

Visualizing Temporal Data with the ArcGIS API for JavaScript

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<https://git.io/JvB8W> (printer friendly, pdf)



Agenda

- Part 1
 - Overview of time support in JS 4
 - How to create temporal data and queries
 - Demonstrations
 - A century of quakes
 - Overlapping hurricanes
- Part 2

About Time!

- Time Support @ 4.14
 - View
MapView.timeExtent, SceneView.timeExtent
 - Layer
FeatureLayer, ImageryLayer, MapImageLayer, CSVLayer
and GeoJSONLayer
 - Query.timeExtent
 - TimeSlider widget

Defining Time in Client-Side Layers

```
// Create a layer from a CSV file
const layer = new CSVLayer({
  url: "ridgecrest-july-2019.csv",
  // Specific geographic fields
  longitudeField: "longitude",
  latitudeField: "latitude",
  // Specify temporal field
  timeInfo: {
    startField: "time",
    interval: {
      value: 1,
      unit: "hours"
    }
  }
});
```

Defining Time in PRO

The screenshot displays the ArcGIS Pro interface with the 'Layer Properties: Earthquakes' dialog box open. The 'Time' tab is selected in the left sidebar of the dialog. The main map area shows a distribution of purple dots representing earthquakes around Australia. The 'Contents' pane on the left lists the layers: 'Map', 'Earthquakes', 'World Topographic Map', and 'World Hillshade'. The 'Drawing Order' section shows 'Earthquakes' at the top.

Layer Properties: Earthquakes

- General**
- Metadata**
- Source**
- Elevation**
- Selection**
- Display**
- Cache**
- Definition Query**
- Time** (selected)
- Range**
- Indexes**
- Joins**
- Relates**
- Page Query**

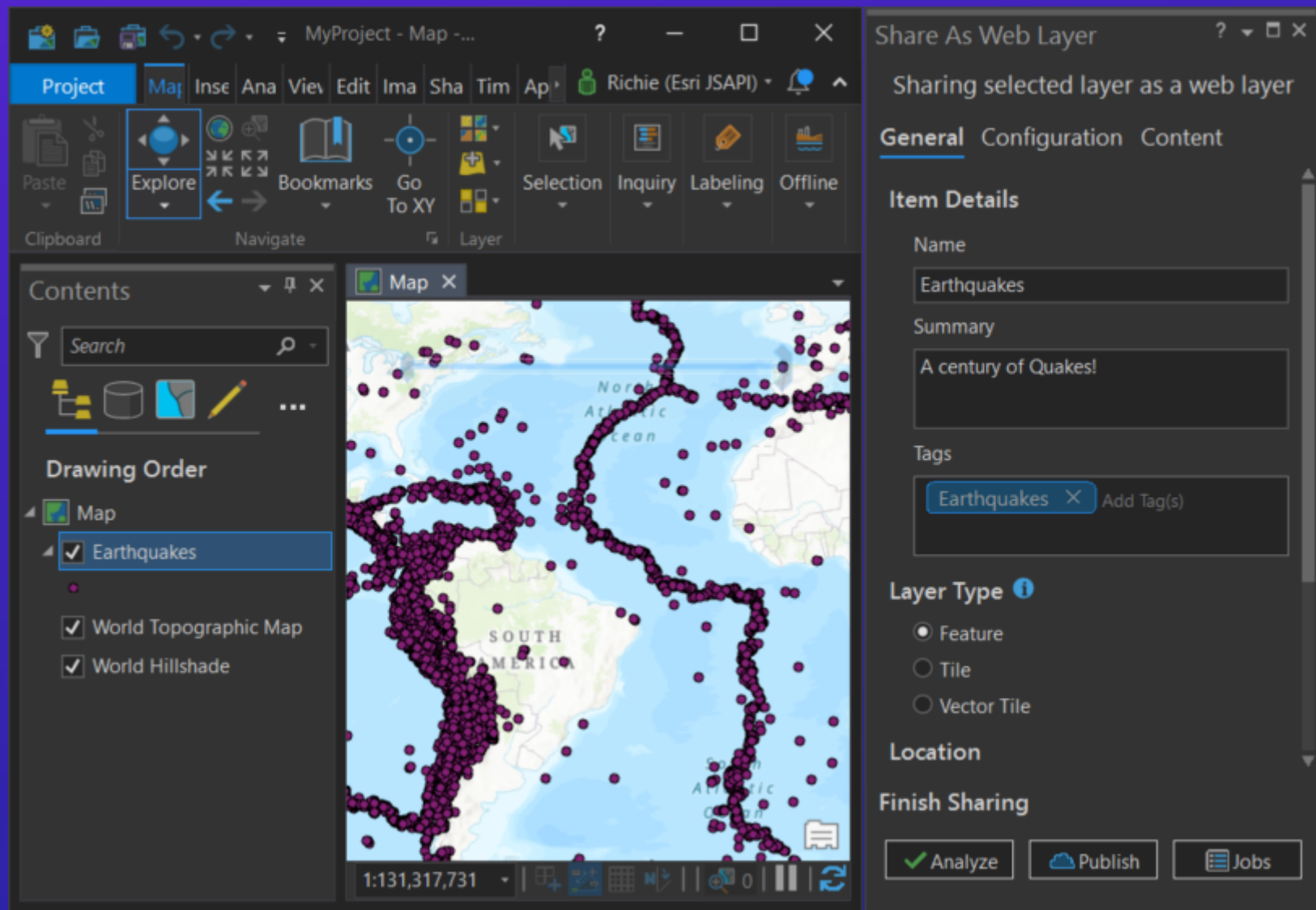
Time Tab Settings:

