2020 EDUCATION SUMMIT

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Teaching with GIS in Schools

Tom Baker, Anita Palmer, Charlie Fitzpatrick, Kylie Donia (chat)

Special guests: Riley Peak, Laura Bowden, Katie Hall

http://educ-k12.hub.arcgis.com

Topics

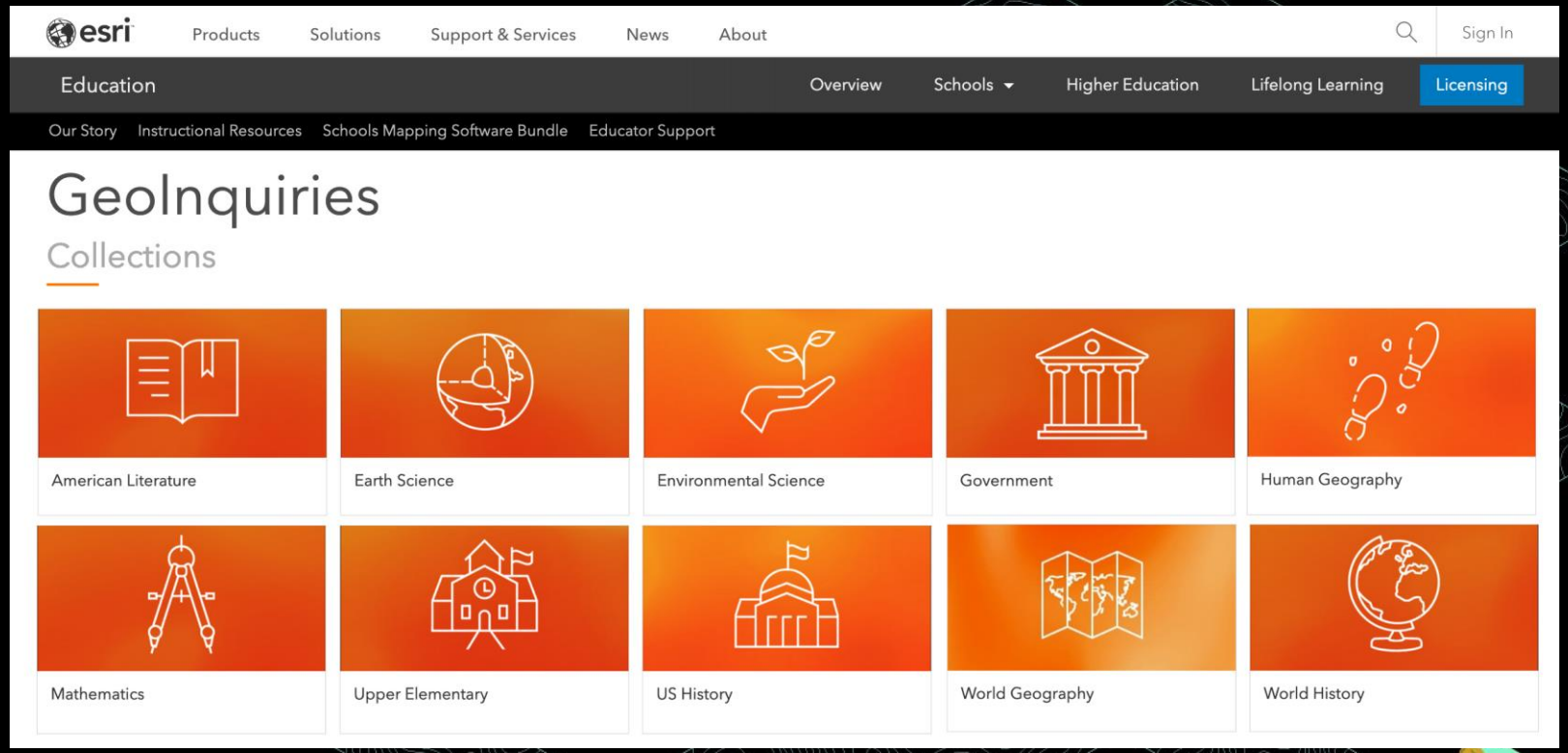
- GeoInquiries
- GeoProjects
- Mapping Hour
- Living Atlas & K12 Org
- Microsoft Badges for GIS
- Learn ArcGIS
- Esri Training
- ArcGIS Online School Competition (US)

