

# Applying Elevation in your Analytic Workflows

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# Agenda

Subhead Here

- Overview of elevation services
- Coverage and data sources
- Visualization and analysis
- Analysis tools
- Community maps for Elevation
- Road ahead

# Overview of elevation services

- Global collection of multi-resolution & multi-source
  - 1000 meters to 0.5 meters
  - 47000 rasters (~ 830 GB)
- Best public and community data
  - USGS, NASA, NGA, CGIAR and national mapping organizations
  - 15 authoritative data provides
- Ready to use imagery, maps and tools
  - Visualization and Analysis
  - 2D and 3D visualizations

# World Elevation - Data Sources

## Global:

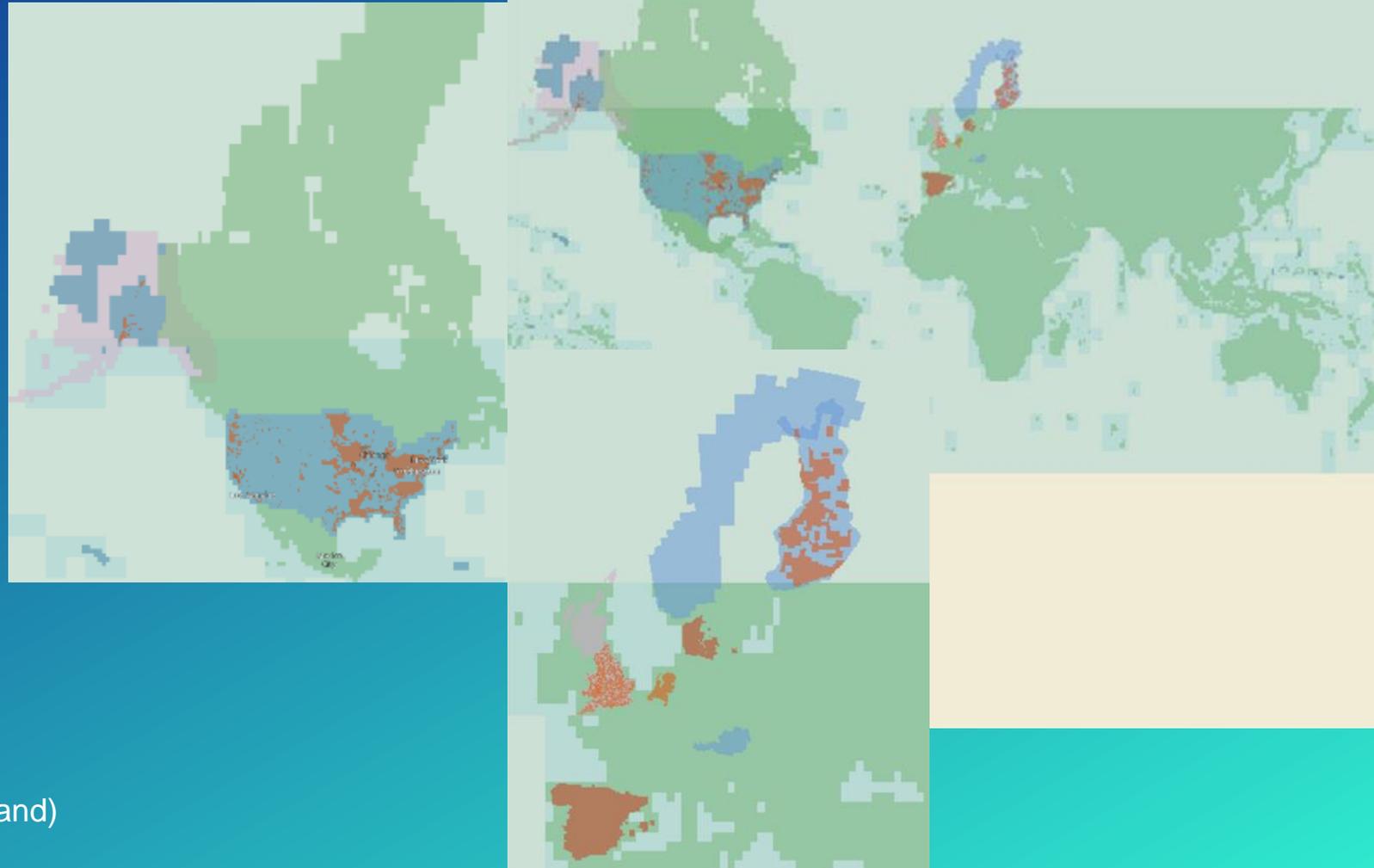
- 1 km GEBCO Bathymetry
- 1 km, 500 m and 250 m GMTED 2010
- 90 m SRTM & EarthEnv-DEM90
- 30 m SRTM

## North America:

- 60 m NED (Alaska)
- 30 m NED (North America)
- 10 m NED (USA)
- 3 m NED, FEMA (partial USA)

## Europe:

- 50 m OS (UK)
- 10 m (Denmark, Finland, Norway, Austria, Spain)
- 5 m (Spain)
- 3 m (Denmark, Netherlands, partial Finland)
- 2 m ( 70% of England & Wales)



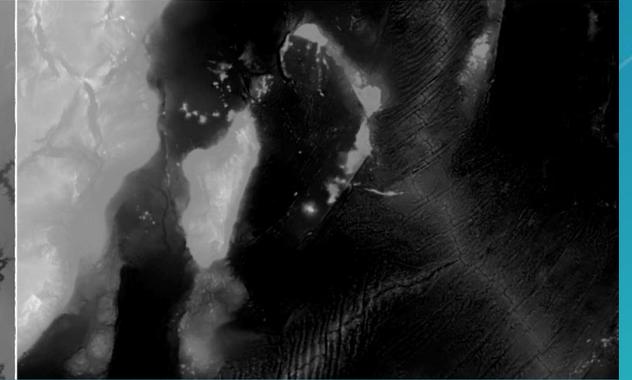
# Visualization and Analysis

- Dynamic Image Services
  - Terrain
  - TopoBathy
- Server raster functions
  - Analysis

