Ocean Carbon from Space Workshop

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European Commission ocean carbon initiatives

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Delivering the European Green Deal

RESEARCH & INNOVATION ACTIONS

The **European Green Deal** aims to make Europe **climate neutral by 2050**. To help meet this target, the EU has agreed to **reduce its net greenhouse gas (GHG) emissions by at least 55% by 2030**, compared to 1990 levels. This **increased level of ambition** requires action in all sectors of the economy.

To achieve this, the **European Commission's latest Green Deal proposals** recognise the **importance of research and innovation**, and of the **Innovation Principle**, in promoting **smart, future-oriented policies** and encouraging **technological and social innovation**.

Focus on: Climate in Horizon Europe

more than 35% of its €95.5 billion budget

HEALTHY AND CLEAN PLANET

Horizon Europe's actions on 'Climate, Energy, Mobility' & 'Food, Bioeconomy, Natural Resources and Environment' with a **joint funding of around €25 billion**, will underpin the implementation of Europe's 2030 climate and energy targets benefiting people, planet, and prosperity.

The four **Green Deal missions** on climate adaptation, healthy oceans, seas, coastal and inland waters, climate-neutral and smart cities, and soil health and food, will develop innovative and inspiring solutions to systemic challenges..

THE EUROPEAN UNION AS GLOBAL LEADER IN THE FIGHT AGAINST CLIMATE CHANGE

With an overall climate target of 30% applicable to the total amount of expenditure from the EU budget 2021-27 and Next Generation EU.

30% of the EU's Neighbourhood, Development and International Cooperation Instrument will support climate objectives.

Over a third of the world's public climate finance comes from the EU and its Member States.

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RESEARCH & INNOVATION

Polar regions, climate change and the Ocean-climate nexus

Understanding the changes, responding to the challenge

The EU is a major funder of polar and ocean-climate research

Sustained R&I cooperation within the Arctic and in the Antarctic is increasingly important for understanding the rapid changes taking place in the region and to predict their regional and global impacts, and contribute to the implementation of the climate and environmental goals of the European Green Deal.

Research and Innovation Framework Programmes (FP7, Horizon 2020, Horizon Europe)

- strengthen scientific knowledge on global climate change and biosphere integrity
- support research to tackle environmental and climate change in the most vulnerable ecosystems such as the ocean and polar regions as a test bed for climate change impacts and sustainable development
- identify and deploy innovative and sustainable solutions based on win-win strategies that are biodiversity positive with climate mitigation and adaptation co-benefits, including NBSs to ensure integrity of the polar regions and the ocean
- contribute to better, evidenced-based policymaking and implementation
- support international processes (UNFCCC, CBD, IPCC, IPBES, etc.)
- enable leading in EU-science diplomacy

ALL-ATLANTIC OCEAN RESEARCH ALLIANCE

EU-PolarNet

EU Polar Cluster

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Horizon 2020 and Horizon Europe

Highlights for pools of carbon in the ocean

Phytoplankton Carbon (PC)

CAP ICE - CArbon Production of under-ICE phytoplankton blooms in a changing Arctic Ocean

ODEON – Online DEposition over OceaNs: Modeling the effect of air pollution on ocean bio-geochemistryin an Earth System Model

Dissolved Organic Carbon (DOC)

NUNATARYUK – Permafrost thaw and the changing arctic coast: science for socio-economic adaptation

SponGES – Deep-sea Sponge Grounds Ecosystems of the North Atlantic: an integrated approach towards their preservation and sustainable exploitation

CHROME - Linking Chemical diversity and Reactivity of Arctic dissolved Organic Matter for its integration in Earth system models

CarbEx – Tracing carbon exchanges/fluxes between Arctic and Atlantic basins

COMFORT – Our common future ocean in the Earth system – quantifying coupled cycles of carbon, oxygen, and nutrients for determining and achieving safe operating spaces with respect to tipping points

AtlantOS – Optimizing and Enhancing the Integrated Atlantic Ocean Observing System

POSEIDOMM – Photochemistry at the Ocean's Surface: Effects and Interactions of Dissolved Organic Matter with Microplastics

CRESCENDO - Coordinated Research in Earth Systems and Climate: Experiments, kNowledge, Dissemination and Outreach

MicroPEAT – Microbial communities of Temperate, Artic and Tropical peatlands and their role in the response of carbon storage function to global change

Inorganic Carbon and fluxes at the ocean interfaces (IC)

4C – Climate-Carbon Interactions in the Current Century - new observation-based data products on ocean surface pCO2, ocean interior inorganic carbon

C-CASCADES – Carbon Cascades from Land to Ocean in the Anthropocene

SEACELLS – Marine phytoplankton as biogeochemical drivers: Scaling from membranes and single cells to populations

SO-CUP - Southern Ocean Carbon Uptake - identify and quantify the processes that control the amount of inorganic carbon that is subducted with the SAMW/AAIW

SONAR-CO2 - Southern Ocean Nanoplankton Response to CO2

Particulate Organic Carbon (POC)