GeoInquiries

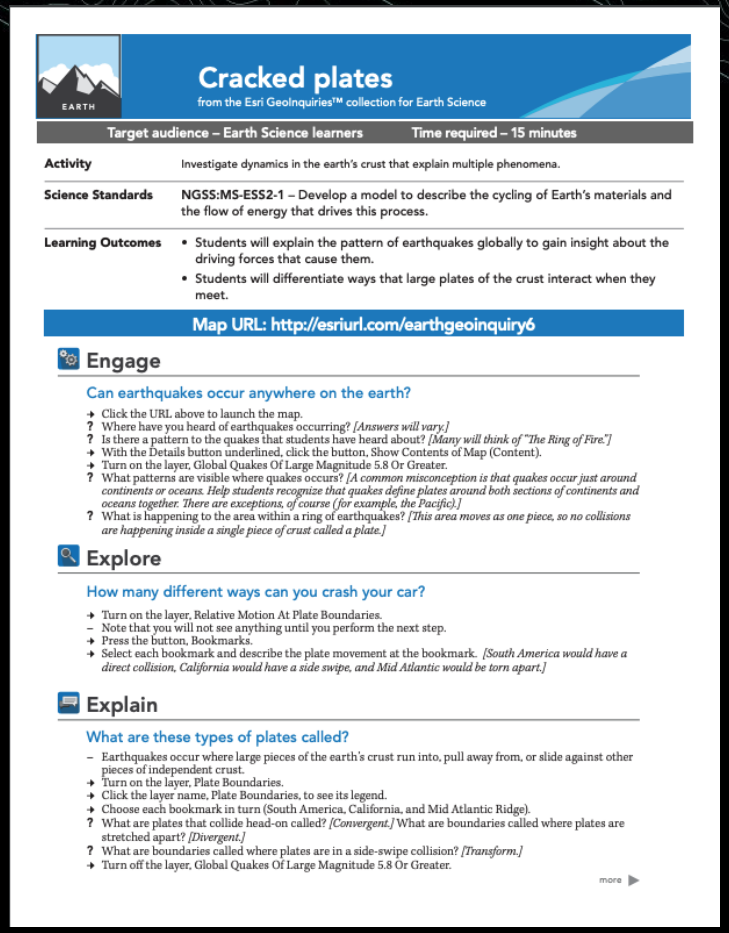
Anita Palmer and Tom Baker

Why GeoInquiries?

- 15-minute activities
- 10 collections
- No-login for Level 1
- Standards-based
- Time-tested (2014)
- Content-forward
- Only a computer and projector
- Level 2 needs login



GeoInquiries are designed, tested, and produced by teachers for teachers



Cracked plates

from the Esri GeoInquiries™ collection for Earth Science

Target audience – Earth Science learners **Time required – 15 minutes**

Activity	Investigate dynamics in the earth's crust that explain multiple phenomena.
Science Standards	NGSS:MS-ESS2-1 – Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
Learning Outcomes	• Students will explain the pattern of earthquakes globally to gain insight about the driving forces that cause them. • Students will differentiate ways that large plates of the crust interact when they meet.

Map URL: http://esriurl.com/earthgeoinquiry6

Engage

Can earthquakes occur anywhere on the earth?

→ Click the URL above to launch the map.
? Where have you heard of earthquakes occurring? *[Answers will vary.]*
? Is there a pattern to the quakes that students have heard about? *[Many will think of "The Ring of Fire."]*
→ With the Details button underlined, click the button, Show Contents of Map (Content).
→ Turn on the layer, Global Quakes Of Large Magnitude 5.8 Or Greater.
? What patterns are visible where quakes occurs? *[A common misconception is that quakes occur just around continents or oceans. Help students recognize that quakes define plates around both sections of continents and oceans together. There are exceptions, of course (for example, the Pacific).]*
? What is happening to the area within a ring of earthquakes? *[This area moves as one piece, so no collisions are happening inside a single piece of crust called a plate.]*

Explore

How many different ways can you crash your car?

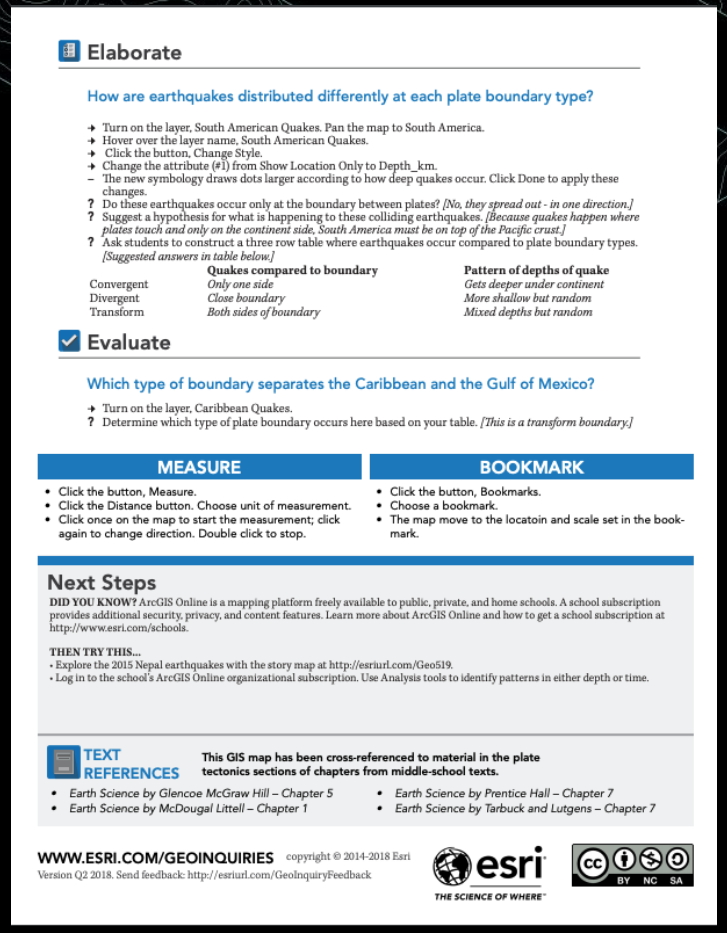
→ Turn on the layer, Relative Motion At Plate Boundaries.
– Note that you will not see anything until you perform the next step.
→ Press the button, Bookmarks.
→ Select each bookmark and describe the plate movement at the bookmark. *[South America would have a direct collision, California would have a side swipe, and Mid Atlantic would be torn apart.]*

Explain

What are these types of plates called?

