

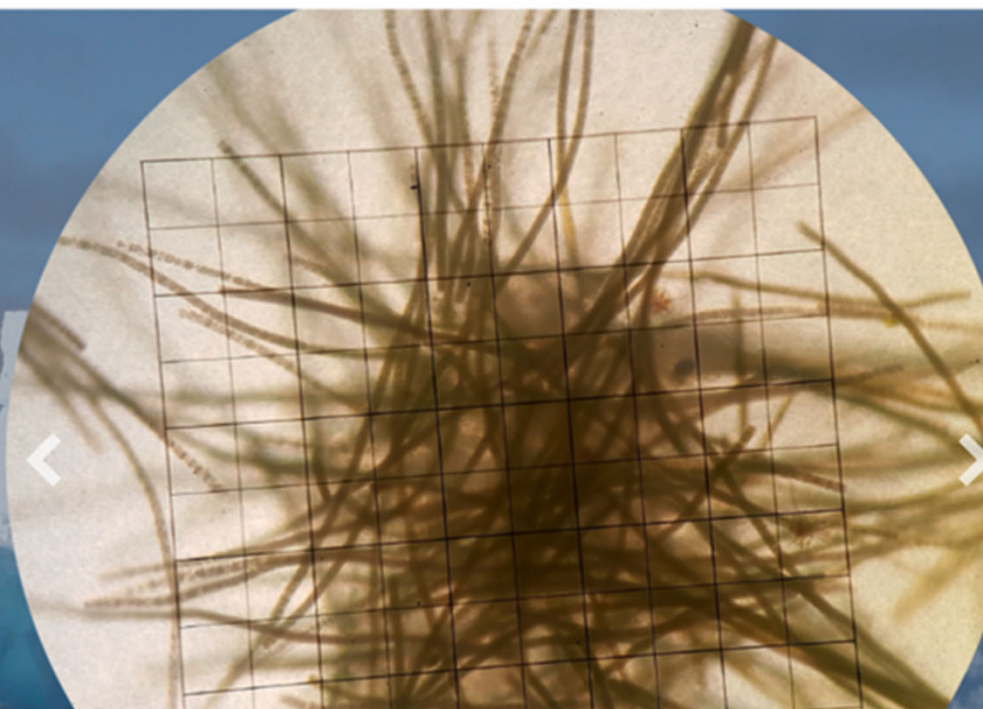
# BioGeoSCAPES Program Development Update



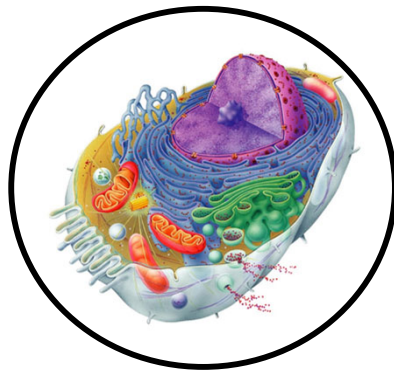
**Maria T. (Maite) Maldonado**, Professor, University of British Columbia, Vancouver, BC, Canada  
**Mak Saito**, Senior Scientist, Woods Hole Oceanographic Institution, Woods Hole, MA, USA  
**SCOR Annual Meeting Oct. 30, 2025**

Earth's life support  
system is underpinned  
by microbial  
biogeochemical cycles

BioGeoSCAPES is a new global research program  
the international community is working together  
to create to study this system



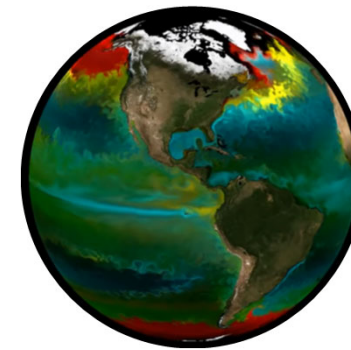
# Ocean Metabolism – at the heart of our planetary system



Intracellular  
processes



Organisms &  
assemblages



Ecosystem-scale  
cycling & feedbacks

**Vision:** to understand how the collective microbial biochemical reactions and processes shape biogeochemical cycles, as well as influence and respond to unprecedented rates of complex global change

