Tracking tropical ocean cycles with MODIS imagery: Tracking Super Typhoon Yolanda

Account Required

Meteorologists have been using satellite imagery to map the paths taken by tropical cyclonic storm systems (hurricanes, typhoons, cyclones) for many years. Today, you can do it yourself in ArcGIS Online by accessing satellite imagery provided in the Living Atlas of the World.

The Global Meteorological Institute is compiling case studies of the deadliest and most powerful Pacific typhoons since 1950. At the top of the list is Typhoon Haiyan, known as Super Typhoon Yolanda in the Philippines. This storm was one of the most intense tropical cyclones on record. Yolanda, a Category 5 Super Typhoon, caused over 6,000 fatalities. With sustained winds of 195 mph, it was the strongest typhoon to ever make landfall. That historic landfall in the Philippines took place on November 8, 2013.

You have been asked to prepare a map to be included in the Typhoon Yolanda case study. Your map should include the following:

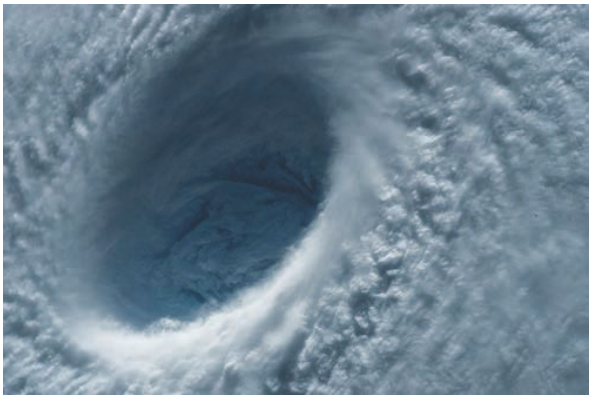
- Satellite imagery of the location of Yolanda from November 5, when the storm became a typhoon, to November 11, when it broke apart after making landfall in Vietnam
- A storm path consisting of points locating the eye of the storm on each date
- Map notes that include basic facts about the typhoon associated with each date

Build skills in these areas

- Adding MODIS imagery to ArcGIS from the Living Atlas of the World
- Filtering imagery to select images from specific dates
- Creating a sequence of map notes from imagery to illustrate a storm track and provide basic storm facts
- Changing a Map Note symbol

What you need

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



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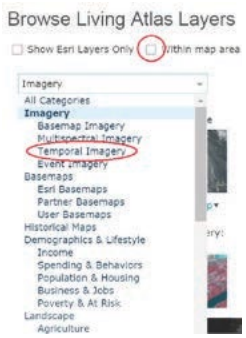
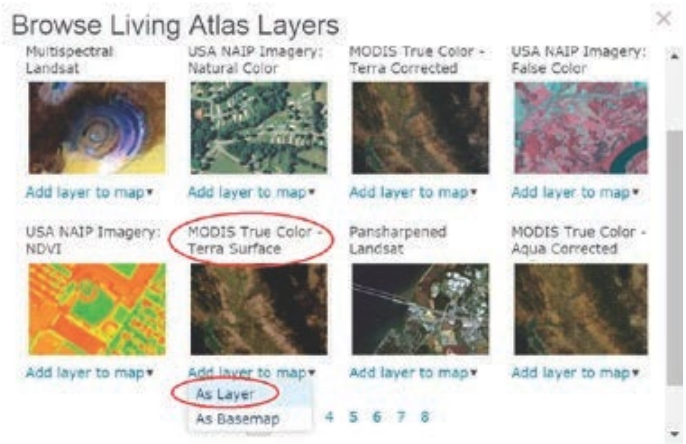
1. Sign into your ArcGIS Online organization account and open a new map
2. Save your map as Yolanda 2013. Give the map appropriate tags and provide a summary.
3. Add MODIS Aqua imagery to your map.
    a. Click the Add Content to Map icon and select Browse Living Atlas Layers. Uncheck the box that says Within map area.
    b. From the All Categories list, select Imagery and Temporal Imagery.

