

Change detection after Hurricane Matthew in Les Cayes, Haiti

Remotely sensed data is useful in detecting and mapping changes caused by many types of natural hazards. Detecting and mapping the changes allows the recorded results to be integrated into the planning process for recovery. Remote sensing data provides a broad scale view of change detection.

Hurricane Matthew hit southwestern Haiti as a Category 4 storm on the morning of October 4, 2016, and left widespread damage to an already impoverished nation. Les Cayes is one of Haiti's major ports with a population of around 70,000. Les Cayes was hit hard by the hurricane with nearly 90 percent of the buildings either destroyed or damaged. You have been asked to map and calculate change both qualitatively and quantitatively to the port of Les Cayes. Since Hurricane Matthew hit on the morning of October 4, you will need a pre- and post-image to that data.

Build skills in these areas

- Using the pull-down menu to pick dates to compare
- Computing change between two dates both qualitatively and quantitatively
- Using various band combinations to visualize change

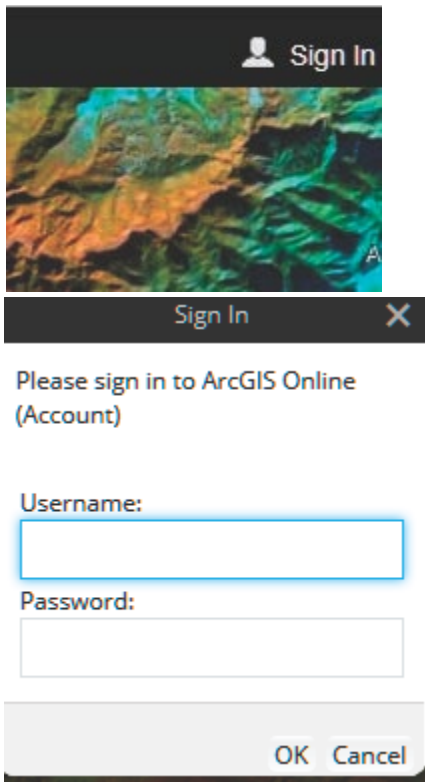
What you need

- Account required
- Estimated time: 30 minutes – 1 hour

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Change in Les Cayes, Haiti

1. Go to [Landsat Explorer](#).
2. In the upper right corner, click Sign In and sign in to your organizational account.

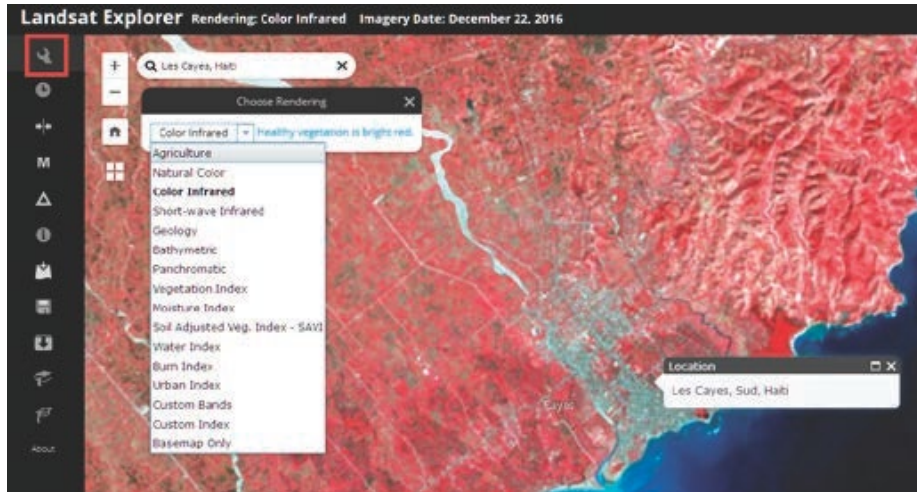


3. Search for Les Cayes, Haiti.



4. Go to the Rendered icon on the left panel and change the band combination to Color Infrared to show healthy vegetation as bright red.

Observe the high concentration of vegetation to the west of the river.



Now use the time selector to pick dates to visualize and compare.

5. Zoom into the city of Les Cayes.
6. Pick the Time Selector on the left panel. Use the drop-down menu to select individual dates.
7. Click the blue arrow pointed down to Set Current as Secondary layer.



Notice the bright red that shows healthy vegetation and the grayish color that shows developed area. Also, notice the Ravine du Sud River and the discharge going into the ocean.

8. Click the Swipe icon on the left panel.
9. Use the pull-down menu to select October 12, 2016, which is after the hurricane.



Once again look at the bright red color and the gray and the Ravine du Sud River discharging into the ocean. Also, take note of the beach areas. Describe the differences that you see. Use the swipe tool to compare the two scenes.

To make quantitative measurements, you must compare the differences between the two scenes with a numerical value. The change detection tool will compute the change in spectral reflectance between the two dates. The change detection tool has three modes for change detection: difference image, difference mask, and threshold mask.

- Difference Image mode illustrates all the changes in the select2016ed index between the two dates. Increases are shown in green and decreases are shown in magenta.
- Difference Mask mode also calculates the difference in spectral reflectance between the two images. Here, you can use the different sliders to adjust how big the change between two images must be to show up in green or magenta. The transparency slider sets the opacity of the change layer.
- Define Area of Interest allows the user to draw and calculate change for a custom are of interest.

To make your calculations you will be using the Difference Mask.

10. On the left tab, click the Change Detection icon. The Change Detection tool can calculate changes in vegetation health (NDVI). The tool is telling how the spectral reflectance has changed from the before to after date of the arrival of Hurricane Matthew.

11. Change the mode to Difference Mask.



Q1 Taking the default for positive and negative values, how many square kilometers between the scenes have decreased?

Q2 What type of land cover has changed the most? Where?

Note: The Area Decrease/Increase numbers will depend entirely on your view extent, how zoomed in you are, and how big your browser window is.

12. Click the box to Define Areas of Interest.

13. Draw a polygon around a specific area of Les Cayes. You are particularly interested in the section of the city that is nearest the ocean and you should include both sides of the river and some of the beach areas.

14. Click Apply.

