



IMBER: CONNECTIONS TO TRACES AND TRACERS

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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”.

Theme 1 – Identify and understand the interactions between biogeochemical cycles and marine food webs impacted by global change

Theme 2 – Understand the sensitivity of marine biogeochemical cycles and ecosystems and their interactions to global change



Theme 3 – Understand **feedbacks to the Earth System** - Capacity of the ocean to control the climate system

Theme 4 – **Responses of Society** Understand feedbacks between human and ocean systems including adaptation and mitigation

IMBER NATIONAL AND REGIONAL ACTIVITIES

TRACERS AS TOOLS TO INVESTIGATE ECOSYSTEM-CLIMATE RESPONSES

IMBER National Projects

Tracers are used to understand mesoscale biogeochemical and ecosystem processes in IMBER research programmes.

ANACONDAS (Amazon iNfluence on the Atlantic: CarbOn export from Nitrogen fixation by DiAtom Symbioses)
AND ROCA (River Ocean Continuum of the Amazon)

Quantify the impact of the Amazon River on biological processes controlling C sequestration and the implications for C, N and Si budgets through the use of tracers such as ¹⁵N₂ to measure rates of nitrogen uptake and nitrogen fixation.

BIOSOPE (Biogeochemistry and Optics South Pacific Experiment)

Determine the biological and biogeochemical characteristics of different trophic regimes using ³³P and ¹⁴C markers for dissolved to particulate P and C (Fig. 1).

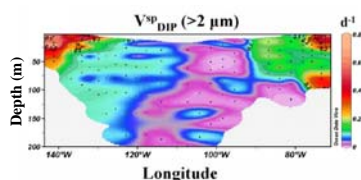


Figure 1. Vertical and longitudinal distribution of the daily specific uptake of P (V^{sp}_{DP}) along the BIOSOPE transect for particles (>2 μ m) (Duhamel *et al.* 2007).

CAIBEX (Exchanges between continental shelf and ocean in the Canaries-Iberian marine ecosystem)

Understand the time-varying horizontal and vertical material fluxes and planktonic biota through the use of CFCs to determine rate of O₂ / nutrient production / consumption.

POTES (Pressure effects On marine prokaryoTES)

Understand the role of microorganisms in the transformation of POM and DOM in the meso- and bathypelagic zones by using tracers such as ³H-EPS to determine the relationships between organic matter and prokaryotes (Fig. 2).

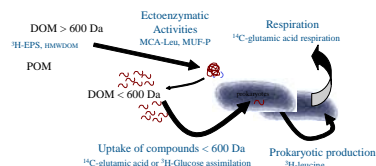


Figure 2. Tracers used in POTES project to determine the relationships between organic matter and prokaryotes (Tamburini *et al.* 2011, IMBER SSC Meeting, Marseille).

IMBER Regional Programmes

Tracers are used as tools to understand mesoscale processes at the regional scale

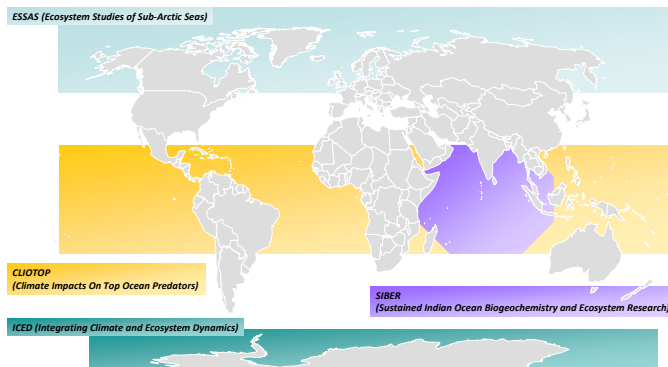


Figure 3. Regions covered by IMBER's regional programmes. The science objectives of each regional programme involve the use of tracers for investigation of biogeochemical and food web processes such as export fluxes, micronutrient limitations to primary production, and mesoscale inputs and fluxes.

Trace elements and isotopes are important tools in IMBER research for describing physical processes, quantifying production, carbon export and trophic pathways, and understanding the role of limiting micronutrients.

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