RÉPUBLIQUE FRANÇAISE
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FRANCE 2030 — PROGRAMME DE RECHERCHE — CARBONE ET ÉCOSYSTÈMES CONTINENTAUX

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PROGRAMME DE RECHERCHE
CARBONE ET ÉCOSYSTÈMES CONTINENTAUX
FairCarboN

Carbon sink or methane source – local to global scale assesment of lentic waters' role in the climate system (DEEP-C)

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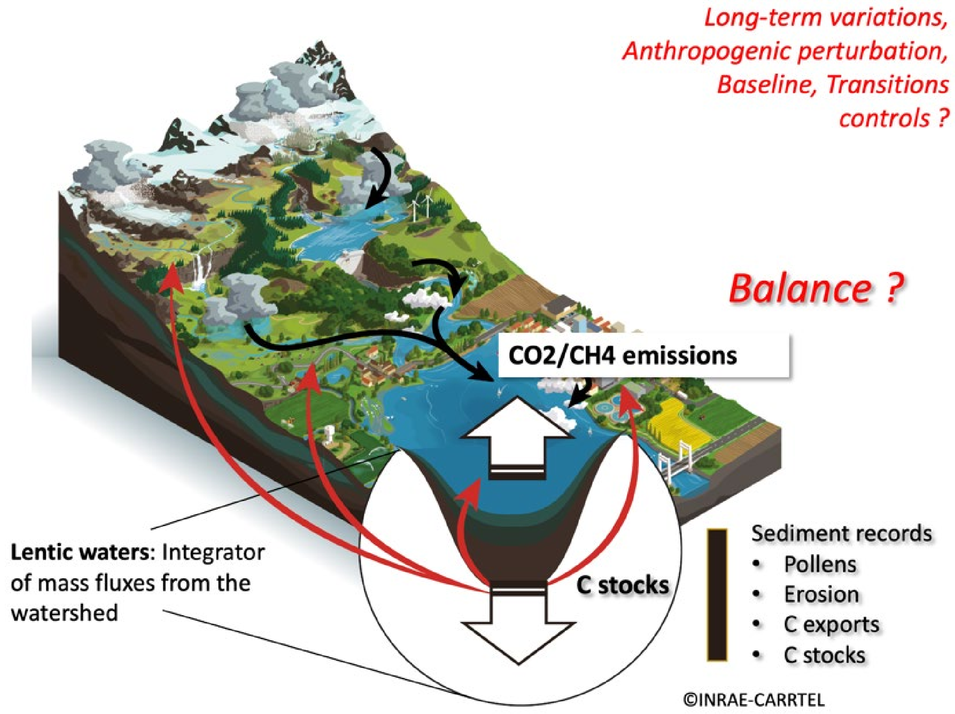
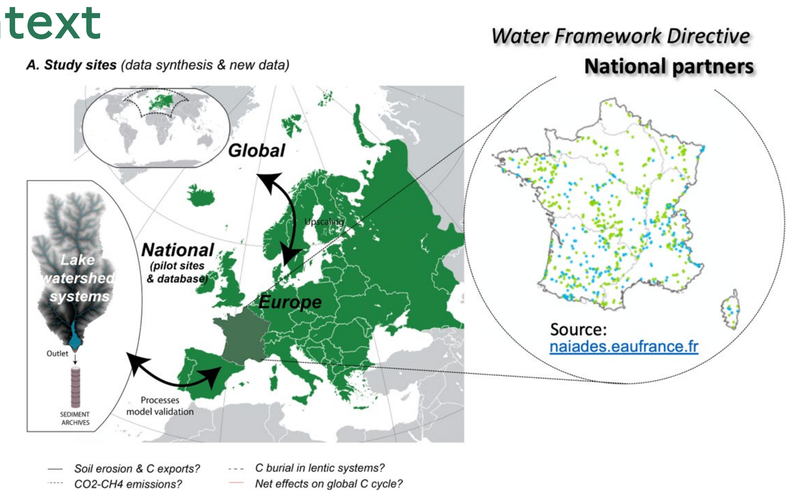
Context and objective

While inland waters serve as significant sources of CO2 and CH4 emissions and potential carbon sinks, knowledge gaps persist. Notably, CH4 emissions from standing water bodies, like lakes, remain poorly understood especially over long timescales. Addressing these gaps requires new data collections and process-based modeling approach that integrates the dynamics of water bodies and their watersheds. This project aims to improve our understanding and modelling of carbon cycling in various standing water bodies and their contribution to carbon and greenhouse gas budgets at different scales.

