

Team Members



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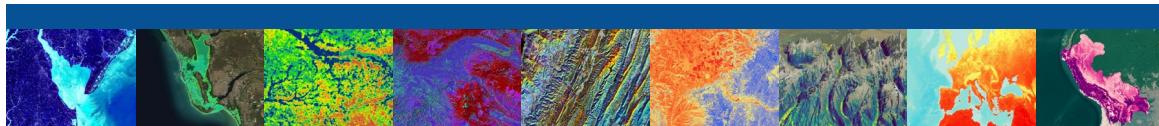
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Partners

The County of Hawai‘i Office of Sustainability, Climate, Equity, and Resilience (OSCER) was established in 2023 to create lasting and immediate change to achieve sustainability, climate, equity, and resilience goals in the local community. OSCER works to advance these goals across Hawai‘i Island and uplift the health of the land and people.



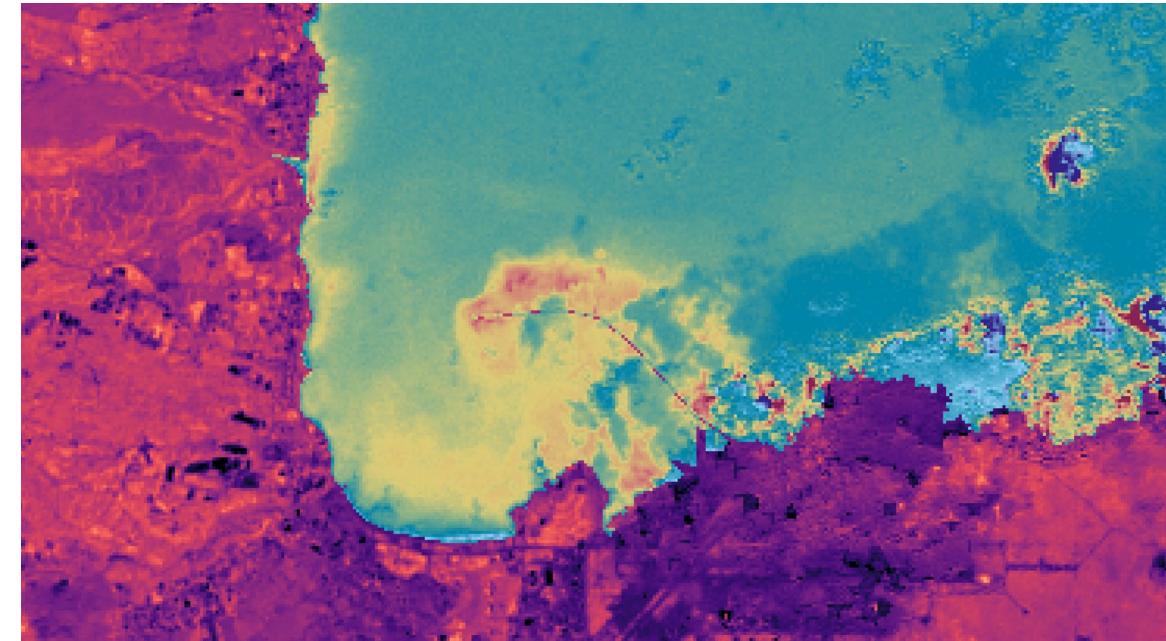
Operating under NASA Earth Action, DEVELOP conducts feasibility studies that bridge the gap between Earth science information and society. DEVELOP works with communities and organizations to address environmental and policy concerns through 10-week projects that help both participants and partners learn about using NASA Earth observations.

