

StateO

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ESA Coastal Blue Carbon : new products for seagrass and coastal wetlands conservation, restoration and climate action

Achievements and perspectives

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1.

Estimating large scale nation-wide coastal blue carbon stock for the 3 main coastal ecosystems

2.

Develop methods, and high quality products, indicators based on Earth Observation to monitor, maintain and restore blue carbon ecosystems (BCE)

3.

Integration in national inventories and Nationally Determined Contribution (NDC) to achieve net-zero emission targets

- Study the three main coastal blue carbon ecosystems (mangroves, seagrass, and salt marshes)
- Use a spatial resolution of at least 10m (EU Sentinel-1/2 data)
- Estimate three different years between 2015 and present day
- Guaranty a user centered approach by encouraging proactive participation from early adopters

4.

Main products : Carbon stock maps for three distinctive years (2016, 2020, 2024)

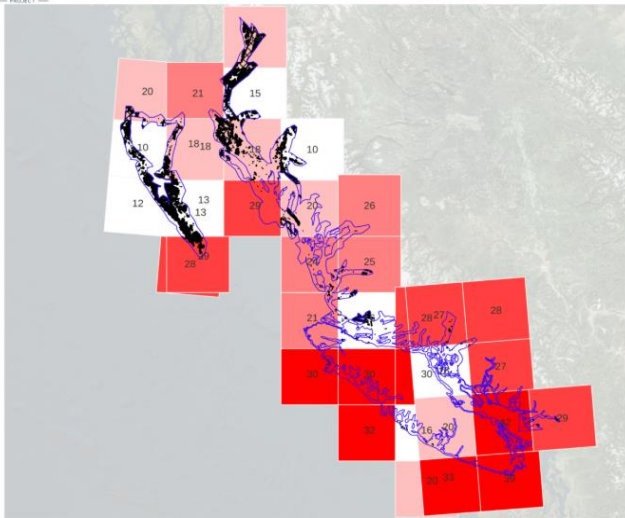
Blue carbon mapping strategy

Mapping the extent and coastal vegetation types (habitats) with Sentinel-2 + VHR (Pleiades-like) => Pipeline

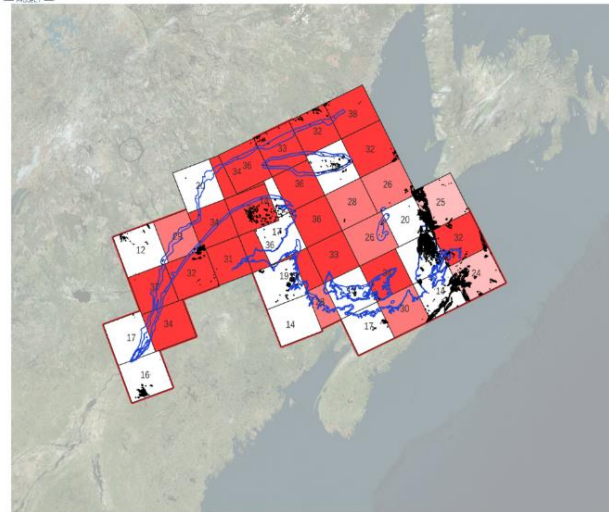
Cloud-free, seasonal image selection and compositing, hundreds of S2 tiles processed per country

1054 tiles (Pacific Canada) ; 447 (Atlantic Canada) ; 676 (French Atlantic); 1586 (Western Med) for one single year

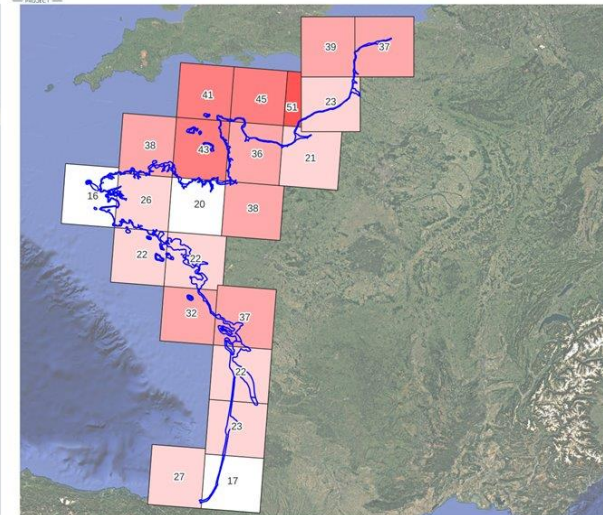
ESA Coastal Blue Carbon, Sentinel-2 images summary, 2024.
Canada West Coast



