ArcGIS API for JavaScript: Creating Custom Layers and Layer Views

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Agenda

- Intro to custom Layers and LayerViews in JSAPI 4.x
- Examples to guide and inspire
- Deep dive into “Earth at Night, Mountains of Light” custom elevation layer
- These slides are available at https://github.com/jwasilgeo/presentations

Extending Layer and LayerView in 4.x

- **Custom Layer (for 2D MapView and 3D SceneView)**
  - esri/layers/BaseDynamicLayer
  - esri/layers/BaseElevationLayer
  - esri/layers/BaseTileLayer
- **Custom LayerView (for 2D MapView)**
  - esri/views/2d/layers/BaseLayerView2D
  - esri/views/2d/layers/BaseLayerViewGL2D
- **Custom externalRenderers (for 3D SceneView)**
  - esri/views/3d/externalRenderers

Extending Layer and LayerView in 4.x

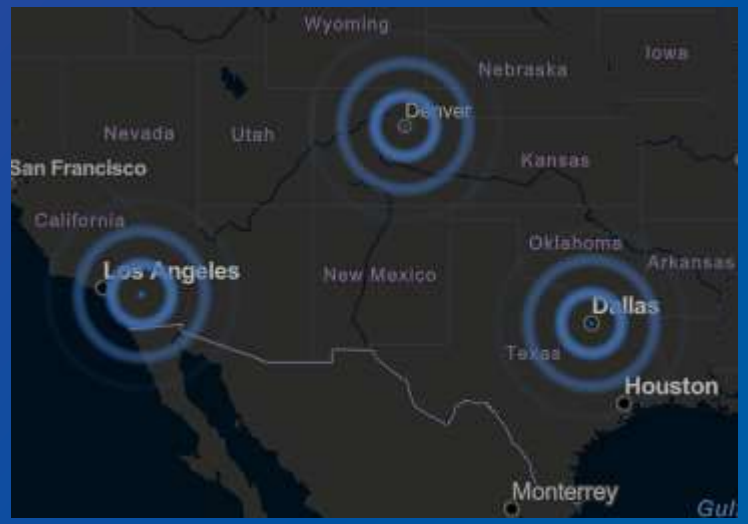
- Custom Layer
  - Layers are for data access; they do not have direct visual representation
  - Why create a custom layer?
    - To connect to a service not supported (yet) by the JSAPI
    - To manipulate data client-side before it is displayed in a MapView or SceneView
    - To mash up multiple services to create new visualizations
  - Limitations
    - Suited for static content
    - No control over when it redraws
    - Limited to image formats and tiles

