

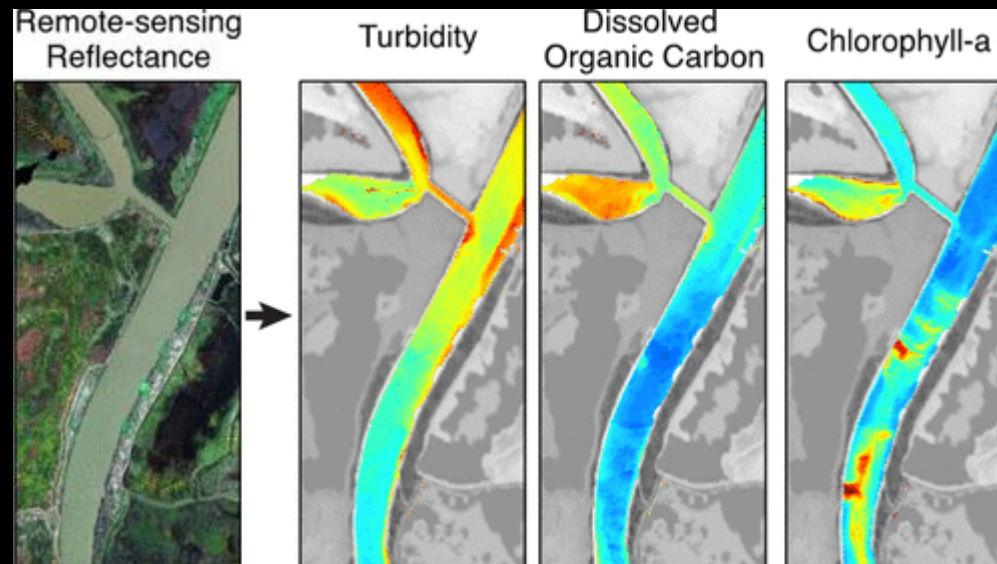
Video 3:

Ocean and Aquatic Optics

Video Objective:

- Talk about optical constituents
- Define inherent and apparent optical properties
- Define optical complexity

Aquatic Remote Sensing



Fichot et al. 2016

Aquatic Remote Sensing

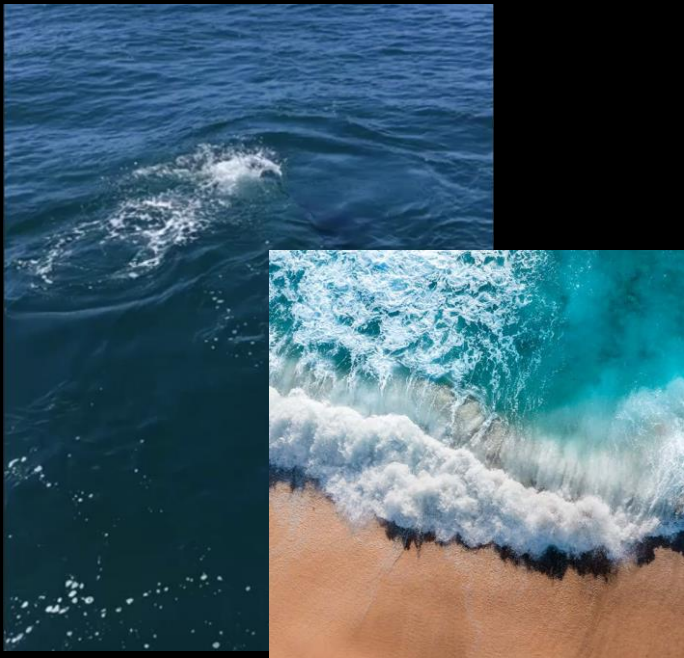
Translating optical properties of the water to information about what is in the water.



What influences water color?

What influences water color?

- Physical aspects of the environment



Waves and bubbles



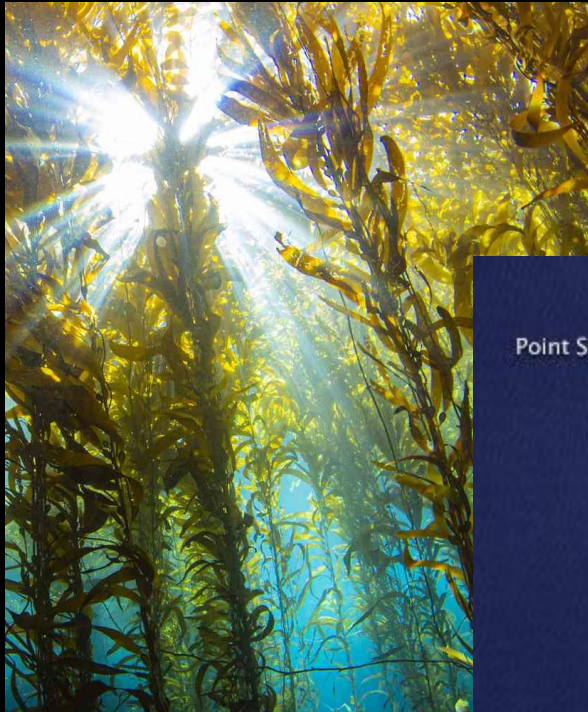
Water Depth



Substrate

What influences water color?

- Physical aspects of the environment
- Stuff floating on the water's surface



Macroalgae



Pollution

What influences water color?