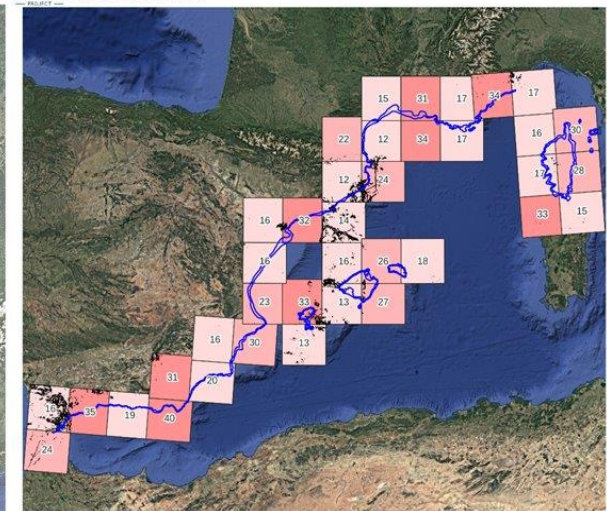
ESA Coastal Blue Carbon, Sentinel-2 images summary, 2024.
Canada East Coast



ESA Coastal Blue Carbon, Sentinel-2 images summary, 2020.
French Atlantic Coast



ESA Coastal Blue Carbon, Sentinel-2 images summary, 2020.
Mediterranean Coast



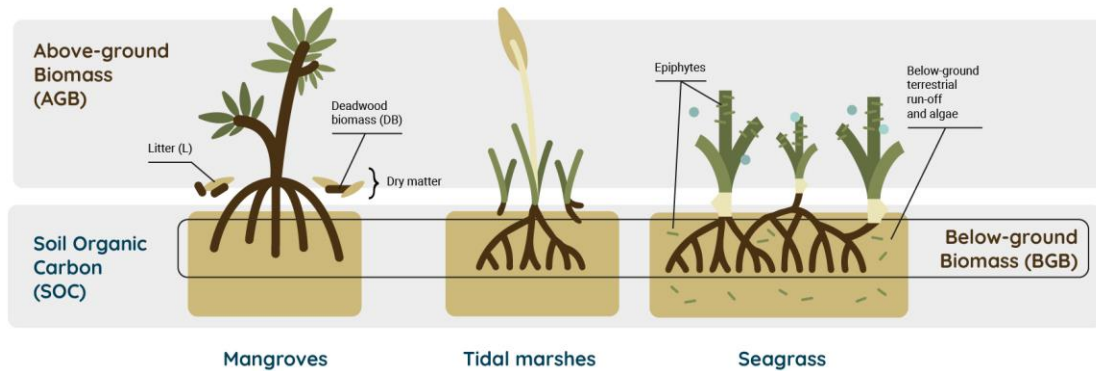
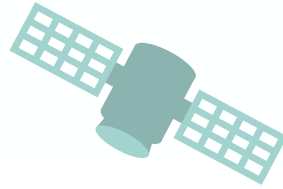
we also made use of national / international coastal vegetation data infrastructures :

- *Seagrass NETForce* + *St Lawrence Résilience Cotière* (Canada)
- OFB (France)
- *Global Mangrove Watch* layers but local knowledge existing in coastal communities is missing (support local fine-tuning in data-poor areas)

Blue carbon mapping strategy

From **tier-2** (regional)

to **tier-3** (locally-fitted) coastal carbon products



-> Carbon database enhancement, but still very much data missing (hopefully, ongoing national carbon data hub initiatives should help) = tier-2

-> Carbon modelling when trained with environmental parameters, moving towards tier-3 spatially-explicit maps of carbon storage

- Literature review and interviews with carbon scientists, but many existing data hard to collect (very limited open-access policy)
- Collection of new carbon data in pilot countries (core sampling and analysis +/- 12-18 months)
 - 50 new cores in Canada (mainly *Zostera* seagrass)
 - 50 new cores in Med sea (*Posidonia* seagrass)
 - 25 new mangrove plots in french Guiana



(top) Field work and C_{org} measurement in lab : loss-on-ignition and elemental analysis. photos © M Pellatt, SFU (bottom) adult mangrove in French Guiana © IRD