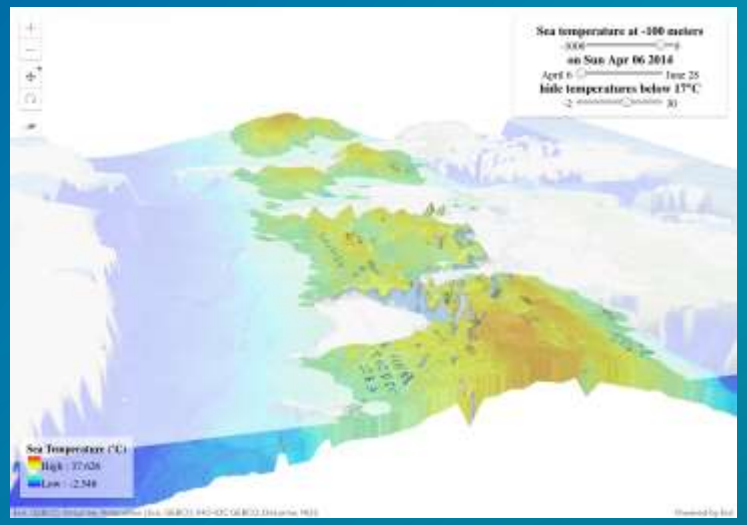
Extending Layer and LayerView in 4.x

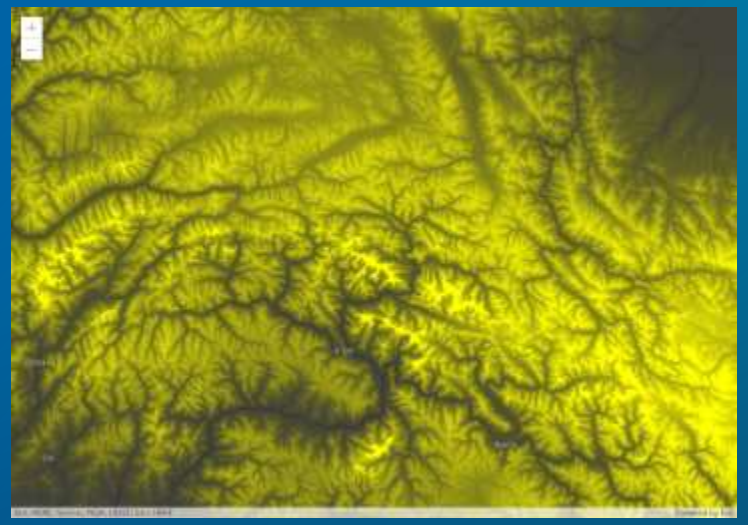
- **Custom LayerView (2D only)**
  - **Represents the view of a Layer after it has been added to a Map**
  - **Responsible for calling a Layer's API to get data and redraw**
  - **Canvas or WebGL is exposed to draw anything you want in a MapView**

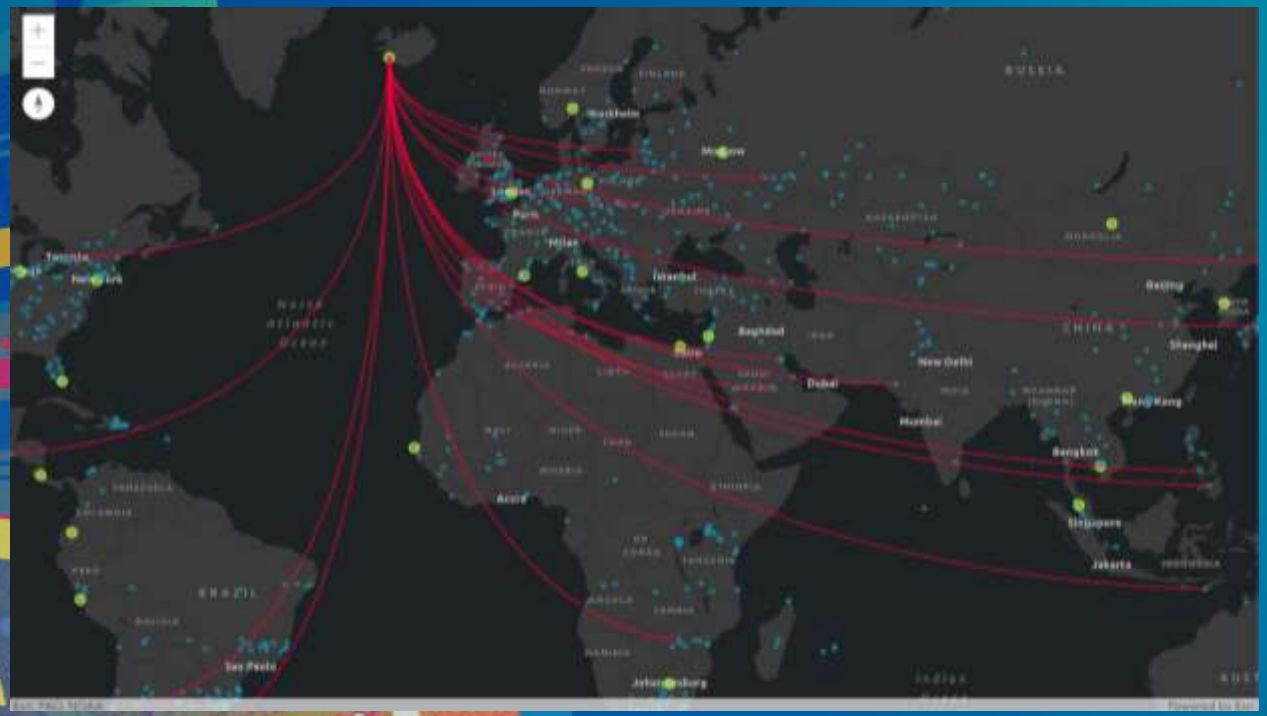
- **Custom externalRenderers (3D only)**
  - **WebGL is exposed to draw anything you want in a SceneView**

