Innovative image-based techniques to characterize Cayo Enrique reef

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Contents

- Remote sensing background
- Coral reef background
- Classification
- GPS/GER measurements
- GER analysis
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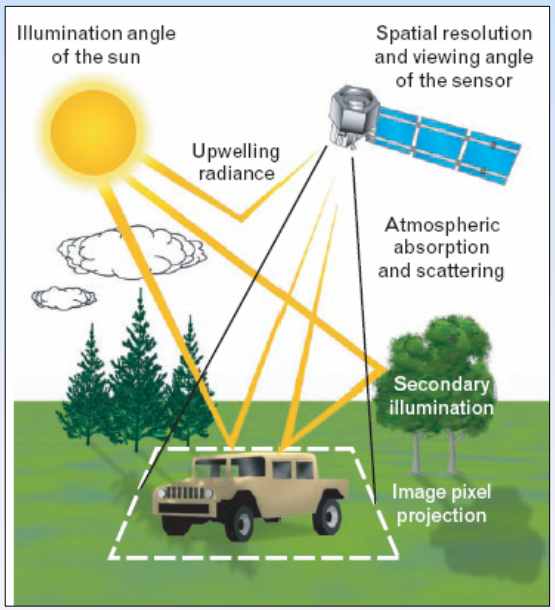
Remote Sensing

1. Radiance from sun
2. Reflected off earth's surface
3. Reflected wavelengths recorded by satellite

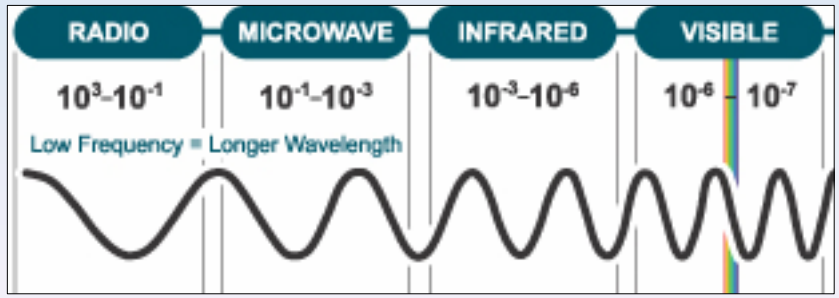
•Field of view
•Spatial resolution
•Viewing angle



(1)

•Visible region
(400 to 700 nanometers)
•Reflected infrared region
(700 to 3000 nanometers)
•Near infrared
(help distinguish vegetation/deep water)