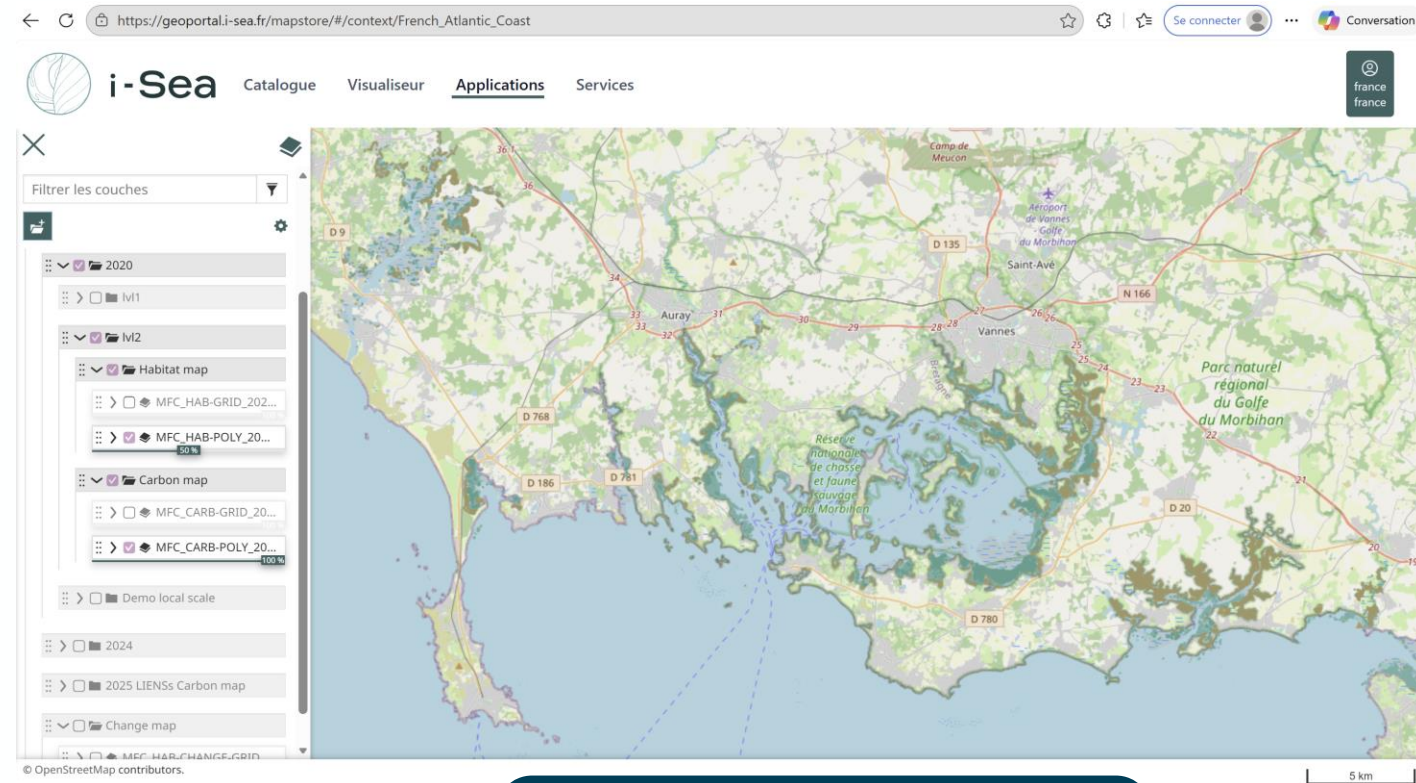
Blue carbon package of products

Results are made available as a **package of products** :

- maps of seagrass, salt marshes and mangroves, 10-m resolution, years 2016-2020-2024
- maps of total carbon stocks
 - 30-cm average
 - 1-m average
- confidence level maps
- (experimental) change maps
- user handbook

