

International research programme on the impacts of global change on marine biogeochemical cycles and ecosystems.

The ocean has a vast capacity for storage and exchange of heat and gases and thus exerts a major control on the global climate. It is also the most extensive and yet the least understood component of the Earth System.

A newly emerging challenge, dictated by the society's need to understand and respond to the impacts of global change, is to determine the inter-relationships between biogeochemical cycles and ecosystems, and quantify and predict responses of the marine system to natural and anthropogenic perturbations. It is also of fundamental importance to investigate the potential feedbacks to the Earth System, including to the human system.

The goal of IMBER is "to investigate the sensitivity of marine biogeochemical cycles and ecosystems to global change, on time scales ranging from years to decades."

Interactions between biogeochemical cycles and marine food webs

Theme 1 focuses on identifying and understanding interactions of the key marine biogeochemical cycles and related ecosystem processes that will be impacted by global change.

Sensitivity to Global Change

Theme 2 will advance understanding of the responses of marine biogeochemical cycles, ecosystems and their interactions to global change by examining the potential synergistic and antagonistic effects of key variables including physical forcing, CO₂ and pH, nutrients supply, and marine harvesting.



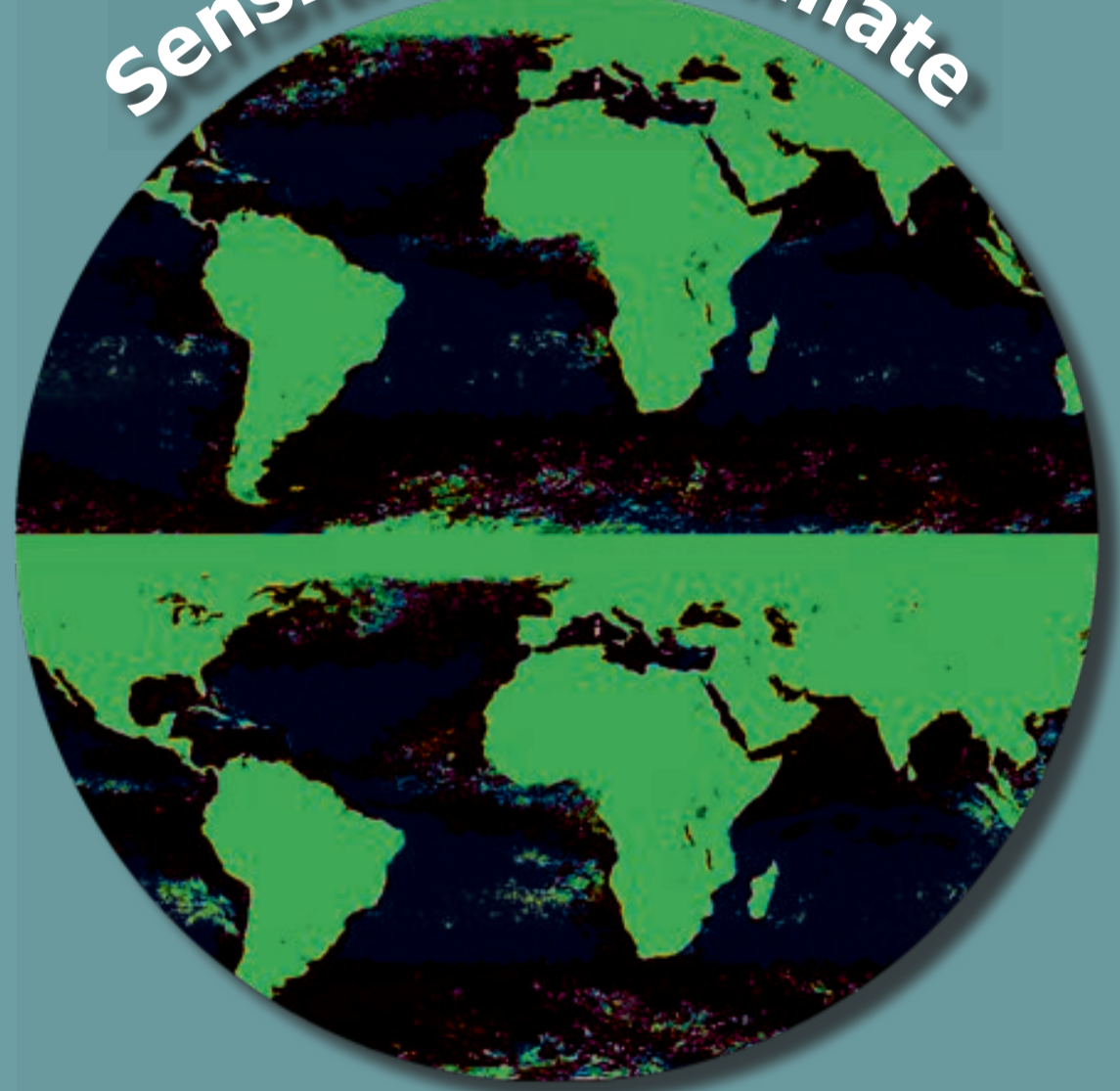
Feedbacks to the Earth System

Theme 3 focuses on the present and future capacity of the ocean to control the climate system via effects on atmospheric composition and ocean heat storage.