- Physical aspects of the environment
- Stuff floating on the water's surface
- ~~Stuff floating in the water column~~

Optical Constituents



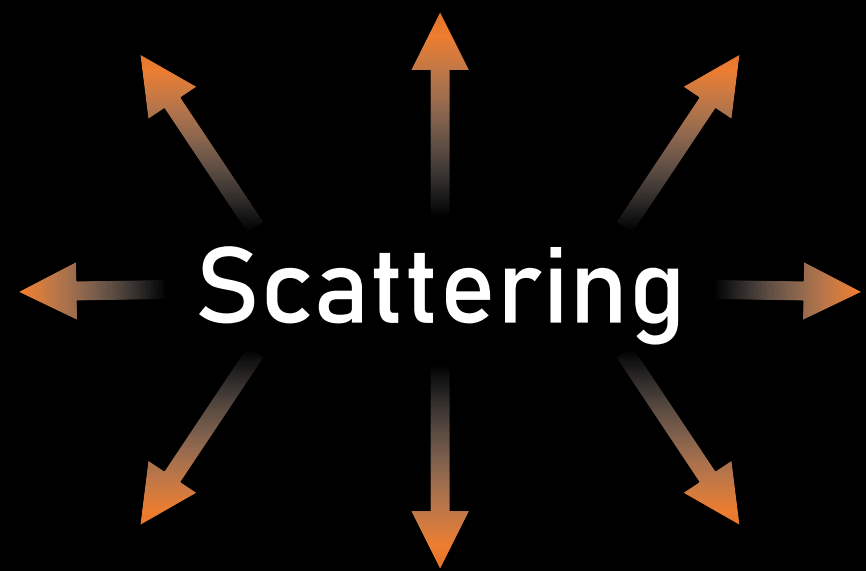
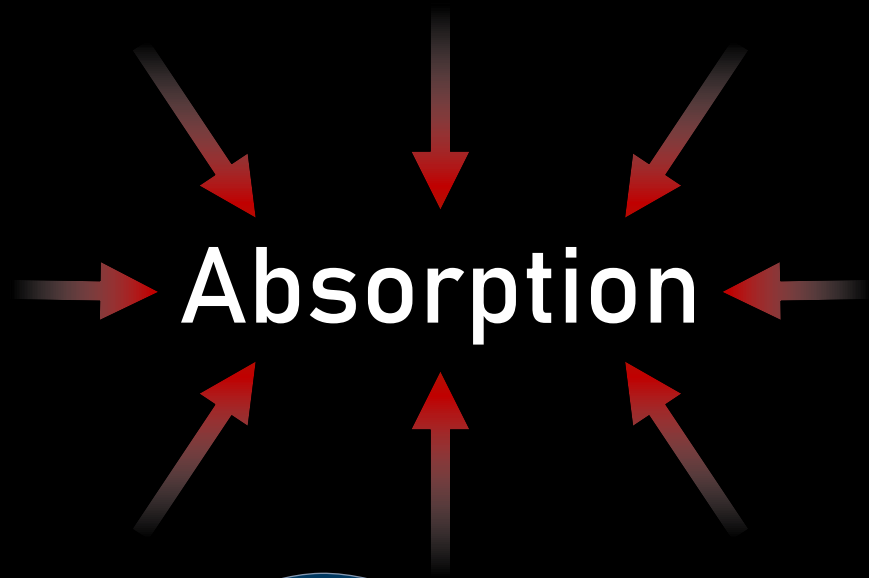
Sediments



Microalgae



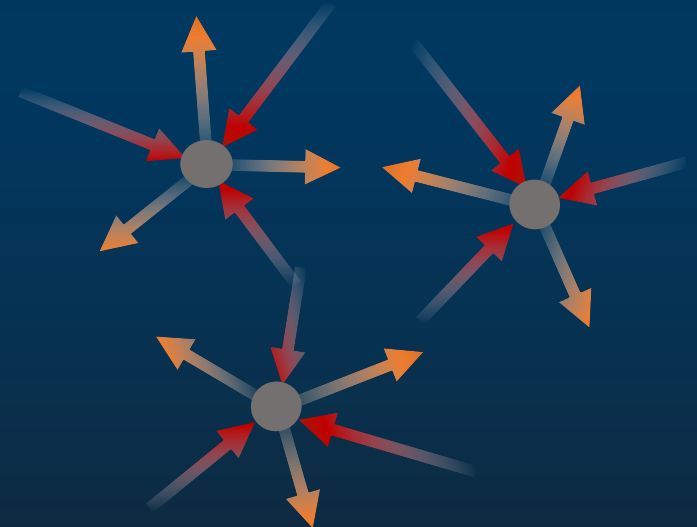
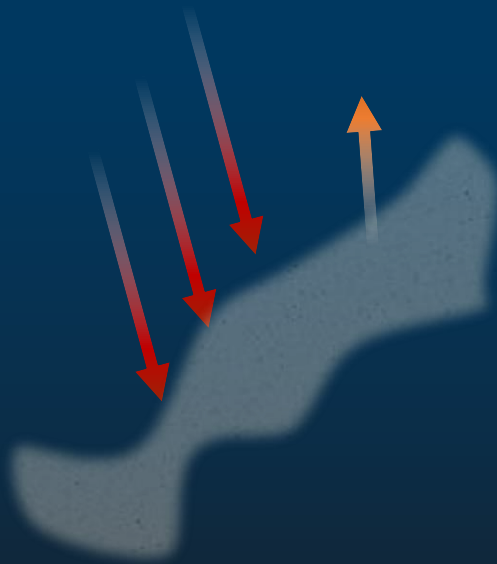
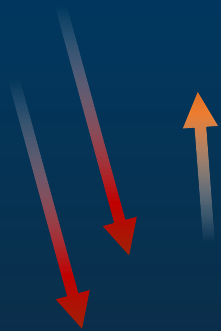
Dissolved Organics