•Spectral signature
•Spectral resolution

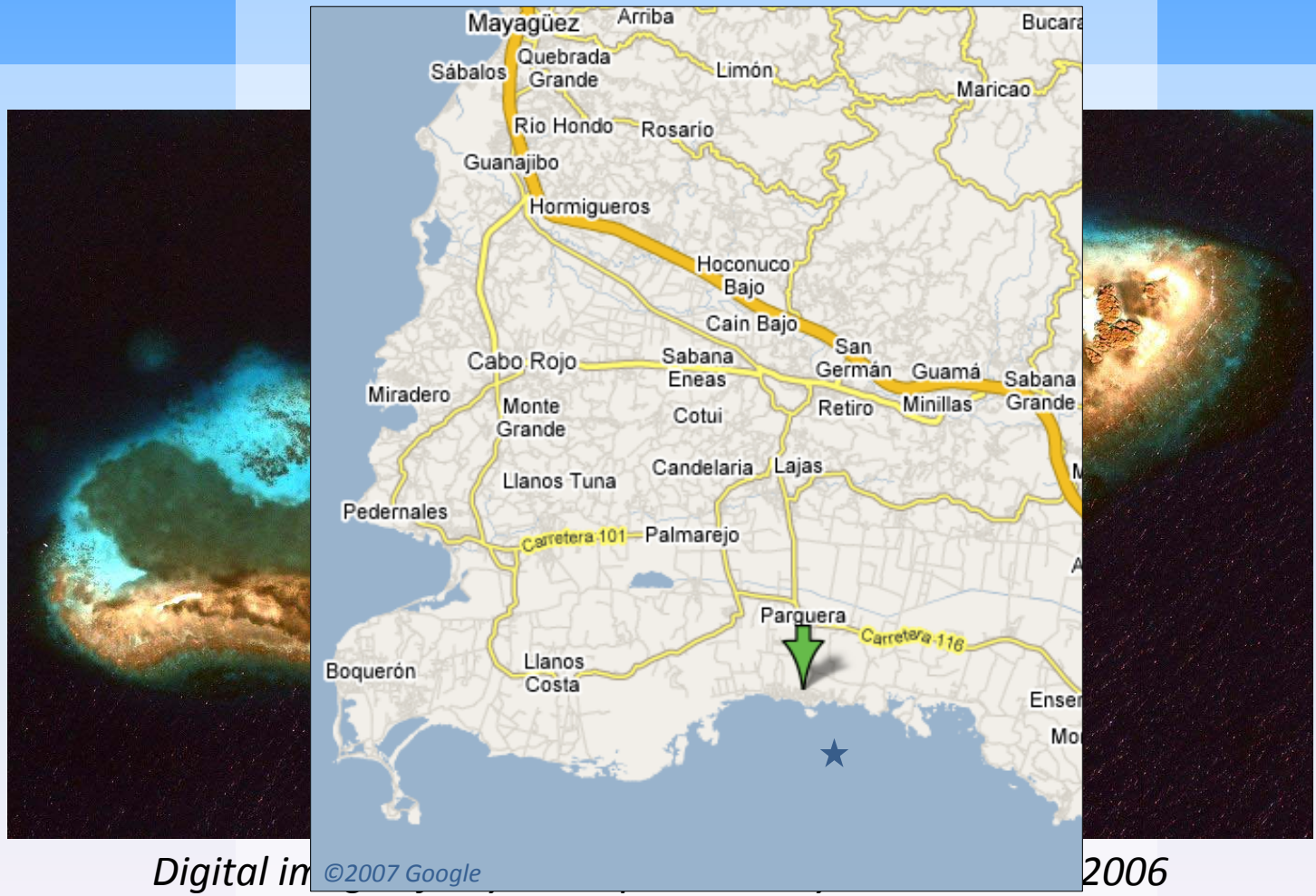


(4)

Obstacles in Remote Sensing

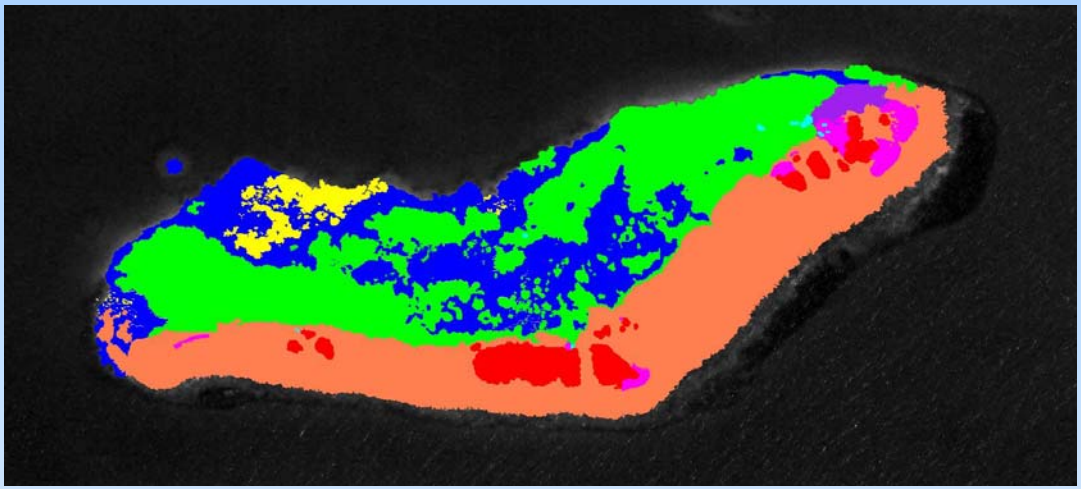
- Materials in atmosphere
- Scattering (water vapor)
- Light absorbed on the way back to sensor
- Secondary illumination
- Image distortion (sun/sensor angle)
- Clouds
- Seasonal changes