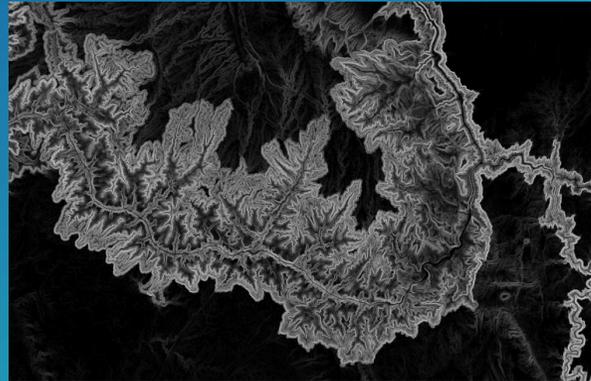
Terrain



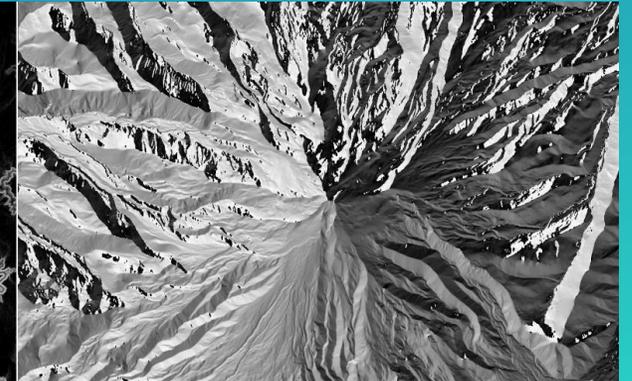
TopoBathy



Slope



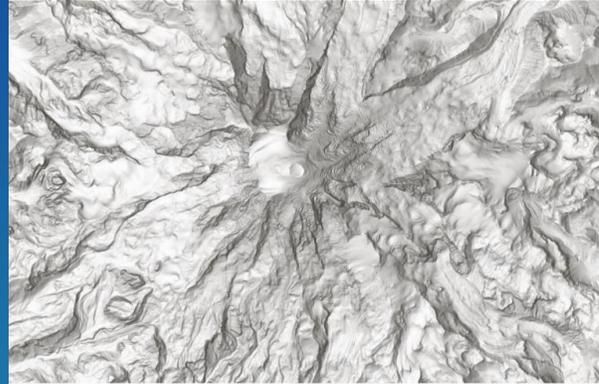
Aspect



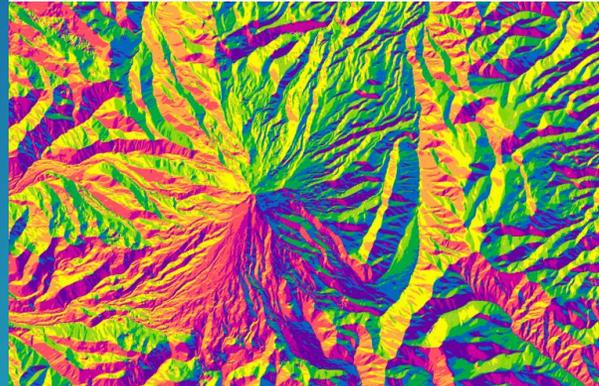
# Visualization and Analysis

- Dynamic Image Services
  - Terrain
  - TopoBathy
- Server raster functions
  - Analysis
  - Visualization
- AGOL subscription
  - No credits

