

Copernicus: from observations to public services and policy making tools

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Space

Copernicus Architecture



COPERNICUS IS DRIVEN BY THE USERS

Copernicus





Copernicus Climate Change Service (C3S) Climate Monitoring for policy making

Climate monitoring: tracking longterm evolution of key variables

European State of the Climate (ESoTC)

ESoTC 2021: 3500 media mentions in 105 countries

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Copernicus Marine Products

GREEN OCEAN $\overline{2}$ Nekton **Plankton** -----Organic Carbon **Nutrients** . (**0**2) Oxygen Carbonate pH **System** ---Others

Fugacity of carbon dioxide in sea water : **fCO2** Surface partial pressure of carbon dioxide in sea water : **spCO2** Surface downward flux of total CO2 : **fgCO2**

MODEL DATA

Global Ocean Biogeochemistry

GLOBAL ANALYSIS FORECAST BIO 001 028

Carbonate system, nutrients, oxygen, plankton

Analysis and Forecast

Global, $0.25^{\circ} \times 0.25^{\circ} \times 50$ levels

Since 4/5/2019, daily, monthly

Models +10D

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IN-SITU DATA

Global Ocean - In Situ reprocessed carbon observations - SOCATv2022 ...

INSITU_GLO_BGC_CARBON_DISCRETE... 013_050 In-situ Globalreprocessing 22 Oct 1957 to 1 Jan 2022, instantaneous Carbonate system

Surface Ocean Carbon ATIas (SOCATv2021 and GLobal Ocean Data Analysis Project (GLODAPv2.2021) data delivered by Copernicus Marine (no processing is added) in interface with the ICOS Ocean Center.

MULTI-OBSERVATION DATA

Global Ocean Surface Carbon

MULTIOBS_GLO_BIO_CARBON_SURFA... 015_008 In-situ Global, 1° × 1° reprocessing 15 Jan 1985 to 15 Dec 2021, monthly Carbonate system

Obtained from an ensemble-based forward feed neural network approach mapping situ data <u>for surface ocean</u> <u>fugacity (SOCAT data base)</u>

Copernicus Marine Products

Global Ocean Biogeochemistry Analysis and Forecast https://doi.org/10.48670/moi-00015

Global integrated surface downward flux of total CO₂ 2.75 Datatype : Single product 2.50 Credit : E.U. Copernicus Marine Service Information 2.25 yr⁻¹] 2.00 Cop 1.75 1.50 1.25 1.25 1985-2021 trend : 1.00 $10.04 \pm 0.03e - 1$ PgC yr⁻² 0.75 Year

> Copernicus Marine Service

Ocean Monitoring Indicator :

Global Ocean Yearly CO2 Sink from Multi-Observations

Reprocessing

The global yearly ocean CO2 sink represents the ocean uptake of CO2 from the atmosphere computed over the whole ocean. It is expressed in PgC per year. The ocean monitoring index is presented for the period 1985 to 2021. The yearly estimate of the ocean CO2 sink corresponds to the mean of a 100-member ensemble of CO2 flux estimates (Chau et al. 2022). The range of an estimate with the associated uncertainty is then defined by the empirical 68% interval computed from the ensemble. https://doi.org/10.48670/moi-00223

CH4 EMISSIONS FROM NORD STREAM PIPELINES LEAKS

Atmosphere Monitoring Simulated and observed time series of atmospheric CH4 at Norunda (Sweden)

Due to clouds, there was no reliable satellite data over the first few days of the incident, when the release was most significant. CAMS joined forces with ICOS and some academic groups to provide estimates of the leaks, based on numerical modelling and comparison with in situ observations. CAMS' estimate is 175,000 tons CH₄ emitted in the first 2 days, approximately 60% of the maximum contents of the pipelines.

See details here: <u>https://atmosphere.copernicus.eu/cams-</u> simulates-methane-emissions-nord-stream-pipelines-leaks

PROGRAMME OF THE EUROPEAN UNION

Greenhouse gas emissions monitoring capacity

C o C O 2

Copernicus

Capernicus CO, service

CoCO2 will deliver prototype systems for a European Monitoring and Verification Support capacity for anthropogenic CO2 emissions by bringing together expertise, existing capacities and innovative ideas from European and international players.

MERCATOR m OCEAN INTERNATIONAL

MOi contribution : deliver "highresolution" data-assimilated air-sea CO2 fluxes to IFS system

Policy making, impact and feedback

Knowledge Centre for Earth Observation (KCEO)

An entry point for knowledge and information For better regulation

Foster uptake by DGs

Collect/ translate EU policy needs into technical EO product requirements

Coordinated approach with EC external partners; An entry point for external clients.

Ensure the evolution of the programme to remain state of the art

Analyse & prioritise research needs; "Strategy" for research investments.

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Copernicus in EU policies, and policy drivers in Copernicus

- Zero Pollution Action plan
 - Outlook and monitoring reports
- Marine Framework Strategy Directive
- EU Methane Strategy
- Ambient Air Directive
 - Revision of EU rules
- EU Arctic Policy
- Managing the Nutrient Cycle for a resilient future (INMAP)
- European Climate and Health Observatory

- CO2M missions and CO2MVS
- Copernicus Thematic Hubs
- New Space development
- Support to the methane super emitter monitoring tool
- European State of the Climate/Ocean reports
- Commission Task Forces and Expert Groups give technical input on political/strategic requests

Europear

Thanks for your attention!

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