Cayo Enrique

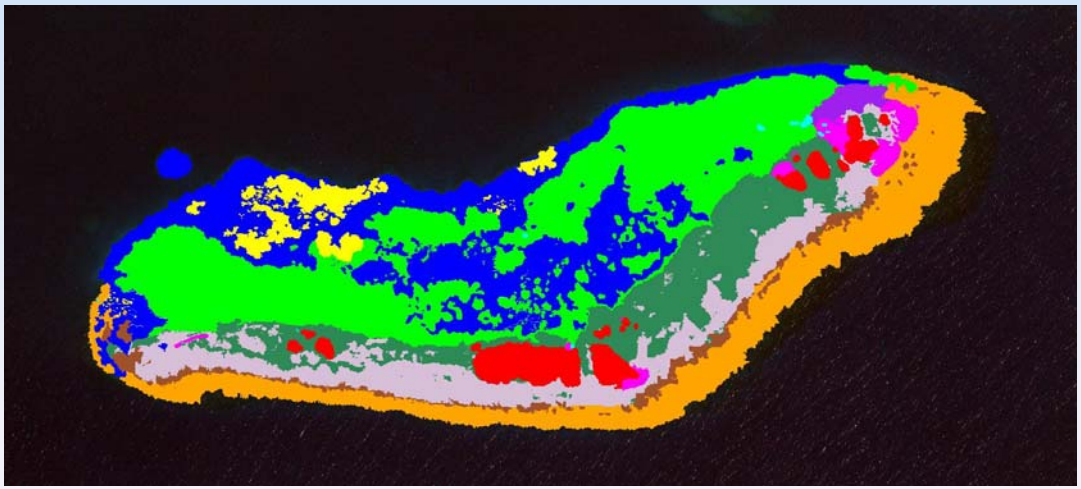


Digital im *2006*

Classification



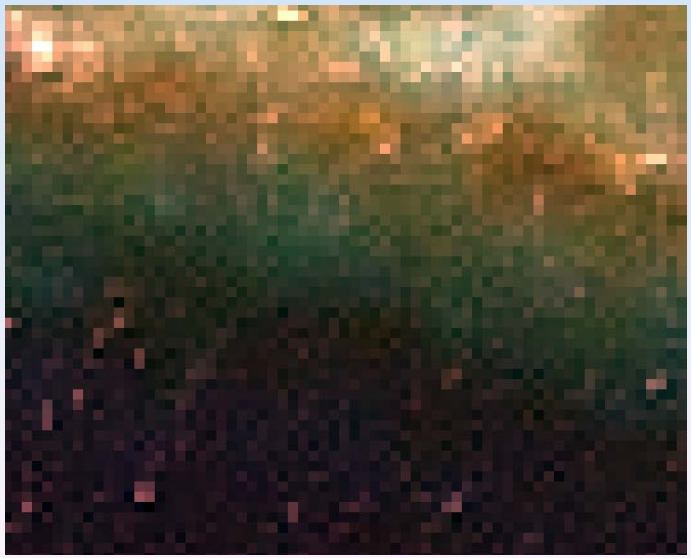
Classification completed previously, completed by Carlos Rivera

