Landsat Explorer app

Over the past 43 years, Landsat has amassed over four million scenes of data, taking images of every location on earth every 16 days. Using the Landsat app, you can explore historic images to see how places change over time and look at images using different combinations of spectral bands. In this exercise, you will investigate three features of the Landsat Explorer.

Features of the Landsat Explorer app

1. The app provides quick access to the following band combinations:

    Agriculture: Highlights agriculture in bright green. Bands 6,5,2

    Natural Color: Sharpened with 25m panchromaticband. Bands 4,3,2+8

    Color Infrared: Healthy vegetation is bright red. Bands 5,4,3

    SWIR (Short Wave Infrared): Highlights rock formations. Bands 7,6,4

   Geology: Highlights geologic features. Bands 7,4,2

    Bathymetric: Highlights underwater features. Bands 4,3,1

    Panchromatic: Panchromatic image at 15m. Band 8

    Vegetation Index: Normalized Difference Vegetation Index (NDVI). (Band5-Band4)/(Band5+Band4)

    Moisture Index: Normalized Difference Moisture Index (NDMI). (Band5-Band6)/(Band5+Band6)

2. The Time tool enables access to a time slider and temporal profile for different indices based on a selected point. The Time tool is only accessible at large zoom scales. It also provides temporal profiles for Normalized Difference Vegetation Index (NDVI), Normalized Difference Moisture Index (NDMI), and an Urban Index.

3. The Identify tool enables access to information on the scenes and can also provide a spectral profile based on a selected point.
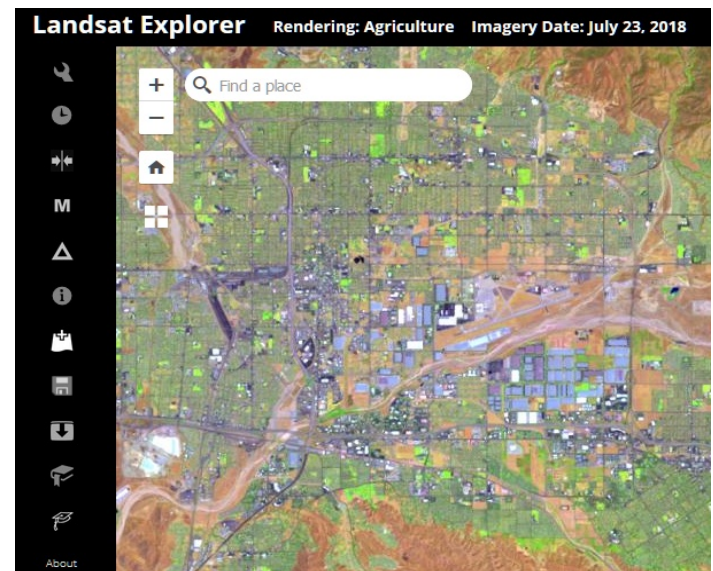
Build skills in these areas

▶ Opening the Landsat app

▶ Finding locations using addresses

▶ Using different spectral band combinations

▶ Analyzing various spectral profiles

▶ Accessing metadata about the imagery

What you need

▶ Account not required

▶ Estimated time: **30 minutes to** 1 hour

Scenario

You have been asked to demonstrate the Landsat Explorer app to a group of learners without previous experience using Landsat. You need to analyze four different locations. You must qualitatively and quantitatively examine the location.

Washington, DC—urban area

1. Open the Landsat Explorer.

2. Search for Washington, DC, District of Columbia, United States..

The Landsat view opens in Natural Color. In this view, you can clearly see the bridges, highways, and concentrated developed land.

3. **Click on the Renderer Icon on the left panel and** change the **b**and combination to color infrared, which shows healthy vegetation as bright red.

4. Locate Arlington Cemetery and the golf course to the West of Addison Heights. If Addison Heights is not immediately visible, zoom in another level. Spectral profiles indicate the value of each pixel for each band. They are essentially plots of the reflected radiation of different objects. Objects behave differently with different wavelengths and therefore they have different spectral profiles. In this next section, you will examine the spectral profile of water, developed land, and healthy vegetation.

5. Click I (for information) and click on water in the image.

You get information about the Landsat scene as well as a spectral profile. Typical spectral profiles are shown as well as the profile of the pixel you selected. Notice that the values are relatively low throughout all the bands. This is because water absorbs light and does not reflect as much as other objects.
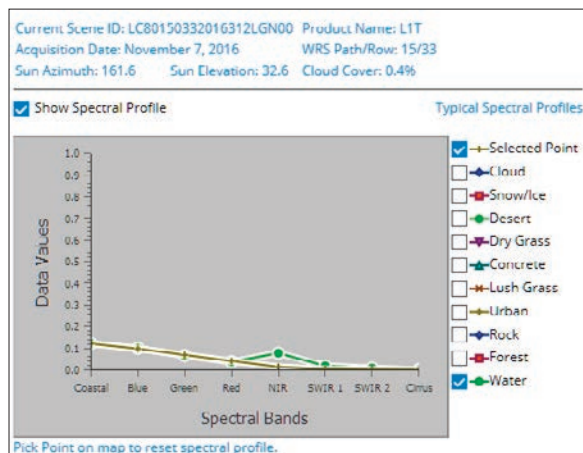

