



Monitoring and Predicting Floods Using Earth Observations for Planning and Preparedness

Exercise 2: Examine Recent Floods in South Sudan using OPERA Dynamic Surface Water Extent Products and Global Flood Product



Review: Recent Flood in South Sudan

- Over the past few years, South Sudan has faced ongoing severe floods. Most recently, intense seasonal flooding in May and June 2026 impacted over 1.35 million people and displaced roughly 375,600. ([FEWS NET](#)).
- The most affected areas are in the states of Jonglei and Unity ([Reliefweb](#)).
- In Exercise 1, we used Global Flood Product layers in [Worldview](#) to monitor flooded areas in South Sudan from May 15 to May 31.
- This current exercise builds on Exercise-1.



Open and Explore Features of Worldview



1. Open [Worldview](#)

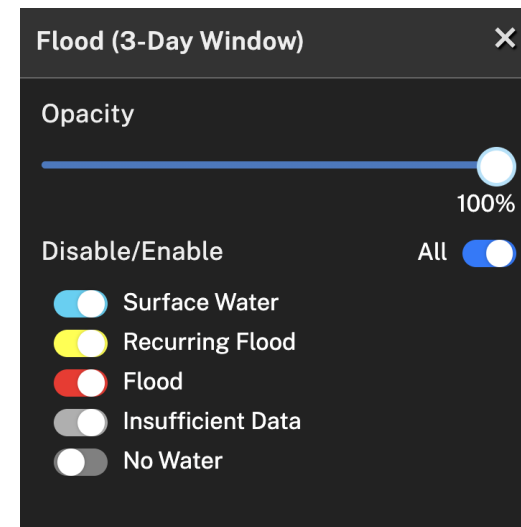
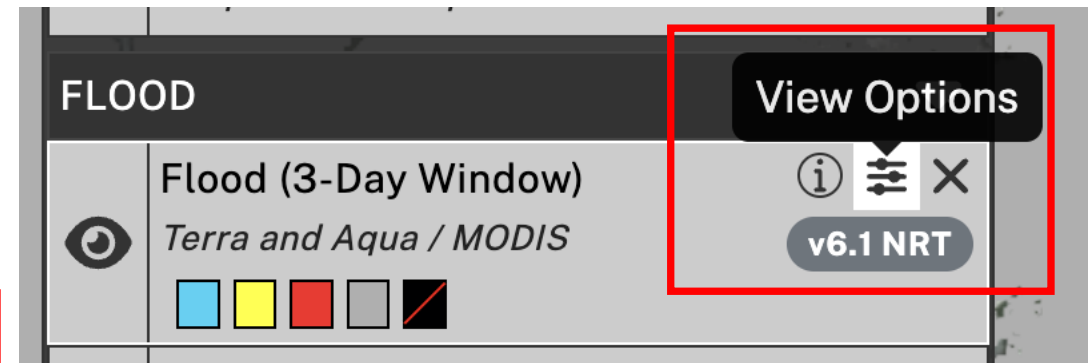
The screenshot shows the NASA Worldview web application interface. The main map displays a satellite view of the Earth with a black overlay. The interface includes a left sidebar with layer controls, a top search bar, a bottom timeline, and a right-side coordinate display. Red boxes and arrows highlight specific features:

- REFERENCE Layers:** A red bracket on the left side of the sidebar groups the 'REFERENCE' layer section, which includes 'Place Labels', 'Coastlines / Borders / Roads', and 'Coastlines'.
- BASE Layers:** A red bracket on the left side of the sidebar groups the 'BASE LAYERS' section, which includes three 'Corrected Reflectance (True Color)' options.
- Select Data Layer:** A red arrow points to the '+ Add Layers' button in the sidebar.
- Select Location:** A red box highlights the search bar at the top with the text 'Search for places or enter coordinates'.
- Share this map:** A red arrow points to the share icon in the top right corner.
- Take a snapshot:** A red arrow points to the camera icon in the top right corner.
- Zoom In/Out:** A red box highlights the zoom controls (+ and - buttons) on the right side of the map.
- Coordinates at Computer Cursor:** A red box highlights the coordinate display at the bottom right, showing '-37.8293°, -99.8112° EPSG:4326'.
- Select Time:** A red box highlights the timeline at the bottom, showing the date '2026 JUN 15' and navigation controls.



Review: How to Examine Layer Legends?

- Hover over any Flood Layer to get the **View Options**.
 - Click on  for information about the data layer.
 - Click on  to see the color legend for the layer.