- Layer Time:** Each feature has a single time field
- Time Field:** time
- Time Format:** YYYY-MM-DDThh:mm:ss.s
- Time Extent:** 7/29/1900 6:59:00 AM - 2/8/2019 4:09:25 PM
- Calculate** button
- ☐ Data is a live feed
- Rate:** 1 Seconds
- Time Zone:** <None>
- ☐ Adjust For Daylight Saving
- Time Offset:** 0 Days
- [Learn more about time properties](#)

OK **Cancel**

Set the time properties on data

Sharing is Caring



- Share as web layer

Oops, I forgot!

The image shows two side-by-side browser windows of the ArcGIS developer portal. The left window displays the 'Century of Quakes' layer details, including the title 'Century of Quakes' and the tag 'Earthquakes'. The right window displays the 'Time Settings' for the layer '0 - Earthquakes', where 'Time Enabled' is checked and 'time' is selected as the time field.

Century of Quakes | Layers | ArcG x +

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☰ ArcGIS 🔍 🌐

Century of Quakes

Overview Data Visualization Usage **Settings**

Layer Details

Title

Century of Quakes

Tags

Earthquakes X Enter tags... ▼

Time Settings (Configured per layer)

0 - Earthquakes

☒ Time Enabled Save

☒ specific events in time.
☐ time ranges with a start and end time. *(Requires more than one Date field.)*

Time field:

time ▼

Time-based Queries

```
var query = new Query({
  timeExtent: new TimeExtent({
    start: new Date(2000, 0, 1),
    end: new Date(2007, 0, 1)
  })
});
```

```
// Search all features!
var extent    = await featureLayer.queryExtent(query);
var count     = await featureLayer.queryFeatureCount(query)
var features  = await featureLayer.queryFeatures(query)
var ids       = await featureLayer.queryObjectIds(query)
```

```
// Only search features downloaded to the browser.
var extent    = await featureLayerView.queryExtent(query);
var count     = await featureLayerView.queryFeatureCount(query)
var features  = await featureLayerView.queryFeatures(query)
var ids       = await featureLayerView.queryObjectIds(query)
```