– Earthquakes occur where large pieces of the earth's crust run into, pull away from, or slide against other pieces of independent crust.
→ Turn on the layer, Plate Boundaries.
→ Click the layer name, Plate Boundaries, to see its legend.
→ Choose each bookmark in turn (South America, California, and Mid Atlantic Ridge).
? What are plates that collide head-on called? *[Convergent.]* What are boundaries called where plates are stretched apart? *[Divergent.]*
? What are boundaries called where plates are in a side-swipe collision? *[Transform.]*
→ Turn off the layer, Global Quakes Of Large Magnitude 5.8 Or Greater.

more ▶



Elaborate

How are earthquakes distributed differently at each plate boundary type?

→ Turn on the layer, South American Quakes. Pan the map to South America.
→ Hover over the layer name, South American Quakes.
→ Click the button, Change Style.
→ Change the attribute (#1) from Show Location Only to Depth_km.
– The new symbology draws dots larger according to how deep quakes occur. Click Done to apply these changes.
? Do these earthquakes occur only at the boundary between plates? *[No, they spread out - in one direction.]*
? Suggest a hypothesis for what is happening to these colliding earthquakes. *[Because quakes happen where plates touch and only on the continent side, South America must be on top of the Pacific crust.]*
? Ask students to construct a three row table where earthquakes occur compared to plate boundary types. *[Suggested answers in table below.]*

	Quakes compared to boundary	Pattern of depths of quake
Convergent	*Only one side*	*Gets deeper under continent*
Divergent	*Close boundary*	*More shallow but random*
Transform	*Both sides of boundary*	*Mixed depths but random*

Evaluate

Which type of boundary separates the Caribbean and the Gulf of Mexico?

→ Turn on the layer, Caribbean Quakes.
? Determine which type of plate boundary occurs here based on your table. *[This is a transform boundary.]*

MEASURE	BOOKMARK
• Click the button, Measure. • Click the Distance button. Choose unit of measurement. • Click once on the map to start the measurement; click again to change direction. Double click to stop.	• Click the button, Bookmarks. • Choose a bookmark. • The map move to the locatoin and scale set in the bookmark.

Next Steps

DID YOU KNOW? ArcGIS Online is a mapping platform freely available to public, private, and home schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at http://www.esri.com/schools.

THEN TRY THIS...
• Explore the 2015 Nepal earthquakes with the story map at http://esriurl.com/Geo519.
• Log in to the school's ArcGIS Online organizational subscription. Use Analysis tools to identify patterns in either depth or time.

TEXT REFERENCES **This GIS map has been cross-referenced to material in the plate tectonics sections of chapters from middle-school texts.**

- *Earth Science by Glencoe McGraw Hill – Chapter 5*
- *Earth Science by McDougal Littell – Chapter 1*
- *Earth Science by Prentice Hall – Chapter 7*
- *Earth Science by Tarbuck and Lutgens – Chapter 7*

Earth Science Level 1

Cracked Plates

EARTH

Cracked plates

from the Esri GeoInquiries™ collection for Earth Science

Target audience – Earth Science learners **Time required – 15 minutes**

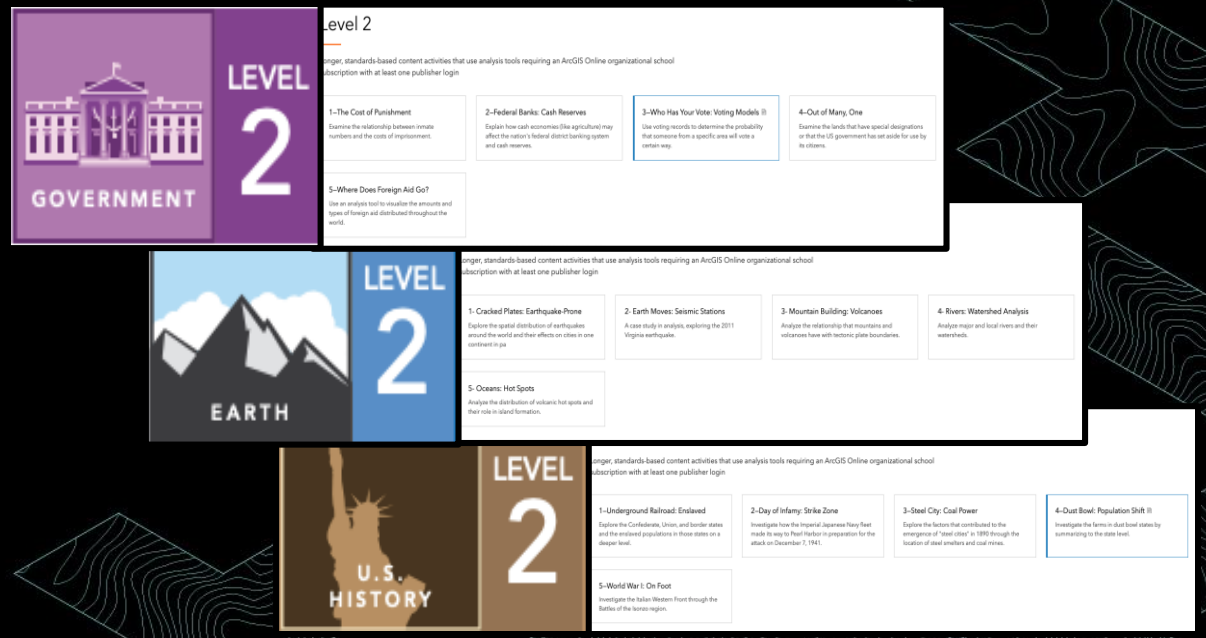
Activity	Investigate dynamics in the earth's crust that explain multiple phenomena.
Science Standards	**NGSS:MS-ESS2-1** – Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
Learning Outcomes	• Students will explain the pattern of earthquakes globally to gain insight about the driving forces that cause them. • Students will differentiate ways that large plates of the crust interact when they meet.