Multi-directional hillshade



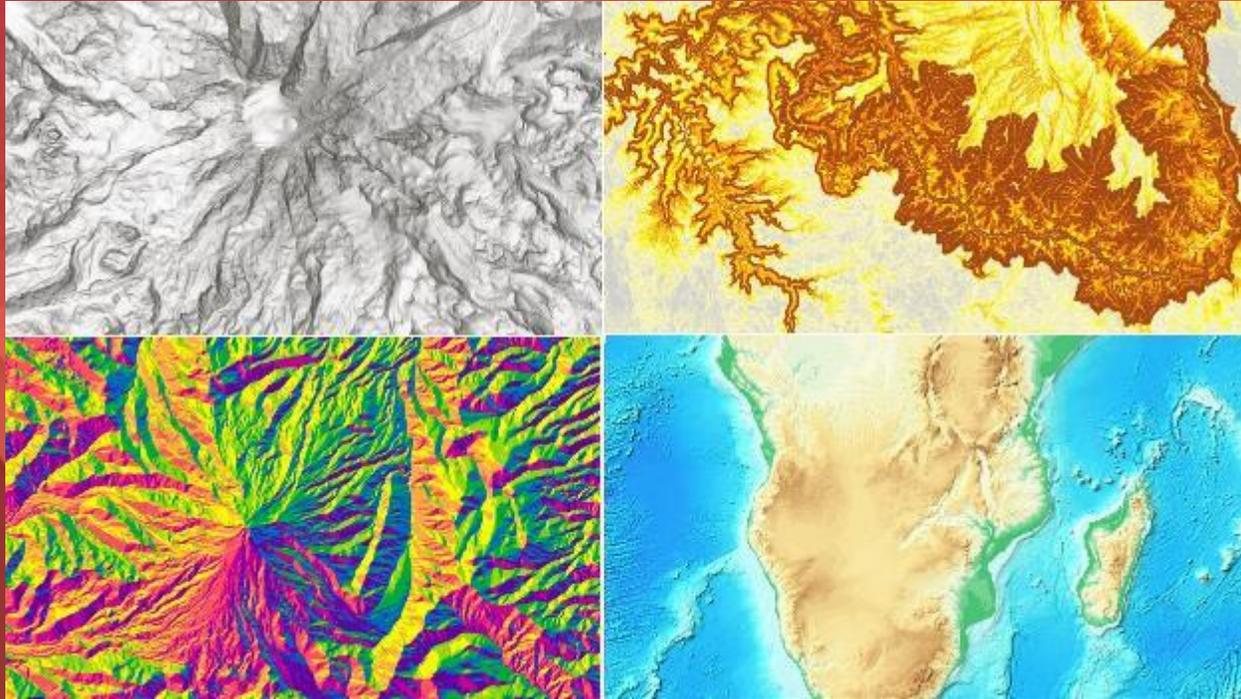
Slope Map



Aspect Map



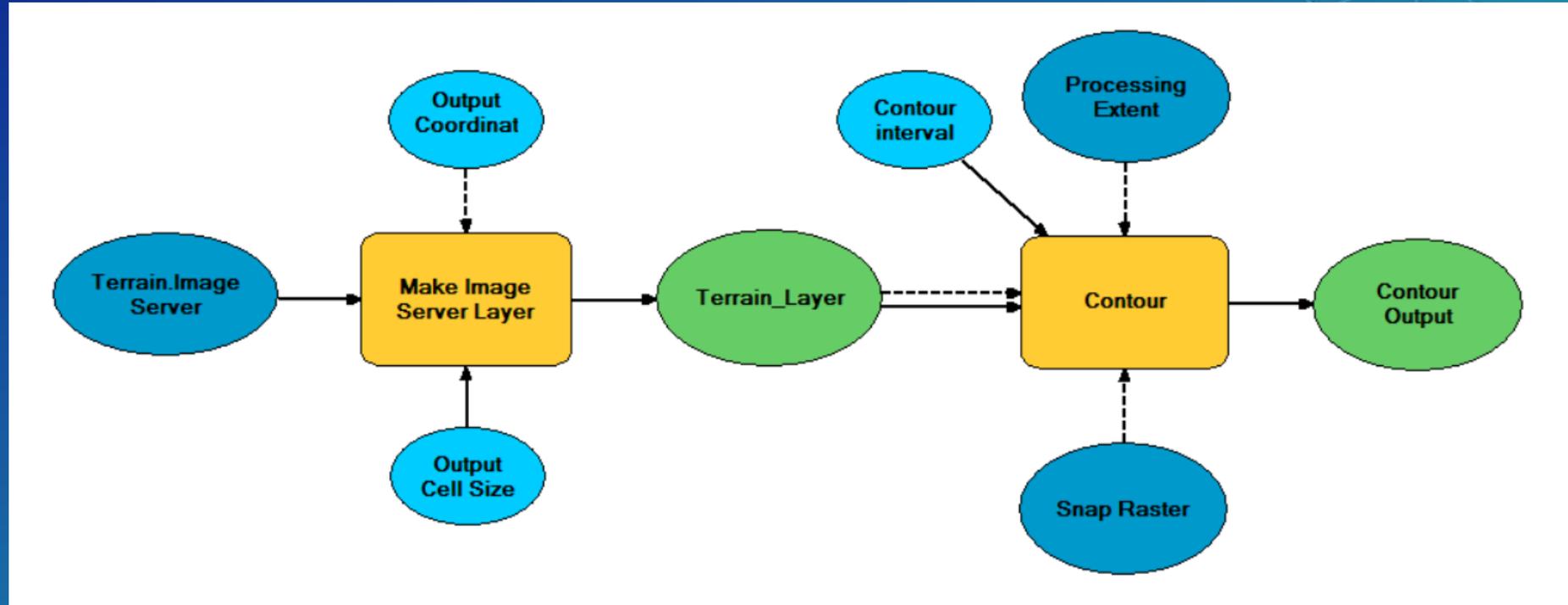
Elevation Tinted Hillshade



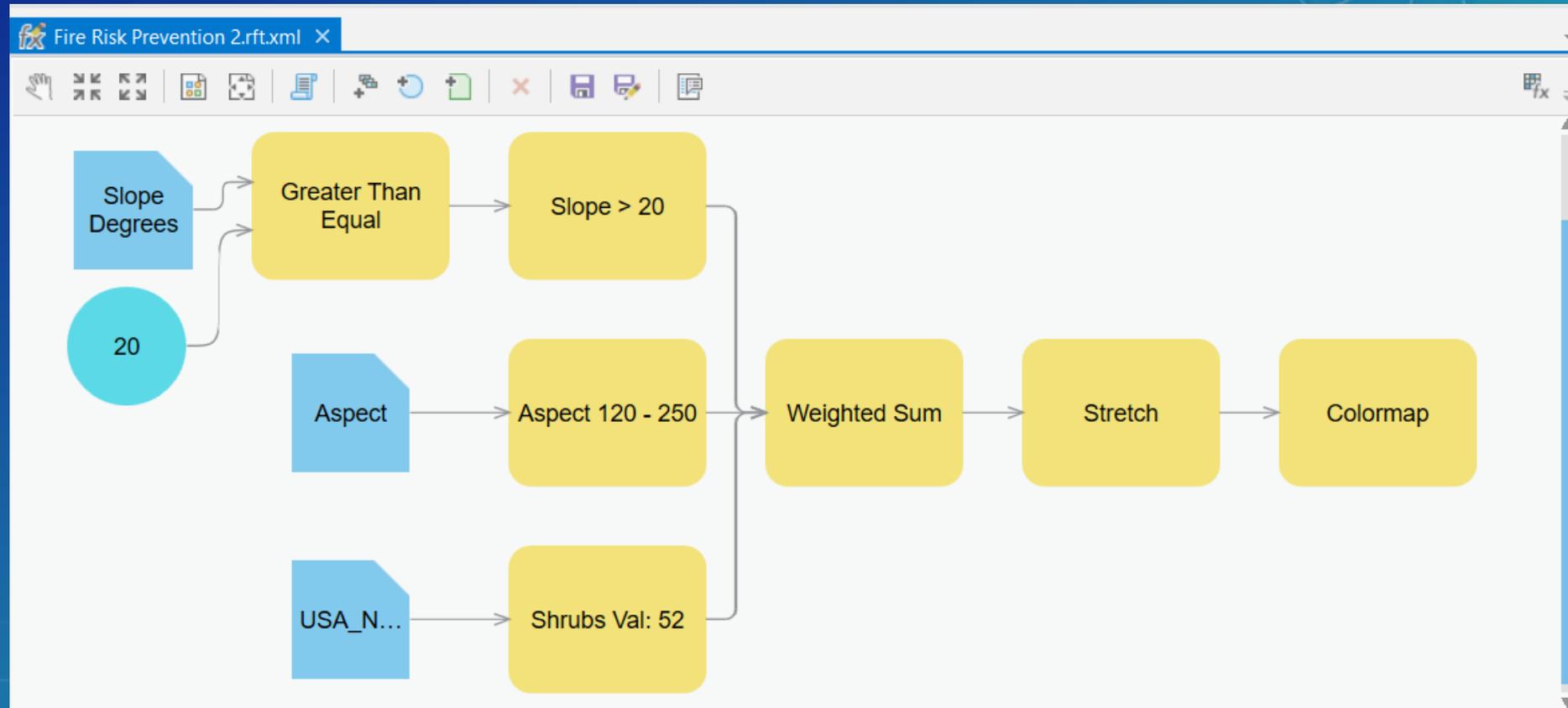
# Demo

Visualization and Analysis

