treaty of Navigation and Commerce	1846		All treaty years: 1840, 1846, 1855, 1861	Hanover	(within modern German	52.3722687	9.7381496	{ "type": "FeatureCollection"
14	Declaration of Accession to the Stipulations and Provisions of the Treaty with Hanover of June 10, 1846	1847		All treaty years: 1847	Oldenburg	(within modern German	53.1441994	8.1934795	{ "type": "FeatureCollection"
15	Declaration of Accession to the Stipulations and Provisions of the Treaty with Hanover of June 10, 1846	1847		All treaty years: 1847	Mecklenburg-Schwerin	(within modern German	53.6259117	11.4165697	{ "type": "FeatureCollection"
16	Convention for the Mutual Extradition of Fugitives from Justice in Certain Cases	1853		All treaty years: 1845, 1853	Bavaria	(within modern German	48.1390991	11.5144997	{ "type": "FeatureCollection"
17	Convention Regarding Disposal of Property and Succession Thereto	1854		All treaty years: 1854	Brunswick	(within modern German	52.2355003	10.5418997	{ "type": "FeatureCollection"
18	Convention for the Mutual Extradition of Fugitives from Justice in Certain Cases	1855		All treaty years: 1840, 1846, 1855, 1861	Hanover	(within modern German	52.3722687	9.7381496	{ "type": "FeatureCollection"
19	Convention for the Mutual Delivery of Criminals, Fugitives from Justice, in Certain Cases	1857		All treaty years: 1857	Baden	(within modern German	49.0054016	8.3868704	{ "type": "FeatureCollection"
20	Treaty Concerning the Abolition of the Stade or Brunshausen Dues	1861		All treaty years: 1840, 1846, 1855, 1861	Hanover	(within modern German	52.3722687	9.7381496	{ "type": "FeatureCollection"
21	Treaty of Peace and Amity	1795		All treaty years: 1795, 1815, 1816	Algiers	Algeria	36.7805595	3.03901	{ "type": "Feature", "prope
22	Treaty of Peace	1815		All treaty years: 1795, 1815, 1816	Algiers	Algeria	36.7805595	3.03901	{ "type": "Feature", "prope
23	Treaty of Peace and Amity	1816		All treaty years: 1795, 1815, 1816	Algiers	Algeria	36.7805595	3.03901	{ "type": "Feature", "prope
24	Treaty for the Free Navigation of the Rivers Parana and Uruguay	1853		All treaty years: 1853, 1853	Argentina	Argentina	-34.6145554	-58.4458771	{ "type": "Feature", "prope
25	Treaty of Friendship, Commerce, and Navigation	1853		All treaty years: 1795, 1815, 1816	Argentina	Argentina	-34.6145554	-58.4458771	{ "type": "Feature", "prope
26	Treaty of Commerce and Navigation	1829		All treaty years: 1829, 1848, 1856	Austria	Austria	48.2084274	16.377821	{ "type": "Feature", "prope
27	Convention for the Extension of Certain Stipulations Contained in the Treaty of August 27, 1829	1848		All treaty years: 1829, 1848, 1856	Austria	Austria	48.2084274	16.377821	{ "type": "Feature", "prope

