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Workflow for analyzing long-term variations in carbon stocks and fluxes (DEEP-C - WP2)

Olivia DESGUE-ITIER, Laurent MILLET, Fabien ARNAUD, Julien AZUARA, Manon BOULAY, Mathieu DELLINGER, Isabelle DOMAISON, Valentin ESSERT, David ETIENNE, Justine FRIZON, Jérôme GAILLARDET, Charline GUIGUET-COVEX, Erwan MESSAGER, Jérôme POULENARD, Pierre SABATIER, Anaëlle SIMONNEAU, Jean-Philippe JENNY

Objective DEEP-C WP2 : Reconstructing the variability of C burial in standing water bodies, their climate and land use controls over the past 150 years, from well-dated sediment records

1 Sampling sediment cores

Collaborations and Associated Managers



In order to complete the existing dataset, **new sediment cores** were collected from different sites of varying typology, including high-altitude lakes. Short cores, 1.5 meters long, were collected in the Jura, the Alps, Vosges, Brenne and Aquitaine region.



The cores were taken using a 63mm diameter **gravity corer** with a PVC pipe. The cores were retrieving from the surface using an inflatable boat and ropes.



Development of a methodological tool for the acquisition of **bathymetric data** using a connected autonomous remote-controlled boat : Deeper Sonar Pro.



2 Laboratory analysis

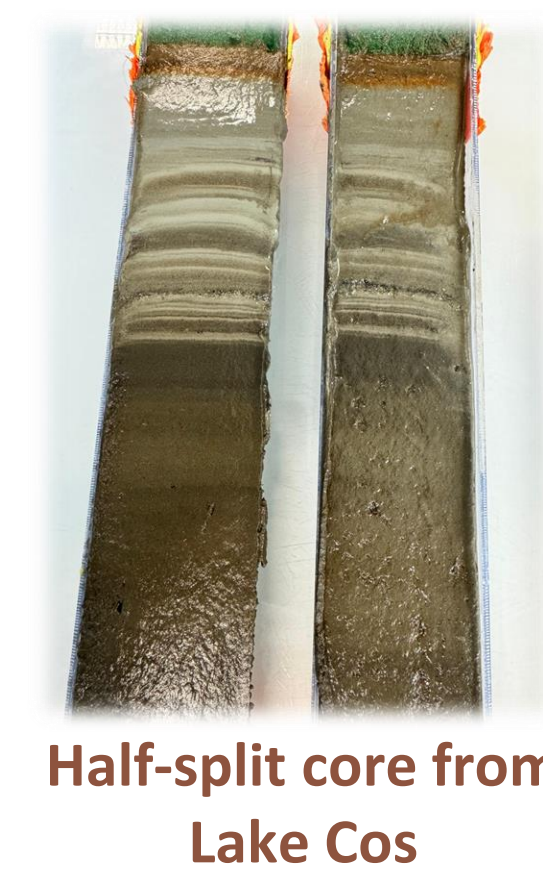
The sediment cores were opened using a dedicated core-splitting bench (EDYTEM) to perform **non-destructive** analyses such as high-resolution image, hyperspectral analysis (IR and near-IR) and relative measurement of the mineral chemical element content using an Avaatech X-ray fluorescence core scanner (ED-XRF).



Sedimentology room - EDYTEM

Then, isotopic activity analyses (dating) and physicochemical measurements were conducted in specialized laboratories from **destructive sampling**.

➤ **Geochemical analyses** were conducted on sediment cores to investigate long-term variations in carbon stocks : *Organic C, Inorganic C, Total C, Total N, δ13C, 15N*.



Half-split core from Lake Cos



Opening of sediment cores

➤ **A multi-proxy comparison** was performed to characterize the sources of organic matter accumulated in the sediments: Quantitative palynofacies, quantification of acids and alkanes, HPLC Pigments and Hyperspectral analysis.

3 Data Management

The descriptive data of the studied ecosystem, location, and type of equipment used were recorded using **the CoreBook application** on a field tablet and then integrated into the cybercartographic library. The sampling protocols and metadata related to the analyses performed are described and available in a digital laboratory notebook: **elabFTW** software (see practices of CARTEL & EDYTEM). The data and metadata are shared among the WP members on a dedicated **Resana** space and made available to the consortium throughout the project.

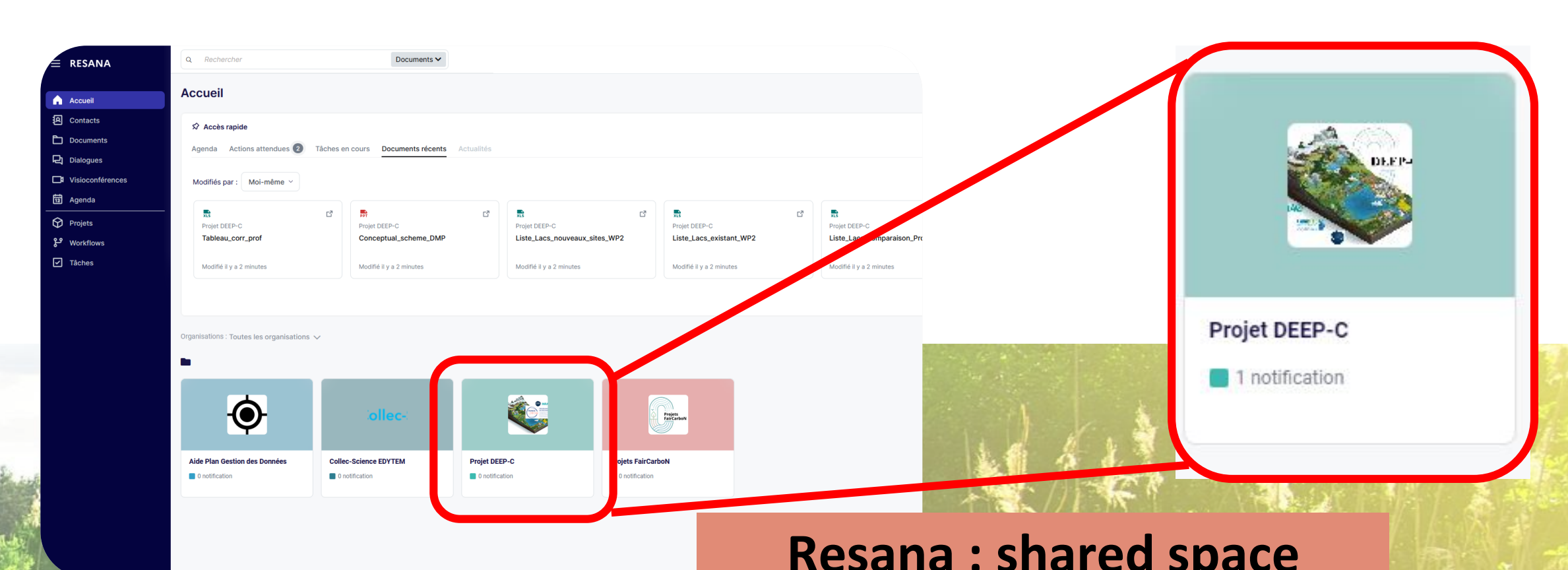
Le Corebook & La Cyber-Carothèque Nationale



Field Data



Laboratory data



Resana : shared space