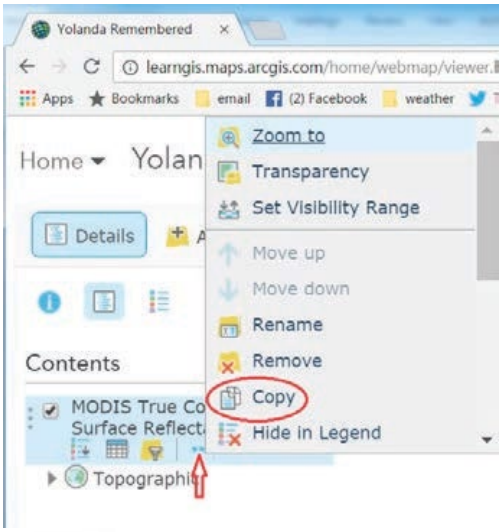


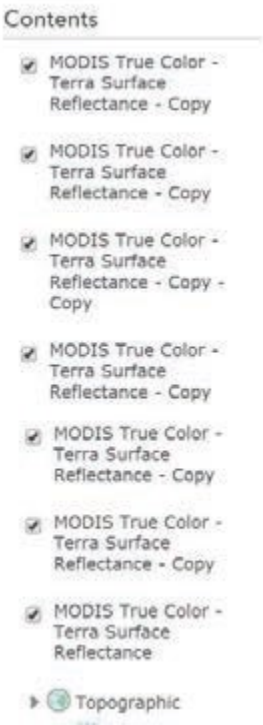


    c. On the first page of the temporal imagery list, select MODIS True Color – Terra Surface. Select Add layer to map as Layer.
    d. Click Close.

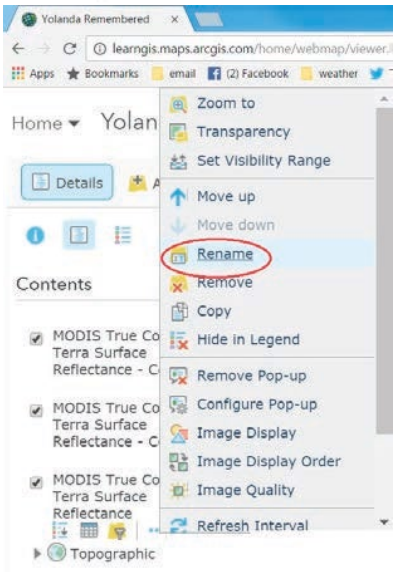
You now have a map with the Topographic basemap and one layer called Select MODIS True Color – Terra Surface Reflectance. You will need a separate layer for each of the days from November 5 through November 11 (a total of seven layers) so you can create a picture of Yolanda's path during that period.

4. Copy MODIS layer:
    a. Click the More Options icon (3 dots) below the MODIS layer and select Copy. You should now see a layer called MODIS True Color – Terra Surface Reflectance – Copy.
    b. Repeat this process five more times until you have seven MODIS layers.
    c. Save your map.



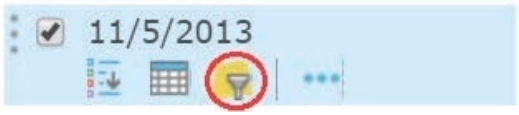


5. Rename MODIS layers:
    a. Click the More Options icon below the original MODIS layer (it does not say “Copy”) and select rename.
    b. Name this layer 11/5/2013.
    c. In the same way, rename all the MODIS layer copies moving up from the bottom of the list. Name each layer for a different date: 11/6/2013, 11/7/2013, etc.
    d. Save your map.