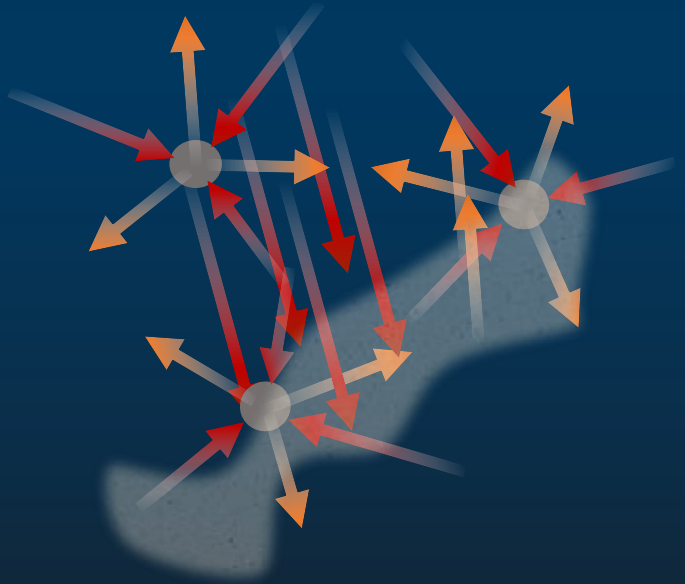
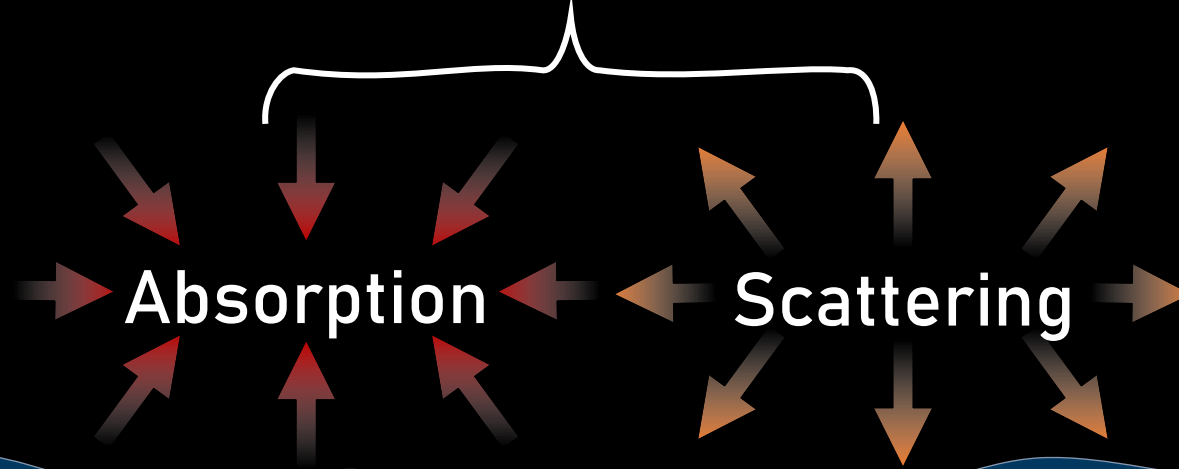
Water

Dissolved Materials

Particles



Inherent Optical Properties (IOP's)



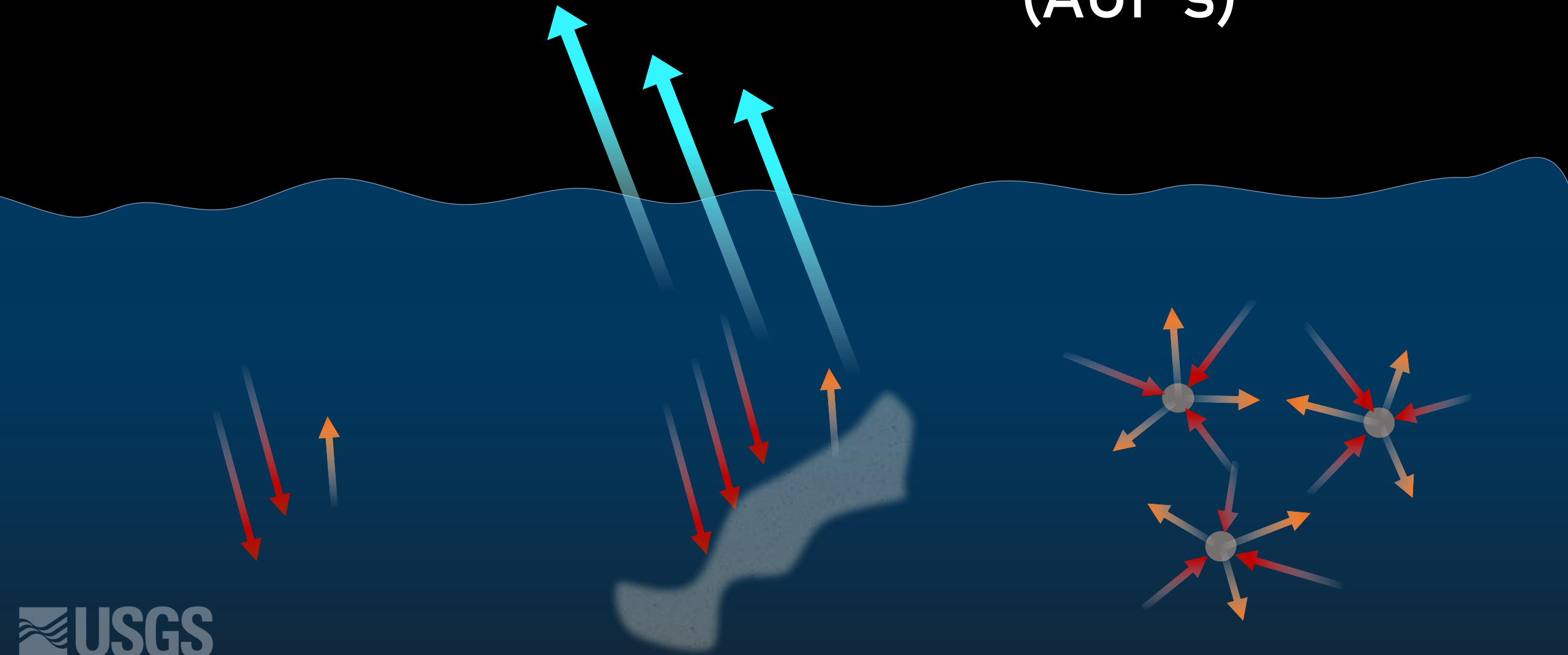
Properties of the water that affect how it interacts with light