Examples of what's possible: http://esriurl.com/jsCustomLayers









Demo

Canvas-Flowmap-Layer

Custom BaseLayerView2D

https://github.com/sarahbellum/Canvas-Flowmap-Layer

Deep dive: “Earth at Night, Mountains of Light”

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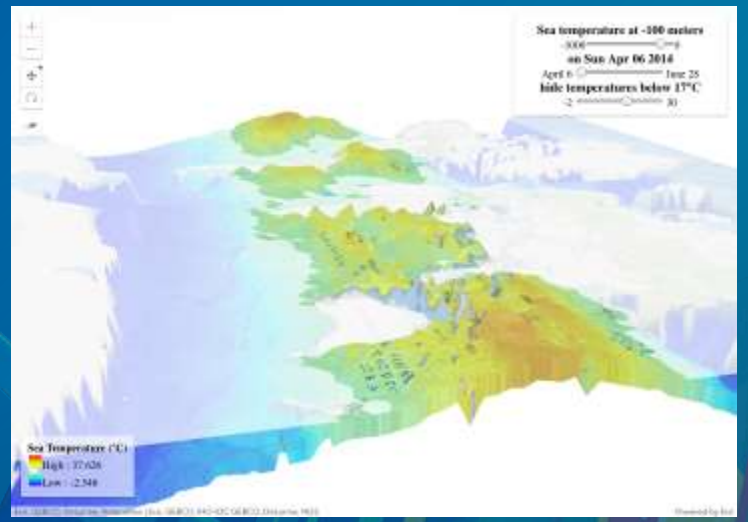
- Custom BaseElevationLayer with NASA nighttime lights tiled image service
- Final product:
  - https://jwasilgeo.github.io/esri-experiments/earth-at-night/
- Blog post with more details:
  - https://petrichor.studio/

Deep dive: “Earth at Night, Mountains of Light”

- **Inspired by 3 official JSAPI samples:**
  - **BaseElevationLayer – Exaggerating elevation: http://esriurl.com/15250**
  - **BaseElevationLayer – Thematic data as elevation: http://esriurl.com/15251**
  - **Using callout lines with labels: http://esriurl.com/15252**



DEMO

“Earth at Night, Mountains of Light”

Step 1: SceneView with WebTileLayer pointing at NASA tiled image service

https://github.com/jwasilgeo/esri-experiments

DEMO

“Earth at Night, Mountains of Light”

Step 2: BaseElevationLayer driven by NASA WebTileLayer, helped by chroma.js to turn color into height

https://github.com/jwasilgeo/esri-experiments

DEMO

“Earth at Night, Mountains of Light”

Step 3: Add a FeatureLayer with callout labels to show cities

https://github.com/jwasilgeo/esri-experiments

Deep dive: “Earth at Night, Mountains of Light”

- JSAPI BaseElementLayer details
  - load() method
    - establish and rely on a WebTileLayer instance pointing to NASA tiled image service
  - fetchTile() method
    - get nighttime image tiles
    - convert image pixel colors to exaggerated elevation values
    - return a promise that resolves to an ElevationTileData object

- chroma.js API details
  - luminance() method
    - relative brightness of a color
    - [R, G, B] to 0 - 1

Resources

- Blog post about “Earth at Night, Mountains of Light”
  - https://petrichor.studio/2019/02/14/earth-at-night-mountains-of-light/
- These slides will be available at Esri Proceedings webpage and at
  - https://github.com/jwasilgeo/presentations
- Dev Summit 2018: “ArcGIS API for JavaScript: Creating Custom Layers”
  - http://proceedings.esri.com/library/userconf/devsummit18/papers/dev-int-018.pdf
- Official docs for “Layer” and “LayerView”
  - https://developers.arcgis.com/javascript/latest/api-reference/esri-layers-Layer.html
  - https://developers.arcgis.com/javascript/latest/api-reference/esri-views-layers-LayerView.html

Upcoming Presentations this Week at Dev Summit 2019

- **Advanced WebGL in 2D Map Views with the ArcGIS API for JavaScript**
  - **Thursday, March 07, 1:00 pm - 1:30 pm**
  - **Demo Theater 1: Oasis 1-2**
  - **Dario D'Amico, Yaron Fine, Matthew George**

- **Advanced WebGL in 3D Scene Views with the ArcGIS API for JavaScript**
  - **Thursday, March 07, 1:30 pm - 2:00 pm**
  - **Demo Theater 1: Oasis 1-2**
  - **Stefan Eilemann**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