# ArcMap : Analysis using model builder



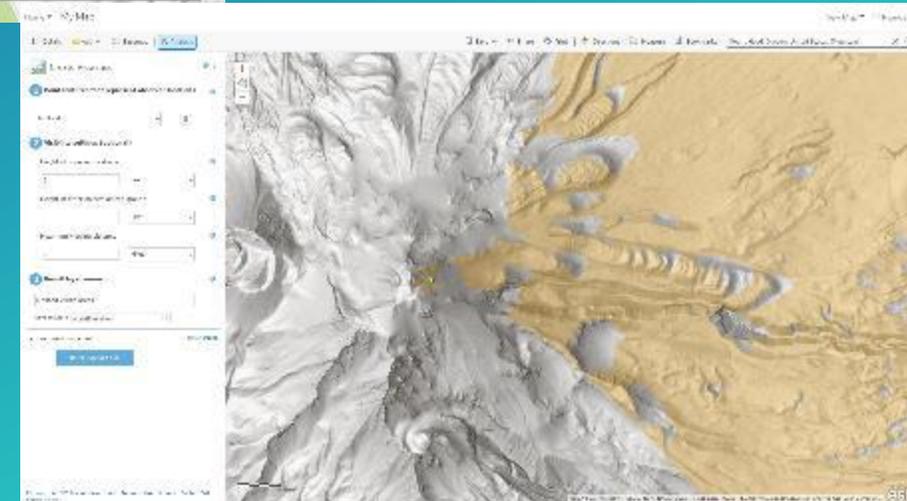
# ArcGIS Pro : Analysis with raster functions



# Analysis Tools

- Elevation Analysis Tasks
  - Profile
  - Viewshed
  - Summarize elevation
- AGOL subscription
  - 1 credit per 1000 features
- ElevationSync Task
  - Profile (free)