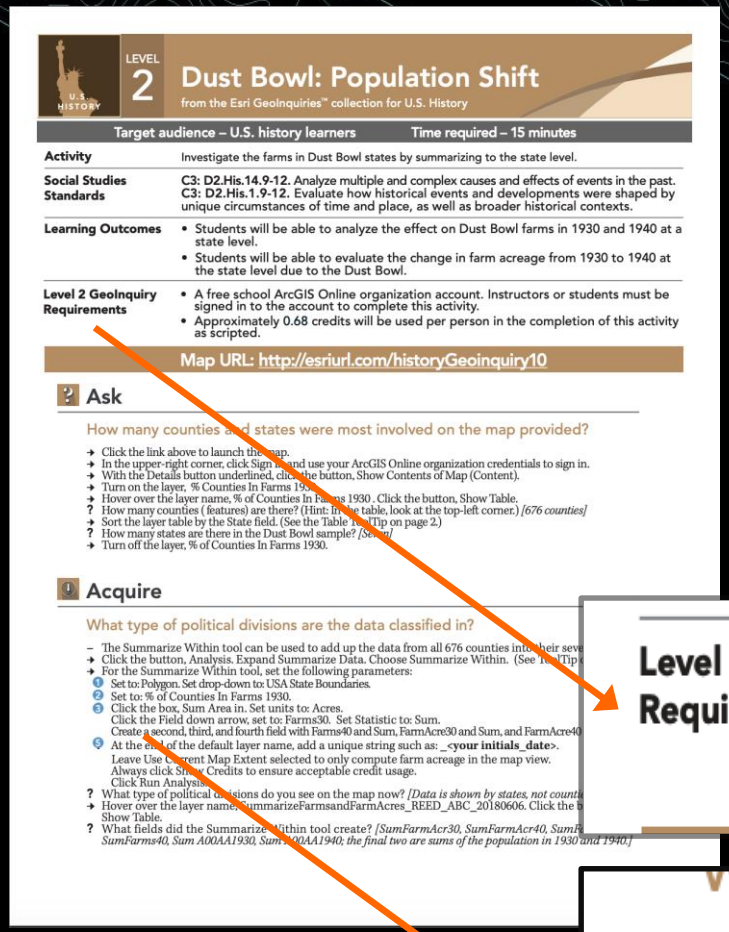
Map URL: http://esriurl.com/earthgeoinquiry6

Engage

Level 2 GeoInquiries

- Use ArcGIS Online Analysis Tools
- Need an ArcGIS Online Organization account (Free for K-12 schools)
- Using Level 2 requires one “Publisher” permission
- Level 2 activities available for six of the ten GeoInquiry collections
- Free





LEVEL 2

Dust Bowl: Population Shift

from the Esri GeoInquiries™ collection for U.S. History

Target audience – U.S. history learners **Time required – 15 minutes**

Activity	Investigate the farms in Dust Bowl states by summarizing to the state level.
Social Studies Standards	**C3: D2.His.14.9-12.** Analyze multiple and complex causes and effects of events in the past. **C3: D2.His.1.9-12.** Evaluate how historical events and developments were shaped by unique circumstances of time and place, as well as broader historical contexts.
Learning Outcomes	• Students will be able to analyze the effect on Dust Bowl farms in 1930 and 1940 at a state level. • Students will be able to evaluate the change in farm acreage from 1930 to 1940 at the state level due to the Dust Bowl.
Level 2 GeoInquiry Requirements	• A free school ArcGIS Online organization account. Instructors or students must be signed in to the account to complete this activity. • Approximately 0.68 credits will be used per person in the completion of this activity as scripted.

Map URL: http://esriurl.com/historyGeoinquiry10

Ask

How many counties and states were most involved on the map provided?

→ Click the link above to launch the map.
→ In the upper-right corner, click Sign In and use your ArcGIS Online organization credentials to sign in.
→ With the Details button underlined, click the button, Show Contents of Map (Content).
→ Turn on the layer, % Counties In Farms 1930.
→ Hover over the layer name, % of Counties In Farms 1930. Click the button, Show Table.
? How many counties (features) are there? (Hint: In the table, look at the top-left corner.) *[676 counties]*
→ Sort the layer table by the State field. (See the Table ToolTip on page 2.)
? How many states are there in the Dust Bowl sample? *[Seven]*
→ Turn off the layer, % of Counties In Farms 1930.

Acquire

What type of political divisions are the data classified in?

– The Summarize Within tool can be used to add up the data from all 676 counties into their seve
→ Click the button, Analysis. Expand Summarize Data. Choose Summarize Within. (See ToolTip
→ For the Summarize Within tool, set the following parameters:
1. Set to: Polygon. Set drop-down to USA State Boundaries.
2. Set to: % of Counties In Farms 1930.
3. Click the box, Sum Area in. Set units to: Acres.
Click the Field down arrow, set to: Farms30. Set Statistic to: Sum.
Create a second, third, and fourth field with Farms40 and Sum, FarmAcre30 and Sum, and FarmAcre40
4. At the end of the default layer name, add a unique string such as: **_<your initials_date>**.
Leave Use Current Map Extent selected to only compute farm acreage in the map view.
Always click Show Credits to ensure acceptable credit usage.
Click Run Analysis.
? What type of political divisions do you see on the map now? *[Data is shown by states, not counti*
→ Hover over the layer name SummarizeFarmsandFarmAcres_REED_ABC_20180606. Click the b
Show Table.
? What fields did the Summarize Within tool create? *[SumFarmAcr30, SumFarmAcr40, SumF*
SumFarms40, Sum A00AA1930, Sum A00AA1940; the final two are sums of the population in 1930 and 1940.]

