



**NASA Assessment of the 2005 Caribbean
Coral Reef Bleaching Event Using AVIRIS and DCS**
NASA Oceanography

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Virgin Islands National Park, Cruz Bay, St. John

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**Funding: NASA Ocean Biology and Biogeochemistry Program and the
NOAA Coral Reef Conservation Program**



Research Goal: Use of remote sensing to describe and monitor biological and physical properties of Caribbean reefs affected by massive bleaching.

Importance of research: To understand and predict reef status using airborne image data and field measurements.

Good News...

Mission success:

- Good weather (i.e., cloud-free AVIRIS images for all planned flight lines).
- Spatial and spectral resolution of airborne data acquired is the first of its kind in region (Puerto Rico, St. Croix, St. John).
- Field data collection included spectral measurements of healthy, recovering, diseased and bleached coral.
- Field data will help quantify coral status in AVIRIS data for mapping coral variability
- Maps will be useful for agency managers making ecosystem management decisions and for scientists conducting research in the region.

Bad News... anomaly in AVIRIS IR bands...

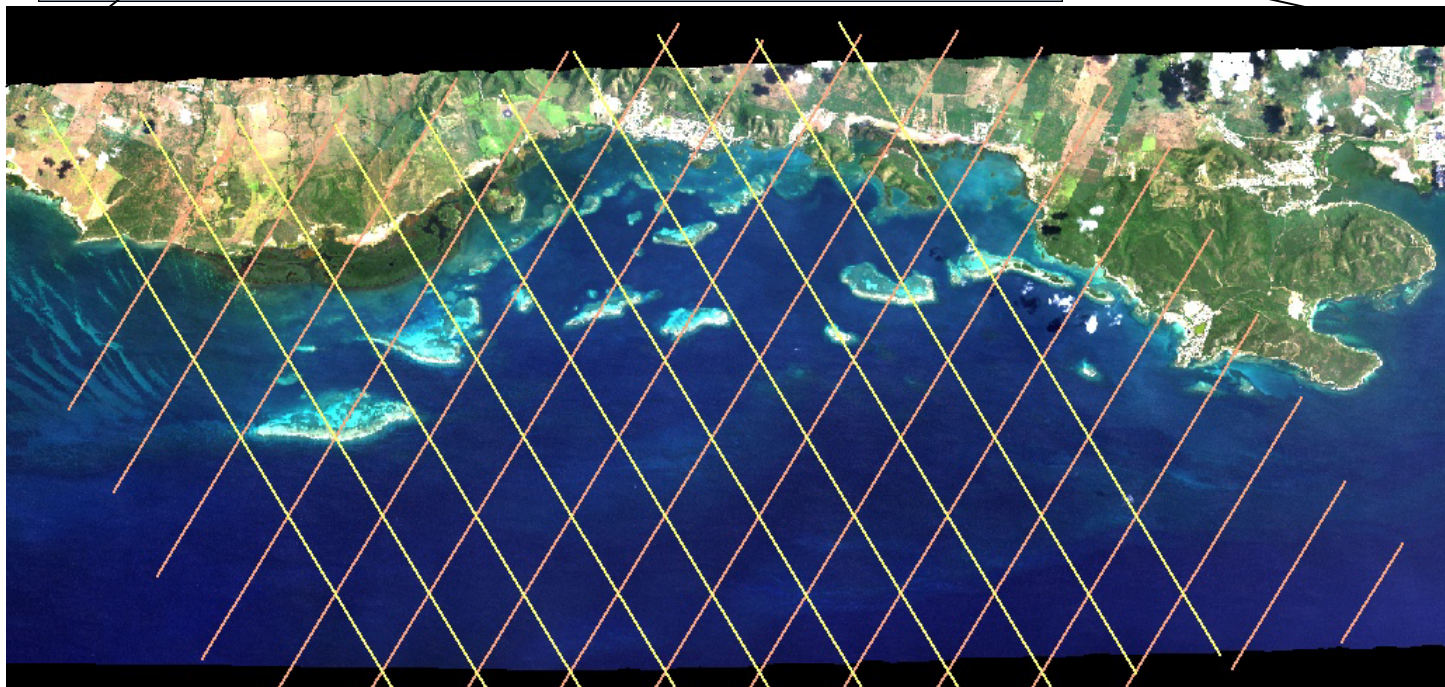


Spectroradiometer measurements



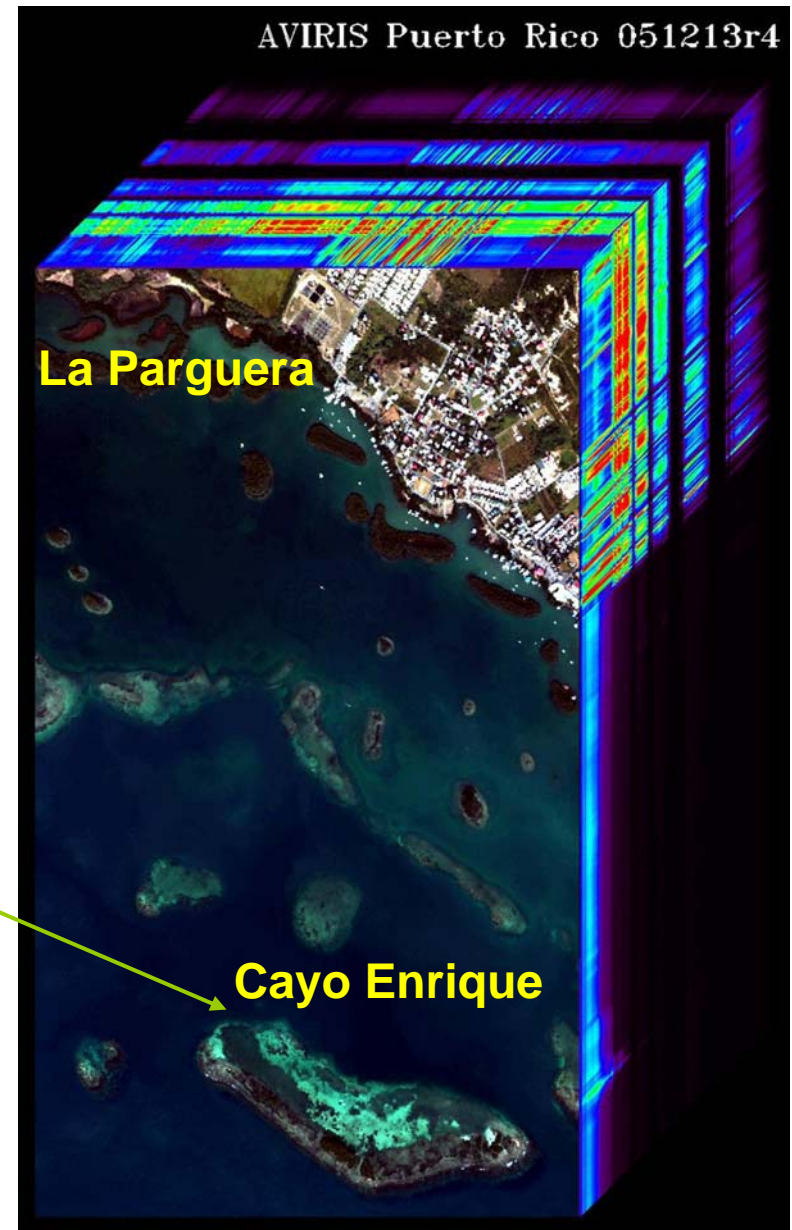
Bleached *Acropora palmata*
(elkhorn coral)