GOCART – Gauging Ocean organic Carbon fluxes using Autonomous Robotic Technologies

MYCO-CARB – Revealing the mechanistic basis of the roles of mycoplankton in the marine carbon cycle

CAPTURE - Carbon pathways in the Southern Ocean

CarbOcean – An integrative approach to unravel the ocean's biological carbon pump – autonomous robotic ocean profiler to simultaneously observe fluxes of particulate organic carbon (POC) and particulate inorganic carbon (PIC), together with physico-chemical ocean parameters

THAWSOME - THAWing permafrost: the fate of Soil Organic Matter in the aquatic Environment – For the first time, this project measured degradation rates of particulate organic carbon in large Arctic rivers

NOCEANIC - Key factors driving particulate organic matter fluxes and related nitrogen losses in the main anoxic oxygen minimum zones of the world oceans

Ocean artUp - Ocean Artificial Upwelling –assess the effects of forced upwelling on the biological carbon pump, from carbon uptake through primary production, the consumption of primary produced organic matter in the pelagic food web, to the sinking of particulate organic carbon and its remineralisation on the way to depth.

QSIPP – Exploring bacterial Quorum Sensing Infochemicals and hydrolytic Proteins linked to marine Particle degradation

HADES - Benthic diagenesis and microbiology of hadal trenches - first detailed, combined analysis of benthic diagenesis and microbial ecology of some of the deepest oceanic trenches on Earth

CWCC-Dynamics - Cold-Water Coral Community Dynamics- incorporate management plans and policies that take into account particulate organic carbon fluxes that shape deep-sea benthic communities.

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Horizon 2020 and Horizon Europe

Highlights for main processes

Marine Primary Production (PP)

MECODIHR - MEchanisms of Coupling of Ocean Dynamics and Intermediate trophic levels: High Resolution study
CoastObs - Commercial service platform for user-relevant coastal water monitoring services based on Earth observation - will develop innovative EO-based products: monitoring of seagrass and macro-algae, phytoplankton size classes, primary production, and harmful algae as well as higher level products such as indicators and integration with predictive models.
AtlantOS - Optimizing and Enhancing the Integrated Atlantic Ocean Observing System
NeTNPPAO - Near-term predictability of net primary production in the Atlantic Ocean
DUSTCO - Effects of atmospheric DUST deposition on COccolithophore production
IRONCOMM - Investigating the role of bacteria-produced siderophores in satisfying diatom Fe requirements
ODEON - Online DEposition over OceaNs: Modeling the effect of air pollution on ocean bio-geochemistry in an Earth System Model
NannoChem - Using Nannofossil Chemistry to constrain the cellular response of marine phytoplankton to changing carbon dioxide concentrations in the surface ocean
NITROX- Nitrogen regeneration under changing oxygen conditions - characterize and quantify factors controlling N2-fixation and primary productivity
CAP ICE - CArbon Production of under-ICE phytoplankton blooms in a changing Arctic Ocean
TROPHY - The consequences of temperature-resource interactions for the future of marine phytoplankton communities
INGENE – Integrating Nutrient economy in phytoplankton GENomics and Evolution
GrIS-Melt - Impacts of Greenland Ice Sheet melt on primary productivity and carbon cycling in Greenland coastal ecosystems
BULLE - Biological Understanding of the CO2 and O2 LeveL in the ocEan
EQUIP - Elemental quota in marine phytoplankton for effective carbon sequestration, clean energy and biogeochemical modelling
NEW: HORIZON-CL6-2022-CLIMATE-01-02: Understanding the oceanic carbon cycle, with deadline 15 February 2022 link: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl6-2022-climate-01-02

Horizon 2020 and Horizon Europe

Highlights for crosscutting themes

Blue Carbon (BC)

RHODOCAR - Global and local impacts on Atlantic RHODOlith beds: Implications for estimates of blue CARbon ecosystem services
GLOMAC - GLObal-scale interactions between MAngrove forests and Climate
SEAMET - Multi-driver climate change effects on SEAgrass METabolism: ecosystem implications
MarshFlux - The effect of future global climate and land-use change on greenhouse gas fluxes and microbial processes in salt marshes
NEW **HORIZON-CL6-2021-BIODIV-01-03**: Understanding and valuing coastal and marine biodiversity and ecosystems services
NEW **HORIZON-CL6-2022-BIODIV-01-01**: Observing and mapping biodiversity and ecosystems, with particular focus on coastal and marine ecosystems
NEW **HORIZON-CL6-2021-CIRCBIO-01-09:** Unlocking the potential of algae for a thriving European blue bioeconomy
NEW **HORIZON-CL6-2023-CLIMATE**: Ocean and coastal waters carbon- and biodiversity-rich ecosystems and habitats in Europe and the polar regions
NEW **HORIZON-MISS-2021-OCEAN-02-01**: European Blue Parks
NEW **HORIZON-MISS-2022-OCEAN-01-07**: Integration of biodiversity monitoring data into the Digital Twin Ocean