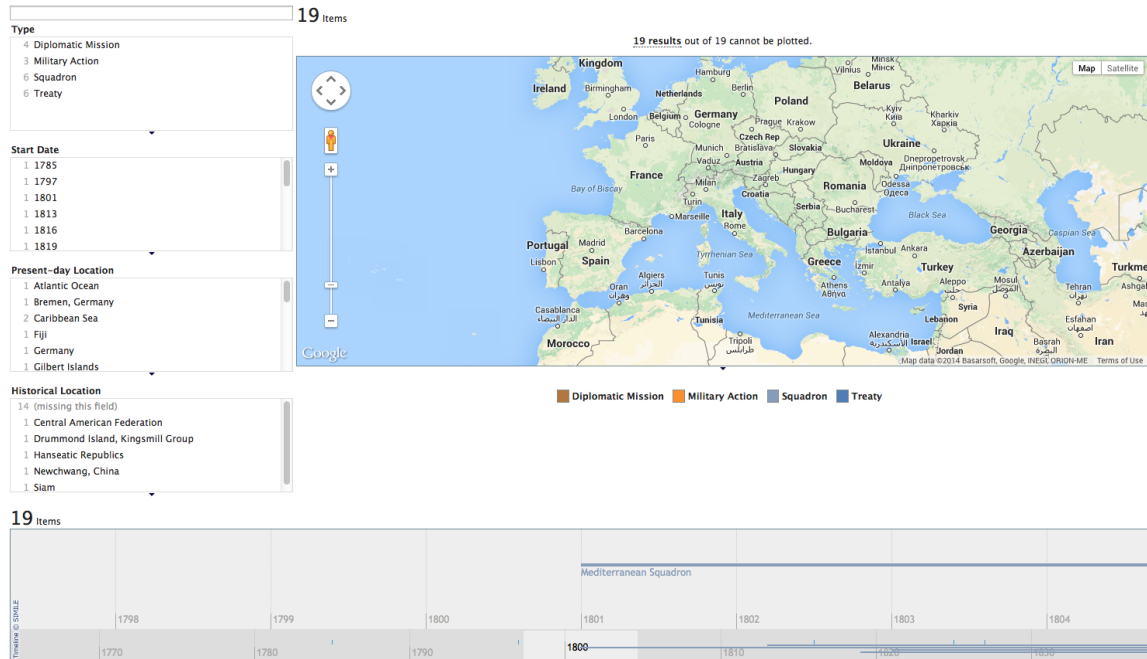
Map Metadata

- Geocoding
 - Historical versus Present-Day Locations
 - [DragTool](#)
 - Markers
 - [GPS Visualizer](#)
 - Shapes
 - [GeoJSON.io](#) (for KML output)
 - [Ogre](#) (for GeoJSON output)

Map Experimentations

- Lots of littles
 - little cash
 - little to no GIS expertise
 - no web developers (until later, then only a few hours per week)
- But a whole lotta labor of love

Simile Exhibit



Google Fusion

Imports to US 1821 with England (Multi-color)

Imported at Mon Sep 23 13:00:22 PDT 2013 from Imports to US 1821 with England (Multi-color).csv
Edited on September 23, 2013

Konstantin Dierks

Share

File Edit Tools Help

Rows 1

Cards 1

Map of geometry

Filter No filters applied

Saved 19 rows

Configure map

Done

Location geometry

Feature map

Change feature styles...

Change info window...

Heatmap



Imports to US 1821 with England (Multi-color)

Imported at Mon Sep 23 13:00:22 PDT 2013 from Imports to US 1821 with England (Multi-color).csv
Edited on September 23, 2013

File Edit Tools Help

Rows 1

Cards 1

Map of geometry

Filter No filters applied

1-19 of 19

Country	Value in Tons	geometry
Bourbon and Mauritius	10,022	KML...
Canary Islands	265,089	KML...
Cape Verde	64,036	KML...
China	3,111,951	KML...
Cuba	6,584,849	KML...
Denmark and Norway	16,156	KML...
Floridas	189,730	KML...
Gibraltar	1,234,263	KML...
Haiti	2,246,257	KML...
Ireland	686,154	KML...
Italy and Malta	973,463	KML...
Madeira	190,289	KML...
Netherlands	1,938,953	KML...
Philippines	114,861	KML...
Portugal	356,116	KML...
Sweden	759,753	KML...
England	23,180,862	KML...

<http://tables.googlelabs.com/>

Neatline

See #dlbb presentation given by Brianna Marshall, Digital Curation Coordinator at University of Wisconsin-Madison Libraries, in March 2014: <http://hdl.handle.net/2022/17377>

- Using Neatline in a way that was not intended
 - Issues with loading georectified maps (projections)
 - Conflicting geo-standards (KML v. WKT)
- Worth revisiting for:
 - detailed annotations
 - highlighting or making explicit patterns in the data

Map Solution: Leaflet!



