# Project data at a glance

## Partners



## 13 organisations from 7 countries



## Project Coordinator

Manuela Balzarolo
CMCC

## Duration

January 2025 - December 2028

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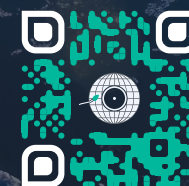
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 **Funded by the European Union**

# CON CERTO

# Improved Carbon cycle representation through multi-scale models and Earth observation for Terrestrial ecosystems

projectconcerto.eu

## Background

CONCERTO leverages Earth observation data, innovative process models, and machine learning techniques to enhance land surface simulations. By refining land cover representation, integrating new data sources, and improving the modelling of carbon fluxes, CONCERTO will support better land management strategies and contribute to carbon neutrality efforts.

## Vision

To strengthen the European research ecosystem by creating an innovative scientific collaborative framework that enhances our understanding, monitoring, and modelling of the terrestrial cycle.

## Mission

To improve the current understanding of the terrestrial ecosystem carbon cycle and its coupling with hydrological, energy and nutrient cycles to mitigate critical uncertainties in the representation of physical and land-carbon cycle dynamics in state-of-the-art Earth system models.

## Goals

To create an innovative scientific framework that enhances our understanding, monitoring and modelling of the land carbon cycle.

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### Enhance land surface models (LSMs) with land use and land cover data

Include land use and land use change, and other relevant data to quantifying how variations contribute to carbon fluxes and influence land carbon sink

### Improve the carbon-climate feedback with Earth system models (ESMs)

Quantify how variations (e.g. $CO$, fluxes) contribute to carbon fluxers

### Develop new representations of carbon cycle processes in LSMs

### Remote sensing for biogenic volatile organic compounds as support for carbon cycle

Improve our understanding of vegetation responses to and recovery from extreme events, including heatwaves, droughts and wildfires

### Assess how improved land surface processes benefit of the Earth System (ES) simulation

## Methodology

**Develop** an integrated land–carbon cycle framework to better quantify terrestrial ecosystem processes and strengthen Earth System Model projections.

**Combine** satellite Earth observation data with advanced modelling to capture variations in carbon processes across space and time.

**Use** artificial intelligence, machine learning, and data assimilation to integrate multi-scale information and reduce modelling uncertainties.

**Exploit** new ESA Earth Explorer missions and existing EO datasets to improve representation of land–carbon interactions.

**Bridge** data and models to deliver more reliable estimates of carbon sinks and sources, supporting robust climate-change predictions.

## Why we need it

Reliable climate projections require a precise understanding of how land processes regulate carbon exchange, yet current models still face major uncertainties. CONCERTO addresses this challenge.

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