## Profile



## Viewshed

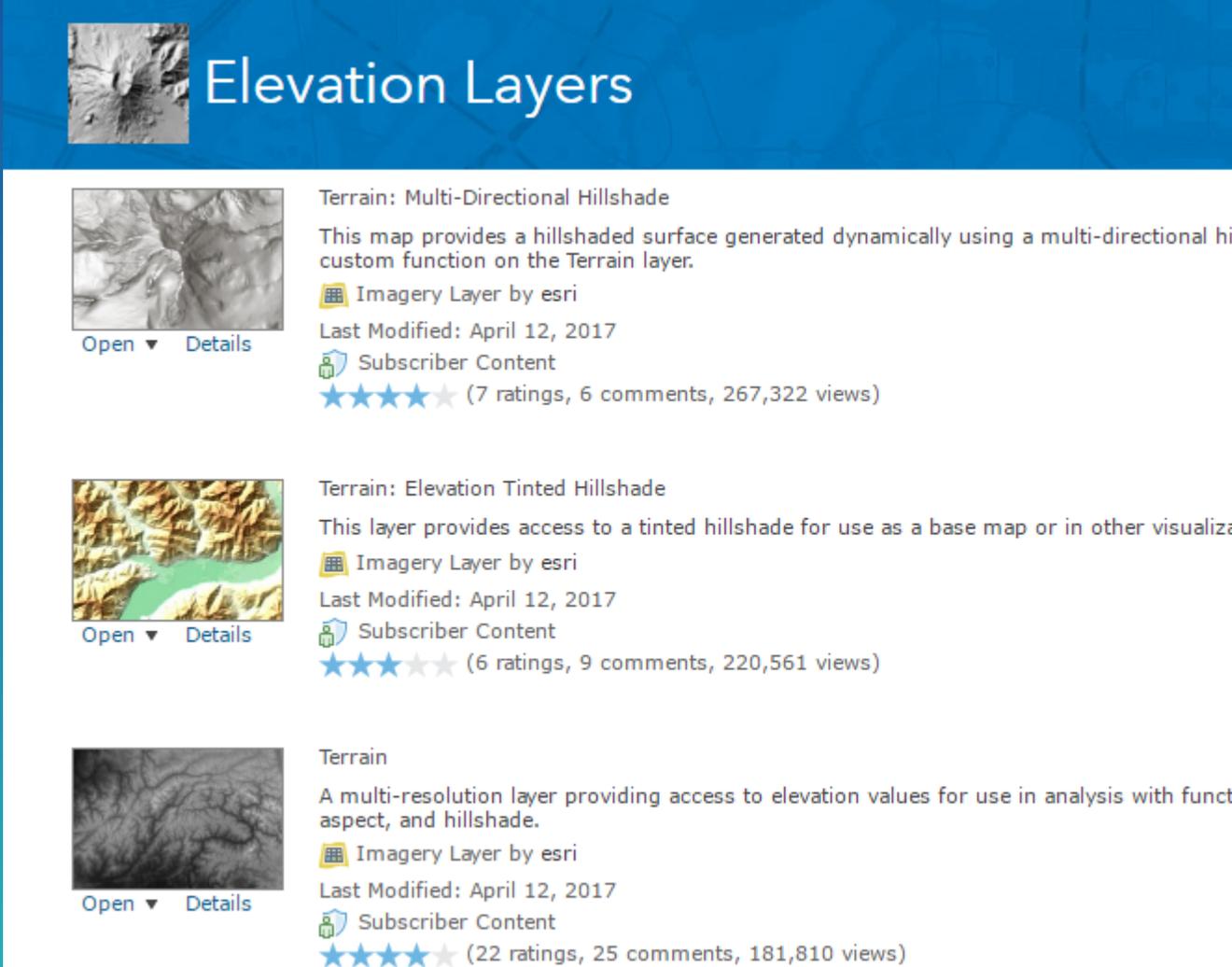


# Demo

Analysis Tools

# Accessing the Elevation Content through ArcGIS

- ArcGIS Online
  - Living Atlas
  - AGOL group: Elevation Layers
  - ArcGIS online web map
  - Custom web apps
- ArcGIS Desktop – ArcMap, ArcGIS Pro
  - <http://elevation.arcgis.com>
- Portal – Living Atlas
- Data Appliance – **On-Premises** offering
  - Terrain, Terrain3D, Profile, World Hillshade



The screenshot shows the 'Elevation Layers' page in ArcGIS Online. The page has a blue header with the title 'Elevation Layers' and a small thumbnail of a hillshade. Below the header, there are three main content blocks, each featuring a thumbnail, a title, a description, and metadata. The first block is 'Terrain: Multi-Directional Hillshade', the second is 'Terrain: Elevation Tinted Hillshade', and the third is 'Terrain'. Each block includes a grid icon, the text 'Imagery Layer by esri', the date 'Last Modified: April 12, 2017', a lock icon and 'Subscriber Content', and a star rating with the number of ratings, comments, and views.

## Elevation Layers

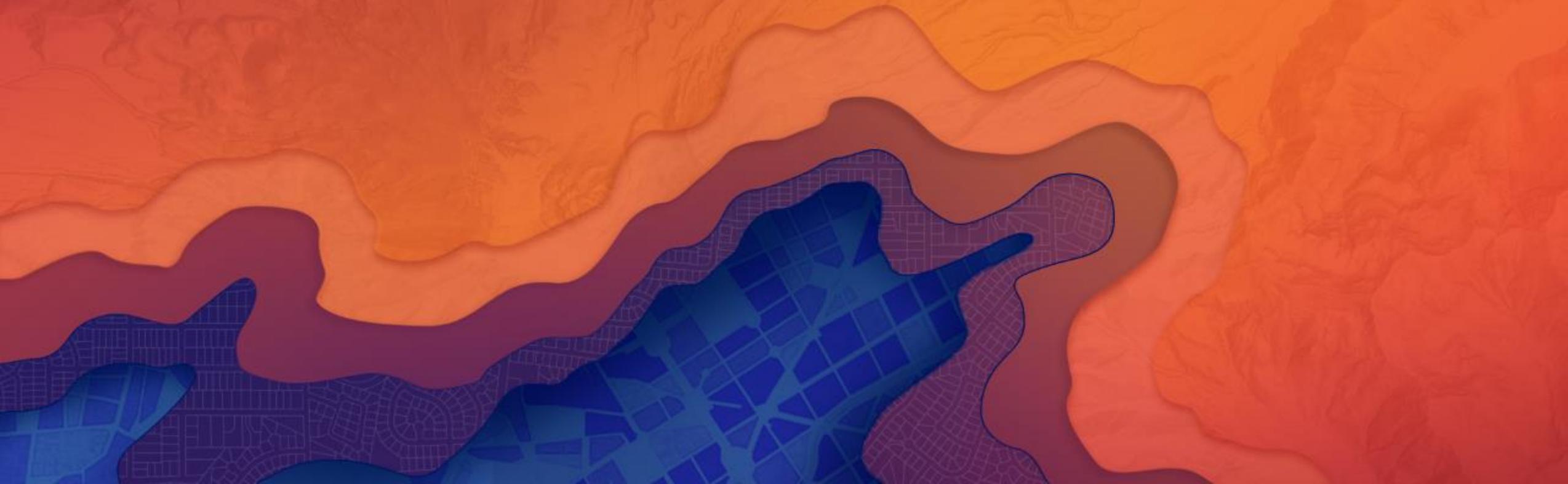
**Terrain: Multi-Directional Hillshade**  
This map provides a hillshaded surface generated dynamically using a multi-directional hillshade custom function on the Terrain layer.  
Imagery Layer by esri  
Last Modified: April 12, 2017  
Subscriber Content  
★★★★★ (7 ratings, 6 comments, 267,322 views)

**Terrain: Elevation Tinted Hillshade**  
This layer provides access to a tinted hillshade for use as a base map or in other visualizations.  
Imagery Layer by esri  
Last Modified: April 12, 2017  
Subscriber Content  
★★★★★ (6 ratings, 9 comments, 220,561 views)