Implementing Leaflet

```
/*
Leaflet, a JavaScript library for mobile-friendly interactive maps.
http://leafletjs.com
(c) 2010-2013, Vladimir Agafonkin
(c) 2010-2011, CloudMade
*/ !function(t, e, i) {
  var n = t.L, o = {
  };
  o.version = "0.7.3", "object" == typeof module && "object" == typeof
module.exports ? module.exports = o : "function" == typeof define && define.amd &&
define(o, o.noConflict = function () {
  return t.L = n, this
  },
  ), t.L = o, o.Util = {
  extend: function (t) {
    var e, i, n, o, s = Array.prototype.slice.call(arguments, 1);
    for (i = 0, n = s.length; n > i; i++) {
      o = s[i] || {
      };
      for (e in o) o.hasOwnProperty(e) && (t[e] = o[e])
    }
    return t
  },
  bind: function (t, e) {
    var i = arguments.length > 2 ? Array.prototype.slice.call(arguments, 2):
null;
    return function () {
      return t.apply(e, i || arguments)
    }
  },
  stamp: function () {
    var t = 0, e = "leaflet_id";
    return function (i) {
      return i[e] = i[e] || ++t, i[e]
    }
  },
  invokeEach: function (t, e, i) {
    var n, o;
    if ("object" == typeof t) {
      o = Array.prototype.slice.call(arguments, 3);
      for (n in t) e.apply(i, [n, t[n]].concat(o));
      return ! 0
    }
    return ! 1
  },
  ...
},
```

<http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.js>

<http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.css>

```
/* Global Styles */
html, body {
  height: 90%;
  width: 100%;
  margin: 0;
  padding: 0;
  background-color: black;
}

#map {
  margin-top: 3%;
  margin-left: auto;
  margin-right: auto;
  border: 1px solid black;
  height: 90%;
  width: 95%;
}

.icon-hint {
  height: 15px;
  width: 20px;
}

.overlay-icon {
  margin: 0px 2px 0px 0px;
}

#timeline-group {
  margin-top: 3%;
  margin-left: auto;
  margin-right: auto;
  height: 20%;
}

#current-year {
  text-align: center;
  font-weight: bold;
  color: white;
}

#slider {
  margin-left: auto;
  margin-right: auto;
  margin-bottom: 20px;
  width: 80%;
}

#control-group {
  margin-left: auto;
  margin-right: auto;
}
```

Implementing Leaflet

```
kdglobal@webserve[~/www/worldmap-dev/assets]: ls
cluster.js                               MarkerCluster.css
jquery.ui.touch-punch.min.js            MarkerCluster.Default.css
leaflet.groupedlayercontrol.css         MarkerCluster.Local.css
leaflet.groupedlayercontrol.js         markercluster_min.js
```

Marker Cluster Javascript Function =>

```
1 function(e, t, n) {
2   L.MarkerClusterGroup = L.FeatureGroup.extend({
3     options: {
4       maxClusterRadius: 80,
5       iconCreateFunction: null,
6       spiderfyOnMaxZoom: true,
7       showCoverageOnHover: true,
8       zoomToBoundsOnClick: true,
9       singleMarkerMode: false,
10      disableClusteringAtZoom: null,
11      removeOutsideVisibleBounds: true,
12      animateAddingMarkers: false,
13      spiderfyDistanceMultiplier: 1,
14      chunkedLoading: false,
15      chunkInterval: 200,
16      chunkDelay: 50,
17      chunkProgress: null,
18      polygonOptions: {},
19      clusterClass: "" // New option for selecting categorical color coding
20    },
21    initialize: function(e) {
22      L.Util.setOptions(this, e);
23      if (!this.options.iconCreateFunction) {
24        this.options.iconCreateFunction = this._defaultIconCreateFunction
25      }
26      this._featureGroup = L.featureGroup();
27      this._featureGroup.on(L.FeatureGroup.EVENTS, this._propagateEvent, this);
28      this._nonPointGroup = L.featureGroup();
29      this._nonPointGroup.on(L.FeatureGroup.EVENTS, this._propagateEvent, this);
30      this._inZoomAnimation = 0;
31      this._needsClustering = [];
32      this._needsRemoving = [];
33      this._currentShownBounds = null;
34      this._queue = []
35    },
36    addLayer: function(e) {
37      if (e instanceof L.LayerGroup) {
38        var t = [];
39        for (var n in e._layers) {
40          t.push(e._layers[n])
41        }
42        return this.addLayers(t)
43      }
44      if (!e.getLatLng) {
45        this._nonPointGroup.addLayer(e);
46        return this
47      }
48      if (!this._map) {
49        this._needsClustering.push(e);
50        return this
51      }
52    }
53  });
```