Explore

What happened to the amount of farm acres compared to the number of farms?

→ In the table, compare the Sum FarmAcr30 field with the Sum FarmAcr40 field for each of the seven states.
? Did the number of acres in farms increase or decrease from 1930 to 1940 for each state? *[The number of acres in farms actually increased from 1930 to 1940.]*
? When you compare the number of farms in the same way, are the number patterns the same as the farm acres? *[From 1930 to 1940, there was a decrease in the number of farms for all states except New Mexico.]*

Analyze

What happened to the amount of population from 1930 to 1940?

→ In the table, compare the Sum A00AA1930 field (Pop in 1930) with the Sum A00AA1940 field (Pop in 1940) field for each of the seven states.
? What is the number pattern in population between 1930 and 1940? *[Four of the seven states increased in population, but Nebraska, Kansas, and Oklahoma decreased in population.]*

Act

What was the Dust Bowl states' population shift related to?

? In 1930 to 1940, if farm acres increased in each state but the number of farms decreased, what might that indicate? *[Increased amount of farm acres indicates that farmland may have recovered by 1940. Also, farm sizes had to have increased because the number of farms decreased.]*
? What can you say about the population shifts in the 10-year period between 1930 and 1940? *[Four of the Dust Bowl states recovered in population. However, Oklahoma, Nebraska, and Kansas lost what is assumed was farmers and their families.]*

VIEW AND SORT A TABLE	SUMMARIZE WITHIN
• Tables are only available for certain map layers. • In the Contents pane, point to a layer and click the Show Table button that appears under the layer name. • Click the field name and choose Sort Ascending or Sort Descending.	• Summarizes an area layer to other features within its boundaries. The area layer is states in this operation. • The result layer name must be unique, so consider adding three initials, school code, and a number after the layer name (example: FileName_REED_ABC1).

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http://esriurl.com/GeoInquiryFeedback

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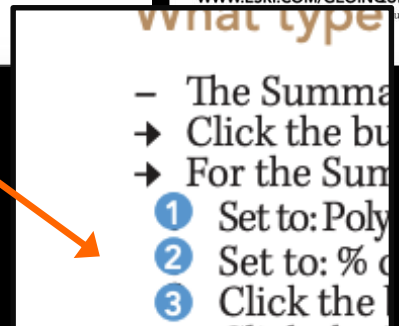