Airborne Data Puerto Rico December 12-13, 2005

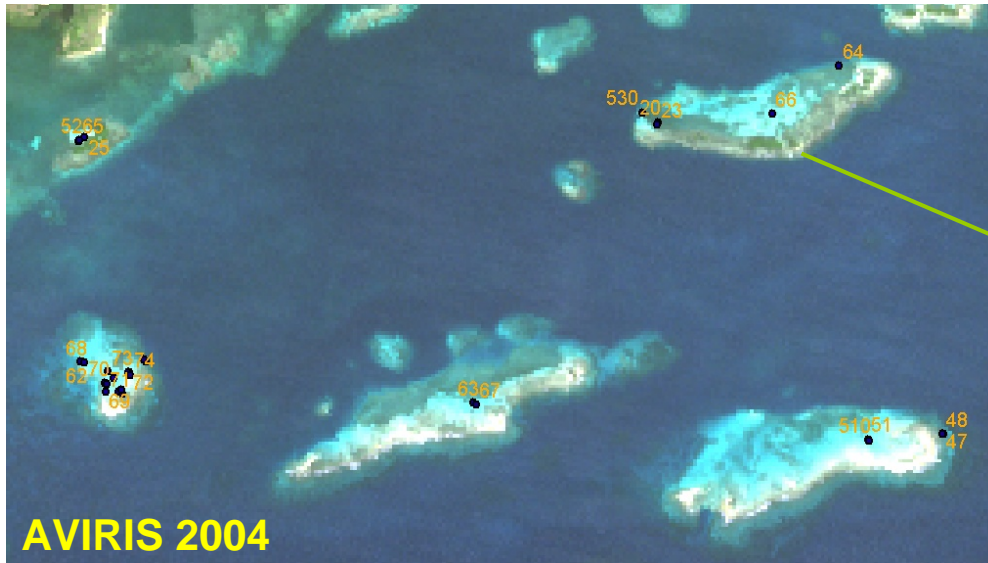


Flight lines for Culebra Is. (above) and La Parguera, PR (left).

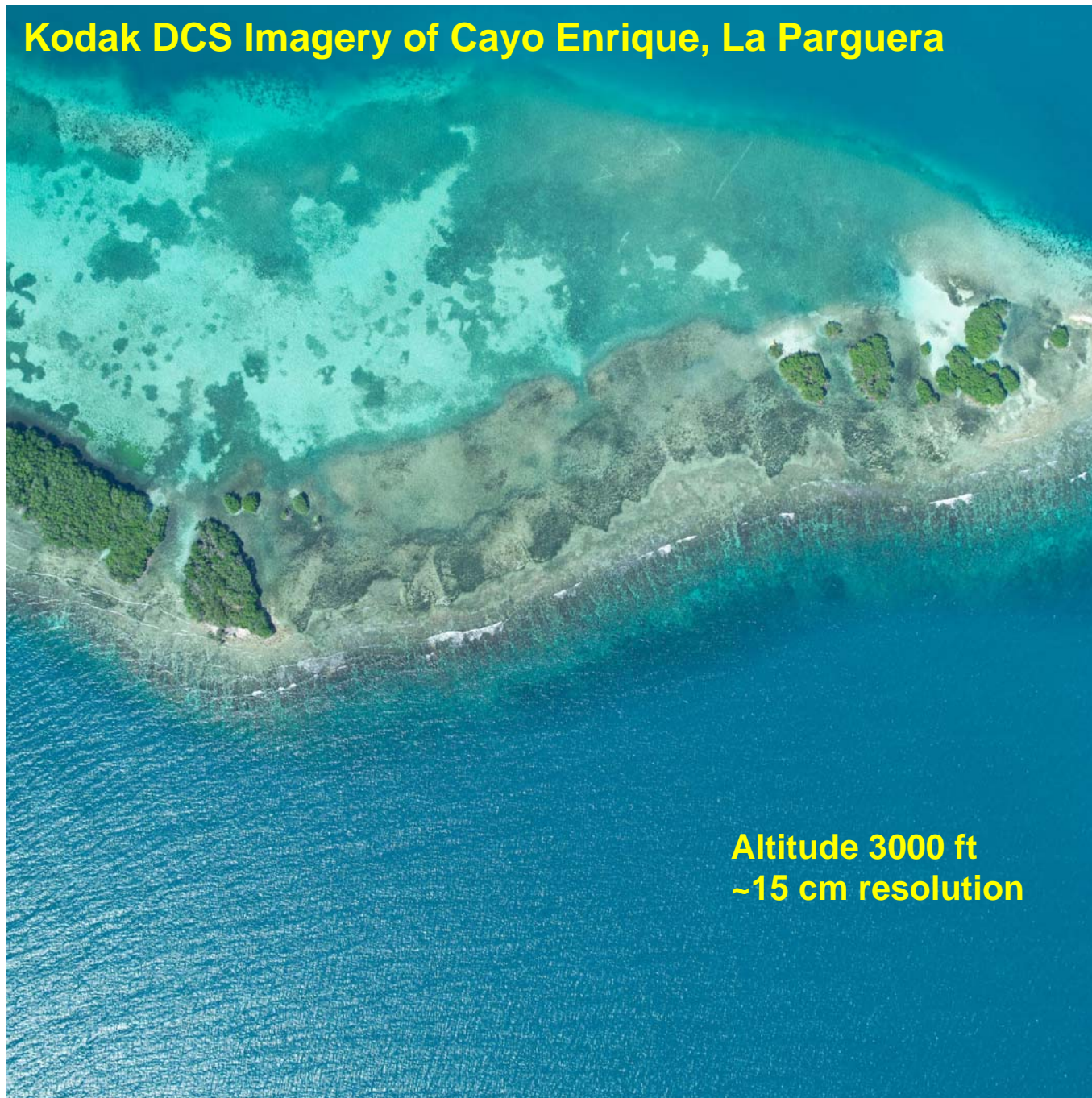
Airborne Data Puerto Rico December 13, 2005