Implementing Leaflet

```
# App's location/URL
app_path = "http://www.indiana.edu/~kdglobal/worldmap-dev/"

# Link to Google Doc (Make sure the correct gdoc_id is active
# so that the correct spreadsheet is pulled from)
#gdoc_id = "1QoUlnCYbfQi50y9T020Lv1Pa0x8JjHkBNaSu1l-D_EE" #Main
gdoc_id = "17EabushNWBxGeNpNBAJp2E97eZt08k7Z5m-G7eqQmk" #Dev

# Refresh style.js? Must be True or False (capitalized)
style_refresh = True

# Size of custom icons (width, height in pixels)
icon_size = "30, 50"

# Anchor point (position of icon relative to point it is marking)
icon_anchor = "15, 0"

# initial lat/long coordinates for map center
init_center = [20, -35]

# initial zoom level
init_zoom = 2

# maximum zoom
max_zoom = 5

#minimum zoom
min_zoom = 2
```

settings.py

```
// Overseas Marine Landings marker icon and shape styling
var OverseasMarineLandingsIcon = L.icon({
  imageUrl: 'http://www.indiana.edu/~kdglobal/worldmap-dev/images/OverseasMarineLandings.png',
  iconSize: [30, 50], // icon height/width in pixels
  iconAnchor: [15, 0], // point where icon corresponds to marker's location
  //popupAnchor: [0, 0] // point from which the popup should open relative to the iconAnchor
});

var OverseasMarineLandingsShapeStyle = {
  'color': '#0000ff',
  'weight': 1,
  'opacity': 1
};

// Overseas Navy Personnel marker icon and shape styling
var OverseasNavyPersonnelIcon = L.icon({
  imageUrl: 'http://www.indiana.edu/~kdglobal/worldmap-dev/images/OverseasNavyPersonnel.png',
  iconSize: [30, 50], // icon height/width in pixels
  iconAnchor: [15, 0], // point where icon corresponds to marker's location
  //popupAnchor: [0, 0] // point from which the popup should open relative to the iconAnchor
});

var OverseasNavyPersonnelShapeStyle = {
  'color': '#0000ff',
  'weight': 1,
  'opacity': 1
};

// Foreign Military Actions marker icon and shape styling
var ForeignMilitaryActionsIcon = L.icon({
  imageUrl: 'http://www.indiana.edu/~kdglobal/worldmap-dev/images/ForeignMilitaryActions.png',
  iconSize: [30, 50], // icon height/width in pixels
  iconAnchor: [15, 0], // point where icon corresponds to marker's location
  //popupAnchor: [0, 0] // point from which the popup should open relative to the iconAnchor
});

var ForeignMilitaryActionsShapeStyle = {
  'color': '#0000ff',
  'weight': 1,
  'opacity': 1
};
```

