

From Earth Observations to Earth Action: Satellite Applications for Biodiversity Conservation

#WCC_9634

Sunday, September 4th: 14:30-19:00
IUCN World Conservation Congress 2016

Coral Reef Watch

Objectives:

- Learn to visualize Sea Surface Temperature, Sea Surface Temperature Anomalies, Coral Bleaching Thresholds, and Coral Bleaching Hotspots
- Learn to compare Sea Surface Temperature Anomalies with Coral Bleaching Hotspots

There are four parts to this exercise:

1. Visualize Sea Surface Temperature Maps
2. Identify Bleaching Thresholds, and conduct a time series comparison
3. Visualize Sea Surface Temperature Anomalies
4. Visualize Coral Bleaching Hotspots

NOAA's Coral Reef Watch website provides information on current and past reef environmental conditions using satellite imagery to quickly identify areas at risk for coral bleaching. More information about coral bleaching can be found on NOAA's online tutorial found at:

<http://coralreefwatch.noaa.gov/satellite/education/tutorial/welcome.php>

Note that the hands-on exercises in the online tutorial use the 50 km satellite products. The exercises below use the newer 5 km satellite products.

Answers to the questions throughout these exercises can be found in the attached Answer Key at the end of this document.

Part 1: Sea Surface Temperature Maps

The daily 5 km Sea Surface Temperature (SST) product shows the nighttime temperature (at the surface) from the NOAA/NESDIS operational daily global 5 km geostationary Blended Night-only SST analysis. The SST scale ranges from -2 to 35 °C.

- Go the website: <http://coralreefwatch.noaa.gov/satellite/index.php>
- On the navigation bar on the left, under Near-Real-Time Data (5 km Resolution), click on **Sea Surface Temperature**.

You will see the most recent 5 km Satellite Sea Surface Temperature Product. You can easily see where the temperatures are warmest and coolest.

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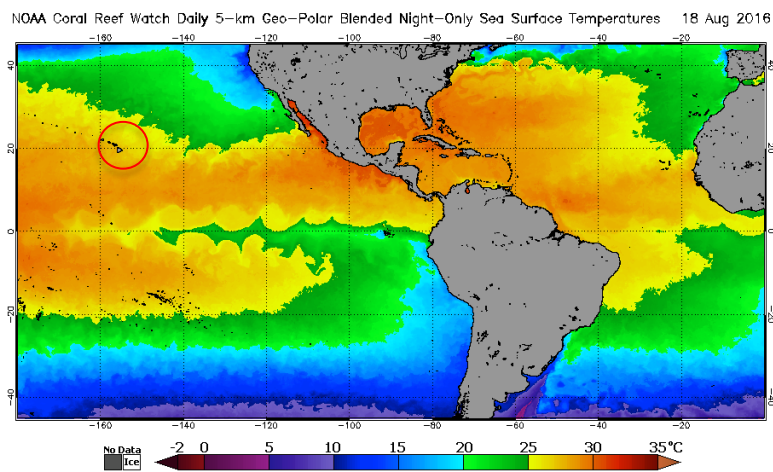
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We will investigate the SST around the Hawaiian Islands.

- To zoom in on a region that includes the Hawaiian Islands, to the right of Regional Images (below the image), click **West**.

An image covering the western Hemisphere appears. The Hawaiian Islands are located west of the United States (circled in red below).

Question 1: What is the approximate Sea Surface Temperature for the Hawaiian Islands for the current date?



Part 2: Bleaching Threshold

Using data from the Virtual Stations, we will see the warmest month, the maximum monthly mean, and the bleaching threshold for the Hawaiian Islands for 2015 and 2016.

- Go back to <http://coralreefwatch.noaa.gov/satellite/index.php>
- In the navigation bar on the left, click on **Virtual Stations/Gauges**.
- Below the image, click on **All stations and products**.

You will see a list of Virtual Station sites by region, the current stress level and the change from the last update.

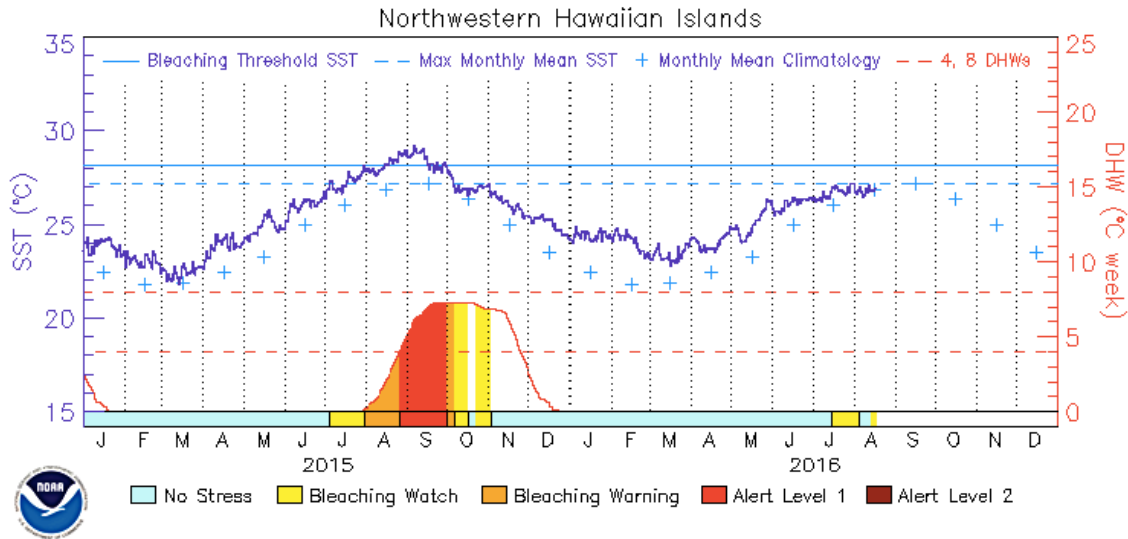
- Scroll down until you see **Polynesia (17 stations)**. Click on **Northwestern Hawaiian Islands**.