Extreme Events (EE)

CRESCENDO - Coordinated Research in Earth Systems and Climate: Experiments, kNowledge, Dissemination and Outreach
COMFORT - Our common future ocean in the Earth system – quantifying coupled cycles of carbon, oxygen, and nutrients for determining and achieving safe operating spaces with respect to tipping points
TiPES - Tipping Points in the Earth System
TRIATLAS - Tropical and South Atlantic climate-based marine ecosystem predictions for sustainable management

Carbon Budget Closure (CBC)

C-CASCADES - Carbon Cascades from Land to Ocean in the Anthropocene
SO-CHIC - Southern Ocean Carbon and Heat Impact on Climate
HYADES - Hydrostatic pressure and prokaryotic activity in the deep sea
CONSTRAIN - Constraining uncertainty of multi decadal climate projections
VERIFY - Observation-based system for monitoring and verification of greenhouse gases

Climate variability and change

NEW**: HORIZON-CL6-2024-CLIMATE**: Closing the research gaps on ocean essential climate variables (ECVs) in support of global assessments (IPCC, WOA, IPBES, and UN Decade)
NEW**: HORIZON-CL6-2021-CLIMATE-01-03**: Key oceanic and polar processes driving regional & global climate change

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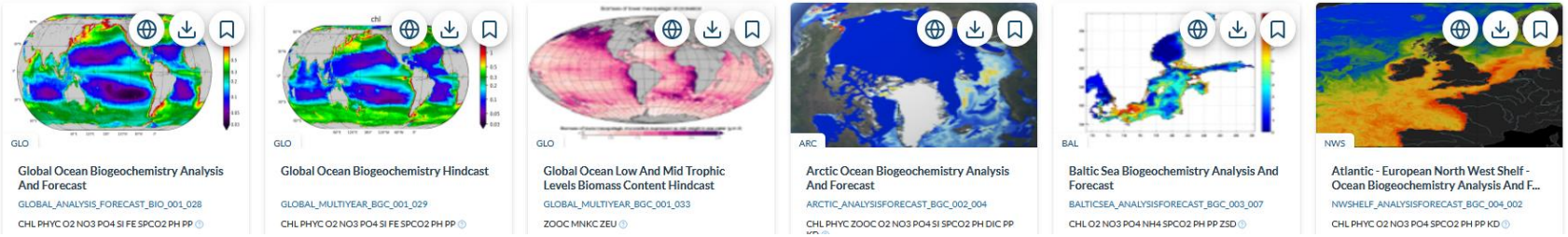
COPERNICUS Programme: Marine Environment Monitoring Service (CMEMS)

CMEMS provides regular and systematic reference information on the physical and biogeochemical state, variability and dynamics of the ocean and marine ecosystems for the global ocean and the European regional seas.

- **daily production of ocean carbon products** (operational, quality controlled) on: Dissolved organic carbon (DIC), fugacity of CO2 (FCO2), surface flux of CO2 (FGCO2), surface partial pressure of CO2 (SPCO2)
- **complementary products on biogeochemistry** : phytoplankton, Phytoplankton Sizes Class Types, Phytoplankton Functional Types, primary production
- all available based on in-situ, satellite and models, observation and 10 day forecast, reanalysis on global scale and per EU sea basin
- **Global Ocean Surface Carbon:** https://www.copernicus.eu/en/access-data/copernicus-services-catalogue/global-ocean-surface-carbon
- **Monthly ocean monitoring indicator** on global yearly ocean CO2 sink, pH, global ocean primary production trend
- CARBOOCEAN (FP6) https://www.copernicus.eu/en/marine-carbon-sources-and-sinks-assessment
- Understanding carbon cycle and ocean carbon conundrum with Sentinel-3A https://www.copernicus.eu/en/understanding-carbon-cycle-and-ocean-carbon-conundrum-sentinel-3a
- COPERNICUS marine services: Global Ocean- in-situ Near real time observations of ocean surface currents https://www.copernicus.eu/en/access-data/copernicus-services-catalogue/global-ocean-situ-near-real-time-observations-ocean



UN Decade of Ocean Science for Sustainable Development

JPI Ocean **-** new Joint Action on Ocean Carbon Capacities *in scoping phase*

https://www.jpi-oceans.eu/news-events/news/jpi-oceans-launches-new-joint-action-ocean-carbon-capacities

ICOS INTEGRATED CARBON OBSERVATION SYSTEM

ICOS-Ocean - providing long-term oceanic observations, aimed at quantifying and understanding the greenhouse gas balance of Europe and neighboring regions. Data available at **Carbon Portal**. **Ocean Thematic Centre**

International Ocean Carbon Coordination Project
Towards a sustained global observation network for marine biogeochemistry

Blue-Cloud

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Thank you

For more information

Polar and ocean research https://ec.europa.eu/info/research-and-innovation/research-area/environment/climate-action/polar-research_en

Horizon Europe https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/programmes/horizon

https://cordis.europa.eu/en

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