Pushing the boundaries of earth observation for monitoring aquatic environments: Arctus, an innovative Canadian SME

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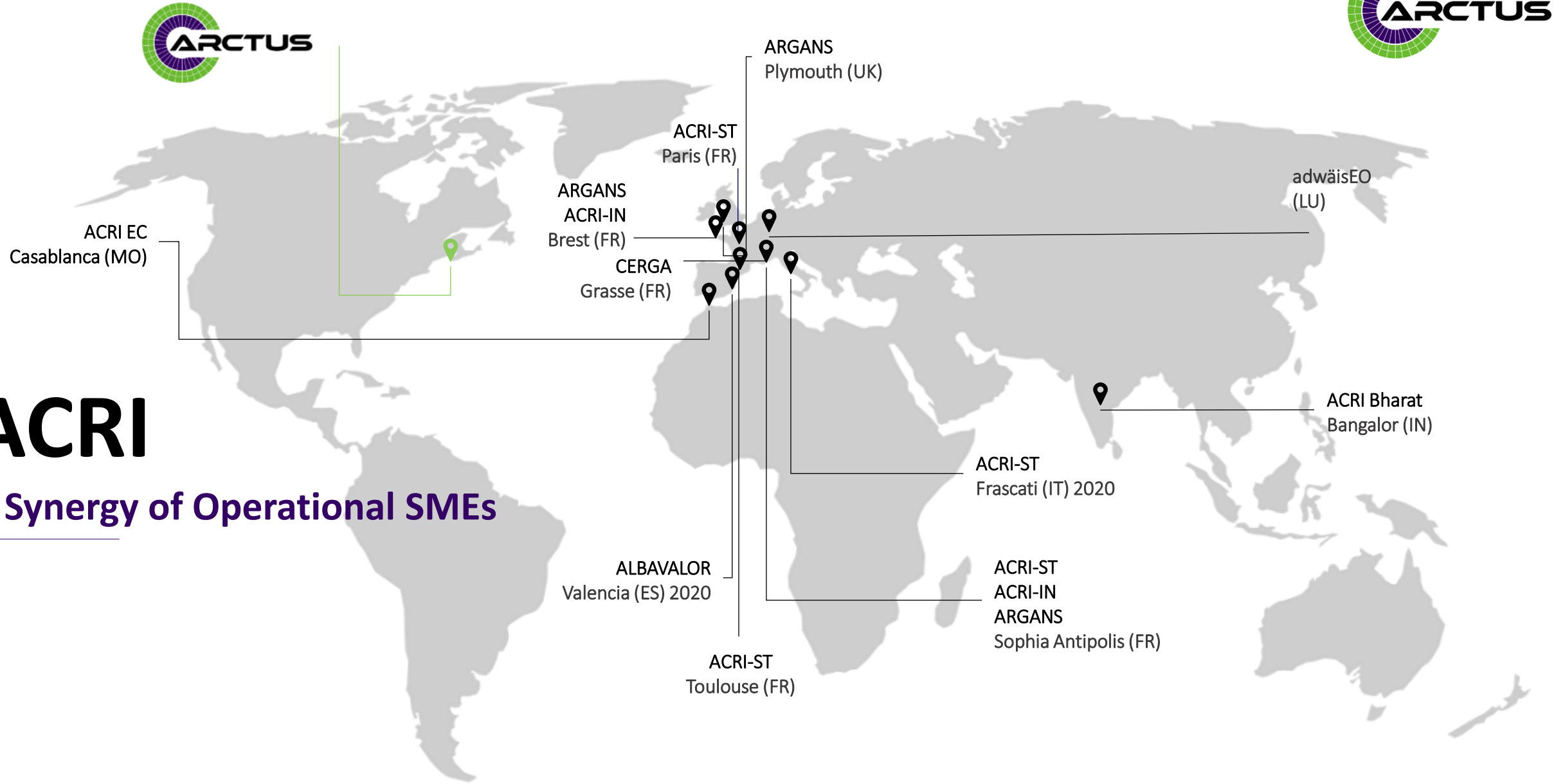
ARCTUS

ARCTUS is a private R&D company established in 2009. We provide **research**, **development** and **applications** in **remote sensing**, **Earth Observation** (EO) and **Geographical Information Systems** (GIS) for governmental agencies, scientific communities and the general public. Our company is specialized in optical remote sensing of aquatic environments, from lakes to oceans.