- *Q1: Variations in export & transfers of C from land*
- *Q2: Impacts on C storage in lentic waters*
- *Q3: Impacts on CO2 & CH4 emissions*
- *Q4: Control factors*



Geographical context



WP 1: National estimates of in-lake carbon (C) transfers and emissions

© CARRTEL & LEHNA, monitoring lentic waters

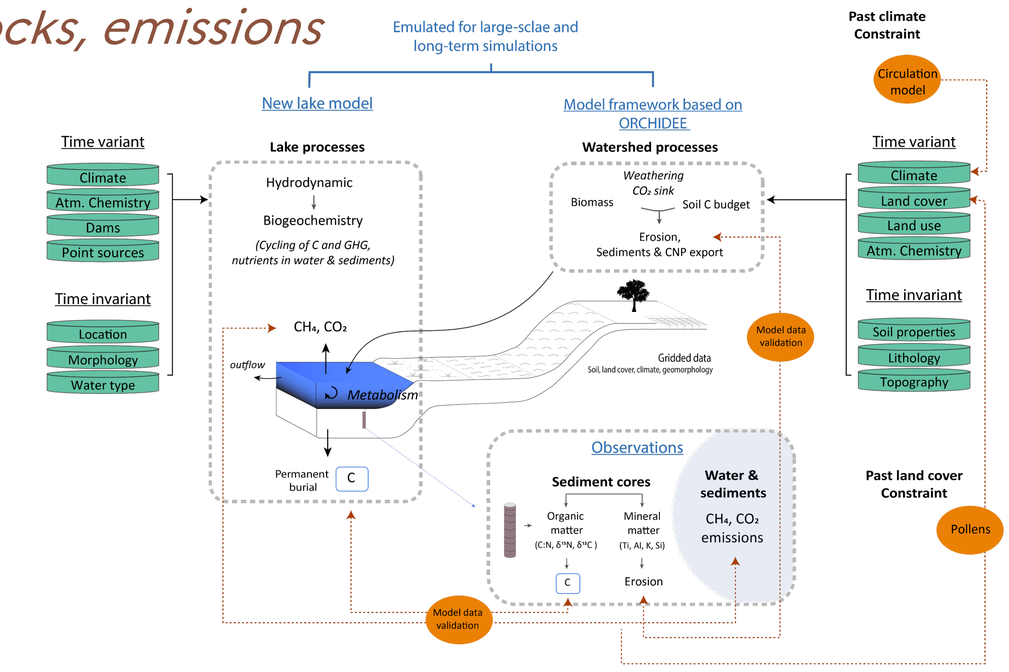
The objective in WP1 is to provide robust estimates on current C stocks and emissions from lentic ecosystems and to investigate abiotic and biotic controls involved in the fate of stored organic C. The WP1 is structured into three interconnected tasks: Task 1 (T1.1) focuses on the quantification and characterization of C in the surface sediment; Task 2 (T1.2) will assess the fate of C (i.e., sequestration vs. mineralization), the metabolic pathways and the microbial diversity involved in C transformation; Task 3 (T1.3) focuses on CO2 and CH4 emissions from sediments.

WP 2: National estimates of carbon (C) stocks and past variations

© EDYTEM, coring lake Bourget

WP2 objective is to consolidate (paleo)observations and to assess C stocks, sources and drivers in lentic systems over 1) centennial and 2) millennial timescales (c.f. Fig.2) using well dated sediment archives. Specific objectives will be to 1) collect and analyse new empirical C data (quality & quantity) from short sediment cores, 2) assess the centennial effects of eutrophication and climate on C burial in 40 lentic systems, 3) investigating millennial trends in erosion, C exports and C lentic stocks.

WP 3: Modelling large scale carbon (C) exports, stocks, emissions



WP3 will quantify continental C budgets and their long-term response to land cover change at European and global scale, with a specific focus on the role of inland water C fluxes. Specific objectives will be to 1) reconstruct land cover change in the basins of 15 pilot sites, 2) the assessment of long-term effects of land cover change on terrestrial C turnover over the last 5,000 years at local to global scales, 3) reassessing inland water C fluxes (CO2 and CH4 emissions, burial, export to coast) at European and global scale, while quantifying the anthropogenic perturbation of fluxes.

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