Inherent Optical Properties



Apparent Optical Properties (AOP's)



Apparent Optical Properties

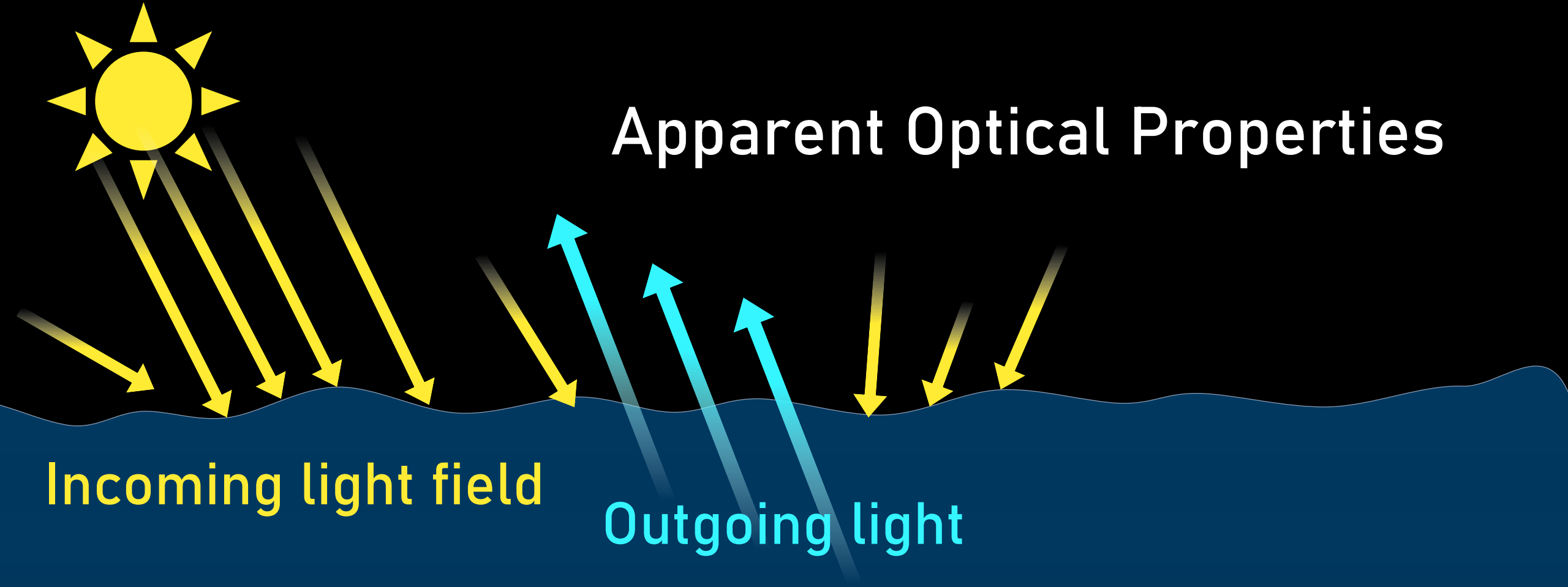


Outgoing light

aka Water Color