ACRI

A Synergy of Operational SMEs



Our Mission

- To become a renowned R&D company specialized in the **monitoring of natural resources** using Earth Observation tools
- To develop practical tools exploiting **Earth Observation data** and to provide **modeling capacities** for integrated management of the environment,
- To undertake research activities related to **ocean and coastal observations and modeling**,
- To provide **consulting and operational services** to space agencies (CSA and ESA) and Earth Observation data users.

What We Do

WE CONCEPTUALIZE YOUR SYSTEM

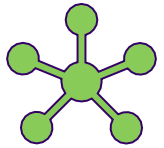
We analyze your needs and review the state-of-the-art scientific literature to help you choose the most appropriate EO data collection technologies and data processing algorithms on the market.

WE COLLECT DATASETS SUITABLE TO YOUR NEEDS

Together with our partners we own access to a pool of instruments and existing datasets that allow the most precise and accurate estimation of various environmental parameters.

WE IMPLEMENT AND VALIDATE YOUR SYSTEM

We validate the proposed algorithms within *situ* data, to draw scientifically based conclusions and recommendations considering different aspects of the problem and of the studied area.



WE DISSEMINATE DATA TO USERS

Printout maps, written scientific reports, added data products to be internally used within desktop GIS platforms, web-based GIS tools to access, download, display and further process huge amount of data.

Our Team

Simon Bélanger, PhD
Scientific Director

Robert Duplain, eng.
Chief Financial Officer

Yanqun Pan, PhD
Ocean Color and AI Specialist

Christiane Dufresne, PhD
Physical Oceanographer
and Modelling Specialist

Thomas Jaegler, MSc
EO Specialist

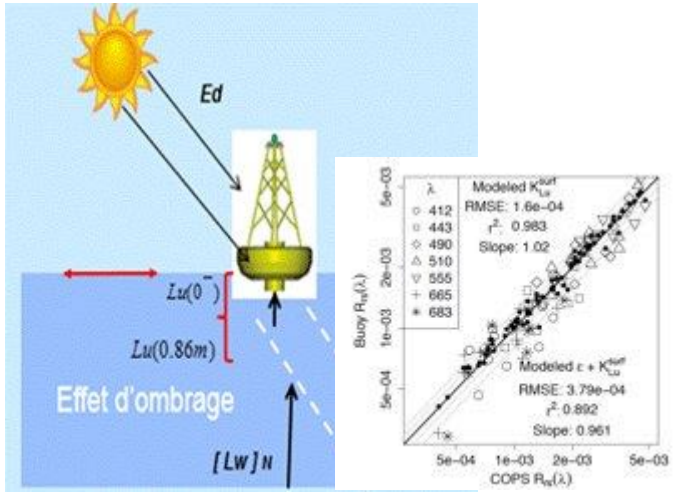
Image: Arctus

Our Key Projects

Our Key Projects (2016 – 2021)

Expert support lab involved in the Sentinel-3 Mission Performance Center (S3-MPC)

ARCTUS is one of the Expert Support Laboratories (ESL) responsible for the evolution of Marine L2 products. This includes the validation of OLCI radiometric products.