**Why?** To constrain biological and chemical feedbacks on a changing planet

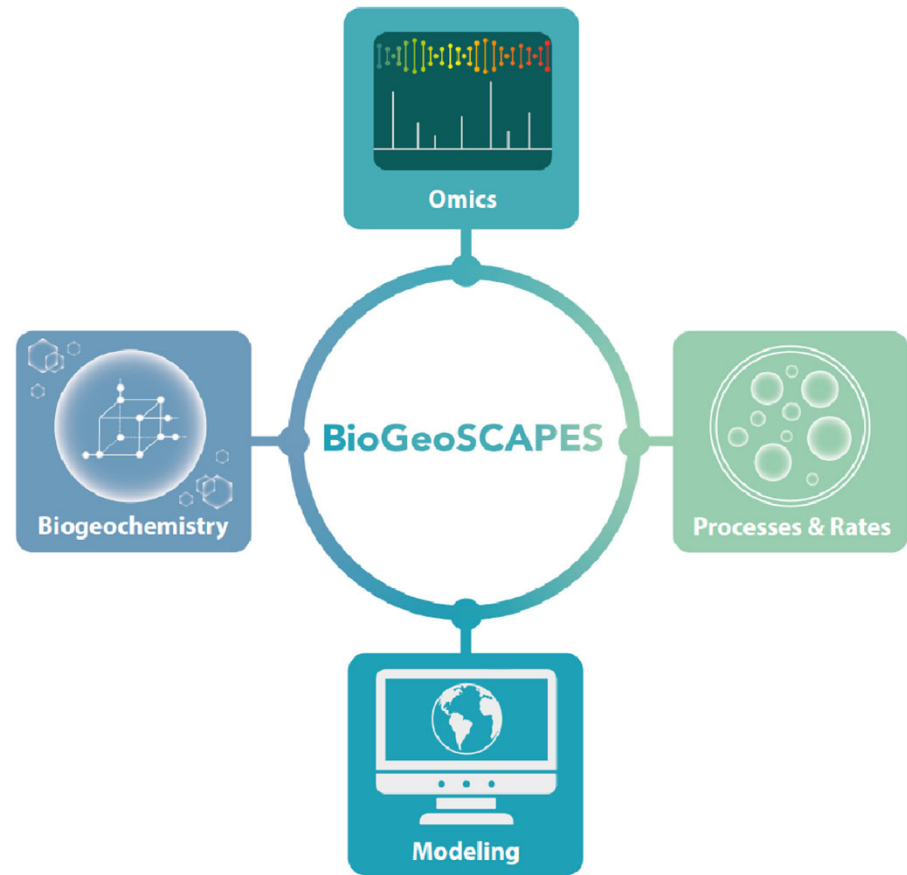
# What is BioGeoSCAPES?

**A global-scale research program** to be launched in ~2026 as a SCOR Large-Scale Research Program

**Combine interdisciplinary (bio)-analytical capabilities, physiology, biogeochemistry & computational biology and ocean biogeochemical modeling**

**Multiple scales of investigation:** Including regional process studies, ocean basin-scale transects, time-series, laboratory and computational studies.

**Underpinned by intercalibration efforts and interoperable data standards** to create an international interoperable data system



Interdisciplinary by definition

# BioGeoSCAPES Activities 2023-25

## Program development (funded by AccelNet NSF):

- **International Science Planning Meeting (Nov. 2023)**
- International Implementation Meeting (Feb. 2025) - Implementation Plan within Science Plan
- SCOR WG #170; PRIMO: Physiology and Rates in Microbial Oceanography
- Two cohorts of BioGeoSCAPES Fellows (26 fellows from 18 nations)
- Two summer schools in Ghana & Nigeria (2024 & 2025), in collaboration with COESSING
- Modeling Working Group: webinars and workshop (May-September 2025)
  - 450 live webinar participants from 33 nations
- Standardization and Intercalibration Working Group: Leadership team planning webinars and workshop
  - Intercalibration efforts underway - metaproteomics, nucleic acids, organic geochemistry & metabolomics, more welcome/needed!
- BioGeoSCAPES Cookbooks working group assembled
- Data Management and Informatics Working Group: Leadership team planning webinars and workshop



BioGeoSCAPES was excited to support the Coastal Ocean Environment Summer School In Nigeria and Ghana (COESSING) in Lagos, Nigeria, this summer! Over 130 participants learned field and lab techniques taught by researchers from around the world. Learn more at [www.coessing.org](http://www.coessing.org).