La Parguera field data collection GPS points (below).



Kodak DCS Imagery of Cayo Enrique, La Parguera

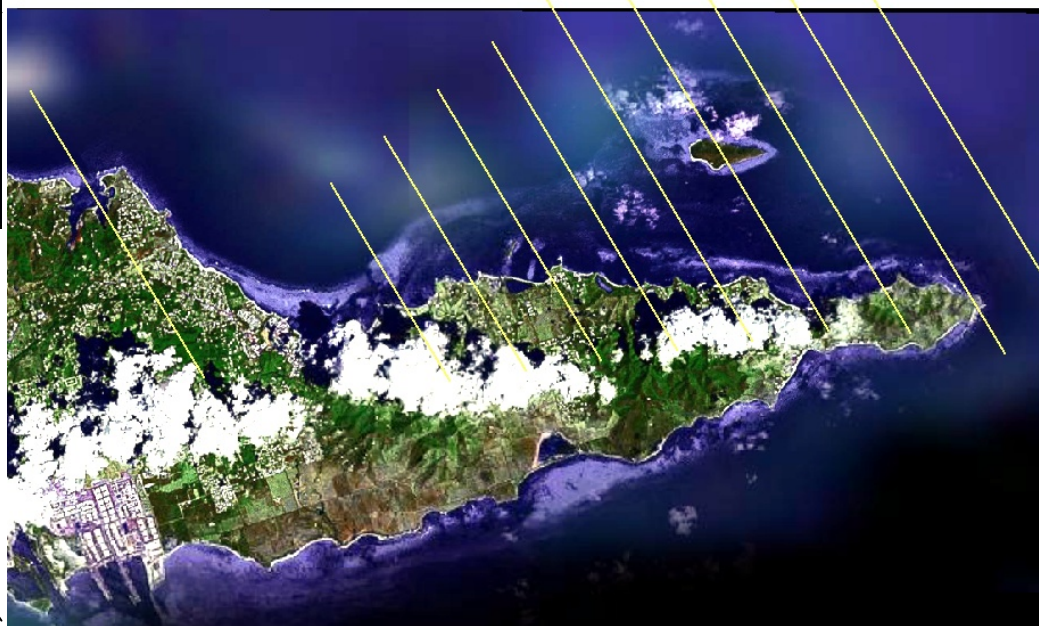


Altitude 3000 ft
~15 cm resolution



AVIRIS
