

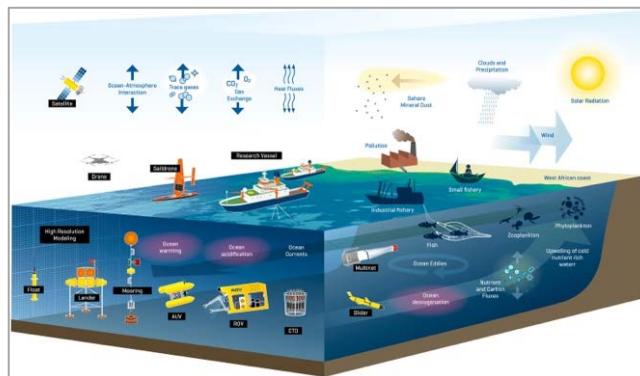
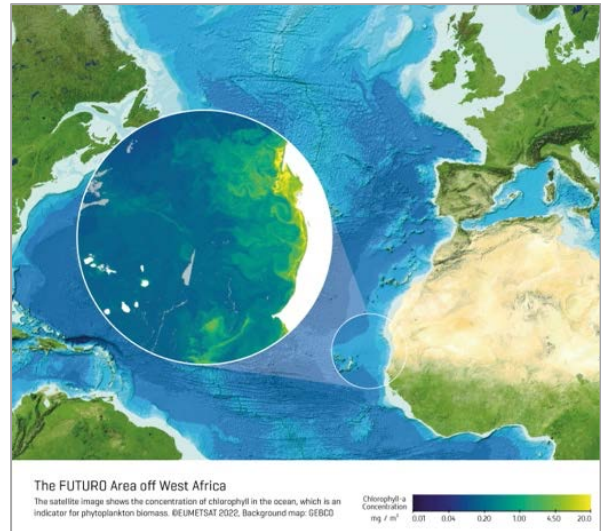
## FUTURO - Future of Tropical Upwelling Regions in the Atlantic Ocean

An international multi-stakeholder field campaign  
initiated and coordinated by GEOMAR Helmholtz Centre for Ocean Research Kiel

### Motivation for FUTURO

The upwelling-driven Canary Current Large Marine Ecosystem (CCLME) off West Africa is **one of the most productive and biologically diverse marine ecosystems in the world** ocean.

The state of coastal upwelling systems plays a crucial role in global nutrition: Coastal upwelling areas, also known as coastal upwelling systems, are a phenomenon that occurs primarily along the eastern margins of the subtropical oceans. There, coastal winds from the trade wind system and the interaction of internal waves cause cold and nutrient-rich water to rise from deeper layers to the surface. Although this only occurs on around one to two percent of the ocean surface, **coastal upwelling areas** are among the **most biologically productive marine regions in the world**. Their **contribution of around 25 percent to global fisheries** plays a decisive role in the **food supply** of neighboring countries and thus makes a significant contribution to global nutrition. High susceptibility to climate change, coincidence of the three major anthropogenic impacts (warming, acidification, deoxygenation), high fishing pressure and low efficiency fisheries management – all of these make the **CCLME a science and management hotspot** that urgently calls for a **concerted international effort to ensure sustainable management of this ecosystem of global relevance**. While an in-depth and system-wide description of the CCLME is missing so far, it is absolutely essential to develop reliable scenarios and forecasts of expected future changes.



This all requires a multi- and transdisciplinary approach, adapting to the complexity of the ecosystem. FUTURO therefore plans a large **international yearlong multi-platform field campaign in the time frame 2027-2029 off West Africa**. The study area is focused on the Mauritania-Senegalese upwelling region (approx. 12-21°N) and reaches out to the Cabo Verde archipelago.

### FUTURO Network and Implementation

FUTURO leverages on **already existing regional infrastructure** such as the Ocean Science Centre Mindelo (**OSCM**,

ww.oscm.cv) in Cabo Verde. In addition to the important logistical functions (e.g., laboratories, logistics of the expeditions), the OSCM provides a platform for multi-stakeholder exchange in the region to facilitate science-policy exchange. The German-funded Climate Competence Centre WASCAL (wascalcv.org) offers a blueprint for an impactful FUTURO academic education and capacity enhancement component. FUTURO will be based on strong and balanced partnerships between international researchers from the Global North and the Global South and is conceptualized as a decade-long program and is planned to be carried out in three consecutive phases: FUTURO<sup>pre</sup> (2024-2026): co-design, planning, fundraising, FUTURO<sup>core</sup> (2027-2029): execution field campaign and FUTURO<sup>syn</sup> (2030-2032): synthesis, transdisciplinary knowledge exchange.

### FUTURO Vision

FUTURO is a comprehensive scientific mission with a large field campaign to advance holistic system understanding and contribute to a solid basis for sustainability in human-ocean relations. The GEOMAR-initiated program integrates multi-, inter- and transdisciplinary science with inclusive forms of engagement with societal actors and knowledge holders outside academia. FUTURO is envisioned to become a substantial contributor to a regional Centre of Excellence for sustainable and trans-disciplinary ecosystem management and to contribute on an international level to the targeted outcomes of the UN Decade of Ocean Science for Sustainable Development (2021-2030).

### FUTURO Contact

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