**Terrain**  
A multi-resolution layer providing access to elevation values for use in analysis with functions, aspect, and hillshade.  
Imagery Layer by esri  
Last Modified: April 12, 2017  
Subscriber Content  
★★★★★ (22 ratings, 25 comments, 181,810 views)

# Visualization Products

SUBHEAD INFORMATION



# Visualization Products

- 3D Visualizations
  - ArcGIS webscene, Pro Scene, ArcGIS Earth
- World Hillshade
- World Topo Base
- Vector basemaps
  - Terrain with Labels
  - Topographic
  - Streets with Relief

Terrain 3D



TopoBathy 3D



World Hillshade



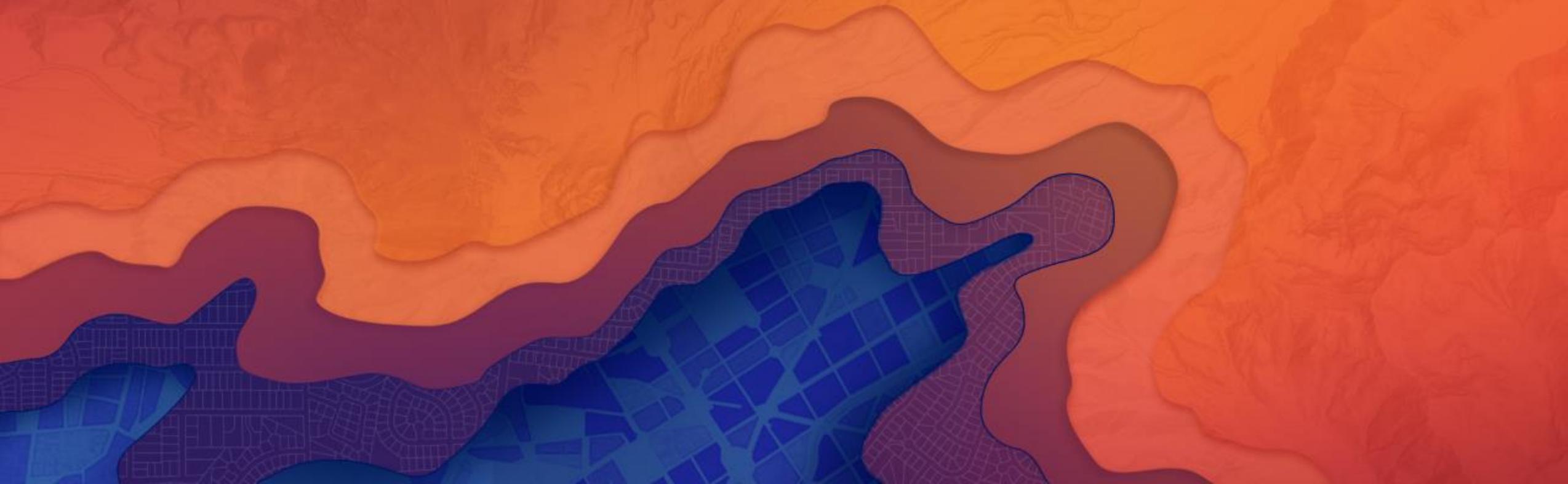
World Topo Base



# Demo

Visualization Products

# Community Maps for Elevation



# Community Maps for Elevation

- Do you have authority on elevation data?
- Do you have better resolution and coverage than Esri's coverage map?
  - High resolution LiDAR derived elevation
  - High resolution bathymetry
  - Apply for the community maps for elevation program
  - <http://esriurl.com/CommunityElevation>
- If accepted, prepare data per Esri specifications along with metadata
  - <http://esriurl.com/ElevSpecs>
- Send data to Esri

# Road ahead

- Airbus WorldDEM 24 m global elevation
- 1 m content from USGS 3DEP & USDA-NRCS
- High resolution content from communities
- Dark Hillshade

# Resources

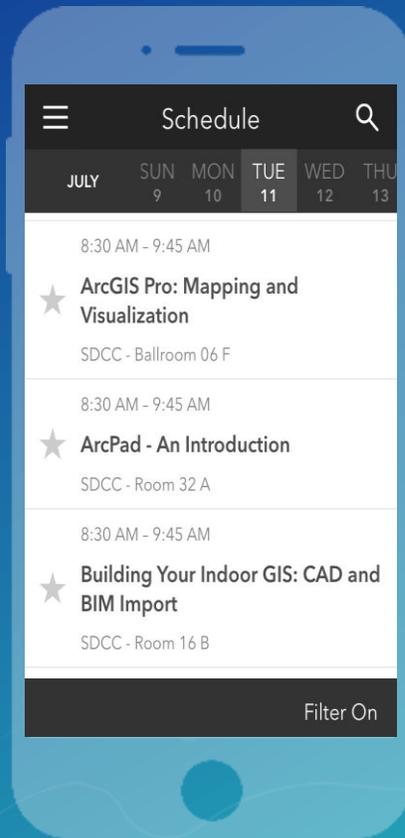
- Blog: Introducing Esri's World Elevation Services ([esriurl.com/IntroWorldElev](https://esriurl.com/IntroWorldElev))
- AGOL Elevation Layers Group ([esriurl.com/ElevLyrs](https://esriurl.com/ElevLyrs))
- Elevation Analysis (GP) Services ([esriurl.com/ElevAnalysis](https://esriurl.com/ElevAnalysis))
- Story Map: Living Atlas for Elevation ([esriurl.com/ElevationStoryMap](https://esriurl.com/ElevationStoryMap))
- Elevation Coverage Map ([esriurl.com/ElevCoverage](https://esriurl.com/ElevCoverage))
- Community Maps for Elevation ([esriurl.com/CommunityElevation](https://esriurl.com/CommunityElevation))
- Acceptance criteria and data specifications ([esriurl.com/ElevSpecs](https://esriurl.com/ElevSpecs))
- Generate token for REST based apps ([esriurl.com/GenToken](https://esriurl.com/GenToken))
- Apply to community maps program ([communitymaps.arcgis.com](https://communitymaps.arcgis.com))