Quicklook

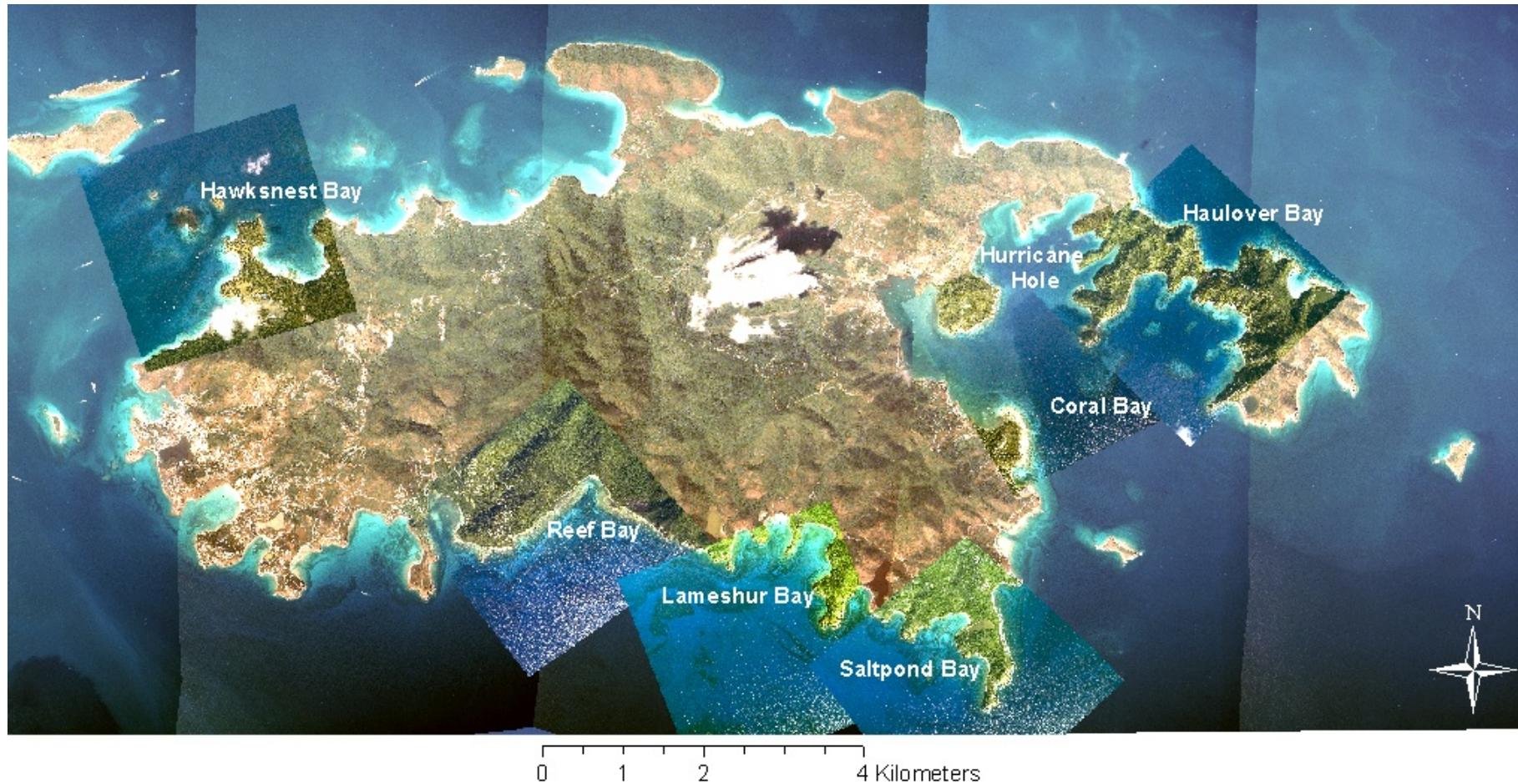
Airborne Data US Virgin Islands Dec. 14-16, 19, 2005



Cirrus DCS Imagery (< 1m resolution)
Buck Island, St. Croix, USVI
December 16, 2005