Responses of Society

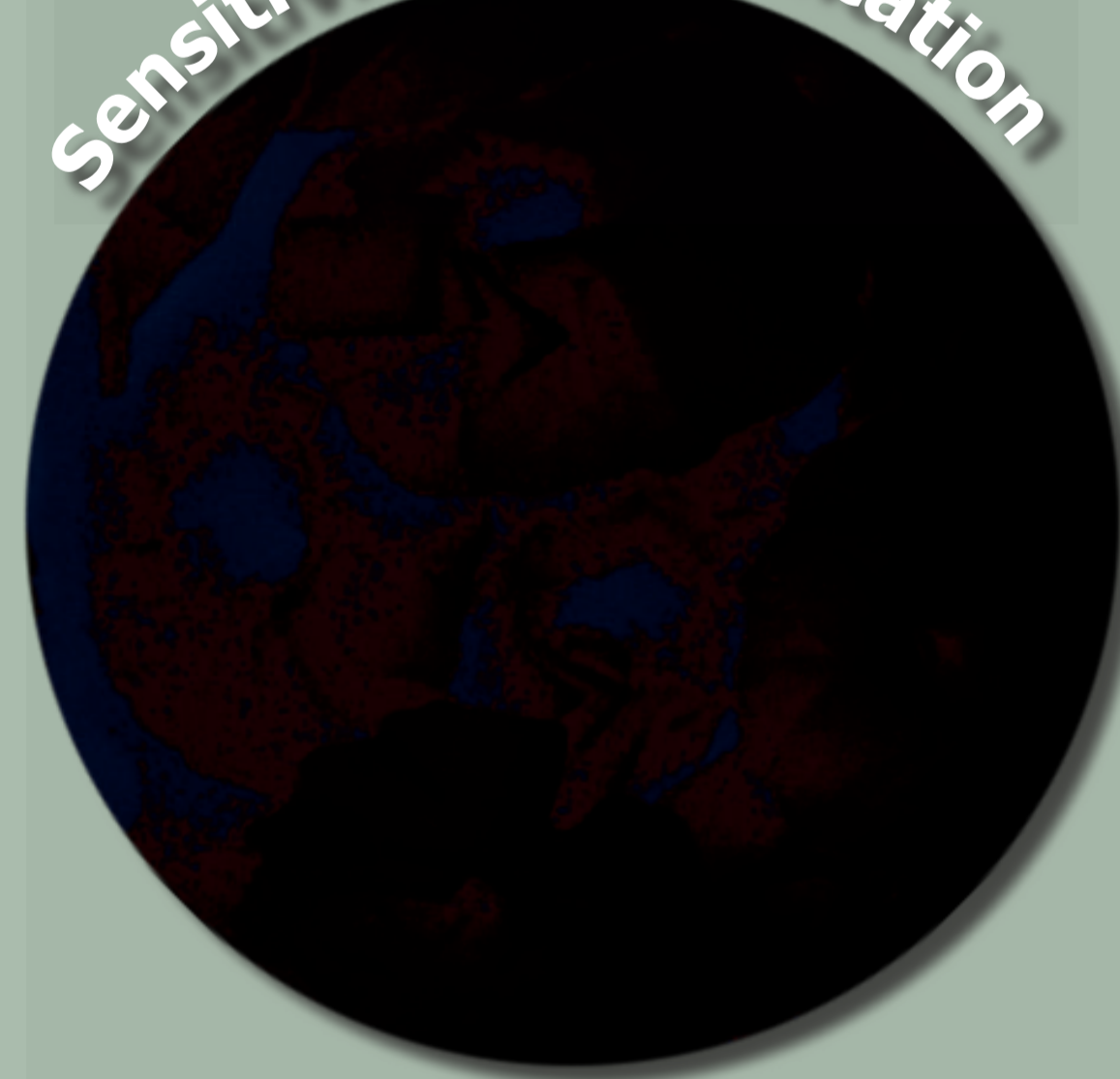
The goal of Theme 4 is to promote an understanding of the multiple feedbacks between human and ocean systems, and to clarify how human institutions can respond, either to mitigate anthropogenic perturbations of the ocean system or to adapt to such changes.