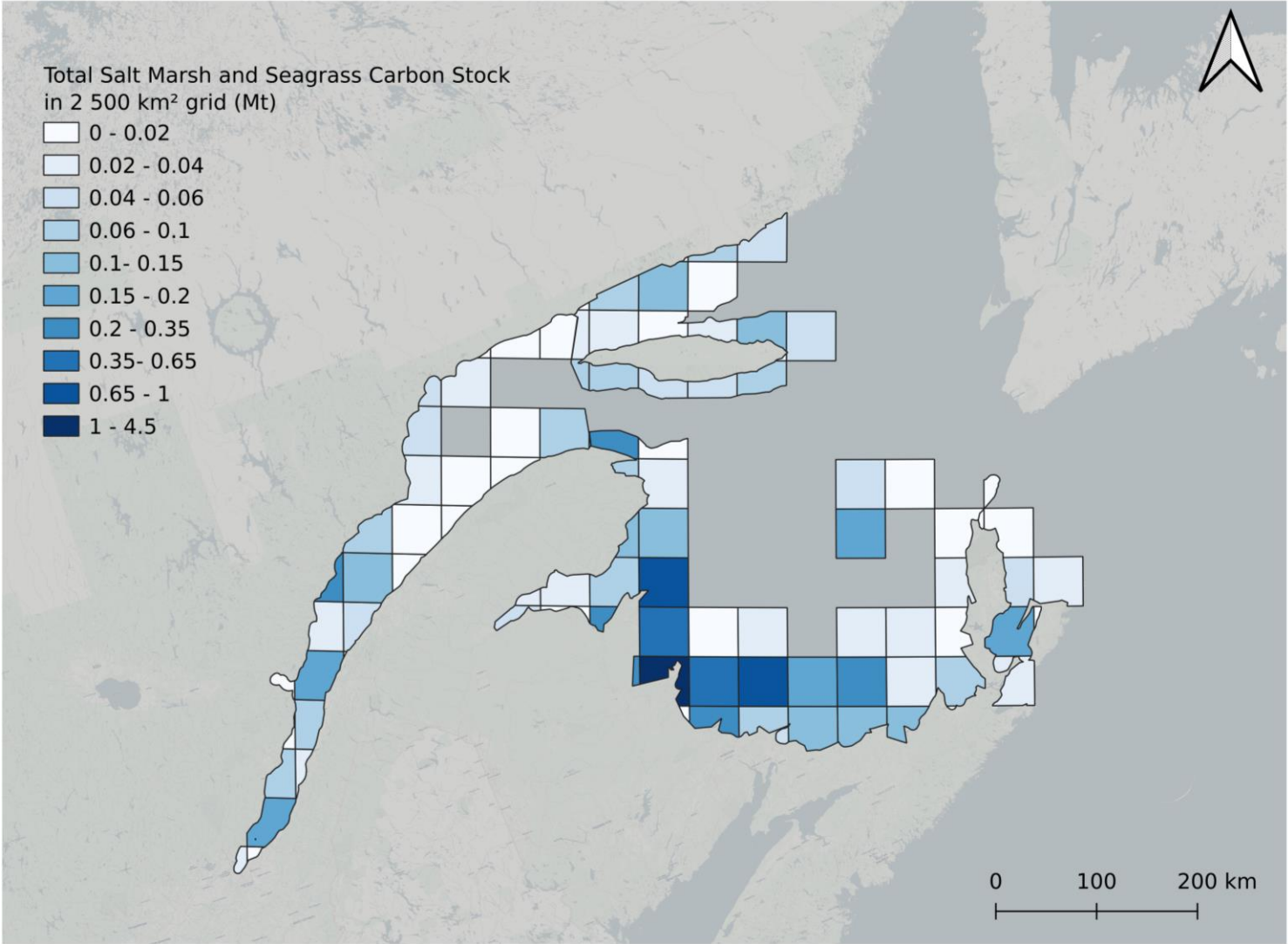


For consultation and downloading
go to the ESA CBC geoportal



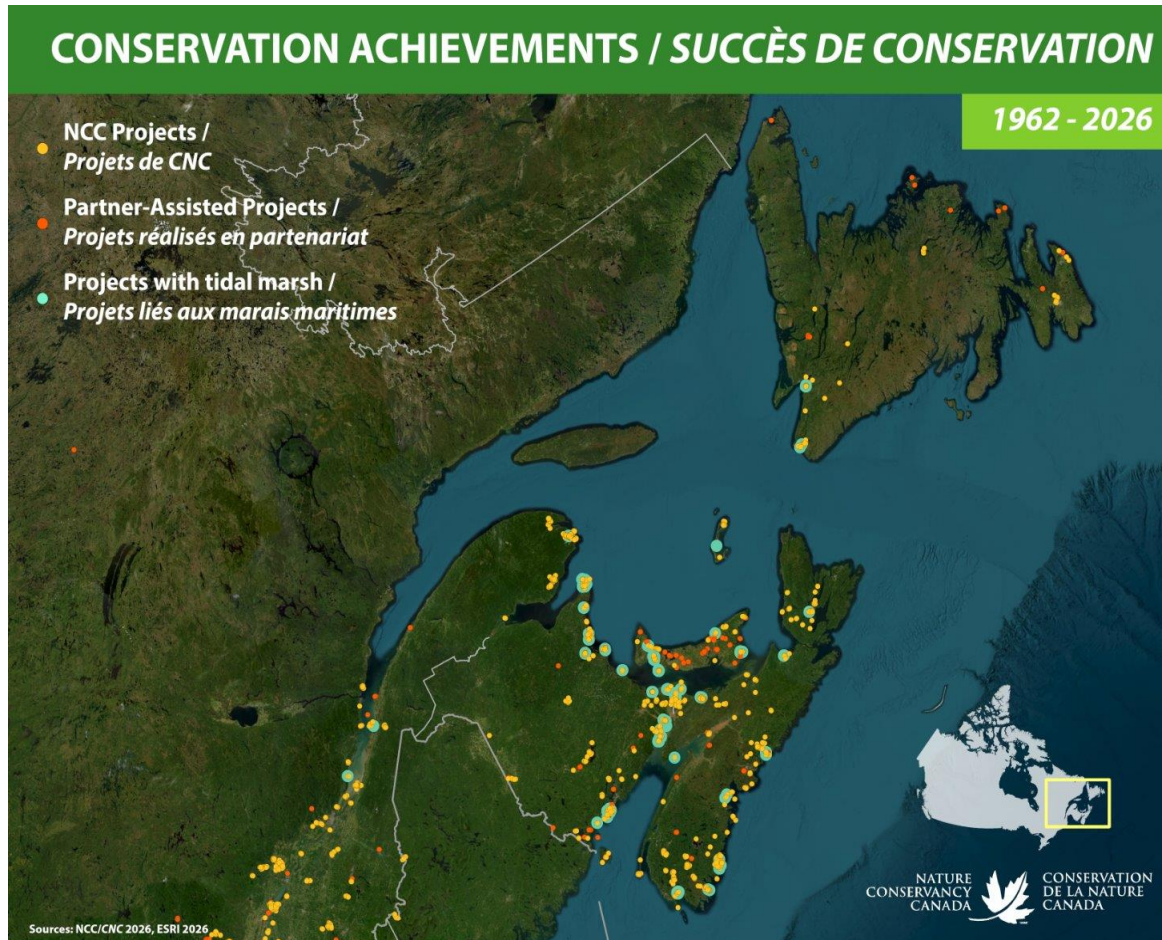
<https://geoportal.i-sea.fr/>

Blue carbon package of products



Stakeholders' uptake canadian salt marshes

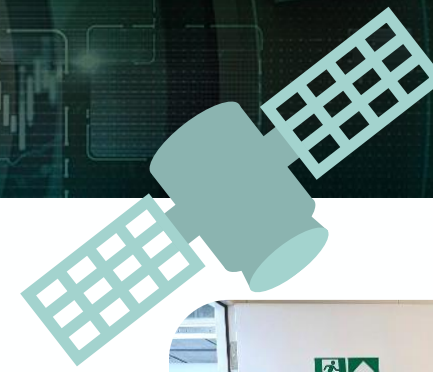
Prioritize coastal land acquisitions w/r marsh conservation & restoration, claim carbon credits



✓ What ESA CBC Provides

- Current extent maps of seagrass and tidal marsh across Eastern Canada
- Carbon stock and carbon density layers supporting baseline estimates
- Identification of where carbon is concentrated across coastal systems
- Overlay capability with flood risk, erosion, tenure, and habitat maps
- Open access with transparent, reproducible methodological workflow

△ What We Still Need....



Next steps

Strengthen **product accuracy** and date-to-date significance -> **robust change maps** over time, expected by the community

Interpretation of carbon fluxes along with natural and anthropogenic drivers

Enhance **collaboration** with national institutions and practitioners (NGOs, protected areas managers, municipalities, regional governments)



Bern Coastal Blue Carbon workshop @ISSI, May 2024

Recommendations

- No clear blue-carbon related policy, cited in many regulation laws, but not required, neither in nature nor climate policies -> **need for clarification** otherwise none national agencies will be moving forward
- **Create transverse blue carbon lead officer in national agencies**, in charge of innovation, data collection, building a live community of practitioners...
- Need for a (coastal) vegetation **data hub**, including carbon. Effective open data policy as a priority. Role of data manager in academia and professional networks.



ESA Coastal Blue Carbon User Consultation Meeting @ESRIN, April 2026