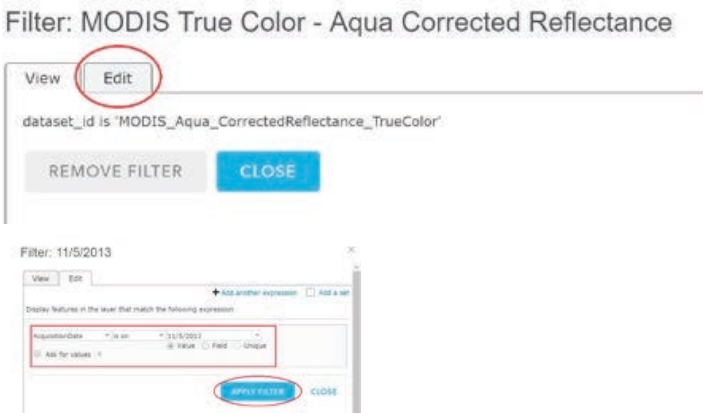


6. Re-center your map and zoom to an appropriate scale.
    a. Turn off all the MODIS layers in your map.
    b. Use the Find box to search for Philippines and center your map on the Republic of the Philippines.
    c. Close the Search results window.
    d. Zoom out slightly until the extent of your map is like the one below.
    e. Bookmark this extent and name it Yolanda.

7. Set acquisition dates for MODIS imager layers.
    a. Click the filter icon beneath the 11/5/2013 layer.

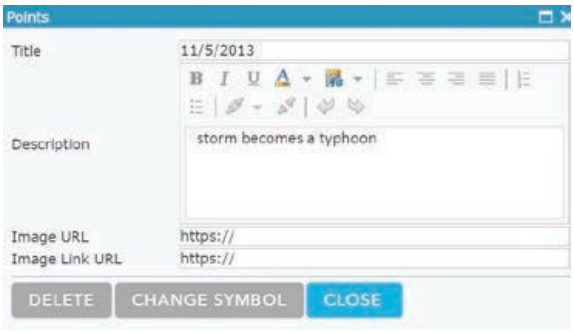


    b. Click NO, CREATE A NEW FILTER.
    c. Click ADD ANOTHER EXPRESSION.
    d. Change the filter so that Acquisition Date is on 11/5/2013 then click the date in the dropdown calendar.
    e. Click Apply filter.
    f. Turn on the 11/5/2013 layer to see imagery of the storm on that date.
    g. Save your map.
    h. Repeat these steps to change each layer's acquisition date to the date in the layer name.



    i. Save your map.
    j. Turn off each of the MODIS layers.

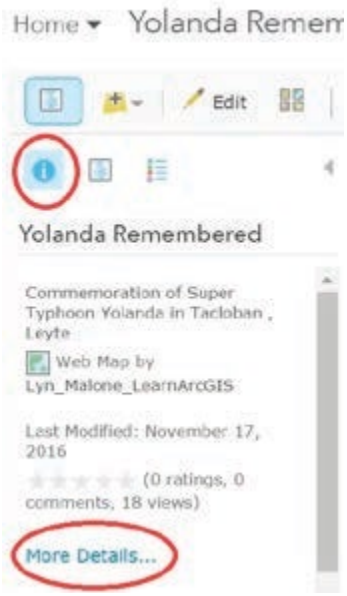
8. Add a Map Notes layer:
    a. Turn on the layer names 11/5/2013.
    b. Click Add>Add Map Notes.
    c. Name the Map Note, Typhoon Yolanda.
    d. Click Create.
9. Add points for the typhoon's center on each date.
    a. Place the pushpin at the center of the large circular cloud mass to the east of the Philippines (the eye of the storm).
    b. Enter the title: 11/5/2013.
    c. Enter the following in the description box: tropical storm becomes a typhoon.
    d. Click Change symbol and select the red star in the Shapes set.
    e. Click Close.



10. Click Edit to stop editing and turn on the layer names 11/6/2013. Repeat the preceding steps to place a point on the center of Typhoon Yolanda for each of the remaining layers and dates.
11. Save your map when you have completed the series.
12. Use the following table to write an appropriate description for each date.

Date	Description
11/6/2013	
11/7/2013	
11/8/2013	
11/9/2013	
11/10/2013	
11/11/2013	

13. Create map metadata:
    a. Go to your map's Details page (information > More Details).



    b. Enter appropriate text in the Description box. The description should include facts about the typhoon and the reason the map was created.

       Your map is ready to be incorporated into the Typhoon Yolanda case study. It shows the location of the typhoon's eye on each day from November 5–11, 2013 and provides a note about its status on each of those days.