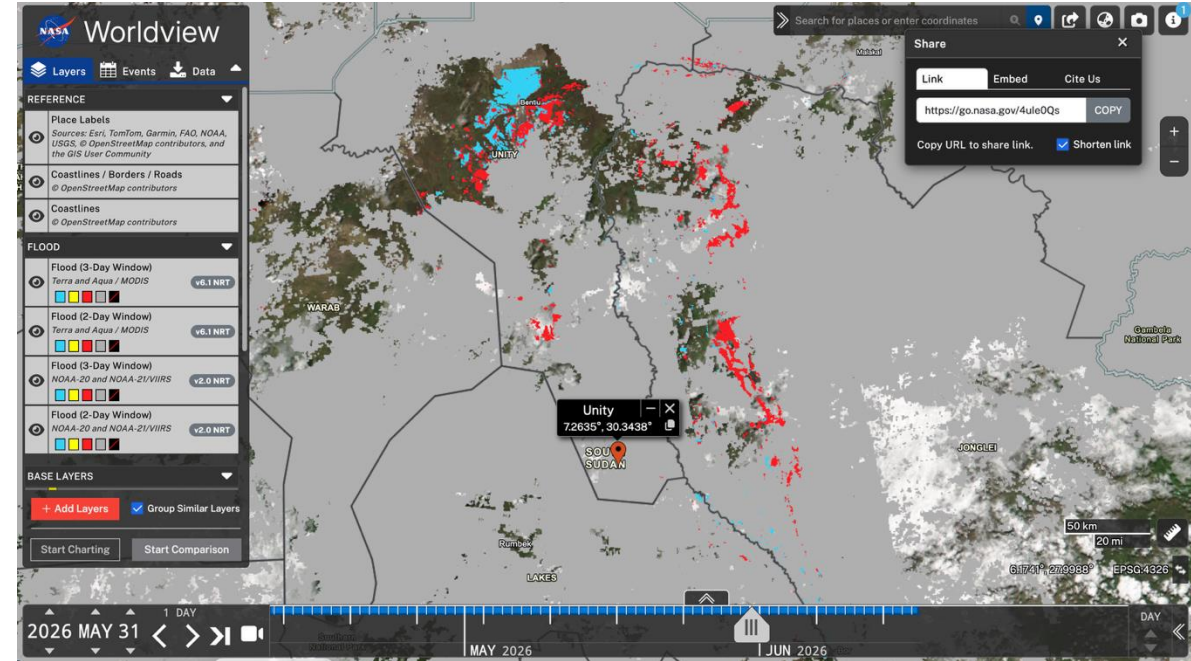


Examine the Floods using OPERA Dynamic Surface Water Extent Products

1. Start with the Worldview Link saved in Exercise-1 with Global Flood Product Layers.
 - Or [start here](#) if you did not save the link.
 - This will open the Worldview window with Global Flood Product layers created in Exercise-1.
- In this exercise we will **add OPERA Products: DSWx-HLS and DSWxS1** using Worldview for the same floods in South Sudan.

Important notes for this exercise:

- Some of your **homework questions** will be based on this exercise.



Add Global Flood Product Data Layers

2. In the left panel click on **+ Add Layers**.

This will open a layer selection window

3. In the **search** window at the top, type **Flood**. Several data options will appear in the layer window.

4. Select the following layers :

- OPERA Dynamic Water Extent, L3 DSWx-S1
- OPERA Dynamic Water Extent, L3 DSWx-HLS
- Close the search window by clicking **X** next to the Search window.

Note: You can reorder layers by dragging them up or down and toggle their visibility using the eye icon next to each one. The map will always display the uppermost active layer.

The screenshot shows a layer selection interface for 'Flood' data. The search filter is 'Flood', and it shows 9 out of 1265 results. The layers are categorized by Coverage, Category, Measurements, Source, Period, and Day/Night. The selected layers are:

- OPERA Dynamic Surface Water Extent (L3) DSWx-S1
- OPERA Dynamic Surface Water Extent (L3) DSWx-HLS
- Flood (2-Day Window) NOAA-20 and NOAA-21/VIIRS
- Flood (3-Day Window) NOAA-20 and NOAA-21/VIIRS
- Flood (2-Day Window) Terra and Aqua / MODIS
- Flood (3-Day Window) Terra and Aqua / MODIS