# The BioGeoSCAPES Science Plan

*56 authors from 17 countries*

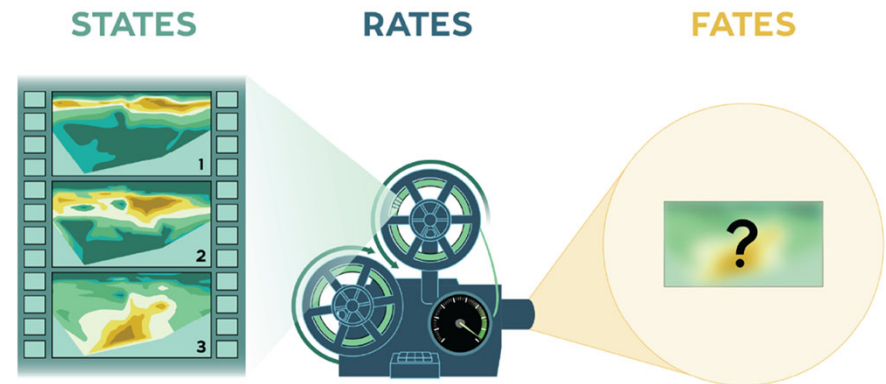
120 pages (before references)

Six sections:

- Executive Summary
- Introduction
- Research Themes 1-3 (States, Rates, Fates); with ~ 12 authors each
- Implementation (Authored by International Implementation Committee)

Requesting SCOR Review

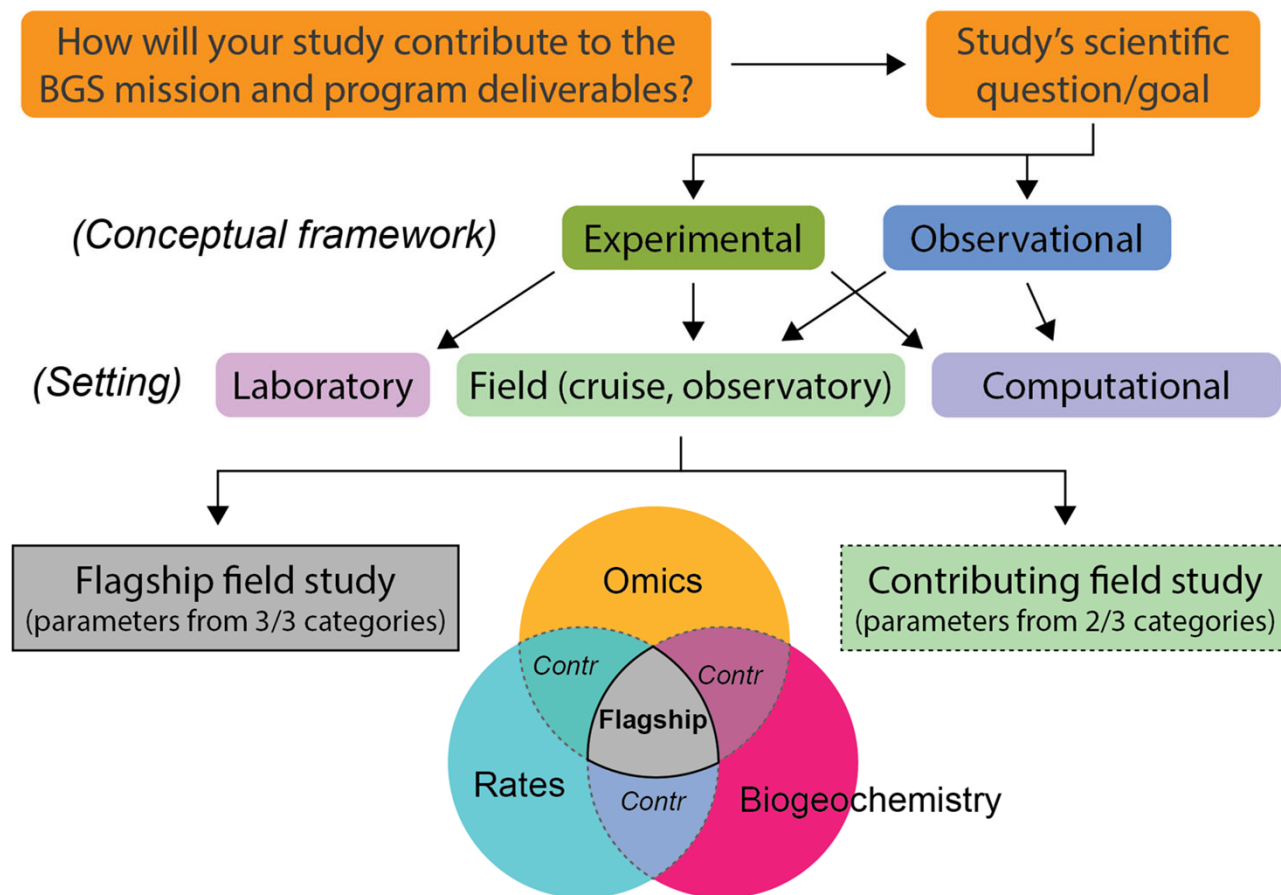
Town hall scheduled for Ocean Sciences  
February 2026 to release the BioGeoSCAPES  
Science Plan



