

# Global Assessment and Monitoring Using Remote Sensing

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<i>Instructor:</i>	Chris Small	small@LDEO.columbia.edu
<i>Schedule:</i>	One hour lecture & two hour laboratory per week	
<i>Suggested Text:</i>	Remote Sensing of the Environment, J.R. Jensen, 2nd Ed.	
<i>Evaluation:</i>	Midterm (40%) & Final (60%) or Semester project	
<i>WWW:</i>	<a href="http://www.LDEO.columbia.edu/rsvlab/">http://www.LDEO.columbia.edu/rsvlab/</a>	

## Lecture & Lab Topics

WEEK:

- 1 Motivation & Applications of Remote Sensing  
**LAB:** Introduction to ENVI image processing software

## How Remote Sensing Works

### *Collecting the Data: Physics of Remote Sensing*

- 2 **Light & Heat:** Physics of ElectroMagnetic Radiation  
**LAB:** Basic Concepts of Image Processing and Analysis
- 3 **Color & Reflectance:** Visible & Infrared Spectroscopy  
**LAB:** Basic Concepts of Spectral Analysis
- 4 **Satellites & Orbital Dynamics:** Missions & Data Availability  
**LAB:** Projections, Geolocation, Warping
- 5 **Sensors and Imaging Systems:** Digital Cameras to Imaging Spectrometers  
**LAB:** Spatial & Spectral Resolution of Sensors

### *Converting Data to Information: Image Processing & Analysis*

- 6 **What Sensors Measure:** Detection, Resolution & Sampling  
**LAB:** Contrast Enhancement & Spatial Filtering
- 7 **Hyperspace:** Spectral Transformations & Principal Component Analysis  
**LAB:** Spectral Transformations & Principal Component Analysis
- 8 **Information Extraction:** Thematic Image Classification  
**LAB:** Supervised, Unsupervised & Nonparametric Classification
- 9 **Physical Measurement & Interpretation:** Spectral Mixture Analysis

**LAB:** Spectral Mixture Modeling

## **Selected Applications of Remote Sensing:**

- 10                    *Marine Biological Productivity & Pollution Monitoring*  
                          **LAB:** Ocean Circulation and Coastal Productivity
- 11                    *Change Detection and Land Use Mapping*  
                          **LAB:** Multitemporal Change Detection
- 12                    *Vegetation Mapping & Monitoring*  
                          **LAB:** Vegetation Spectroscopy
- 13                    *Deforestation and Biomass Assessment*  
                          **LAB:** Spatial Analysis & Geographical Information Systems (GIS)