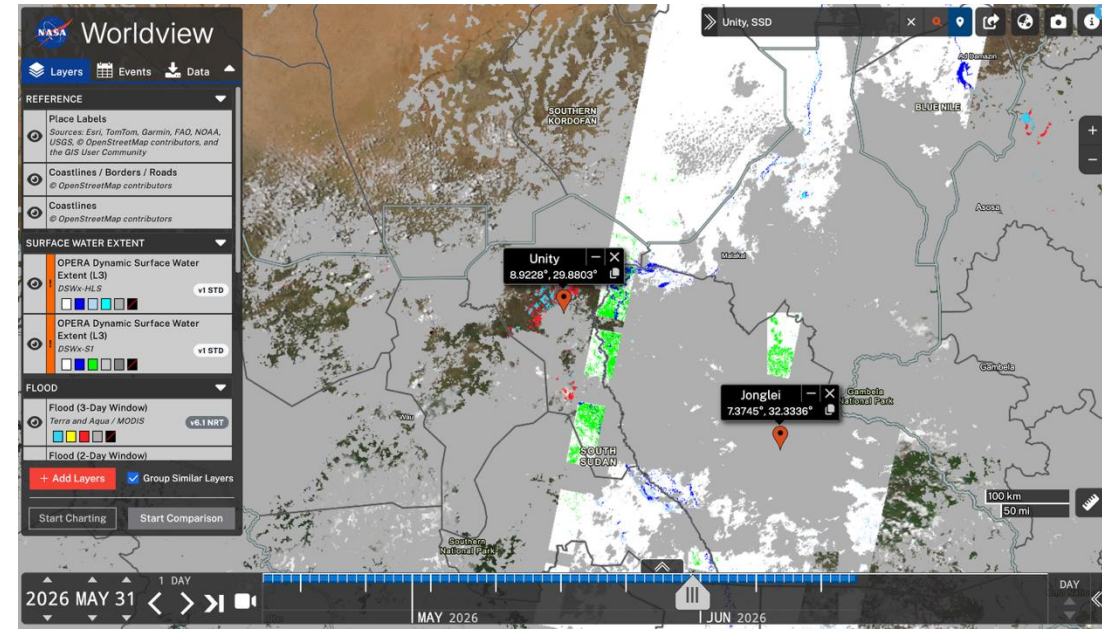
Other layers include:

- Flood Hazard: Frequency and Distribution (Flood Hazard Frequency and Distribution, v1 (1985-2003))
- Flood Hazard: Mortality Risk (Global Flood Mortality Risks and Distribution, v1 (2000))
- Flood Hazard: Economic Risk (Global Flood Proportional Economic Loss Risk Deciles, v1 (2000))