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U.S. History Level 2

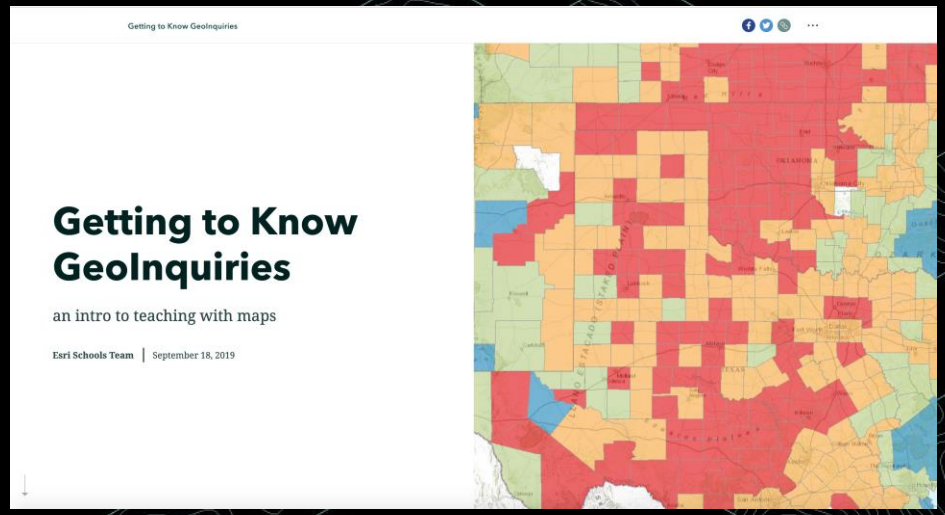
Dust Bowl: Population Shift

Level 2 GeoInquiry Requirements

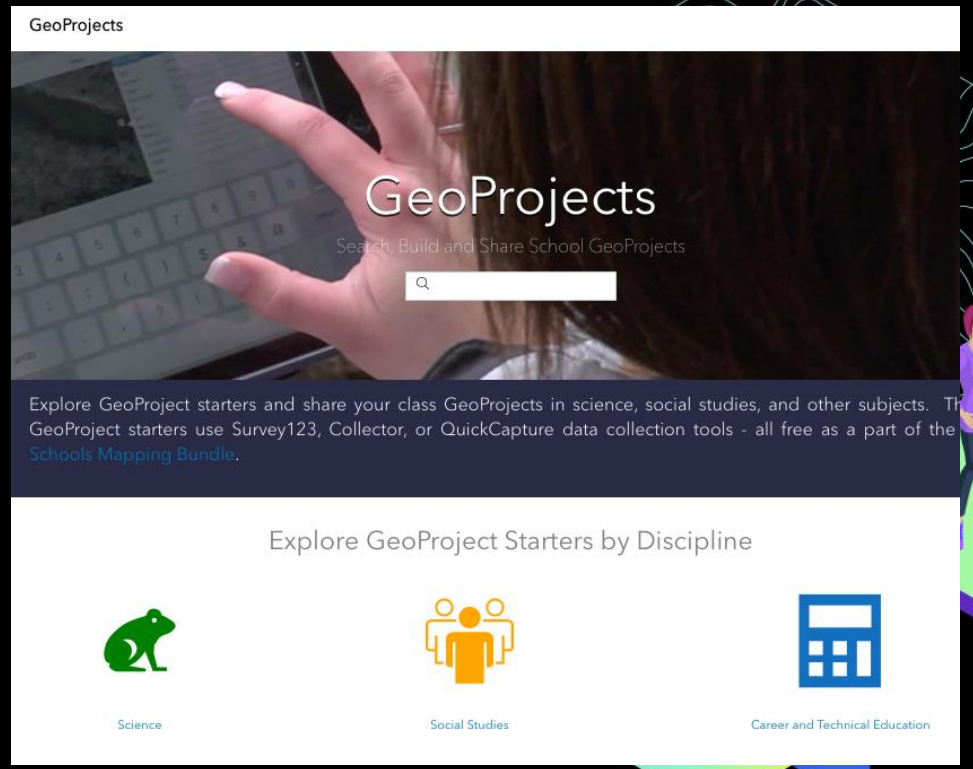
- A free school ArcGIS Online organization account. Instructors or students must be signed in to the account to complete this activity.
- Approximately 0.68 credits will be used per person in the completion of this activity as scripted.

GeoInquiries and More

- Student handouts
- GeoNet Community
- State GeoInquiries (TX, MN, VA, MI, WV and others)
- Getting to Know GeoInquiries Story Map – http://esriurl.com/GeoInquiryStoryMap



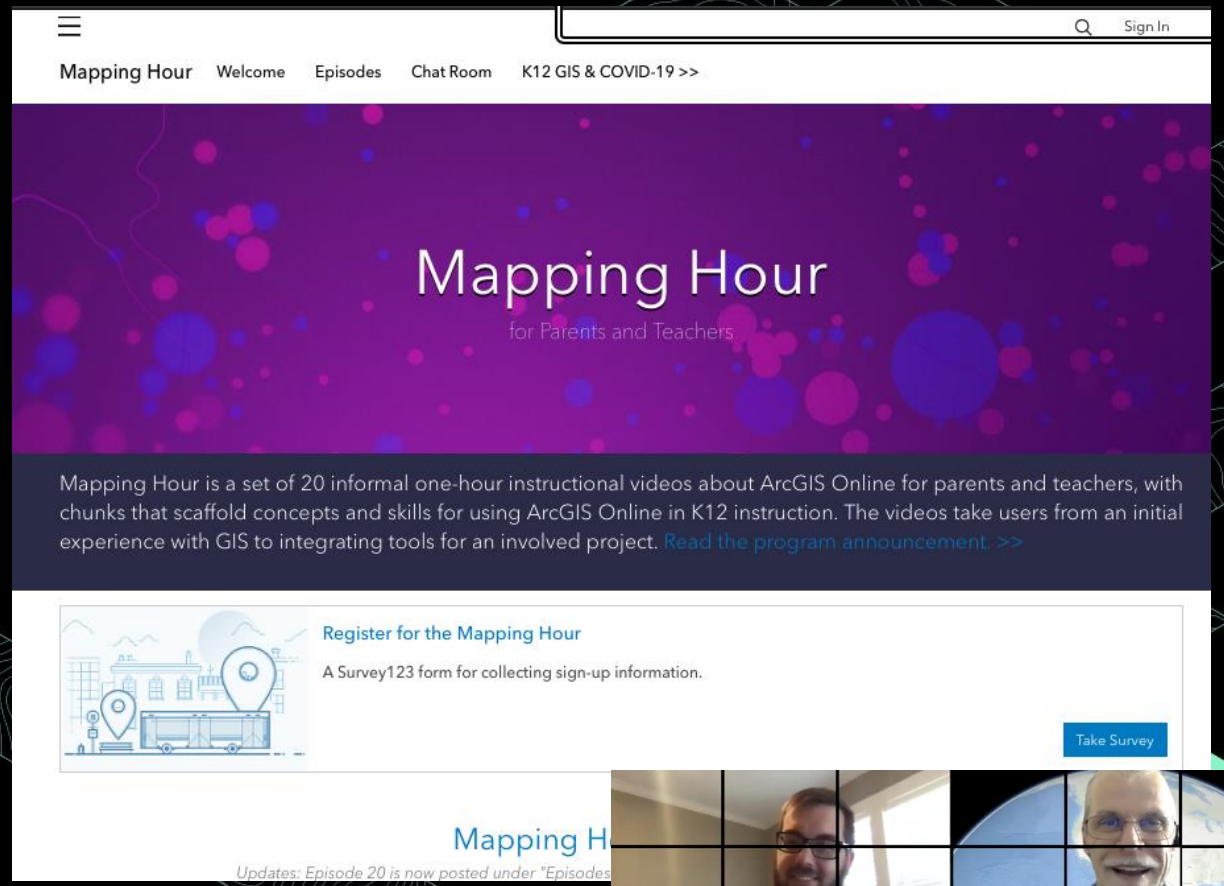
GeoProjects



Mapping Hour

Mapping Hour

- 20 1-hour video episodes
- Beginner to advanced
- Includes an optional temporary ArcGIS Online account
- Designed for teachers and parents
- Includes ArcGIS Online, Survey123, Community Analyst, StoryMaps, and more
- http://esriurl.com/mappingHour



Living Atlas & K12 Org

Charlie Fitzpatrick

livingatlas.arcgis.com

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ArcGIS Living Atlas of the World is the foremost collection of geographic information from around the globe. It includes maps, apps, and data layers to support your work.

