

CoastWatch Data Portal: Finding SAR (Synthetic Aperture Radar) Imagery Tutorial

Synthetic Aperture Radar or SAR is a type of active data collection where a sensor produces its own energy and then records the amount of that energy reflected back from the surface of the Earth. SAR is an invaluable tool in environmental monitoring, earth-resource mapping, and military systems which require broad-area imaging at high resolutions. SAR can work in any weather condition and even at night. In this tutorial we will go over how to find SAR images on the Data Portal and how to view the spatial extent of a SAR Image.

Step 1: Access the CoastWatch Data Portal by going to https://coastwatch.noaa.gov/cw_html/cwViewer.html

Step 2: Click the **trashcan icon in the upper right-hand side of the screen**. This will clear all current data layers. Additionally close the **Legend and Info Panels** on the right-side of the screen by clicking on the **X** next to these panels.

Step 3: Next we will select a location. To do this, click and drag the main window (viewing the map) to center on the desired location. For this example, we will focus on the Hawaiian Islands in the Pacific Ocean. **Click and drag the map** until the Hawaiian Islands are centered on your map.

Step 4: Use the plus button on the **upper left-hand side of the screen**, or the scroll wheel on the mouse, to zoom in. This will help us get a closer look at our location.

Step 5: **Set the Date** on the **Date/Calendar panel on the left-side of the screen**. In this example we will set the date to **July 19, 2021**. This date corresponds to the date when the Sentinel-1 satellite flew over the Hawaiian Islands and should have some SAR images for us to look at. Click on the drop-down menu in the **Date/Calendar panel** to change the year, month, and day to **July 19, 2021**.

Step 6: Now our date is set and we are ready to do a **Search for SAR images**. Locate and click on the **L1/L2 Spatial Search tab** within the **CoastWatch Data Layers panel** on the left side of the screen. Next click on the word "Polygon" and scroll down the tab. Next click the bubble next to "**S-1A/B NRCS**." NRCS stands for Normalized Radar Cross Section and this option will allow us to look at SAR Imagery. Next **click on the map to drop points around our**

location. Click once in the Northwest, once in the Northeast, and once in the Southwest. In the Southeast, double click to complete the rectangle.

Step 7: Once you have made the rectangle, return to the **L1/L2 Spatial Search tab**. Scroll to the bottom to the “**Search Results**” button. You may have to minimize the **Date/Calendar panel** and **Active Layers Panel** by clicking the **X** next to the panel to make room for the Search Results button.

Step 8: Once you have clicked the **Search Results** button, locate the **Search Results panel on the right-side** of the screen. Here you can see the results of your **L1/L2 Spatial Search**. Click on a thumbnail to view the SAR image. In the same panel, next to each thumbnail you can click on “**Show spatial extent**” to view the spatial extent of the SAR image.

In the next example we will look at a SAR image from the Gulf of Mexico.

Step 9: First we will need to reset the map so we can select a new location. Scroll to the top of the **L1/L2 Spatial Search tab** within the **CoastWatch Data Layers panel**. Click “**Reset.**” This will reset the map and allow us to draw a new shape around our next location.

Step 10: Use the minus button on the **upper left-hand side of the screen**, or the scroll wheel on the mouse, to zoom out.

Click and drag the map until the Gulf of Mexico is centered on your map. Use the plus button on the **upper left-hand side of the screen**, or the scroll wheel on the mouse, to zoom in. This will help us get a closer look at our location. Set the Date in the **Date/Calendar panel** to **July 17, 2021**.

Step 11: Locate the **L1/L2 Spatial Search tab** within the **CoastWatch Data Layers panel** and click on the word “Polygon.” Next we will **click on the map to drop points around our location**. Draw a rectangle just as we did over Hawaii. Then click on the “**Search Results**” button. Locate the **Search Results panel on the right side of the screen** to view the results. Click on a thumbnail to view the SAR image. In the same panel, next to each thumbnail you can click on “**Show spatial extent**” to view the spatial extent of the SAR image.

In the last example we will look at a SAR image from the Caribbean Sea.

Step 12: Scroll to the top of the **L1/L2 Spatial Search tab** within the **CoastWatch Data Layers panel**. Click **“Reset.”** This will reset the map and allow us to draw a new shape around our next location. Locate the **L1/L2 Spatial Search tab** and click on the word **“Polygon.”** Next we will **click on the map to drop points around our location**. Form a rectangle in the Caribbean Sea, then scroll to the bottom of the **L1/L2 Spatial Search tab**. Click on the **“Search Results”** button. Locate the **Search Results panel on the right side of the screen** to view the results. Click on a thumbnail to view the SAR image. In the same panel, next to each thumbnail you can click on **“Show spatial extent”** to view the spatial extent of the SAR image.