Cirrus DCS Imagery (< 1m resolution) on NOAA aerial photography
St. John, USVI
December 19, 2005

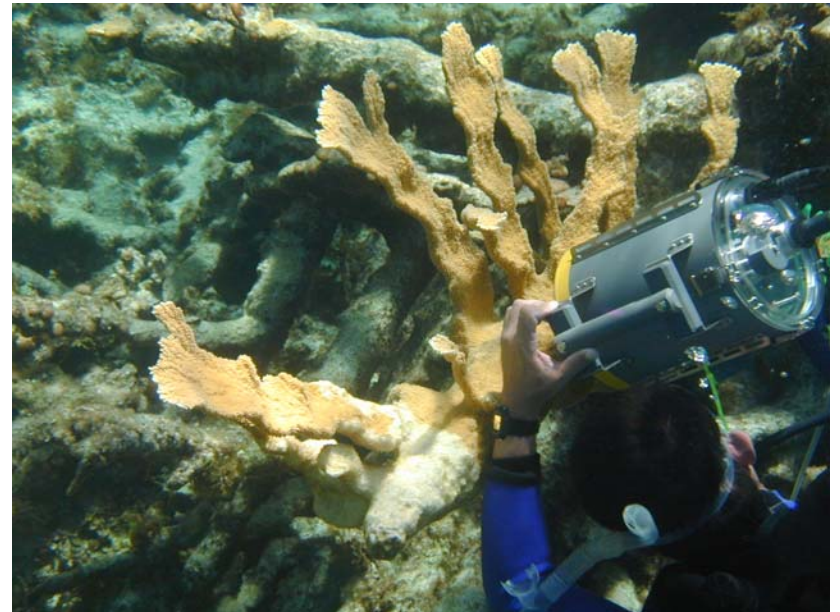


Field Data Collection

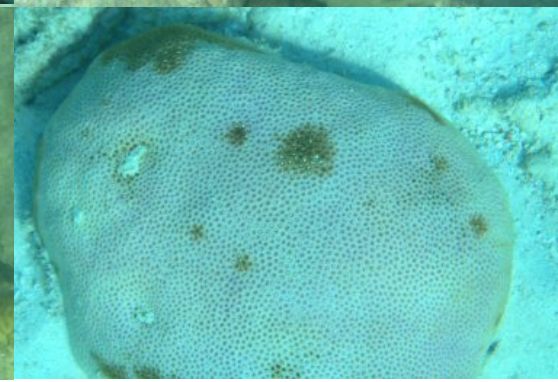
Biological information data collection includes:

- bio-optical properties of the water column and of reef bottom types (bleached, diseased, pale, 'healthy', dead, algal covered, and other dominant bottom types)
- percent cover of benthic types,
- rugosity

A critical contribution is to map the distribution and 'health' status of the declining *Acropora* species (elkhorn and staghorn coral)







More Information

Press Releases:

http://www.coralreef.gov/announcements/nasa_noaa_press.pdf

http://www.nasa.gov/centers/ames/news/releases/2005/05_67AR.html

NOAA Bleaching Project Data Collection:

http://ccma.nos.noaa.gov/ecosystems/coralreef/coral_bleaching.html

NOAA Bleaching Assessment Report:

http://ccma.nos.noaa.gov/products/biogeography/coral_bleaching/welcome.html

Contact:

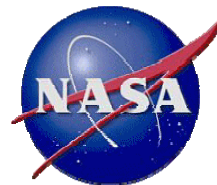
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<http://geo.arc.nasa.gov/sge/coral-health>

Educational Opportunities:

- 1) NASA Earth System Science Program (ESSP) Fellowships (MS, PhD)
See NSPIRES (NASA's proposal announcements website)
- 2) NASA Graduate Students Researcher Program (GSRP)
work w/ NASA Ctr. Scientist
- 3) NASA Postdoctoral Program (NPP)



NASA Funding? Watch for upcoming ROSES announcement.

What we saw....



Partially bleached and dead elkhorn coral.



Diseased brain coral.



Dead staghorn coral.