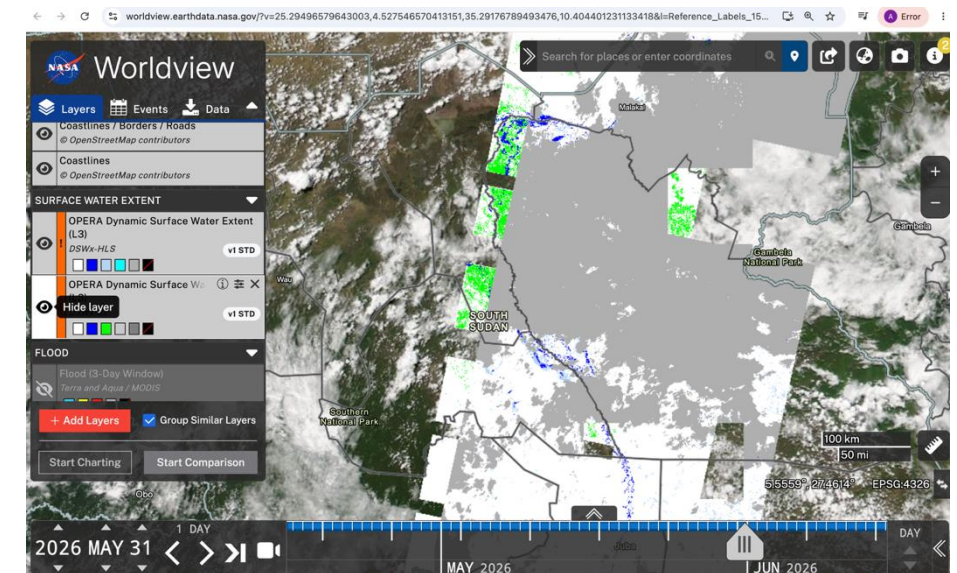
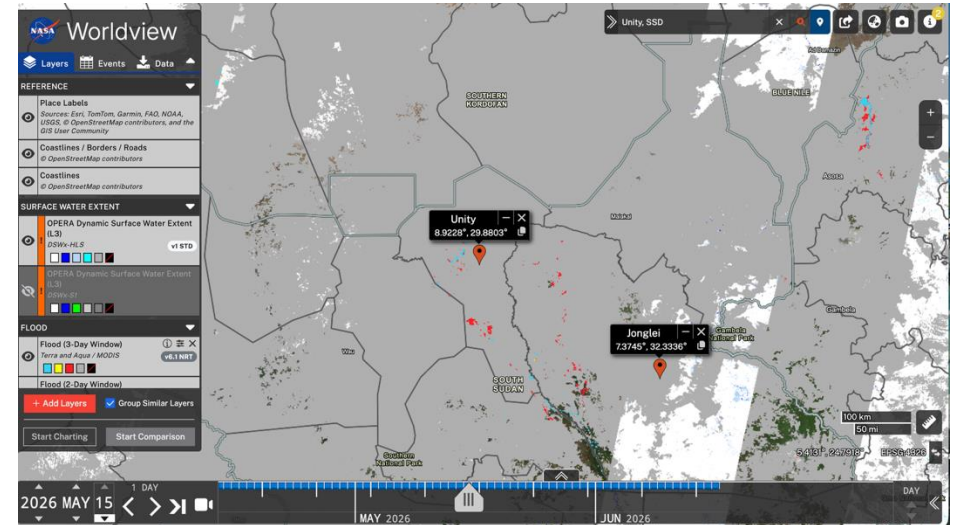
Examine the OPERA DSWx-HLS and DSWx-S1 Layers

5. In the **Search for places or enter coordinates** window type **Jonglei**, and click return when you see Jonglei, SSD.
 - The map will zoom to the state of Jonglei in South Sudan and place a marker on the map.
6. Click on the **X** in the **Search for places or enter coordinates** window and type **Unity** and select Unity, SSD.
 - The map will zoom to the state of Unity in South Sudan and place a marker on the map.



Examine the OPERA DSWx-HLS and DSWx-S1 Layers

- Click through May 15 to 31 keeping DSWx-HLS active and hide or **turn off all other layers** including DSWx-S1 and all Flood Layers.
 - Note down the dates when you see DSWx-HLS swath covering the states of Unity and Jonglei (any one or both).
- Repeat Step 7 with the only active layer DSWx-S1.
- Activate both DSWx-HLS and DSWx-S1 simultaneously and examine when **both the products** are available and overlap in the area of interest in South Sudan.
- Select 31 May for comparison of various flood products when both DSWx-HLS and DSWx-S1 are available for the area of interest.



Compare Flood Detection from DSWx-S1 and DSWX-HLS

11. Select **Start Comparison** found at the bottom of the left layer list panel.
 - At the top of the layer list panel, two tabs will appear A:date and B:date.
 - The map screen will split into A (left) and B (right) with a vertical line.
 - Keep **Comparison Mode → Type → Swipe** (bottom of the layer list panel)
12. Click on the **A layer tab** and make sure the date is 2026 MAY 31, if not, you can change the date using the timeline. Set Layer A to be DSWx-S1 by keeping it on and turning DSWx-HLS off.
13. Click on the **B layer tab** and select the same date (2026 MAY 31). Set Layer B to be DSWx-HLS by keeping it on and turning DSWx-S1 off.

