

## Sea surface temperature can be used to predict coral bleaching events

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Coral bleaching is the loss of color in corals due to stress-induced expulsion of unicellular algae (i.e., zooxanthellae) that live within coral tissues. Zooxanthellae give corals their particular color, and under stress those cells are expelled, leading to a lighter or completely white appearance in corals.

High sea surface temperature along with high incident radiation are the primary causes of summer coral bleaching. Because reef-building corals live near their upper thermal tolerance limits, small increases in the temperature of the ocean over several weeks, or a large increase over a few days, can cause bleaching events and ultimately may lead to coral death.

The ability to provide advanced warning of possible major coral bleaching events is important in sustaining healthy reefs. When coral reef managers and stakeholders are alerted to potential bleaching events, they can mobilize monitoring efforts, implement response strategies, and educate reef users and the general public on coral bleaching and the possible effects on the reef ecosystem.

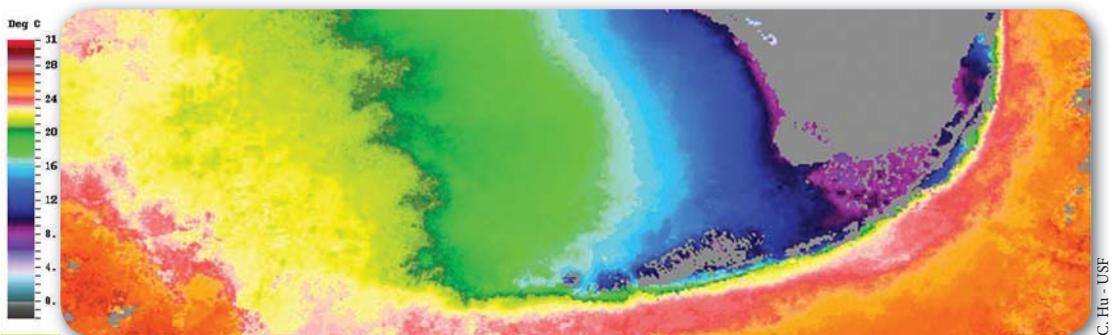
The National Oceanic and Atmospheric Administration (NOAA) has partnered with researchers at the University of South Florida to develop a system for

### Coral bleaching

Coral bleaching can be induced by:

- Increased or reduced water temperature;
- Increased solar radiation;
- Changes in water chemistry;
- Changes in local water circulation;
- Sedimentation; and
- Pathogenic infections.

forecasting potential coral bleaching events. The NOAA Integrated Coral Observing Network system uses data (e.g., sea temperature, winds, light penetration) from local lighthouse stations and satellites to alert managers and scientists of the risk of coral bleaching. The forecasting system takes a page from artificial intelligence research, using a program called an expert system to model the way coral reefs respond to environmental extremes. As sea temperature extremes become more frequent and other stressors like pollution and other human activities affect coral reefs, forecasting coral bleaching becomes even more critical to managers. The goal of NOAA is to issue bleaching forecasts for coral reefs worldwide based on global high resolution satellite data.



Satellite sea surface temperature composite for January 8 – 14, 2010, when extreme cold sea temperatures in shallow nearshore waters of the Florida Keys (blue color immediately adjacent to the Atlantic side of the Florida Keys) caused significant bleaching and mortality of corals. This image shows that reefs separated from one and another by only a few miles may experience very different temperatures.