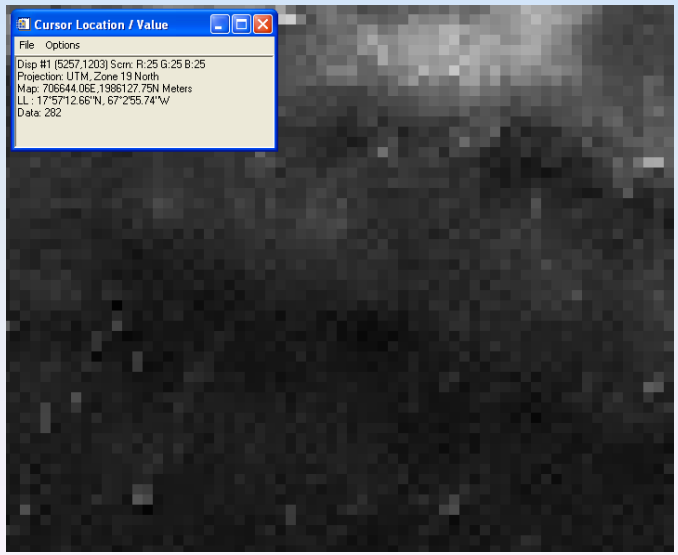


Classification completed in this part of the project

Classifying Techniques

- Use of NIR bands
- Using a single band
- Ground-truthing





Visiting the Reef

GPS and GER

GPS Pathfinder® Pro XRS receiver

Used to record exact location

(3)

GER 1500 *Spectroradiometer*

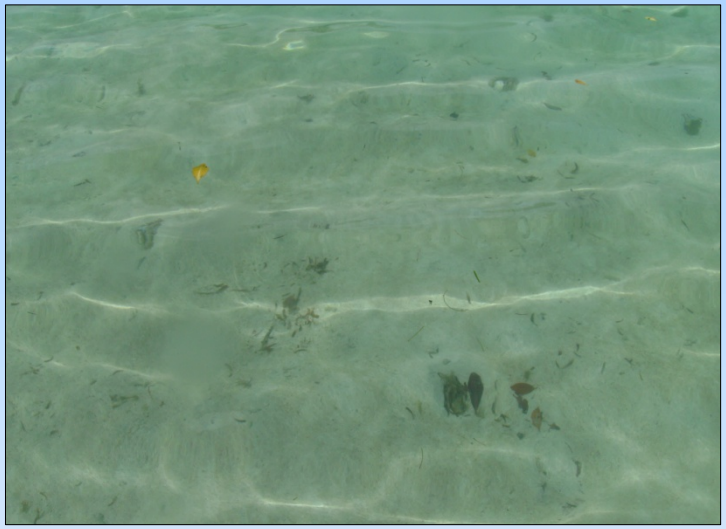
Used to record intensity of energy reflected for different wavelengths