Filters and Effects

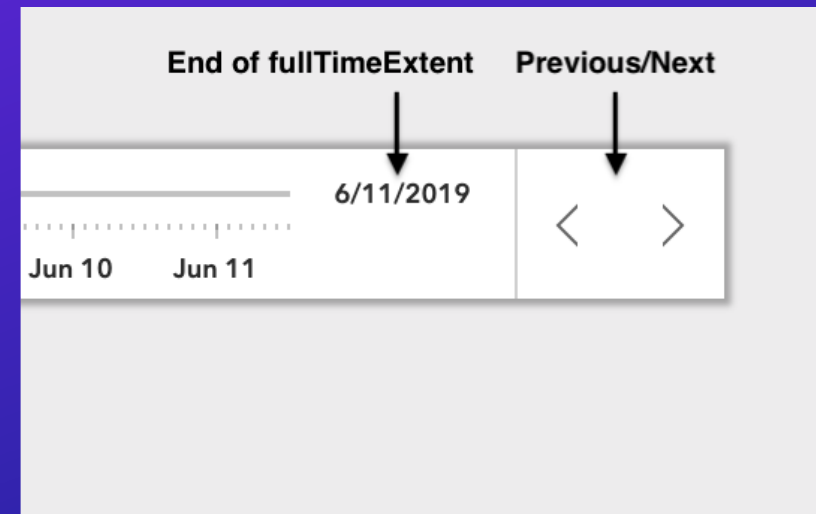
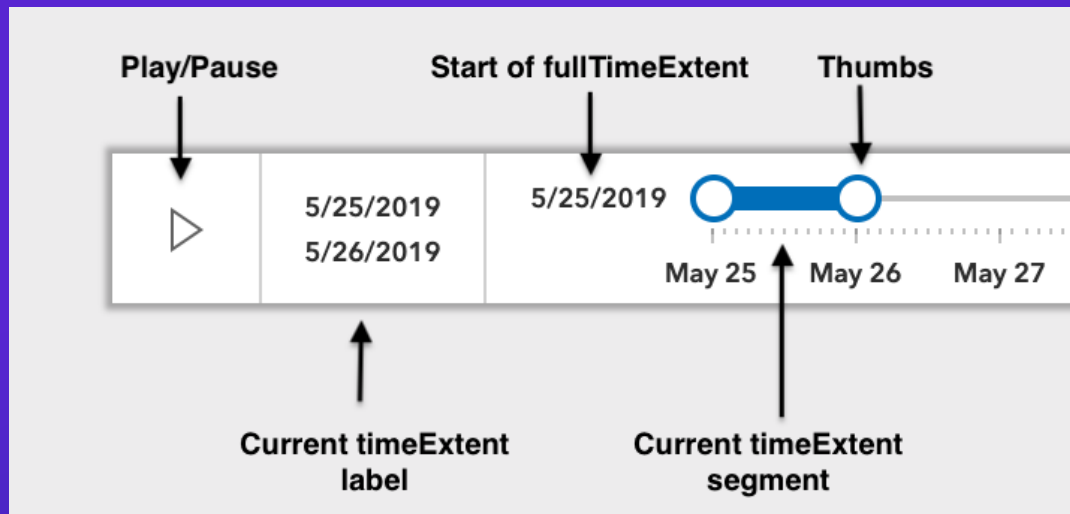
- Filter - *Client-side spatial/aspatial/temporal filtering.*

```
// Only show earthquakes that occurred between 2000 and 2006.
featureLayerView.filter = new FeatureFilter({
  timeExtent: new TimeExtent({
    start: new Date(2000, 0, 1),
    end: new Date(2007, 0, 1)
  })
});
```

- Effects - *Visual effects applied to included/excluded features.*

```
// Show quakes less than 7 magnitude as faint shadows.
featureLayerView.effect = new FeatureEffect({
  filter: {
    where: "magnitude >= 7"
  }
  excludedEffect: "grayscale(100%) opacity(0.5)"
});
```