# Please Take Our Survey on the Esri Events App!

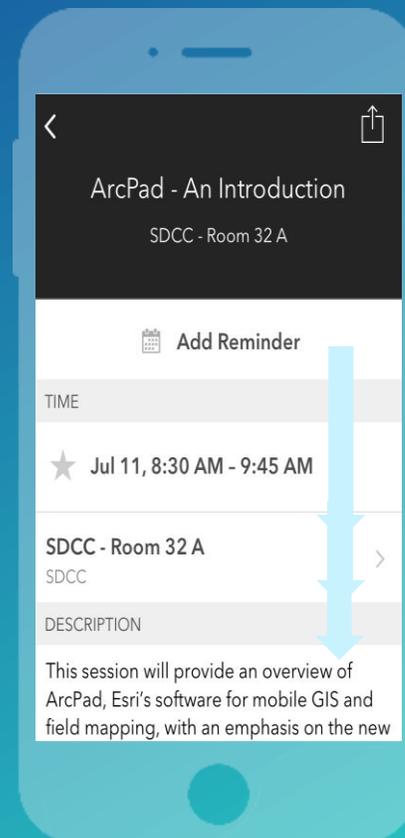
Download the Esri Events app and find your event



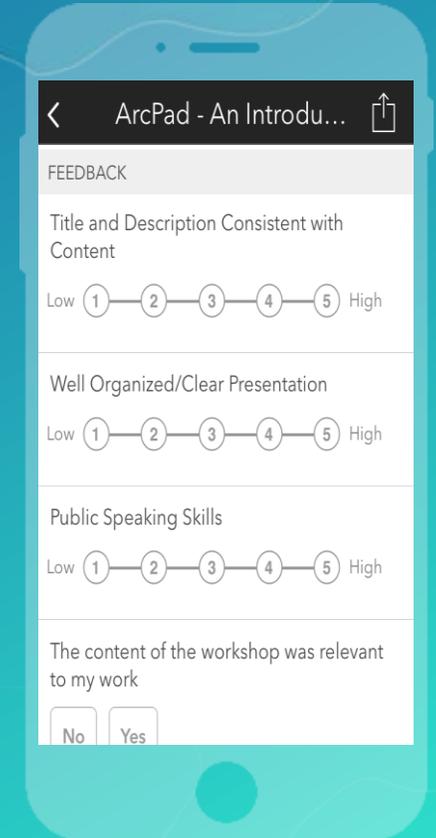
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"