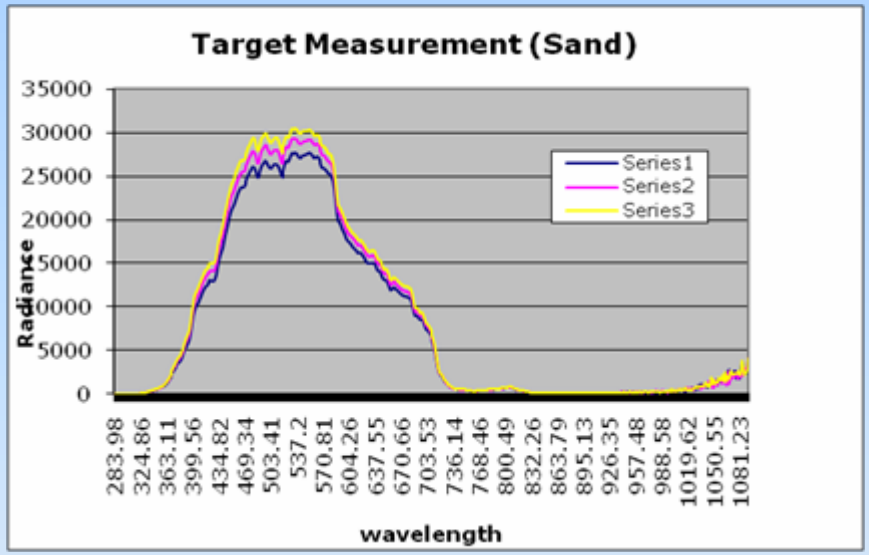
+

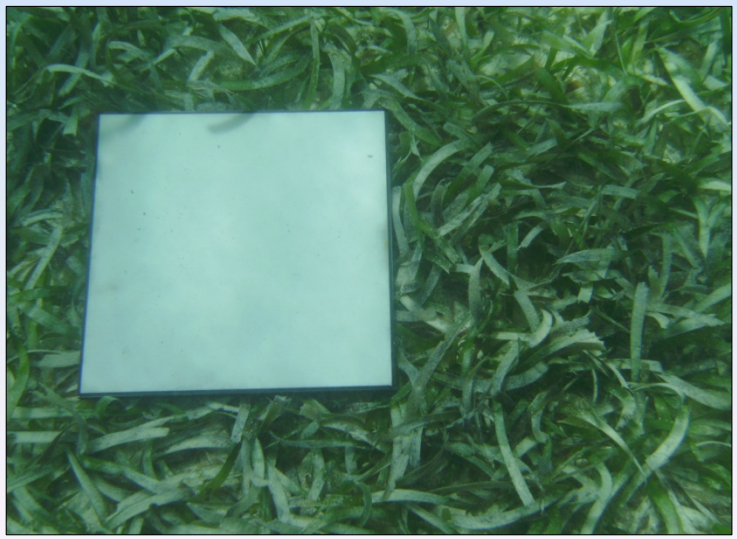
Reynolds
Oven Bags
Easy Clean Up!
Large Size
Delicious Family Meals