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You will see the time series data for the Northwestern Hawaiian Islands with the Bleaching Threshold SST, the Maximum Monthly Mean SST the Monthly Mean Climatology and the Bleaching Alert Level.



Question 2: What month/year did the SST pass the bleaching threshold in the Northwestern Hawaiian Islands?

- Scroll down the page to see other Virtual Stations in the Polynesia region.

Question 3: What station(s) experienced the highest SST and worst bleaching alerts (Alert Level 2) in 2015 and 2016?

- Scrolling back up to the Northwestern Hawaiian Islands, to the right of the graph click on the drop-down box **Select a 2-yr range**.
- Select **2014-2015**, and then **2013-2014**.

Question 4: What month/year had the highest SST and worst Alert level in the Northwestern Hawaiian Islands?

Part 3: SST Anomalies

- Go back to the Coral Reef Watch homepage <http://coralreefwatch.noaa.gov/satellite/index.php>

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- On the navigation bar on the left side, click on **SST Anomaly**.

This product displays the different between today's SST and the long-term average. Positive numbers (from yellow to red) mean the temperature is warmer than average; negative numbers (blue to purple), mean the temperature is cooler than average.

- Scroll down to **Go to 5 km Product Suite**, and click to get archived data.
- Scroll down to **Archived Data and Images**.
- Under **Global and Regional Images**, in the drop-down box, select **SST Anomaly**.
- In the drop-down box to the right of that, select **Great Barrier Reef (large)**.
- To the right of that select **2014** as the year and **February 1** as the month and day.
- Click **View**. The SST anomaly image appears in your window.
- Go back and select **2015** as the year, and keep **February 1** as the month and day. Do the same for 2016.

Question 5: What year had the highest SST anomalies in the Great Barrier Reef region?

- Now go back and select **2015** as the year, but display **January 1**, then **February 1**, then **March 1**, then **April 1**.

Question 6: Which month had the highest SST Anomaly in the Great Barrier Reef region?

- Keep the SST Anomaly image for **February 1, 2015** open for the next exercise.

Part 4: Coral Bleaching HotSpots

- Open the SST Anomaly image for February 1, 2015 as you did above, if it is not already open.
- In a new window, open up the homepage for Coral Reef Watch.
<http://coralreefwatch.noaa.gov/satellite/index.php>
- In the navigation window on the left, select **HotSpot**.

The 5 km HotSpot product measures occurrence and magnitude of instantaneous thermal stress, potentially resulting in coral bleaching. The scale

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goes from 0 to 5°C. HotSpot values of 1°C or more indicate thermal stress leading to coral bleaching and are highlighted in yellow to dark red/brown colors.

- Scroll down and click on **Go to 5 km Product Suite**.

The **Daily 5 km Satellite Coral Bleaching Thermal Stress Monitoring** page appears.

- Scroll down until you see **Archived Data** and Images.
- Under **Global and Regional Images**, select **Hotspot** in the drop-down box. To the right of that, select **Great Barrier Reef (large)** and select **2015, Feb. 1** as the date.
- Click **View**.

Compare the SST Anomalies map to the HotSpots map and note their similarities.

Now we will go back and compare the HotSpots maps for the Great Barrier Reef on 1 Feb. 2015 with the Bleaching Threshold graph.

- In a new window, go back to the Coral Reef Watch homepage.
<http://coralreefwatch.noaa.gov/satellite/index.php>
- In the navigation bar on the left, click on **Virtual Stations/Gauges**.
- Below the image click on **All stations and products**.
- Scroll down until you see **Great Barrier Reef (7 stations)**.
- Click on **Central GBR**.

Compare the information with the HotSpots maps with the Bleaching Threshold graph.

Question 7: How many times did the SST exceed the Bleaching Threshold in 2015?

Question 8: When was the highest alert level?

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Answer Key

Question 1: What is the approximate Sea Surface Temperature for the Hawaiian Islands for the current date?

Answer: 25-30°C

Question 2: What month/year did the SST pass the bleaching threshold in the Northwestern Hawaiian Islands?

Answer: September 2015

Question 3: What station(s) experienced the highest SST and worst bleaching alerts (Alert Level 2) in 2015 and 2016?

Answer: Main Hawaiian Islands, Northern and Southern Line Islands, Samoas, Wallis and Futuna, Northern Tonga, Southern Tonga, Marquesas

Question 4: What month/year had the highest SST and worst Alert level in the Northwestern Hawaiian Islands?

Answer: October 2014

Question 5: What year had the highest SST anomalies in the Great Barrier Reef region?

Answer: 2015

Question 6: Which month had the highest SST Anomaly in the Great Barrier Reef region in 2015?

Answer: February

Question 7: How many times did the SST exceed the Bleaching Threshold in 2015?

Answer: 4 times

Question 8: When was the highest alert level for the Great Barrier Reef?

Answer: March 2015