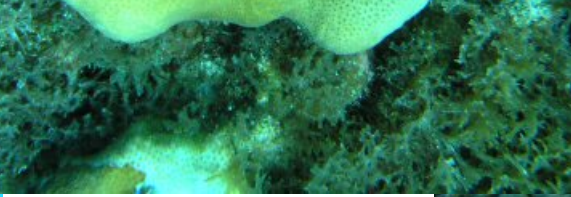
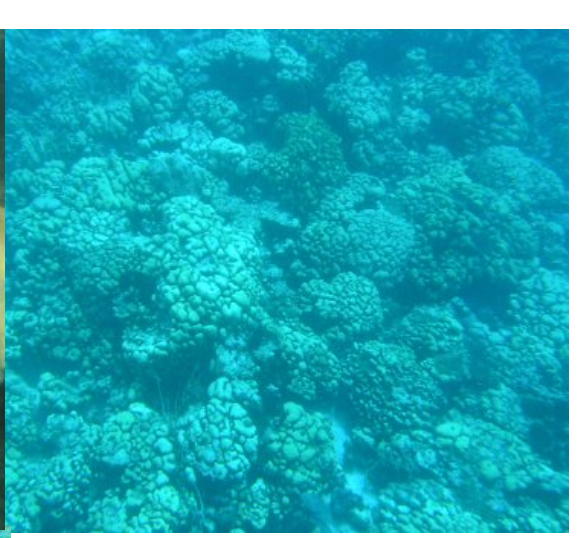
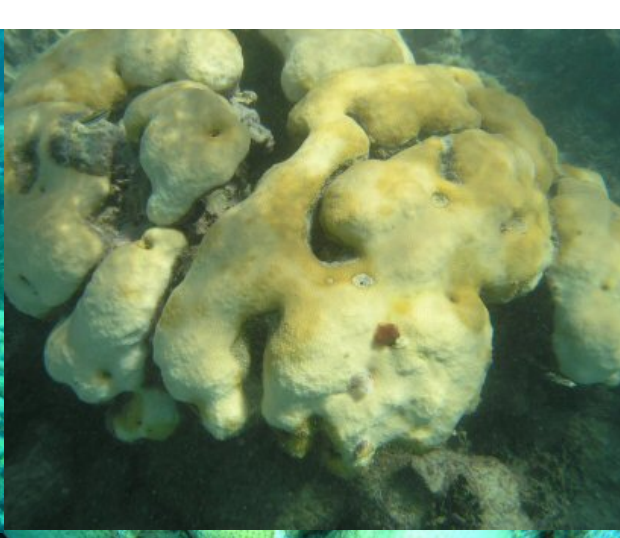
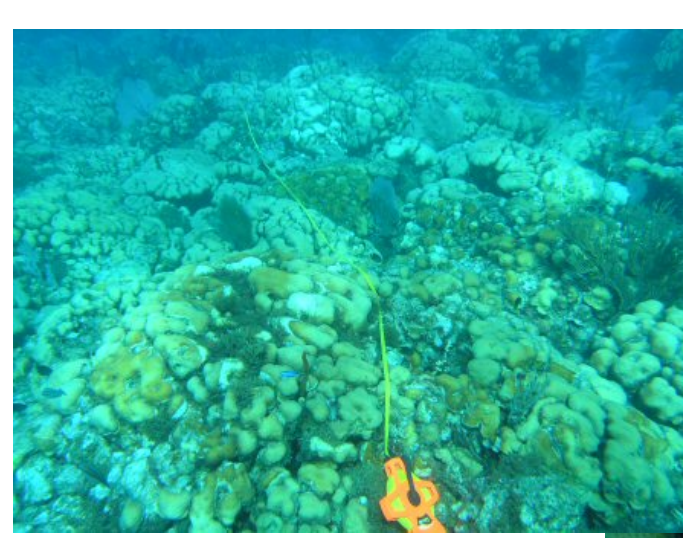
Bleached brain coral.



Bleached starlet coral.



Recovering and healthy elkhorn coral.



Field Data Collection: Benthic Types of La Parguera, PR