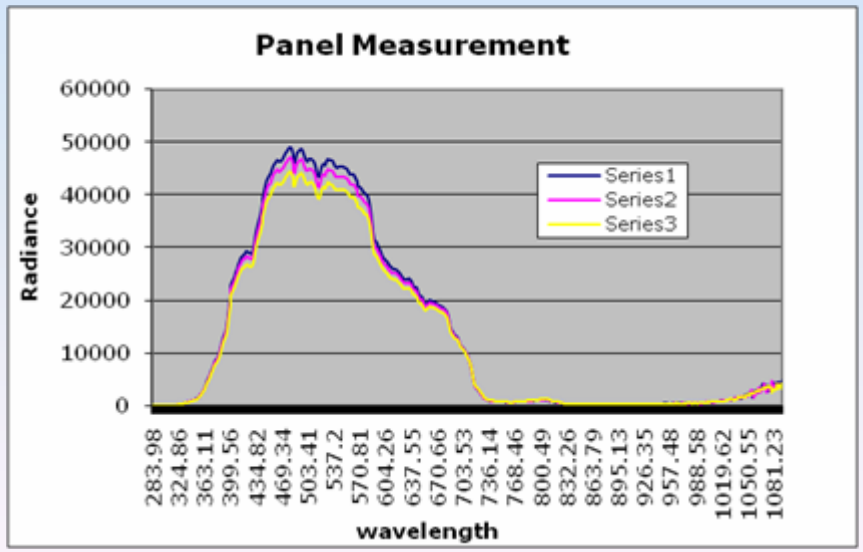
=

Spectral Analysis





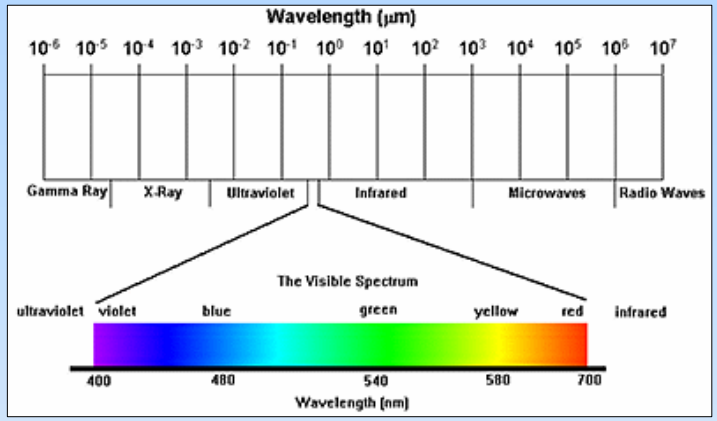




Spectral Analysis Continued…

% Reflectance =

$$\frac{\text{Avg. target measurements}*100}{\text{(Avg. panel measurements}*2)}$$



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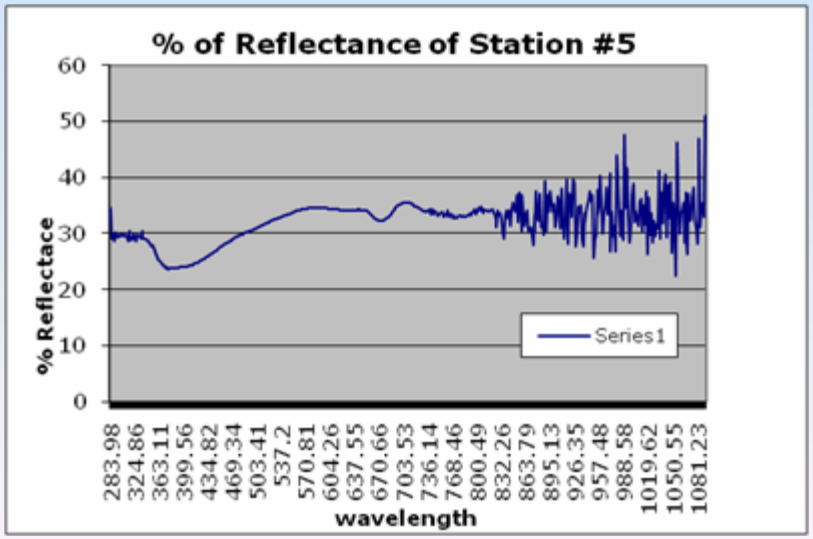
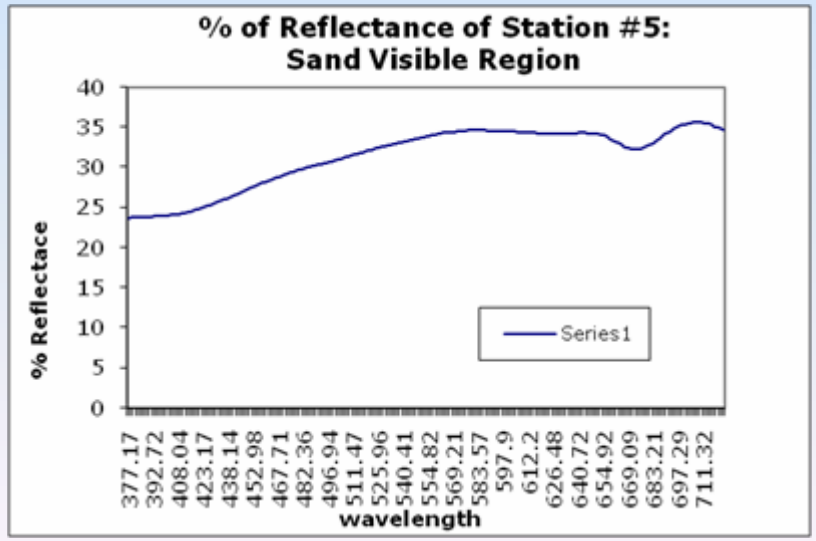