***The mission of the BioGeoSCAPES program is multi-faceted and interdisciplinary encompassing oceanic expeditions covering large spatial areas throughout all ocean basins, localized spatial studies of key regional and coastal ecosystems including process and time-series studies, laboratory experiments, and modeling and informatics research.***

# BioGeoSCAPES Studies / Framework

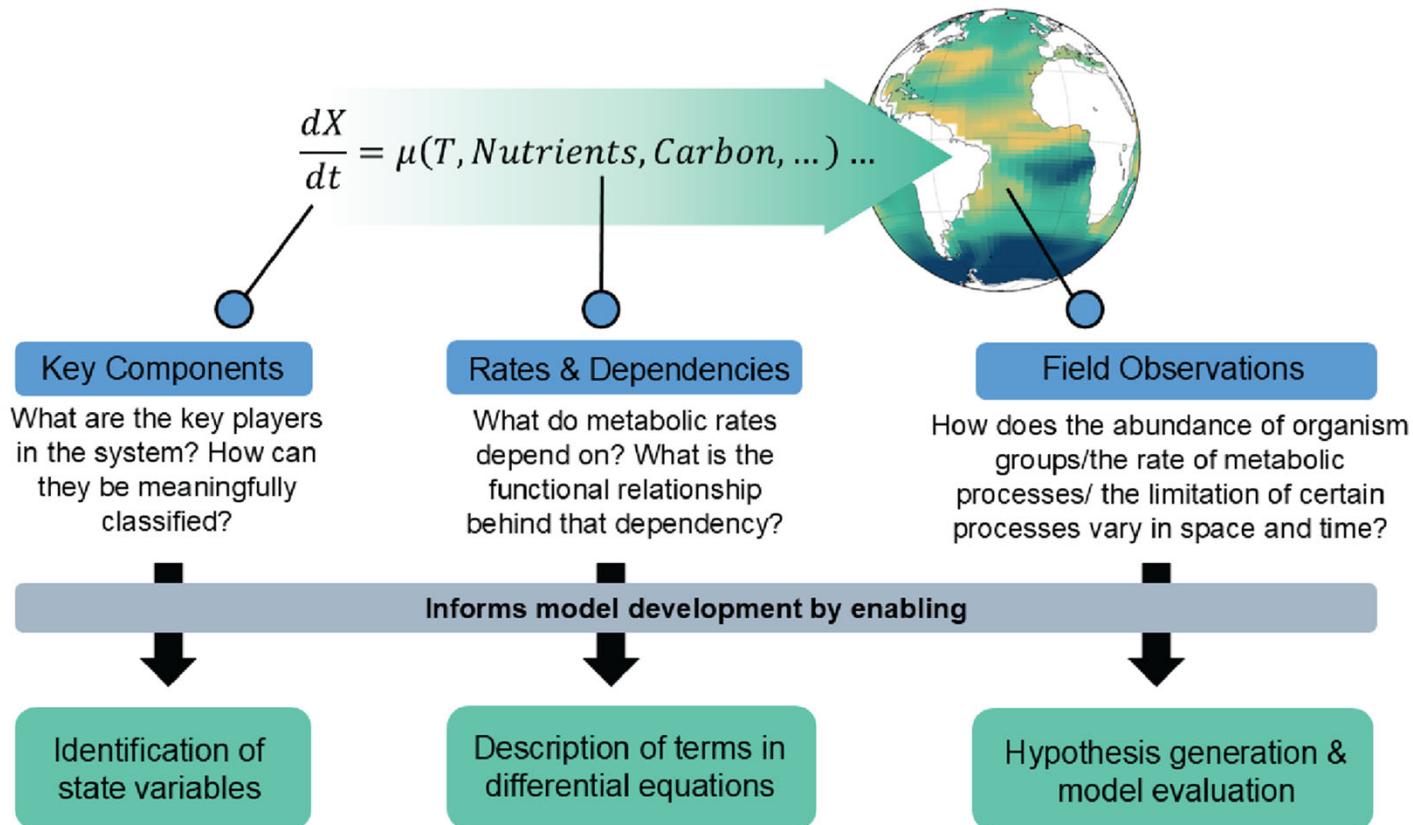
Connecting microbial metabolic processes to biogeochemical cycles