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Monitoring Water Quality in Hilo Bay, Hawai‘i to Support Future Community Planning



Hilo Bay Water Resources



Hilo Bay Water Resources

Instances of **brown water advisories** (BWA) are composed of periods of cloudy or hazardous water, posing public health concerns and threatening Hilo Bay's marine ecosystem and native wildlife. After heavy rainfall, sediment, bacteria, and other contaminants wash into the coastal waters, causing BWAs and increasing groundwater discharge. Following flash flood advisories issued by the National Weather Service, Hawaii's Department of Health Clean Water Branch (CWB) staff visually assess the water to determine public advisories, cautioning residents and beach visitors from swimming in affected waters. CWB has limited staff to regularly monitor water quality across Hawai'i Island, making remote sensing a valuable addition to existing methods.

What are Turbidity and Chlorophyll-a?

Water quality indicators of turbidity and chlorophyll-a often coincide with brown water discharges and related hazardous bacteria. Turbidity refers to the level of cloudiness or murkiness of water due to suspended sediment. Chlorophyll-a, a chemical used in algae's photosynthetic process, can indicate excessive nutrients in coastal waters. Thus, studying turbidity and chlorophyll-a levels from satellites could help improve future planning of brown water-related public health advisories. For this study, the DEVELOP Hilo Bay team used both Landsat 8 OLI and Sentinel-2 MSI to look at turbidity and chlorophyll-a.

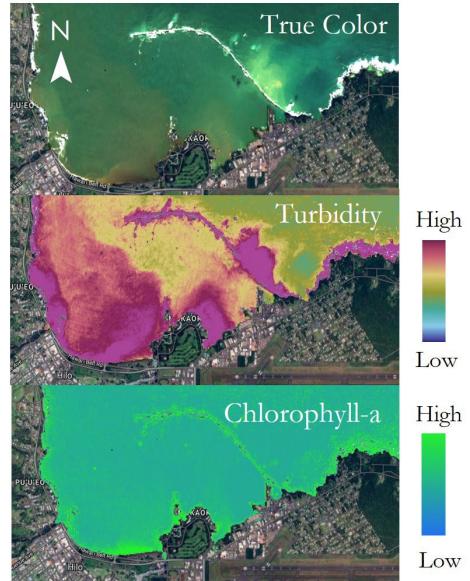


Figure 1. A BWA on February 17, 2019.

Why use satellite data?

Satellite data can tell us more about brown water events by identifying where brown water plumes are located and when they happen. Sensors on satellites detect and measure water quality indicators, like turbidity and chlorophyll-a, by recording how sunlight reflects off water.

What did we find in the Hilo Bay Region?

- We found that BWAs often coincide with high turbidity levels and that Hilo Bay has the highest concentration of turbidity during BWAs, with smaller turbidity plumes along the coast.
- We also identified a chlorophyll-a hot spot at the mouth of the Wailoa River.

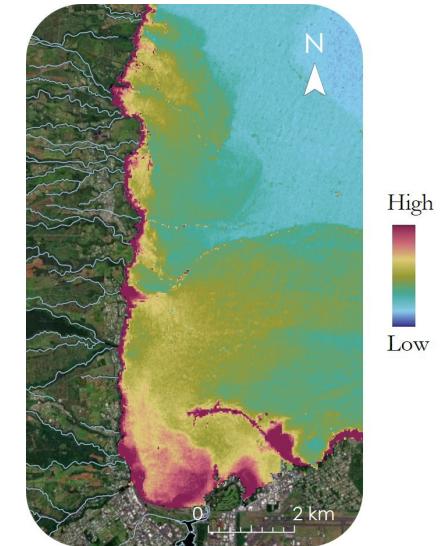


Figure 2. Magenta and yellow indicate high turbidity levels in the water.

Project Purpose

NASA DEVELOP and the County of Hawaii's Office of Sustainability, Climate, and Resilience partnered on this study to examine the location, spatial distribution, and seasonality of brown water plumes. This study laid the groundwork for future, improved water quality monitoring protocols in the Hilo Bay region. Understanding the location of brown water plumes and the potential for remote sensing to help identify brown water events will help the County of Hawai'i and their partners plan for appropriate responses.

Ola i ka Wai... Water is life!