CENTER FOR CHEMICAL CURRENCIES OF A MICROBIAL PLANET

The Center for Chemical Currencies of a Microbial Planet (C-CoMP) leverages recent advances in analytical and data sciences, incorporates new ocean sampling technologies and an open-science framework, and engages scientists, educators, and policy-makers who bring a variety of expertise, experiences, and viewpoints to bear on promoting a deeper understanding and appreciation of the chemicals and microbial processes that underpin ocean ecosystems and other microbiomes that affect our daily life.

WHY MICROBES?

One quarter of the carbon derived from photosynthesis on Earth cycles rapidly through a pool of seawater metabolites generated by the activities of microbes. These molecules help govern the global carbon cycle, provide life-supporting nutrients, and support the function of marine food webs that ensure a vital and healthy ocean.

The central mechanism of this fast cycle is a chemical-microbe network, but the controls on this network, and its links to carbon sequestration in the deep ocean, are not known. Its sensitivities to a dynamic ocean are also unknown, and responses to future needs are not predictable. The goal of C-CoMP is to bring rapid and transformative advances to the understanding of the bioreactive molecules within the chemical-microbial network of the ocean carbon cycle that are responsible for a quarter of Earth's annual organic carbon flux.

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WOODS HOLE OCEANOGRAPHIC INSTITUTION

OTHER PARTNERS: University of Georgia, University of Virginia, Columbia University, Marine Biological Laboratory, Massachusetts Institute of Technology, Stanford University, Butson College, Boston University, The Ohio State University, Bermuda Institute of Ocean Sciences, The University of Texas Rio Grande Valley

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Research Objectives

C-CoMP supports a group of senior personnel, working in interdisciplinary teams that include undergraduate and graduate students, postdocs, technicians, and support staff who apply novel approaches and open science practices to resolve major outstanding knowledge gaps at the heart of the global carbon cycle:

- The chemical currencies of surface ocean carbon flux
- The chemical-microbe network in the surface ocean
- Network sensitivity and feedbacks on planetary climate

These focus areas are resistant to study and not yet integrated into global earth systems models, but central components of Earth's carbon cycle. Given their complexity, these focus areas can only be addressed through a sustained network of scientists, students, and educators who work together to achieve research goals while expanding ocean science literacy efforts and broadening the workforce able to tackle multi-disciplinary problems.

Science Themes

C-CoMP science themes represent critical knowledge gaps in metabolite-driven carbon cycling that govern the fate of one quarter of Earth's primary production.

- Chemical currencies of surface ocean microbes
- Rules of the chemical-microbial network
- Network sensitivity and feedbacks on climate
- Education research

Education & Workforce Development

Each of our education and workforce development initiatives is designed to increase access to and participation in ocean science research.

- Expanding ocean literacy
- Undergraduate programming
- Postbaccalaureate programming
- Postdoctoral programming

Collaboration and Community Building

Achieving C-CoMP's mission requires the active engagement of scientists, educators, and policymakers who bring a variety of expertise, experiences, and viewpoints. To this end, the Center operates according to a set of guiding principles for collaboration coupled with policies and practices that support transparent and extensive communication and explicitly and implicitly indicate that the thoughts, ideas, and perspectives of all individuals matter.