Sensitivity to Climate



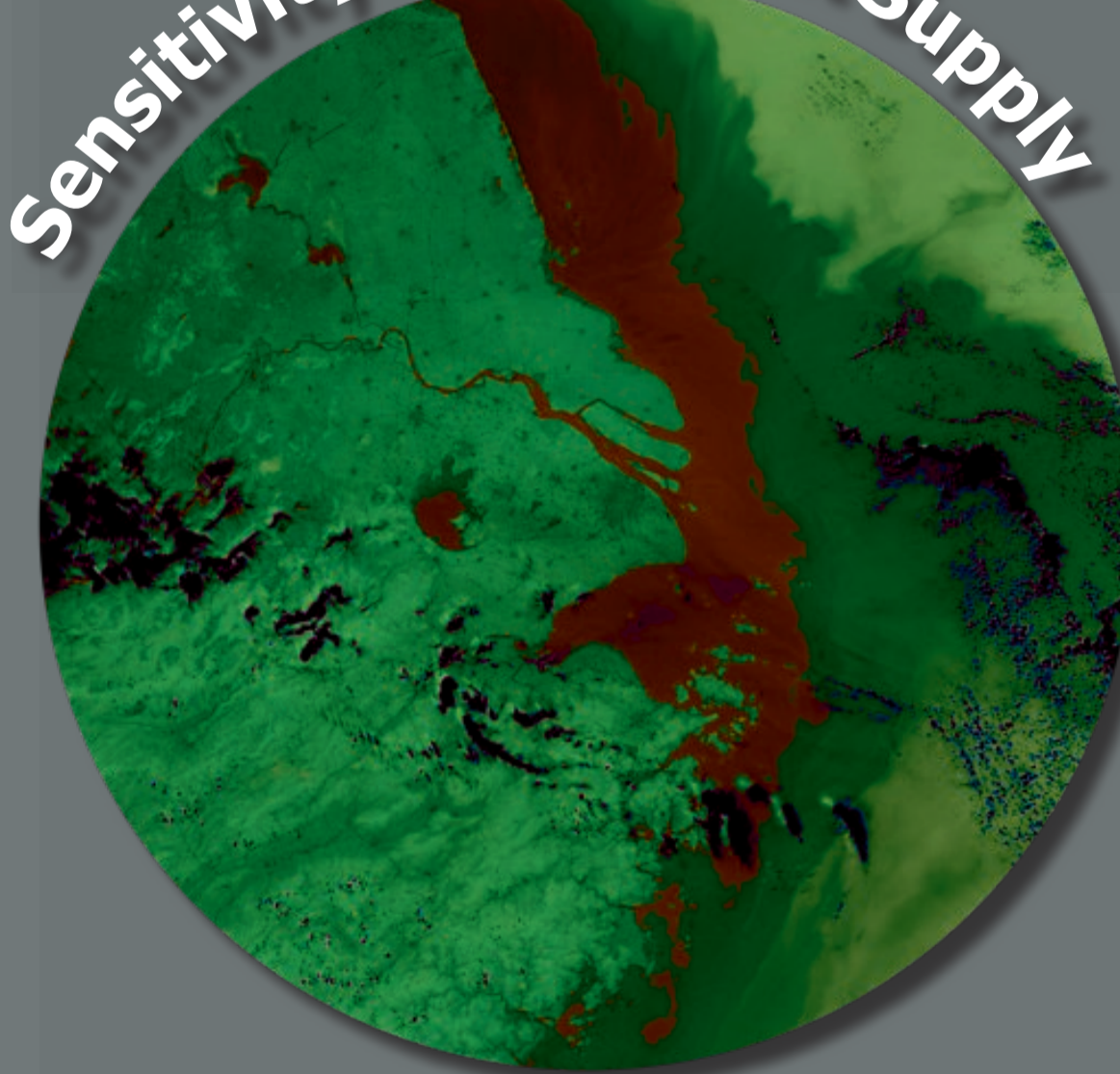
IMBER seeks an improved understanding of how climate-induced changes in physical forcings (such as temperature, circulation, ventilation and stratification) will force seasonal to inter-decadal variability in food webs, biogeochemical systems, and their interactions.

Sensitivity to Acidification



Key questions include: what are the effects of CO₂-driven changes in carbonate chemistry, what are the effects of pH-driven changes in nutrient and trace metal availability and speciation and which organisms are most sensitive to pH and CO₂ changes.

Sensitivity to Nutrient Supply



IMBER seeks a quantitative understanding of the coupled responses of marine biogeochemical cycles and food webs to anthropogenic additions of both macro- and micronutrients. (e.g., effects of changes in the abundance, distribution and stoichiometry of nutrients, effect of increased areas experiencing hypoxia and anoxia).

Sensitivity to Harvesting



A particular objective is to understand how harvesting-induced changes in the food web structure will impact biogeochemical cycles and how harvesting of living marine resources impacts marine food webs from end-to-end.