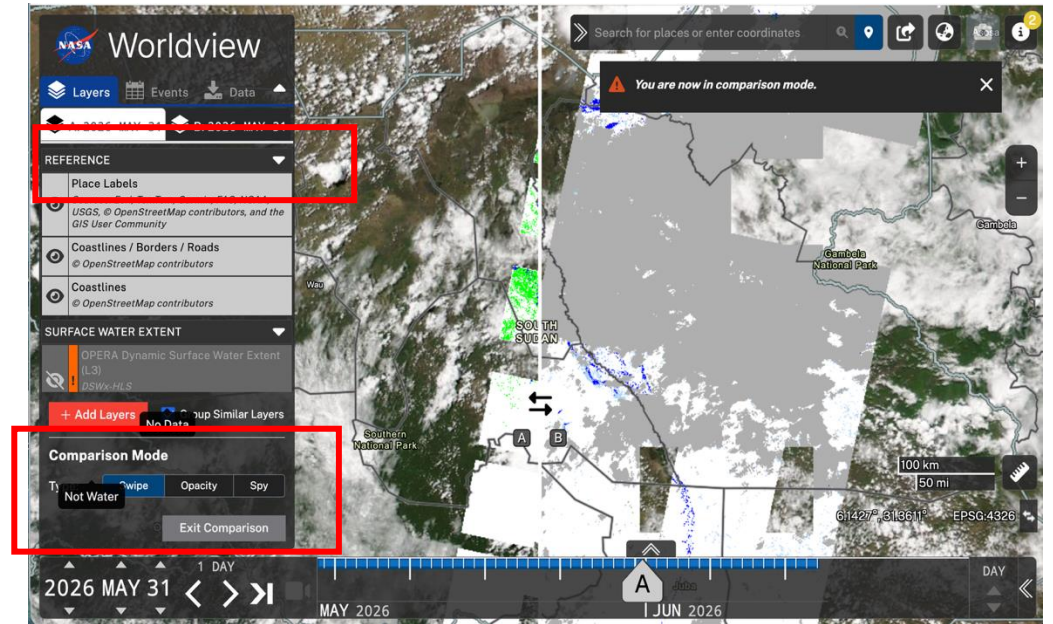


Compare Flood Detection from DSWx-S1 and DSWX-HLS

14. Swipe the vertical line dividing Layers A and B on the map from left to right to see how DSWx from Sentinel-1 (DSWx-S1) and DSWx from Harmonized Landsat and Sentinel-2 (DSWx-HLS) capture flooded areas.

15. Finally, click on the arrow at the top right to get **Share** window. Select **Shorten link** and then click **copy**.

- You will see a message: **Copied!**
- Now open a word document on your computer, paste the link and save the document. **You will be using this link in your next exercise.**



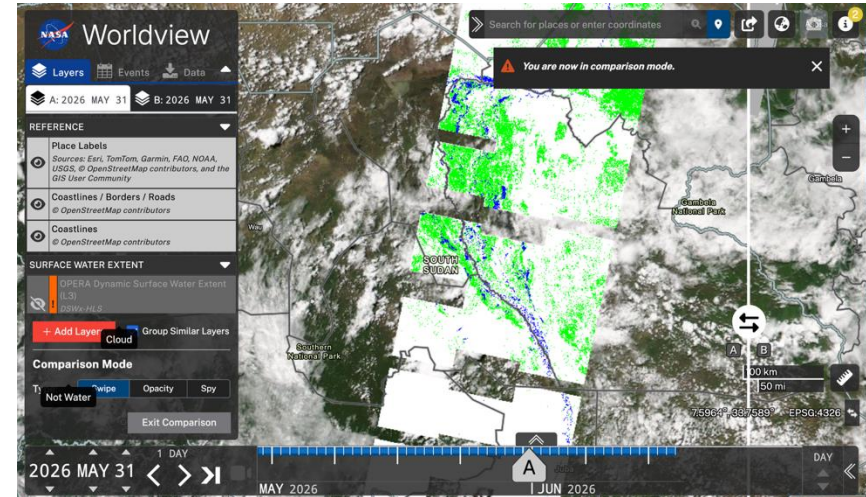
Compare Flood Detection from DSWx-S1 and DSWx-HLS

16. Consider the following questions:

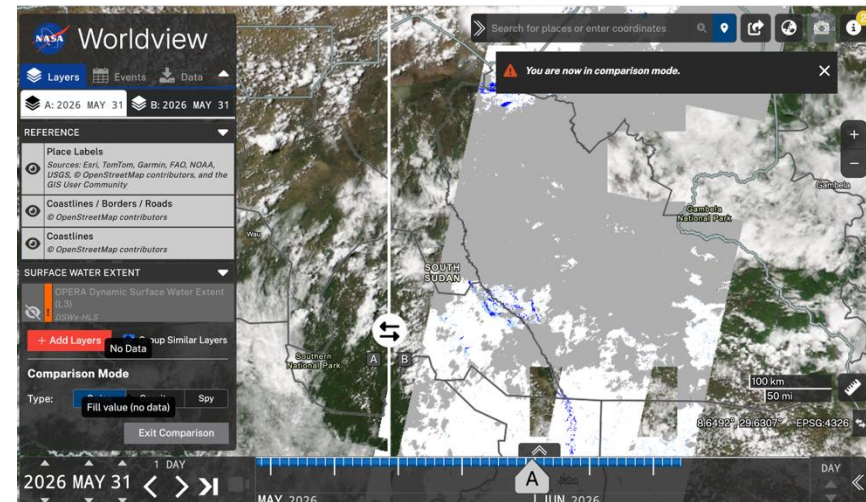
- a) Which product shows more flooded area: Does DSWx-S1 or DSWx-HLS? Why?
- b) What does dark blue color indicate in both the products?