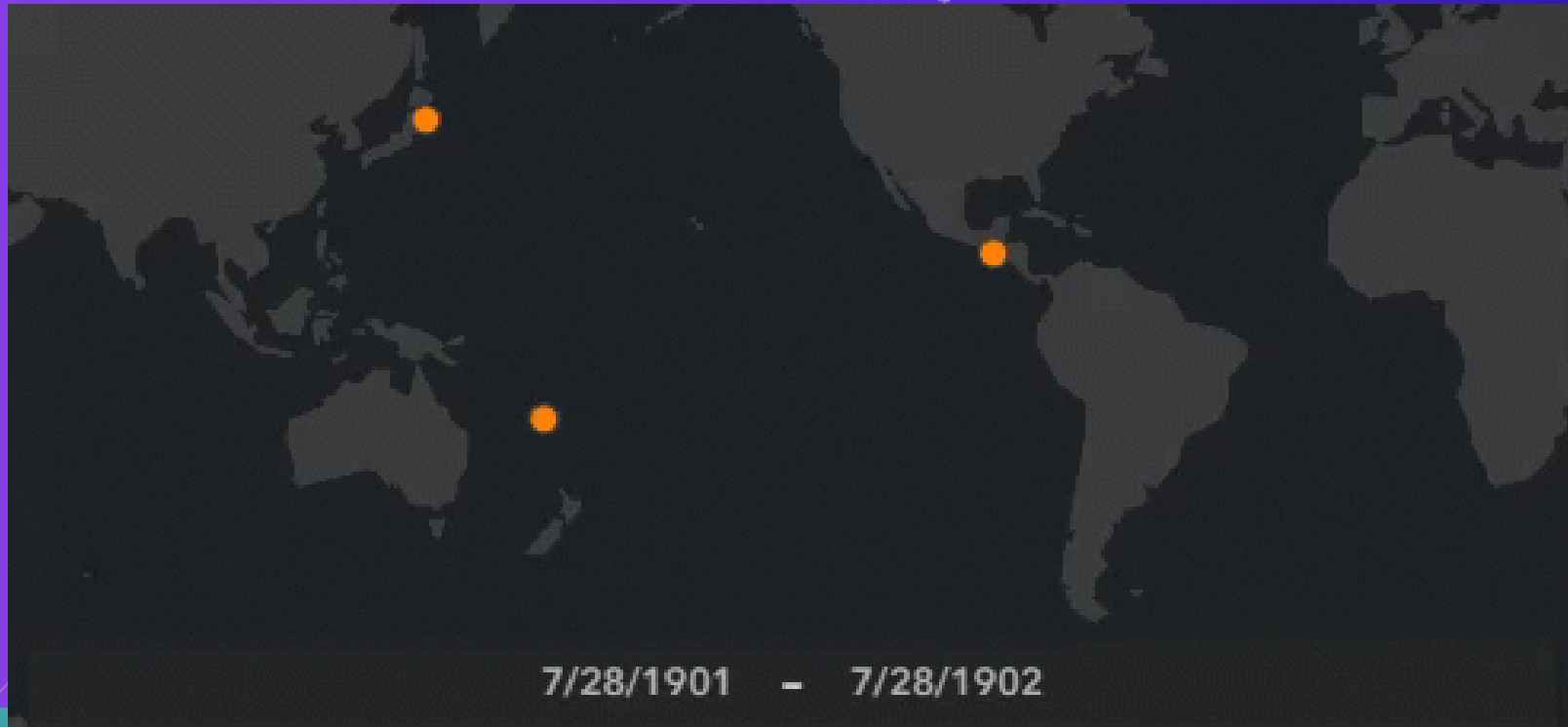
The TimeSlider Widget



TimeSlider Properties

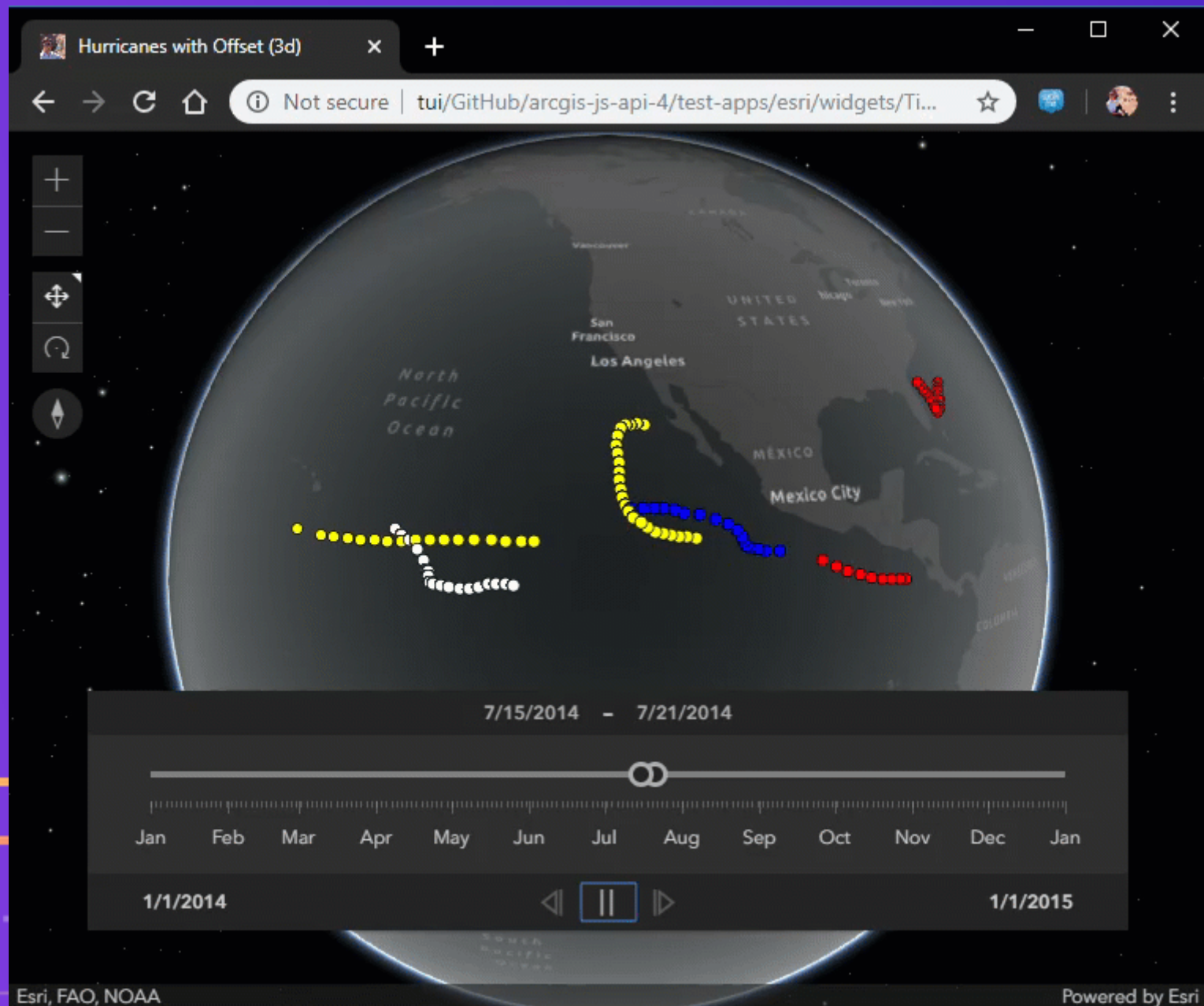
```
var timeSlider = new TimeSlider({
  container: "timeSliderDiv",      // HTML node
  fullTimeExtent: { start, end },  // Temporal width
  // optional
  mode: "time-window",             // Handle layout
  playRate: 1000,                  // Play speed
  stops: {                          // Handle stops/steps
    interval: { value: 1, unit: "years" }
  },
  loop: true,                       // Allow looping
  timeVisible: false,              // Show times
  values: [ first, second ],       // Handle positions
  view: view                        // The MapView/SceneView
});
```

