Remote Sensing of Lake Tahoe's Near Shore Environment

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Remote Sensing Applications

The Sacramento San Joqauin River Delta

HyMap Airborne Imaging Spectrometer 3m pixel resolution



Remote Sensing Applications

 Species detection and mapping of submerged aquatic vegetation



Submerged aquatic plants

Need of mapping at Lake Tahoe

- Invasive species in near shore area
 - Asian Clams
 - Macrophytes (aquatic plants)



Corbicula fluminea found underwater at Marla Bay, Lake Tahoe 2009

Objectives

- Mapping near shore substrate
 - Asian clams
 - Aquatic plants
- Water quality monitoring
 - Phytoplankton
 - Organic carbon
 - Suspended solids





Methods

- Remote sensing data
 - Multispectral satellite image (WorldView-2)
 Hyperspectral airborne image (SpecTIR)
- In situ measurements
 - Above-surface spectrometer measurements
 Underwater spectrometer measurements
- Laboratory optical measurements

 Absorption & Scattering coefficient of water
- Radiative transfer modeling
 - Model remote sensing reflectance from above measurements

In situ Spectrometer



In situ Spectrometer



SpecTIR



- High spatial resolution
 2 m
 - Hyperspectral – 126 bands in visible-NIR

SpecTIR

• 15 Flight lines in south of the lake



SpecTIR



WorldView-2





- High spatial resolution
 - 2.5 m
- Multispectral
 - 8 bands in visible NIR

WorldView-2



Radiative Transfer Model

Hydrolight modeling of Remote sensing reflectance near shore environement



In situ Spectrometer (Underwater)



In situ Spectrometer (Underwater)



Laboratory Spectrophotometry



Upcoming Analyses

Comparisons of spectra obtained by several different methods

Develop substrate classification methods, and apply them on the images.

Develop models determine water constituent concentrations

Thanks



Funding provided in part by







Department of LAND, AIR AND WATER RESOURCES University of California, Davis Climate Change . Sustainable Agriculture Environmental Quality . Landscape Processes



Boat Drivers and Scientific Divers at TERC

Dr. Vincent and his colleagues at Laval University, Canada