17. You can select **Exit Comparison** at the bottom of the layer list panel to end the comparison mode.

Layer A: DSWx-S1



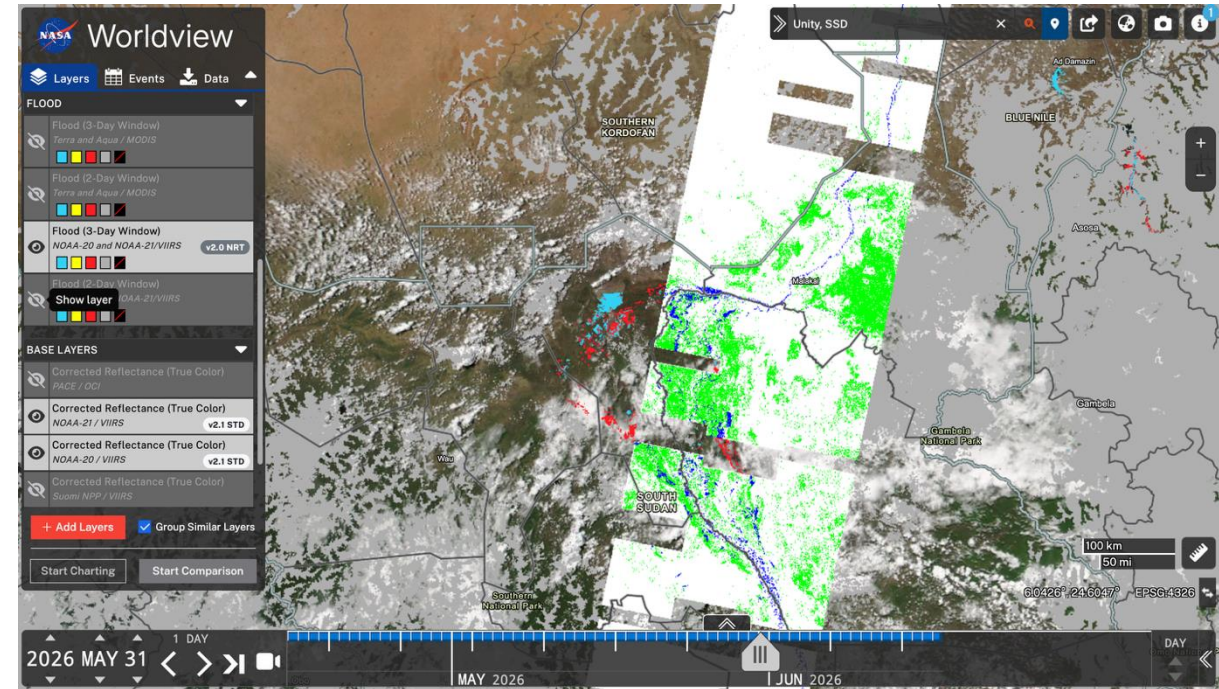
Layer B: DSWx-HLS



Compare Flood Detection from DSWx-S1 and Global Flood Product

18. Turn on the **Flood (3-Day Window)** and **Flood (2 Day Window): Terra and Aqua /MODIS**, and **NOAA-20 and NOAA-1 /VIIRS**, one at a time.
19. Turn the DSWx-HLS layer off to compare SAR based DSWx-S1 map with the flood maps from MODIS and VIIRS.
20. Visually compare DSWx-S1 with Flood (3-Day Window) from NOAA-20 and NOAA-21/VIIRS.

Observe how the Global Flood Product shows flooding where DSWx-S1 maps permanent water yet fails to detect flooding in areas with inundated vegetation. Because these water bodies are likely seasonal, the Global Flood Product registers them as floods relative to its historical baseline.



Compare Flood Detection from DSWx-S1 and Global Flood Product

21. Adjust **Opacity** of the DSWx-S1 layer through **View Options** to 50% see the Flood layer below.