aka Remote Sensing Reflectance

Apparent Optical Properties





Apparent Optical Properties

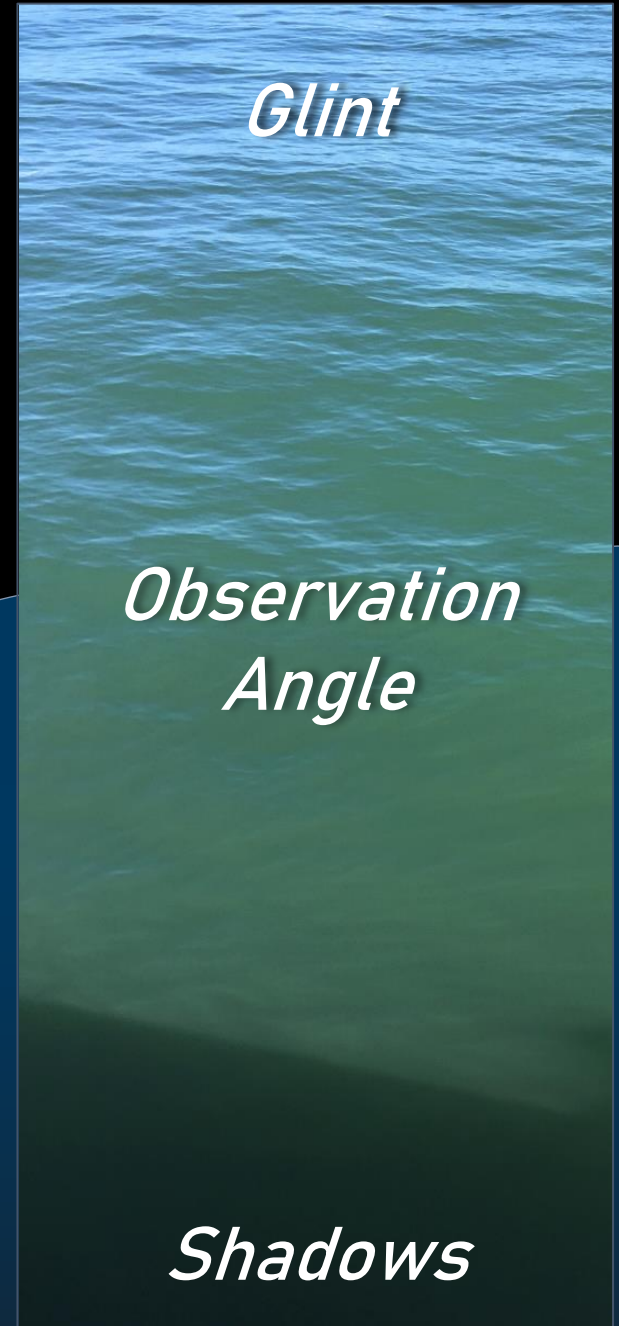
Incoming light field