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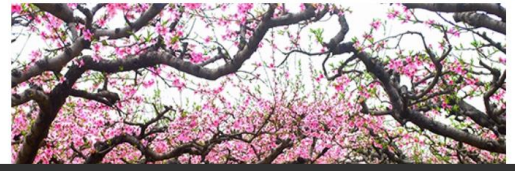
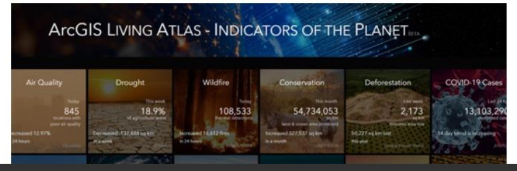
What's new

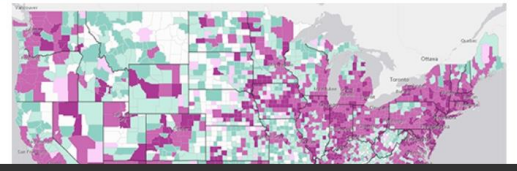
Explore items recently added to ArcGIS Living Atlas of the World, learn about GIS events, and discover ways to use content.

World Elevation layers update

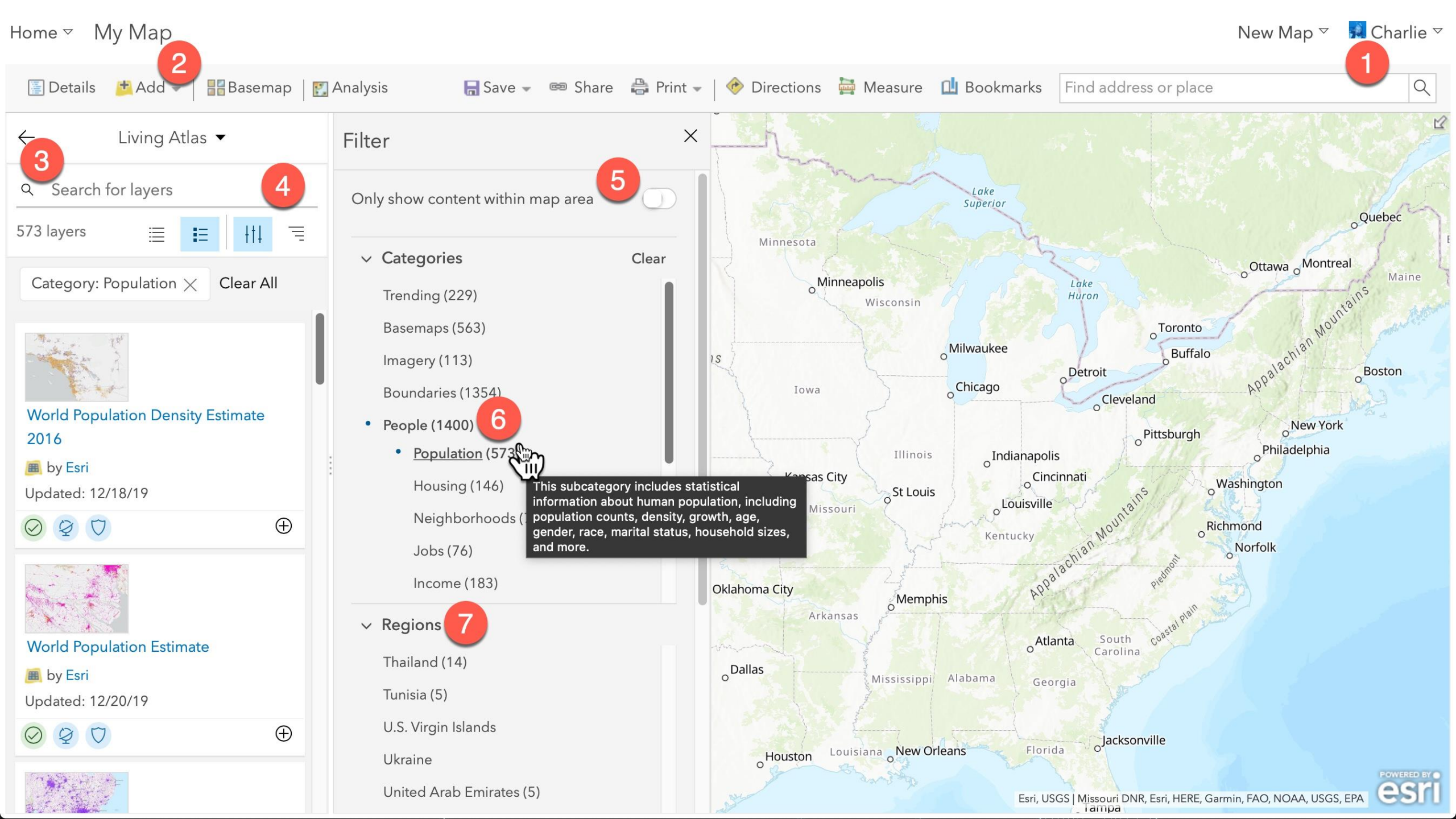
ArcGIS Living Atlas of the World provides foundation elevation layers and tools to support analysis and visualization across the ArcGIS platform. Learn about the recent high-resolution updates to the Terrain and TopoBathy layers, as well as planned updates to Elevation 3D and Hillshade.