style.js



Implementing Leaflet

1	A2						
2	Marker	Category	Sub Category	Title	Start Year	End Year	
3	Marker	Diplomacy	Foreign Treaties	Foreign	1850		
4	Map	Diplomacy	Foreign Treaties		1785		
5	Shape	Military	Overseas Marine Landings		1799		
6		Missionary	Foreign Military Actions				
-		Commerce	Overseas Navy Personnel				
	Present Location	Present Lat	Present Lon	GeoJSON			
	(on Borneo island)	4.8903399	114.9420013	{"type": "FeatureCollection", "crs": { "type": "nar			
	(historical Prussia)	52.5014076	13.4023285	{"type": "FeatureCollection", "features": [{"type"			
	(historical Prussia)	52.5014076	13.4023285	{"type": "FeatureCollection", "features": [{"type"			
	(historical Prussia)	52.5014076	13.4023285	{"type": "FeatureCollection", "features": [{"type"			
	Source		URL				
	Miller, Hunter. Treaties and Other International Acts of the United States of America		http://babel.hathitrust.org/cgi/pt?id=uiug.30112040219443;view=1up;seq=3				
	Miller, Hunter. Treaties and Other International Acts of the United States of America		http://babel.hathitrust.org/cgi/pt?id=uiug.30112104106221;view=1up;seq=3				
	Miller, Hunter. Treaties and Other International Acts of the United States of America		http://babel.hathitrust.org/cgi/pt?id=uiug.30112104106221;view=1up;seq=3				
	Miller, Hunter. Treaties and Other International Acts of the United States of America		http://babel.hathitrust.org/cgi/pt?id=uiug.30112104105421;view=1up;seq=5				

Implementing Leaflet

Type

- Marker (uses lat/lon)
- Map (URL for each map)
- Shape (uses GeoJSON)

Category/Subcategory

- Legend
- Markers on the map

Start / End Year

- Timeline functionality

Sources

- Linked to fulltext versions in HathiTrust, Internet Archive, Google Books

The screenshot displays a web-based map application. The main map area shows a historical map of the Americas with several colored circular markers (red, orange, blue, green) and black location pins. A pop-up window is open over one of the markers, displaying the following information:

Foreign Military Action
Year: 1807
Description: Arrest of army troops commanded by Zebulon Pike while on military exploring expedition, in Spanish colonial territory
Historic Location: Spanish colonial territory (Colorado)
Present Location: Alamosa, Colorado
Source: [Grimmet, Richard F. Instances of Use of United States Armed Forces Abroad, 1798-2004. Washington DC: Congressional Research Service, Library of Congress, 2004.](#)

On the right side of the map, there is a legend panel with the following sections:

- Diplomacy**
 - Foreign Treaties
 - Diplomatic Missions
- Military**
 - Foreign Military Actions
 - Overseas Marine Landings
 - Overseas Navy Personnel
- Missionary**
 - Mission Stations
- Commerce**
 - Foreign Exports
 - Foreign Imports
- Immigration**
 - Major Foreign Origins
 - Minor Foreign Origins

At the bottom of the map, there is a timeline slider set to the year 1831, and navigation controls (back, play, forward) are visible.

