Section 1

Video: Accessing imagery sources with apps

Print

Time	Caption
0:00	♪ [music] ♪
0:08	So an image service provides access
0:11	to raster data over the internet
0:13	as a web service.
0:14	Multiple rasters can be shared as
0:16	a single image service, dynamically
0:18	visualized and mosaicked on the fly.
0:20	An image service can be accessed
0:22	from anywhere with an internet connection,
0:24	which makes it easy to share and
0:25	access massive volumes of imagery.
0:28	So you could publish your own image
0:30	services with your own imagery using
0:32	ArcGIS Enterprise with ArcGIS Image Server
0:34	or using ArcGIS Image for ArcGIS Online.
0:38	Of course, Esri also provides several
0:40	ready-to-use image services,
0:41	including Landsat, Sentinel-2,
0:44	and National Aerial Imagery
0:46	Program images, also called NAIP.
0:48	We've also got a world terrain service
0:50	and a world imagery tile service
0:52	that's generally used as a basemap.

0:54 These services are available from

0:56 the Living Atlas of the World,

0:58 which provides a massive collection of

1:00 ready-to-use, authoritative data layers

1:02 curated and prepared for

1:04 easy integration with ArcGIS.

1:06 These imagery layers can be consumed

1:08 in ArcGIS Pro in the Map Viewer

1:11 or consumed and shared via web apps.

1:14 So let's use ArcGIS Online's Map Viewer

1:17 to take a look at Sentinel-2 imagery

1:19 depicting a recent volcanic

1:21 eruption in Hawaii.

1:22 On January 5th, 2023,

1:25 the Kilauea volcano erupted.

1:27 Within hours lava had

1:28 filled 277 acres of the crater.

1:31 We're interested in how the

1:33 eruption progressed through time,

1:35 so we can browse previous images,

1:36 which aren't currently visible, to find

1:38 images of the eruption as it unfolded.

1:41 Using the time slider, we can limit

1:43 our search to the date range

1:44 around the eruption, and in this case,

1:46 I'll limit the search to January 2023.

1:51 Since Sentinel-2 acquires images

1:53 every five days, we'll use that

1:55	as our time interval.
1:58	A natural color rendering, as we see here,
2:01	displays the image the way that
2:02	our eyes would see it, using red,
2:04	green, and blue bands.
2:06	In this case, as I proceed through images
2:08	of the eruption, we can see some smoke,
2:10	but it's hard to tell what's
2:11	happening on the ground.
2:13	We're most interested in
2:14	the lava, which reflects a lot of
2:16	short-wave infrared energy.
2:18	So we're going to use the Short-wave
2:19	Infrared renderer, which will make
2:21	the lava easy to see when
2:22	we review the same images.
2:29	By going beyond red, green, and blue
2:31	wavelengths, we can better understand how
2:34	the Kilauea eruption progressed over time.
2:43	Map Viewer is useful for examining
2:46	image services and creating web maps.
2:48	Esri also offers a collection
2:50	of Explorer apps, which demonstrate more
2:53	of what's possible with image services
2:55	and are useful tools for exploring Landsat
2:58	and Sentinel-2 imagery more deeply.
3:01	Let's use Earth Observation Explorer
3:05	to dig a little deeper

3:06	into the Kilauea eruption.
3:08	I'll navigate to the crater,
3:09	switch to Sentinel-2 imagery,
3:11	and pull up the January 7th image,
3:13	which was particularly clear.
3:18	And if I switch to the Short-wave Infrared
3:21	with DRA renderer, you can see the lava
3:23	glow orange and the snow turn blue.
3:26	Let's look at why that is.
3:29	First, let's look at some spectral
3:31	profiles from the image.
3:32	A spectral profile plots
3:34	reflectance at different wavelengths,
3:35	also called bands, for a particular point
3:38	in a multi-spectral image.
3:40	If we click the snow, the reflectance of
3:42	short-wave infrared and near-infrared are
3:44	lower while blue reflectance, symbolized
3:46	using blue in the image, is higher.
3:48	This explains why the snow
3:50	appears blue in this rendering.
3:52	If we click the lava, we get a distinctive
3:55	spike in short-wave infrared reflectance.
3:57	The short-wave infrared band is
3:59	visualized using red, which explains
4:01	why the lava glows bright orange.
4:03	We can see the distinctive spectral
4:05	profiles of rock with low reflectance

4:07	across the spectrum and grass,
4:09	which has higher reflectance
4:11	in the near-infrared band.
4:13	We can also look more closely at the
4:15	spectral characteristics of the image
4:17	with an interactive spectral scatter plot.
4:19	If we plot the short-wave infrared band
4:21	against the near-infrared band,
4:23	we can identify relationships
4:24	between these bands that correspond
4:26	with different land cover types.
4:28	By circling groups of pixels on the plot,
4:30	we can see where they fall in the image.
4:33	Molten lava corresponds with
4:35	pixels that have low near-infrared
4:37	reflectance and relatively high
4:38	short-wave infrared reflectance.
4:40	Pixels with high near-infrared reflectance
4:43	and low short-wave infrared reflectance
4:45	appear to be snow, as you can see here.
4:52	These pixels appear to be vegetation,
4:57	and this group of pixels,
4:59	which have similar reflectance
5:01	in both bands, appears to be rock.
5:07	These image services and Explorer apps
5:10	are useful on their own, but it
5:12	can also be really powerful to create
5:13	resources that are tailored for your

5:15	organization's own imagery and needs.
5:18	Configurable apps for imagery let you
5:20	create focused, shareable apps for
5:22	exploring and visualizing imagery layers,
5:24	no programming required.
5:26	So let's take a look at building
5:29	an imagery viewer configurable app
5:30	for exploring how Las Vegas has
5:32	changed over the last 30 years.
5:35	All configurable apps start
5:37	with a web map, which you
5:38	can then share as an app.
5:40	We'll use the Imagery Viewer
5:42	to create this web app.
5:46	Once the app is created, I'll use
5:48	the Express Setup to configure
5:49	the most important settings.
5:53	For example, in the About section,
5:55	I can add a Details tool to help
5:58	the user understand what
5:59	the app is and how to get started.
6:03	In the Interactivity section, I can
6:05	configure a swipe tool so users
6:07	can easily compare images.
6:11	And in Theme and Layout,
6:13	I'll rearrange the tools.
6:18	I could switch to the Full Setup
6:19	to access more advanced settings,

6:21	but I can also publish a perfectly
6:23	serviceable app from here.
6:28	This app uses Landsat to interactively
6:30	illustrate how Las Vegas land cover
6:32	has changed between 1991 and 2020.
6:36	First, you can compare dates using Swipe.
6:42	You can also use bookmarks
6:44	to explore areas of interest,
6:46	like the North Las Vegas Airport.
6:52	You can also see census tract pop-ups
6:55	from the web map to add context.
6:58	And finally, we can change dates
7:01	to explore change through time.
7:07	This simple focused app was built quickly,
7:09	adding context to the Las Vegas imagery
7:12	in a polished, user-friendly form.
7:14	With web-enabled image services,
7:17	you can interactively explore your imagery
7:19	from your web browser and visualize it
7:21	in a way that makes it easy to interpret.
7:23	This will ultimately help you make
7:25	better decisions and tell better stories
7:27	with your imagery.