Esri is monitoring global activity of the coronavirus disease 2019 (COVID-19) and supporting resources for community preparedness. View the COVID-19 GIS Hub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Analysis
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Share
Print
Directions
Measure
Bookmarks
Find address or place
Living Atlas
3
4
Search for layers
573 layers
Category: Population
Clear All
World Population Density Estimate 2016
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World Population Estimate
by Esri
Updated: 12/20/19
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Only show content within map area
Categories
Clear
Trending (229)
Basemaps (563)
Imagery (113)
Boundaries (1354)
People (1400)
6
Population (573)
Housing (146)
Neighborhoods (
Jobs (76)
Income (183)
This subcategory includes statistical information about human population, including population counts, density, growth, age, gender, race, marital status, household sizes, and more.
Regions
7
Thailand (14)
Tunisia (5)
U.S. Virgin Islands
Ukraine
United Arab Emirates (5)
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Minnesota
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Wisconsin
Lake Huron
Quebec
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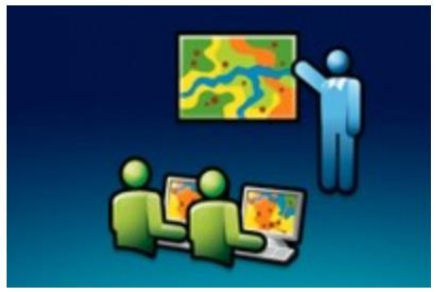

01. INSTRUCTION DOCS

02. Helping Educators

03. Community

04. Video Bonanza

Home of Mapping Hour and the GIS Club Kit, both addressing COVID-19 disruption. This is the ArcGIS Online Org for GIS in Schools & Clubs. (Scroll L-R for more.) **Request software** or see **current map**. See the **ArcGIS Online Competition for HS+MS** and the **Teacher Video Challenge**. Send email to schools@esri.com.

Videos of Youth

Search group content

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1 - 11 of 11

01. Education at 2019 Esri International Conference

Document Link by EsriK12GIS

Video of youth section from 2019 Esri Conference. Shortcut = http://esriurl.com/k12gisuc2019

Created: Jul 13, 2019 Updated: Jul 13, 2019 View Count: 11

02. Education at 2018 Esri International Conference

Document Link by EsriK12GIS

Video of youth section (teacher award) from 2018 Esri Conference. Shortcut = http://esriurl.com/k12gisuc2018. See also http://esriurl.com/funwithgis235 and http://esriurl.com/funwithgis238

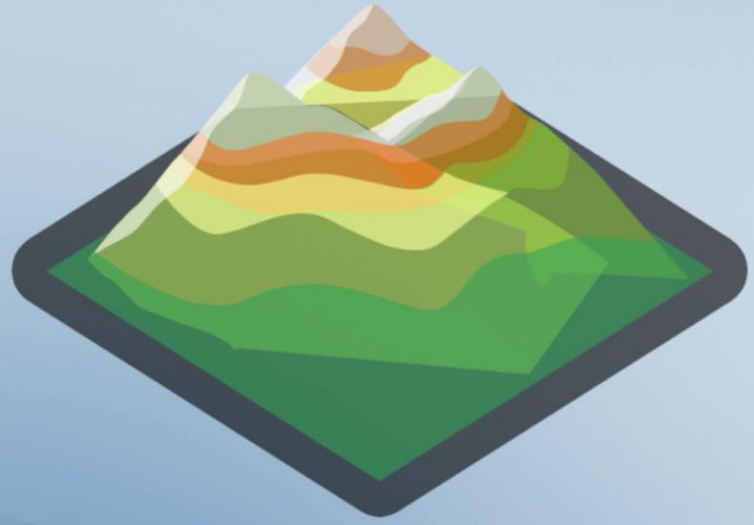
Created: Jul 14, 2018 Updated: Nov 25, 2019 View Count: 28

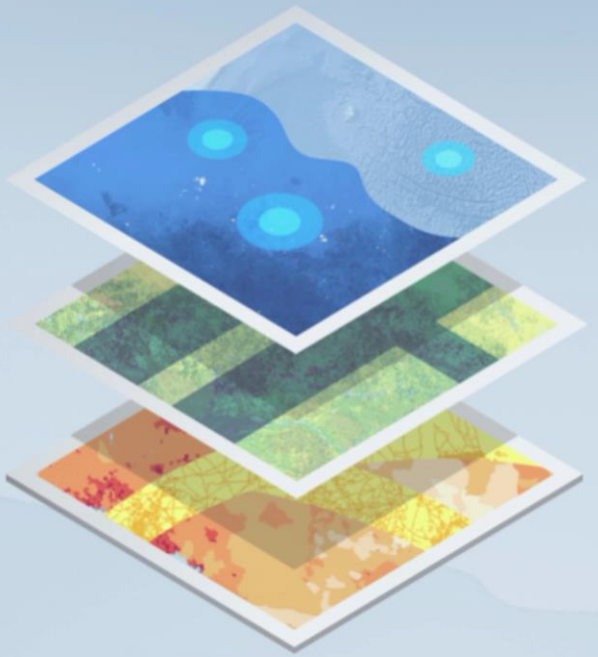
03. Education at 2017 Esri User Conference

Document Link by EsriK12GIS

Microsoft Badges for GIS

Dr. Katie Hall





ArcGIS for Schools

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