Outgoing light

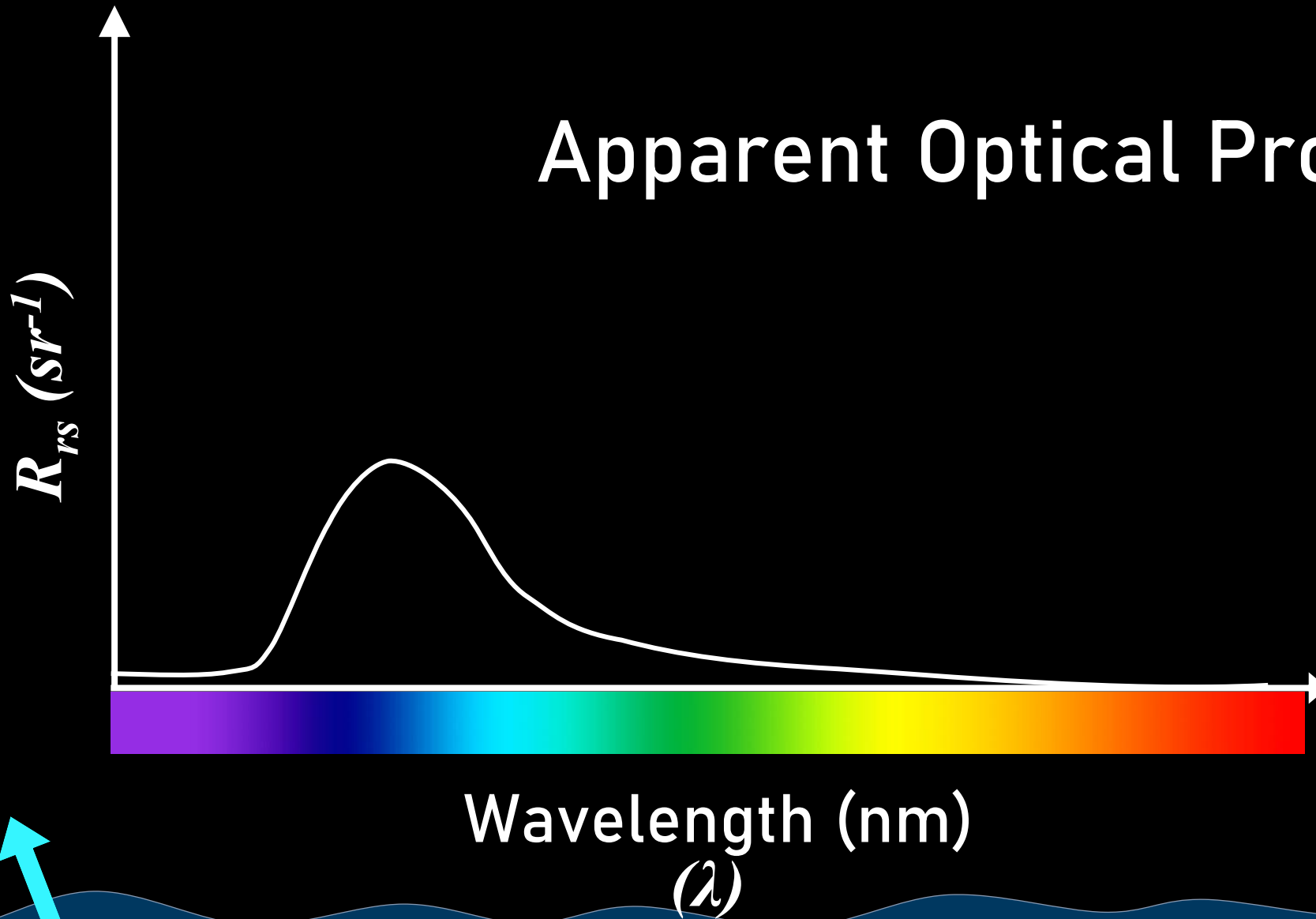
Glint

*Observation
Angle*

Shadows

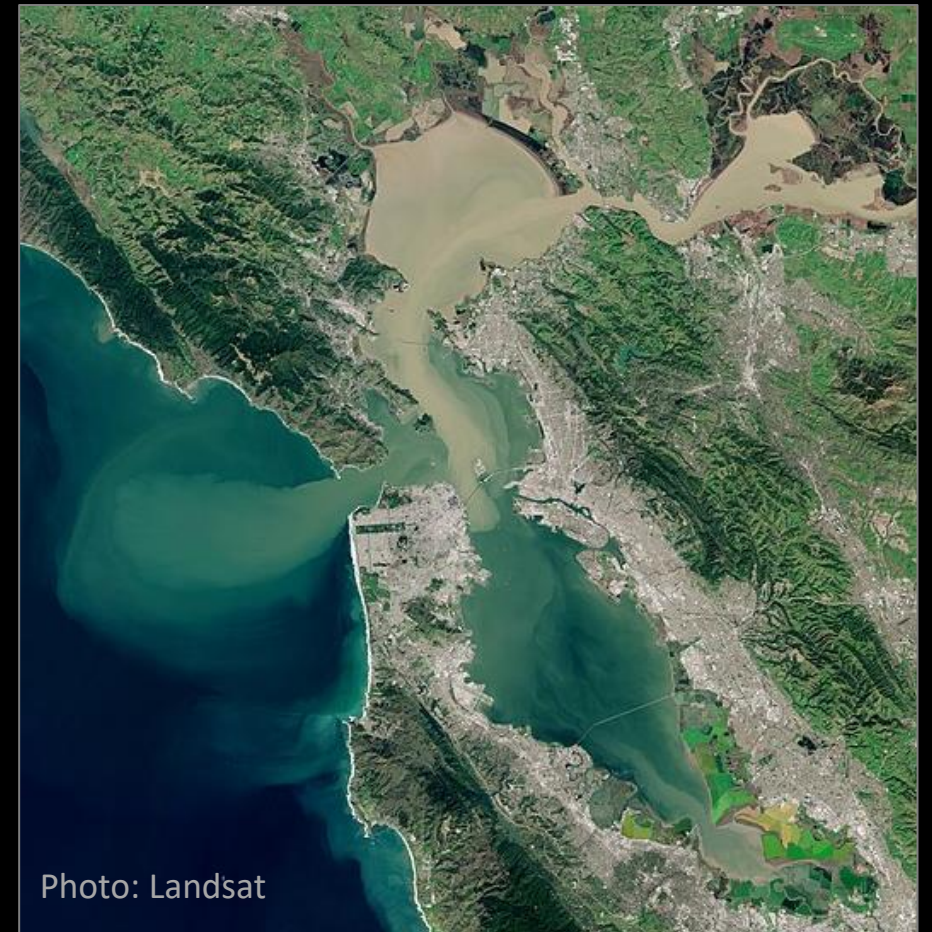
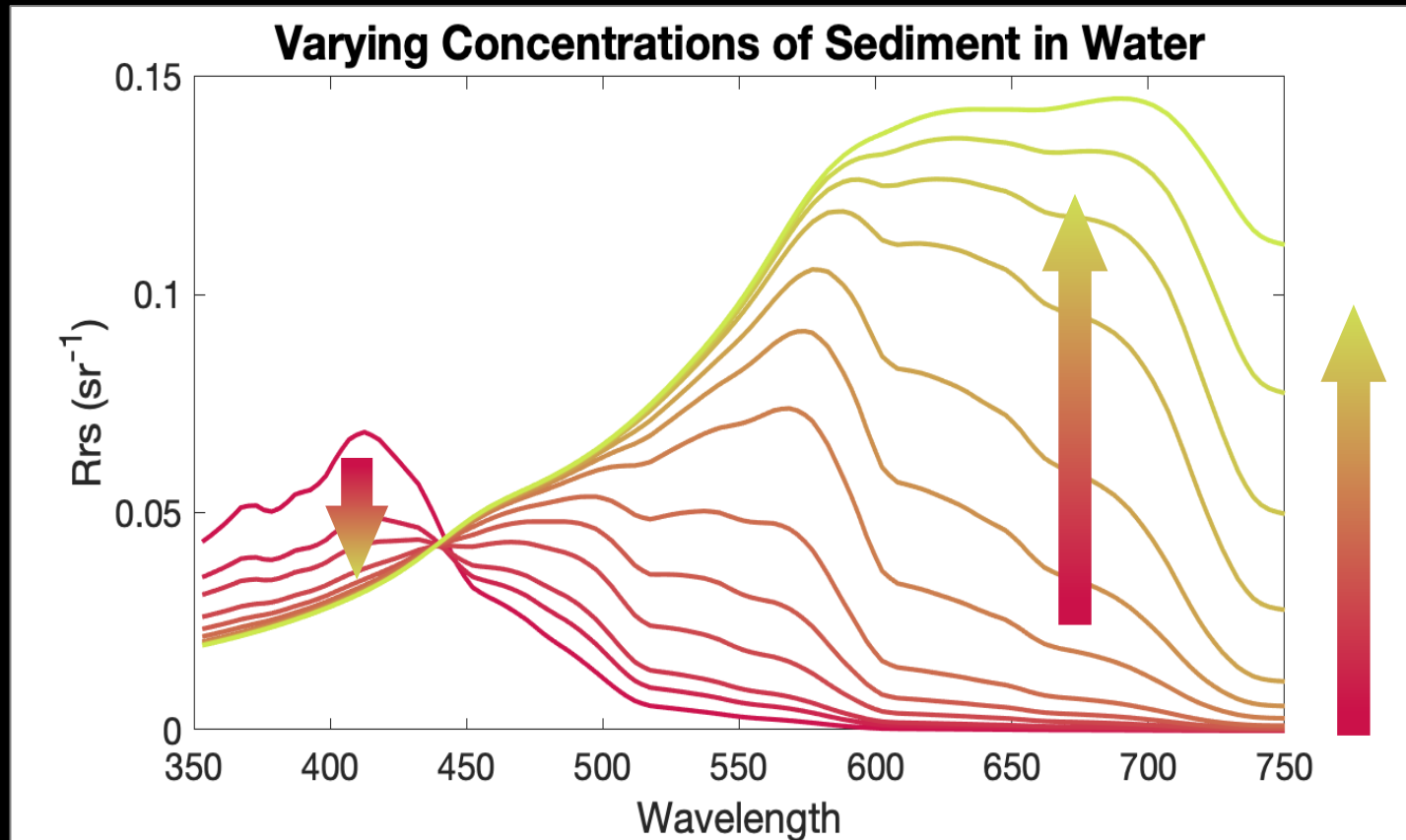