Century of Quakes

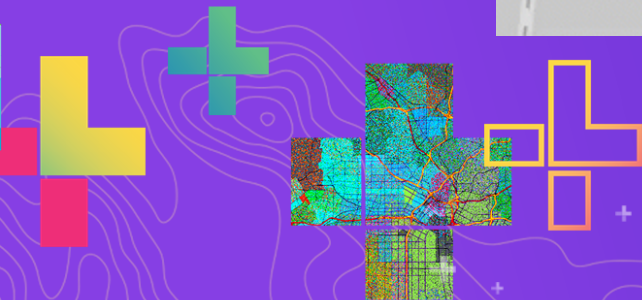
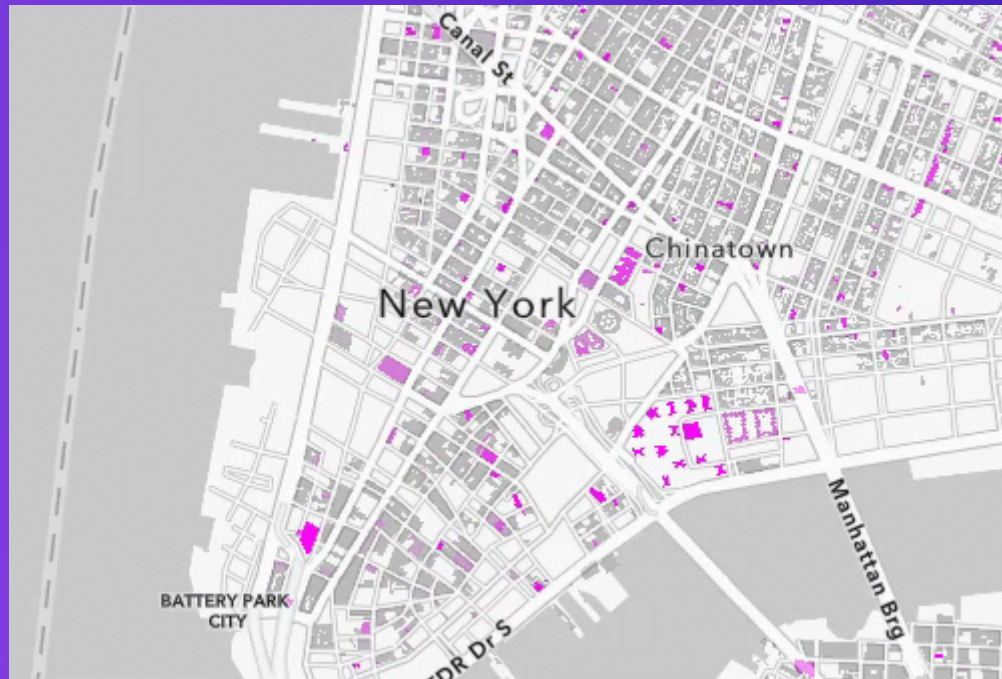


Hurricanes





New York Construction (1880-2017)



Wait, there's more.

- May/June Quakes
- Hurricanes and Storms
- Hurricane Trends (2d)
- Imagery with Time
- MapServer with Time
- Recent Earthquakes (with Arcade)
- Ridgecrest Earthquake (2019)



esri

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SCIENCE
OF
WHERE***