6. Click I and get a spectral profile of developed land.

7. Describe the spectral profile curve for development land, paying attention to where vit spikes.

8. Click I and get a spectral profile of healthy vegetation.

9. Describe the spectral profile curve for healthy vegetation. Why does it spike in the NIR band?

10. Check all the Typical Spectral Profiles

11. Looking at all the Spectral Profiles, write a summary of how spectral reflectance is reflected in the spectral profiles of different objects.
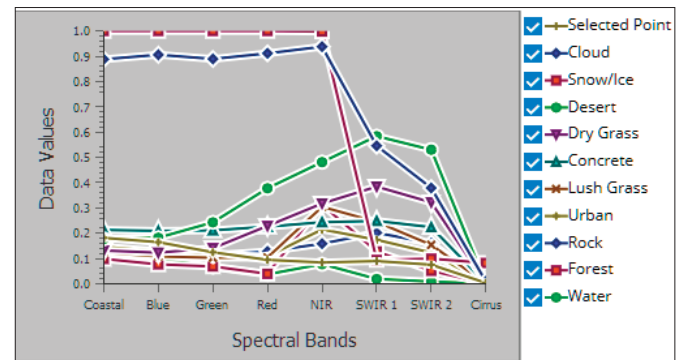
Wadi As-Suh, Saudi Arabia—agricultural area

Circular irrigation is a method of crop irrigation in which equipment rotates around and waters crops with sprinklers. In this section of the exercise, you will identify areas of circular irrigation and examine them using both the vegetation and moisture indexes.

1. Search for Wadi As-Sirhan, Saudi Arabia. Zoom out.

3
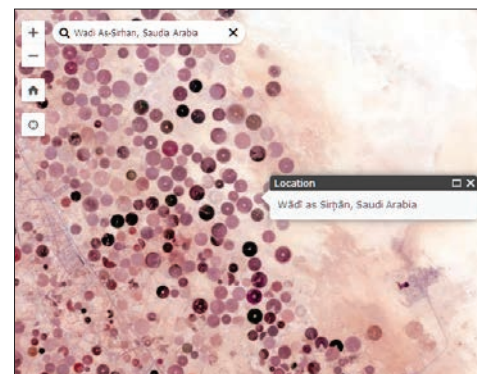
2. Show the image using the Vegetation Index that shows healthy vegetation in dark green.

3. Show the image using the Moisture Index where moisture-rich areas are bright blue.

4. Which band combination shows the circular fields the best?

Princess Charlotte Bay, Queensland, Australia—ocean area

Coral reefs, under threat from environmental conditions, can be monitored by remote satellite imagery. Using remote sensing data, coral reefs can be classified by structure and type and these classifications can be compared temporarily to show change. Find and identify the coral reefs in the area identified.

1. Search for Princess Charlotte Bay, Queensland, Australia.

2. Display the image using the Bathymetric band combination.

3. What color displays the coral reefs?

4. Calculate a spectral profile for the ocean.

5. Calculate a spectral profile for the coral reef.

6. How do the two spectral profiles compare?
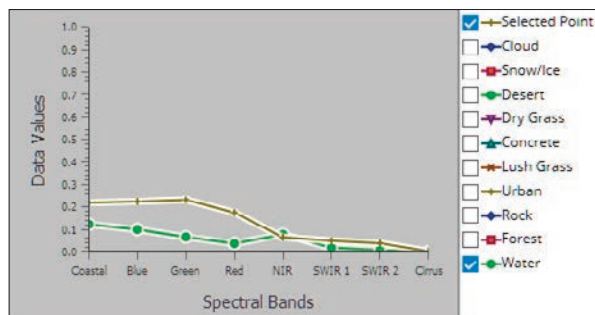
Abu Dhabi—desert area

Eolian formations are found in places where wind is the cause of erosion and deposition.

Eolian sediments are usually materials that consist of sand and silt-sized particles. Remote sensing can provide valuable information about regional geomorphologic features caused by wind. The study of eolian formations helps us understand climate and the forces mold it.
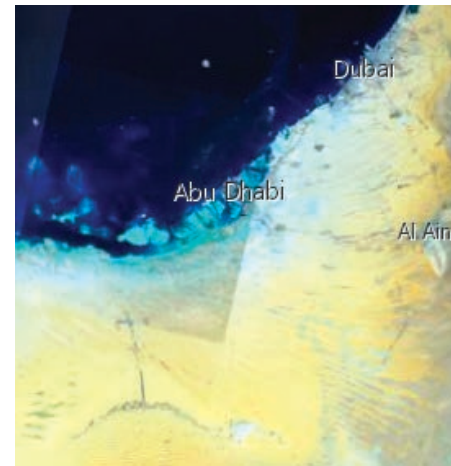
1. Search for Abu Dhabi, United Arab Emirates and zoom until you see an image that matches the image shown here.

2. Display using the geology band combination.

3. Zoom out and look for the eolian formations.

4. Describe one pattern of an eolian formation.

5. To observe the dunes and orientation better, display as Panchromatic for a sharper image in black and white.