Science Plan -  
Chapter 5:  
Implementation

# Conceptual BiogeoSCAPES Framework

Field and lab-based experiments and observations (omics, biogeochemical & physical) inform Earth system model developments for synthesis & prediction



*Science Plan -  
Chapter 5:  
Implementation*

# BioGeoSCAPES Major Deliverables & Legacy

## Major deliverables

- **Mechanistic insights into microbial diversity, interactions, and feedbacks, improving our understanding & modelling of biogeochemical cycles.**
- **4D maps in space and time of key microbial metabolisms and their drivers to assess rates of change across different scales and contribute to global ocean monitoring co-design frameworks.**
- **Risk and vulnerability assessments over timescales of a decade to multiple decades, directly informing international climate and biodiversity policies and supporting the design and implementation of climate-smart marine protected areas**

## Legacy

- A new generation of **interdisciplinary scientists**, trained and equipped to make a difference in our rapidly changing world.
- Promoting **intercalibration studies and production of analytical standards**
- Promoting **international interoperable informatics and data management capabilities**
- A leading example of how **diverse scientific fields and researchers from different nations can collaborate to address complex challenges**

## Upcoming Activities

**Science Plan internal/external review - HAPPENING NOW**

### Workshops/Webinars

- Standardization and Intercalibration
- Informatics and Data Management

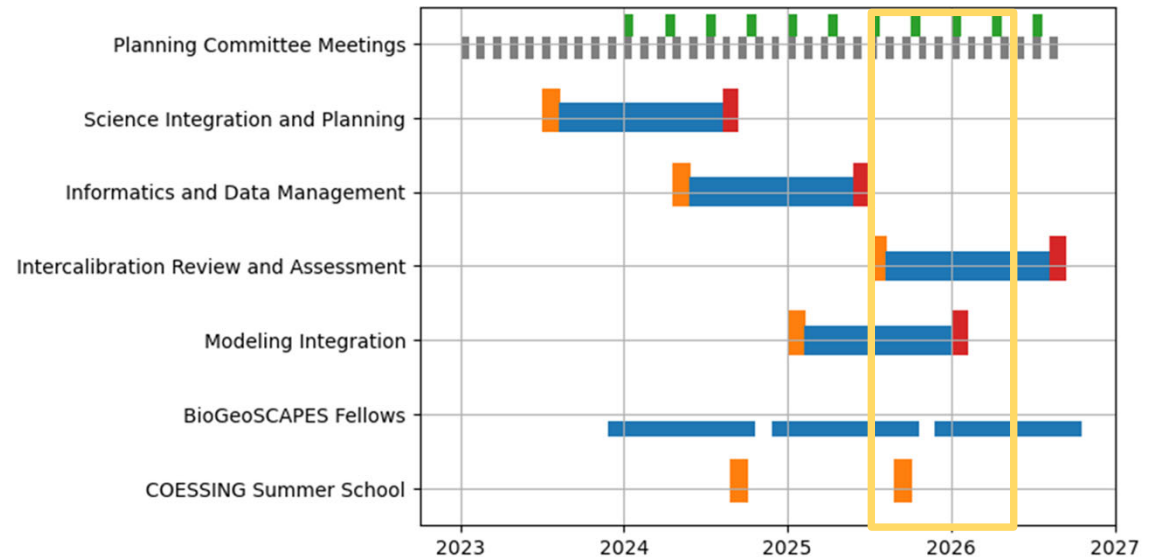
**Ocean Sciences 2026** - Events in Glasgow, Scotland: Town Hall and Scientific Sessions

## Incentives for participation

International networking, recognition, and collaboration

Exchange of technical capabilities and knowledge

Bringing together scientists from around the world to advance our common goal of improving humanity's sustainable interactions with the ocean environment



**THANK YOU!**



[www.biogeosciences.org](http://www.biogeosciences.org)