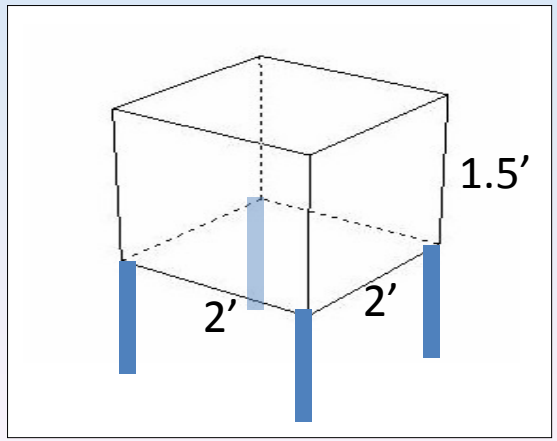
Hyperspectral Camera

SOC 700

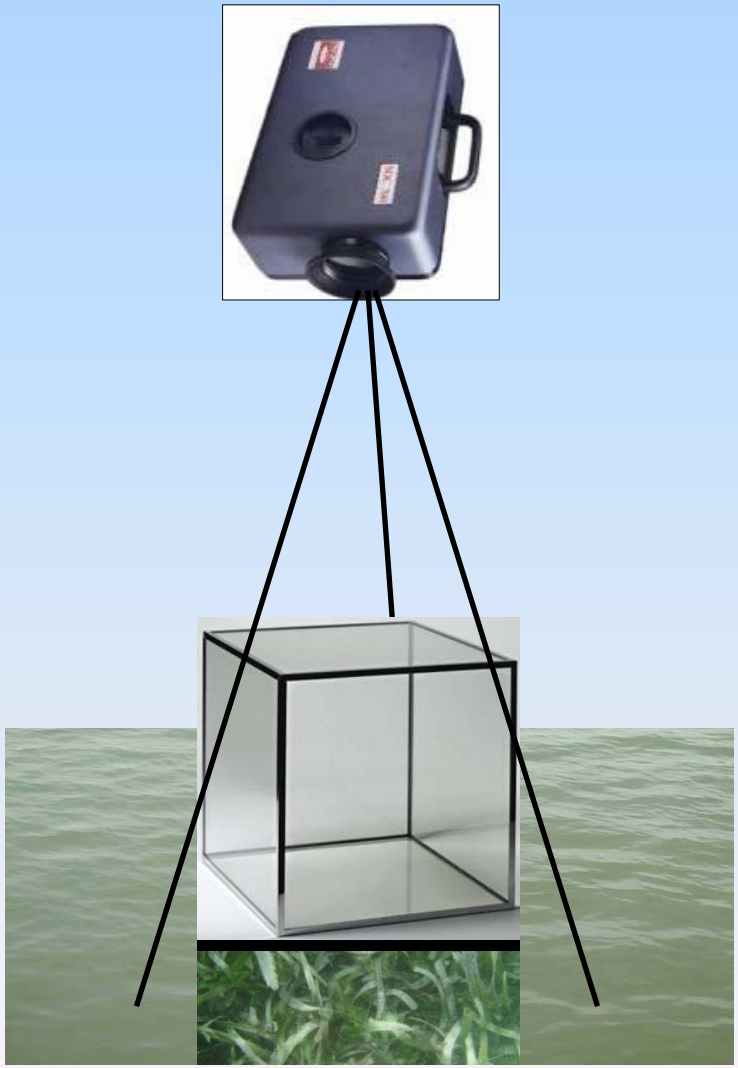
Used to record images with many spectral bands

Plexi-glass box

Used to block waves obstructing camera's field of view



The general idea of the box:



Future Work

- Periodic digital image collection
- Reef classification
- Continue ground-truthing
- More measurements
  - Hyperspectral
  - Spectroradiometer
- *Preserve marine life*

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