

## **Week 1 Module 2: Ocean Color Science**

# Introduction

## **What is Ocean Color?**

- Ocean color refers to the spectral signature of light reflected off the ocean surface.
- Influenced by particles, organic matter, and phytoplankton in the water.
- Detected by specialized instruments, providing insights into marine health and ecosystem dynamics.

## Why Study Ocean Color?

- Monitoring ocean color helps scientists understand climate and environmental changes.
- Critical for tracking phenomena like harmful algal blooms (HABs) and carbon cycling.
- Important for fisheries, weather forecasting, and climate regulation.



# Understanding Ocean Color Science

## **The Ocean Color Instrument (OCI) on NASA's PACE Mission**

- PACE Mission's Ocean Color Instrument (OCI) measures light across a wide range of wavelengths (UV to near-infrared).
- Hyperspectral capabilities allow for detailed observations of ocean ecosystems.
- Helps distinguish between substances like phytoplankton and organic material.

## **Phytoplankton and Marine Ecosystems**

- Phytoplankton, microscopic marine algae, are vital for the ocean food web and carbon cycling.
- Different phytoplankton types affect ocean color by absorbing and scattering light differently.
- OCI monitors phytoplankton health and their response to climate changes.





# **Applications of Ocean Color Science**

## **Studying Harmful Algal Blooms (HABs)**

- HABs affect marine life and industries like fishing.
- PACE's sensors differentiate between harmful and beneficial phytoplankton blooms.
- Helps in predicting and mitigating HAB impacts.

## **Atmospheric Interactions and Aerosols**

- OCI provides insights into aerosols (dust, pollution) and their interaction with the ocean.
- Aerosols can impact marine ecosystems by altering light penetration and phytoplankton growth.



# Technological Advances in Ocean Color Science

## **PACE: A New Frontier**

- PACE's OCI provides high-resolution data that surpasses earlier missions like CZCS and VIIRS.
- Enhanced resolution allows precise tracking of environmental changes globally.

## **Multi-Angle Polarimeters**

- PACE employs multi-angle polarimeters to measure sunlight interactions with particles in the atmosphere and ocean.
- Provides detailed information on particle sizes, compositions, and their effects on climate.





# **Impact and Future of Ocean Color Science**

## **The Importance of Ocean Color Data**

- Ocean color data is crucial for managing marine resources and forecasting environmental changes.
- Supports public policy on climate and ocean health as global population grows.

## **PACE's Role in Future Research**

- PACE will provide critical data for climate models, ecosystem monitoring, and ocean-atmosphere interactions.
- Contributes to research in both marine and atmospheric sciences.