Coastal Atacama Water Resources



Improving Industry and Authority Response to Indicators of Possible Harmful Algal Blooms in Coastal Atacama Using Satellite Image Processing Techniques

Project Synopsis

Harmful Algal Blooms (HABs) are an excess proliferation of microalgae, which threaten the health of human and aquatic ecosystems. Over the past decade, Chile has experienced a significant rise in both the frequency and intensity of HABs across the country. This study focused on the Atacama region in Northern Chile to identify potential indicators of HABs. Using satellite imagery from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) Aqua, Landsat 8 Operational Land Imager (OLI), and the NOAA Advanced Very High Resolution Radiometer (AVHRR) data, this project examined the spatial and temporal patterns of several parameters, including chlorophyll-a concentration, sea surface temperature, normalized fluorescence line height, turbidity, and wind speed. The seasonal variations of these indicators were mapped to highlight areas with the greatest likelihood of experiencing HABs. These findings will guide partner organizations in Atacama on future in situ water sampling efforts.

Earth Observations





Aqua MODIS

Landsat 8 OLI

Project Partners

- Ministry of Health of Chile
- Centro de Informacíon de Recursos Naturales
- University of Atacama

Objectives

- Identify areas with the highest likelihood of future HAB events within the Coastal Atacama region
- **Observe** dynamics or patterns in water resource parameters such as chlorophyll-a concentrations, sea surface temperatures, and turbidity to find precursors or predictors of HABs
- Assess whether there are any correlations between inland agriculture and bloom events
- Locate areas of interest of HAB activity for future in-situ water quality monitoring and toxin accumulation assessments

Methodology



Embassy of Chile, Agricultural Office





Team Members



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Conclusions

- This feasibility study showed that we can identify and observe trends of several parameters related to HAB events using satellite data.
- Aqua MODIS proved the most useful due to the Ocean Color SMI bands of chlorophylla, sea surface temperature, and normalized fluorescence line height.
- Landsat 8 offered high resolution and extensive temporal coverage, which was implemented to produce NDTI values. Cloud removal bands (QA_PIXEL) resulted in data gaps, making it not as effective.
- The river outlets in Bahía Inglesa, Chañaral, and Huasco had the highest chlorophyll-a activity and should be further studied, especially with future in situ measurements.

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