Implementing Leaflet

```
#!/usr/bin/env python
# Author: Bryan J. Brown
# Email: bryjbrown@gmail.com
# Date: Spring semester, 2014
#
# Script for pulling historical metadata from Google spreadsheets and parsing into Leaflet JS
# Created for the 'Globalization of the US, 1775-1861' project w/ Konstantin Dierks
#
# Adjustments by Shaun Akhtar <shaun.akhtar@gmail.com>, September/October 2014

import sys
sys.dont_write_bytecode = True
import urllib2
import csv
import os
import time
import subprocess

# ./settings.py, controls various script options
import settings

# Save old data.js into /backups/ with timestamp
cwd = os.getcwd()
t = time.localtime()
tf = '%d-%02d-%02d@%02d:%02d' % (t.tm_year, t.tm_mon, t.tm_mday, t.tm_hour, t.tm_min, t.tm_sec)
if not os.path.exists(cwd + "/backups/"):
    print "Backups dir missing."
    print "(Creating " + cwd + "/backups/"
    os.mkdir(cwd + "/backups/")
if os.path.exists(cwd + "/data.js"):
    os.rename(cwd + "/data.js", cwd + "/backups/data_" + tf + ".js")

# Grab remote CSV data from Google Docs spreadsheet and save to local file 'data.csv'
csv_local = open("data.csv", "w")
csv_link = "https://docs.google.com/feeds/download/spreadsheets/Export?key={}&exportFormat=csv&gid=0".format(settings.gdoc_id)
csv_data = urllib2.urlopen(csv_link).read()
csv_local.write(csv_data)
csv_local.close()

# Read CSV file and save relevant data to memory
csv_input = open("data.csv", "r")
reader = csv.DictReader(csv_input, delimiter=',')

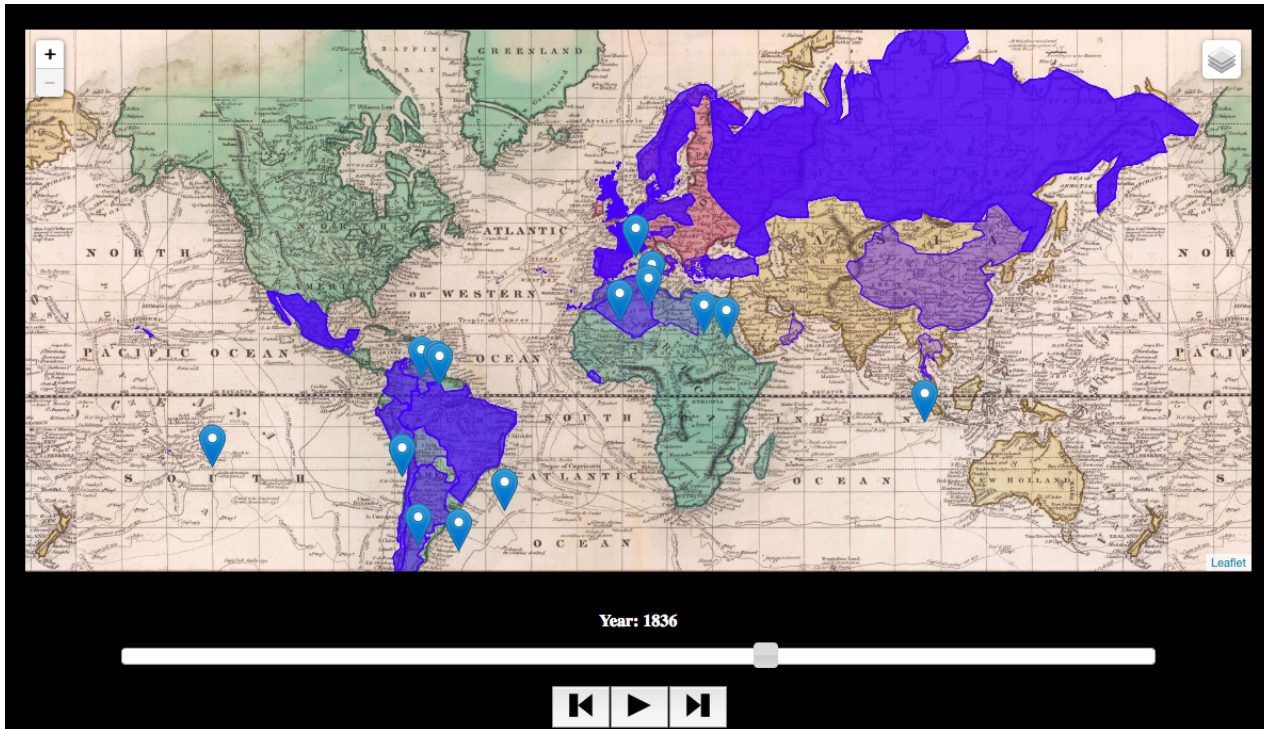
# Initialize empty arrays to hold each metadata record according to record type
# (each individual record will be stored as its own hash inside these arrays)
map_list = []
marker_list = []
shape_list = []

# Sort records by type
```