**Rajinder Nagi**  
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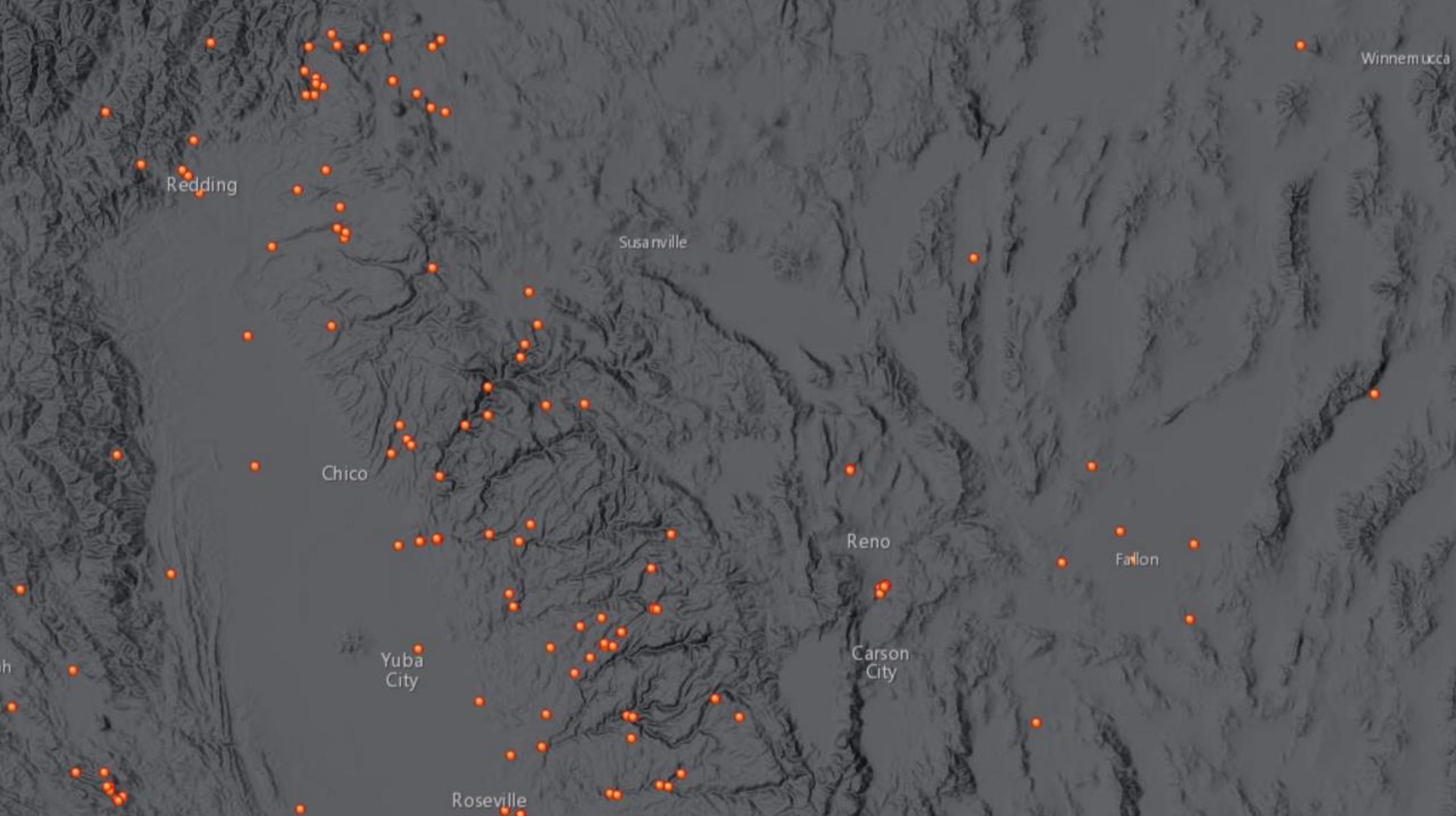


esri

THE  
SCIENCE  
OF  
WHERE

# Dark Hillshade Preview

The image features a topographic map with a hillshade effect. The background is a gradient of warm colors, from light orange at the top to dark red at the bottom. Overlaid on this is a dark blue grid pattern that follows the contours of the terrain. The grid is composed of small squares and is most prominent in the lower-left and central areas of the map.



Redding

Susanville

Chico

Reno

Fallon

Yuba City

Carson City

Roseville

Winnemucca





Rosedale

Centerville

West Bountiful

Bountiful

North Salt Lake

Becks

Salt Lake City

Dunford

South Salt Lake

West Valley City

Millcreek

Murray

Foothill

Canyon Rim

Mt Olympus

Holladay

Pinecrest

Mt Aire

Summit Park

Kimball Junction

Snyderville

Atkinson

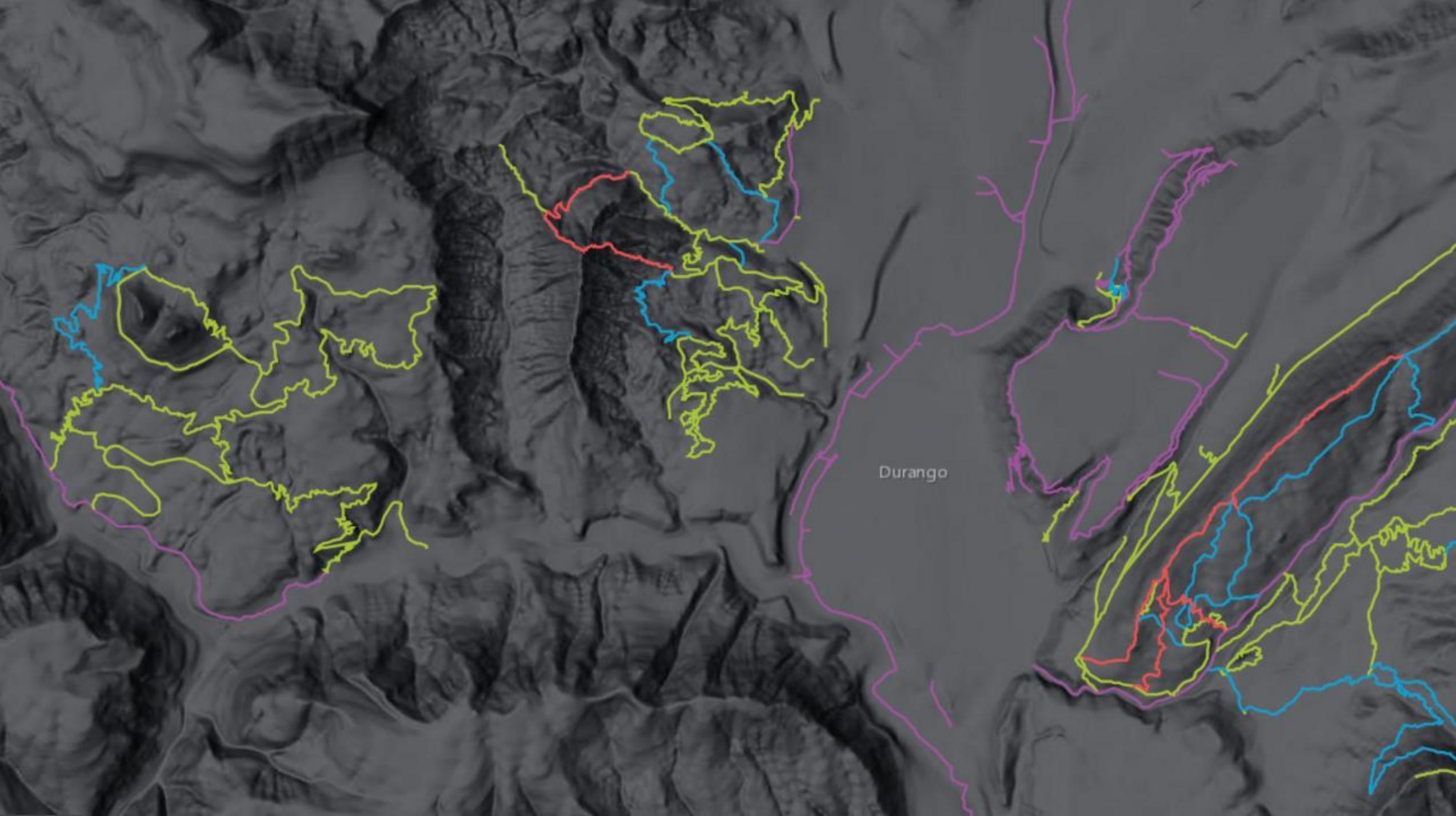
Keetley Junction

Wanship

Hoytsville

Coalville

Peoa



Durango