Apparent Optical Properties

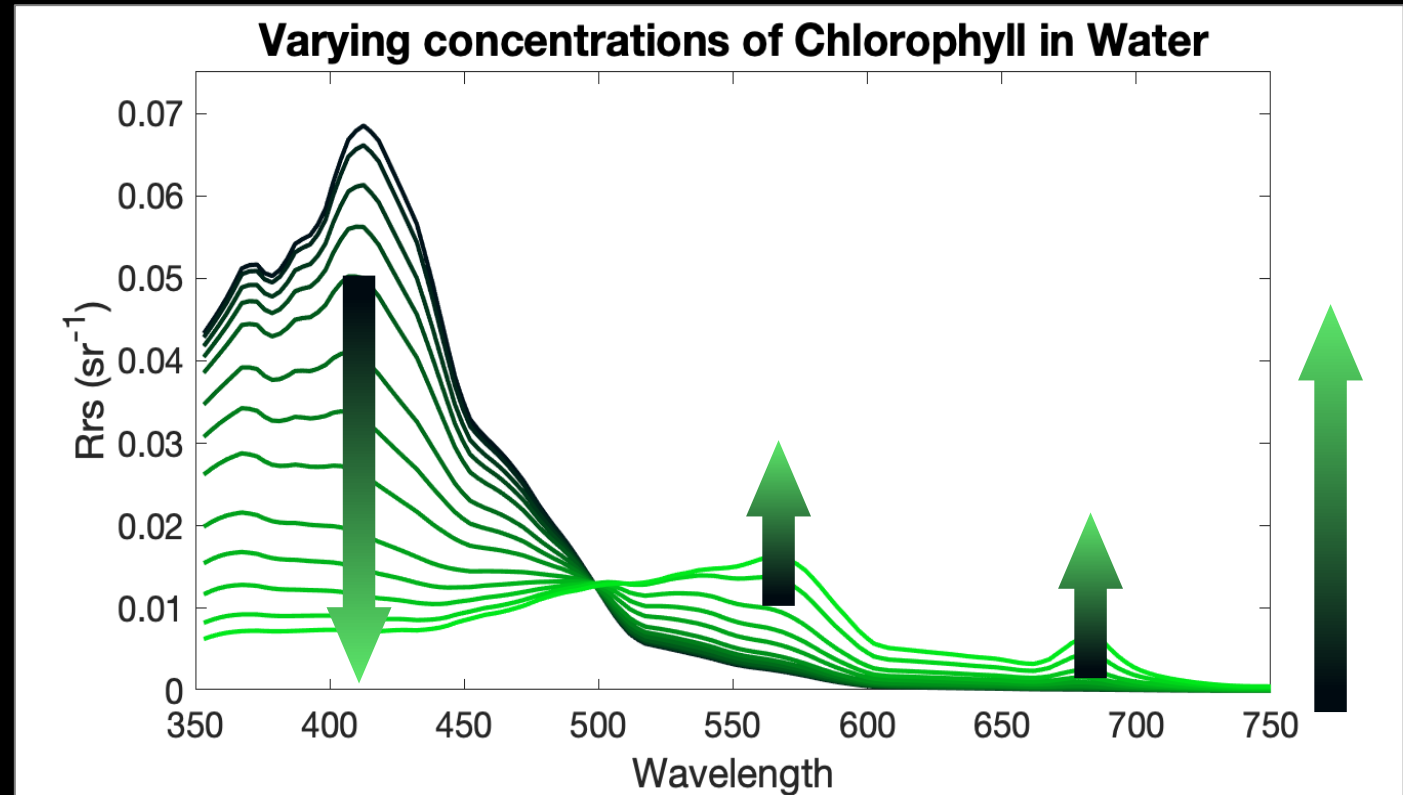


Major in-water optical constituents

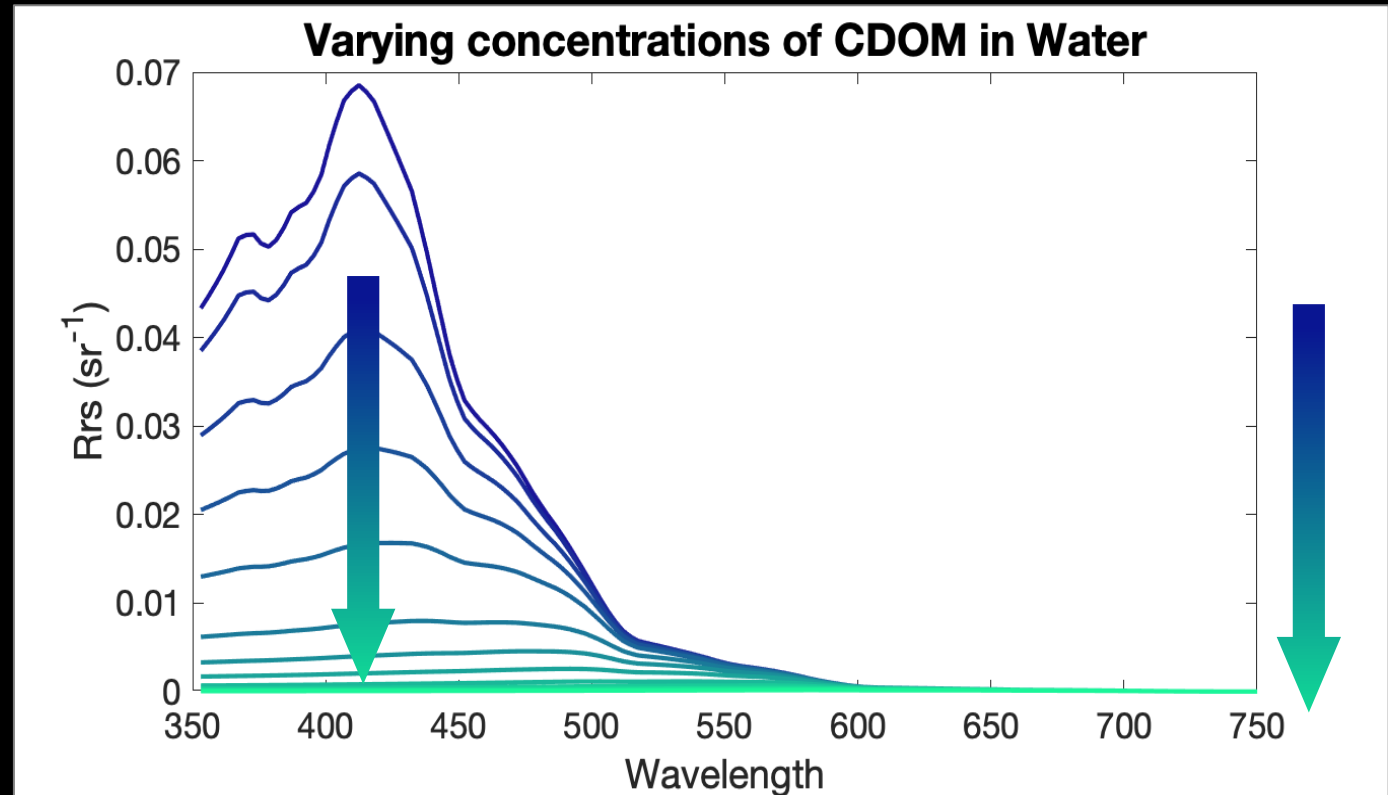
Suspended Sediments



Microalgae

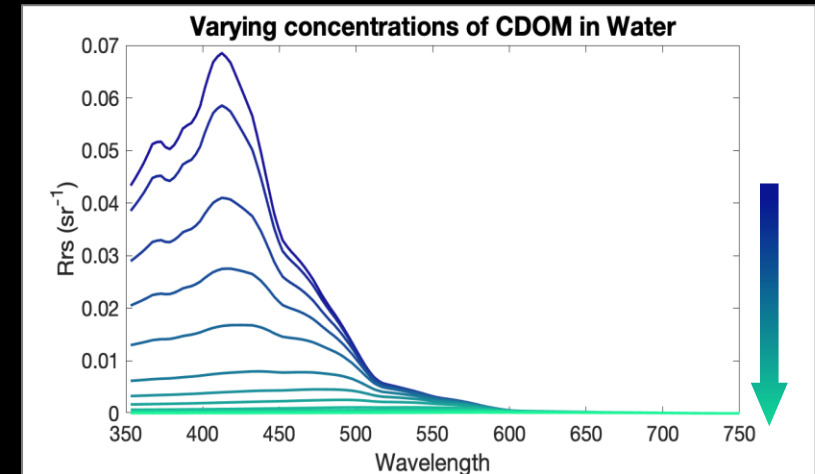
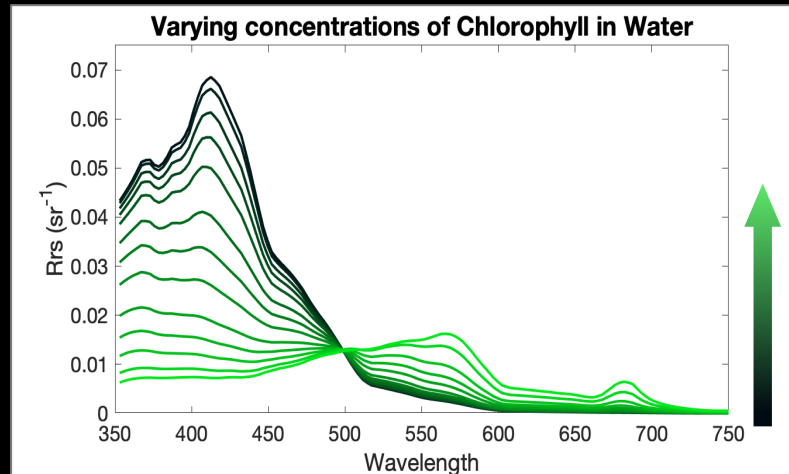
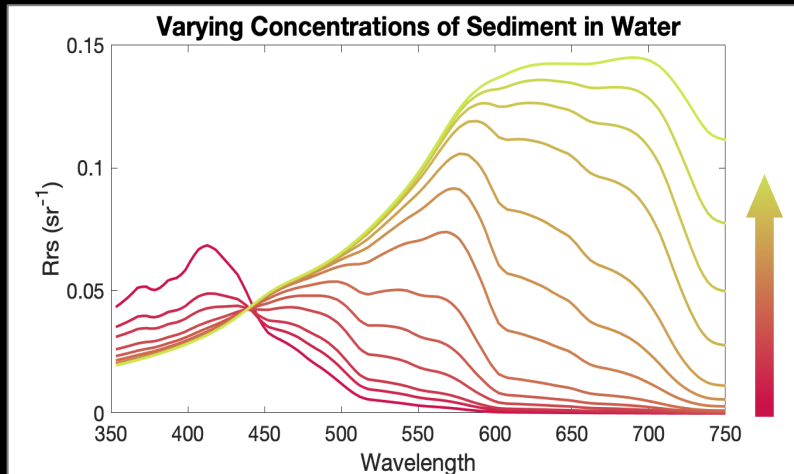


Colored Dissolved Organic Matter

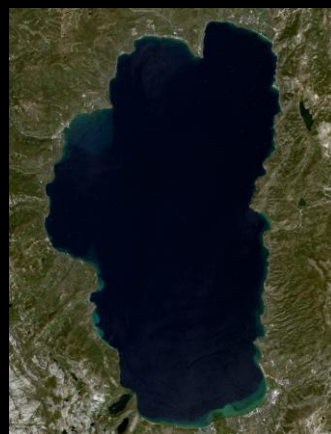


↑ **Optically Complex** - *more than one constituent*

↓ **Optically Simple** - *only one constituent*



Optically Complex *-more than one constituent*



Optically Simple *-only one constituent*

Conclusions

- Water color is a function of optical constituents
- Inherent optical properties, factors of observation, physical environment influence water color
- Water bodies range in optical complexity
- More spectral information can help improve retrievals in complex waters