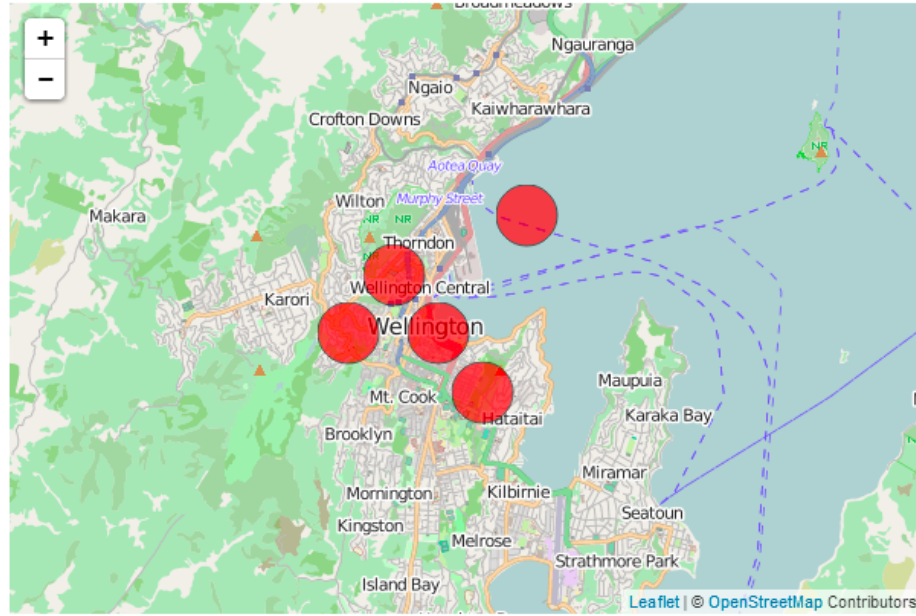
- Dynamically generates all the Javascript data that Leaflet uses and displays
 - automatically backing up previous data
 - generates markers based on data type (marker or shape)
 - checks to use “historical lat/lon” over present, if populated
- Defines all kinds of functionality
 - initializes map
 - adds and removes layers based on year in the timeline
 - integrates marker cluster functionality with timeline
 - Sets basemaps (to change based on year) and more!

<https://github.com/globalization-of-the-united-states/gotus>

Challenges: Shapes










Challenges: Routes



Screengrab courtesy of <https://leanpub.com/leaflet-tips-and-tricks/>

Challenges: Metadata

	Globalization Metadata Unified Template (Production, Frozen Version...	Konstantin Dierks	11:41 PM	
	Globalization Metadata Unified Template (Development) 	Konstantin Dierks	11:41 PM	
	Globalization Metadata Unified Template (Staging, Working Version) ...	me	11:41 PM	

Moving Forward: Grants

Kon's New Frontiers Grant (know by mid-January 2015)

- **metadata compilation** to ensure structured and consistent capture of descriptive information, which serves and will continue to serve as the source for spatial and temporal visualizations necessary for this digital research project
- **digitization and geo-rectification of a set of 73 historical maps** that reflect the ever-changing world between 1789 and 1861 that will be packaged and shared for scholarly re-use and consumption
- **codification of data curation best practices** for the preservation of the geospatial and descriptive data and metadata that Professor Dierks has been meticulously collecting, including procedures and protocols for storing the data in a repository like IUScholarWorks, and, as equally important, procedures and protocols for providing other scholars access to this data and metadata for use in their own research
- **guidance and oversight for the next phase of web development to extend the interactive mapping component that is built using an open-source, extensible platform known as Leaflet in order to create generalized mapping functionality for re-use by other scholars on the Bloomington campus and beyond interested in historical, map-based data visualizations**

Professor Eric Sandweiss, Professor and Chair of the Indiana University History Department

- Pending funding of CIC Global Midwest grant led by Eric and colleagues, we will put this framework to the test.