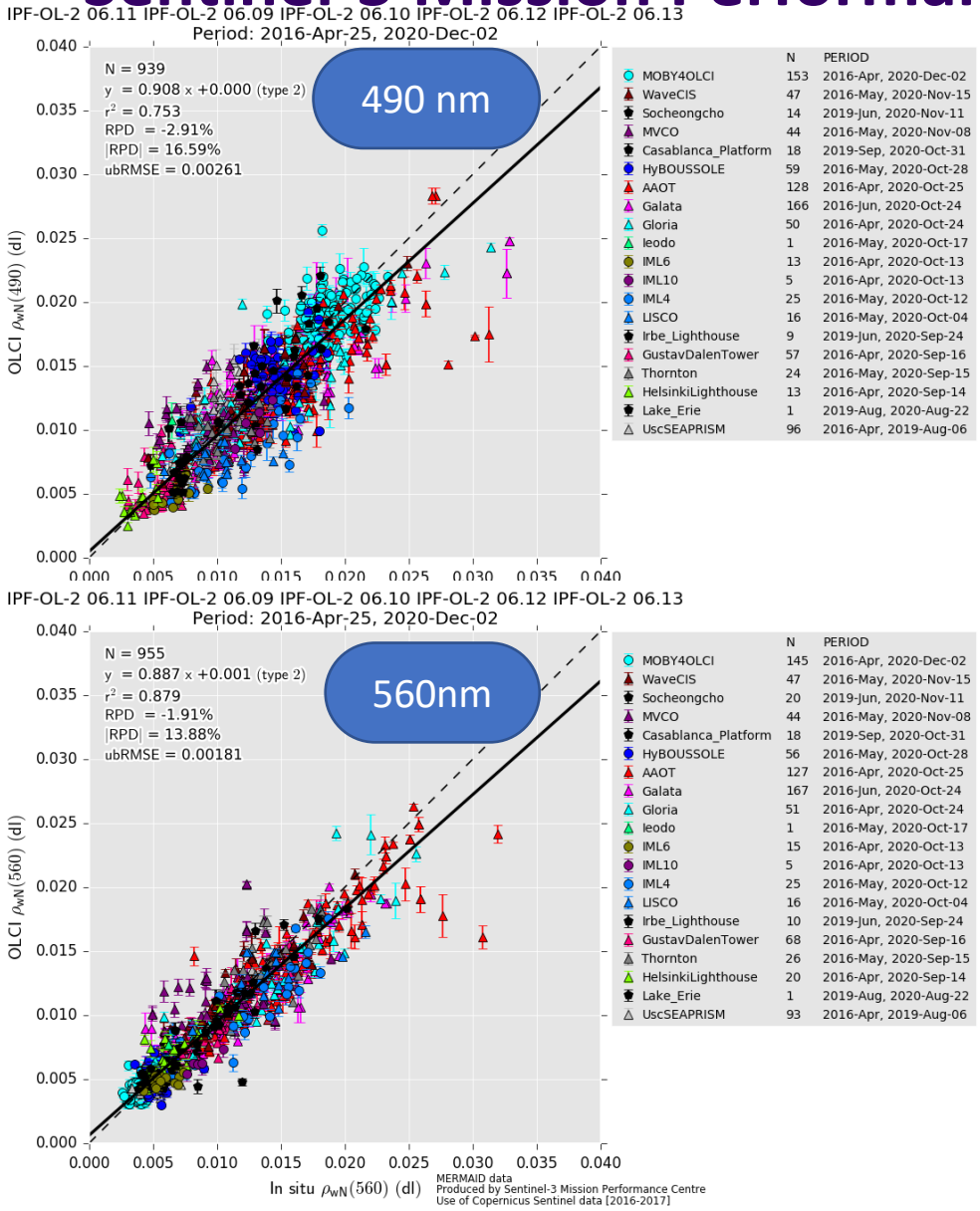


Within the Sentinel-3 Mission Performance Center (S3-MPC)

ARCTUS has created an automated processing chain for the array of buoys in the St. Lawrence estuary.

ARCTUS has contributed to the buoy's technological improvement for satellite validation purposes (Bélanger et al., 2017).

Sentinel-3 Mission Performance Center (S3-MPC)



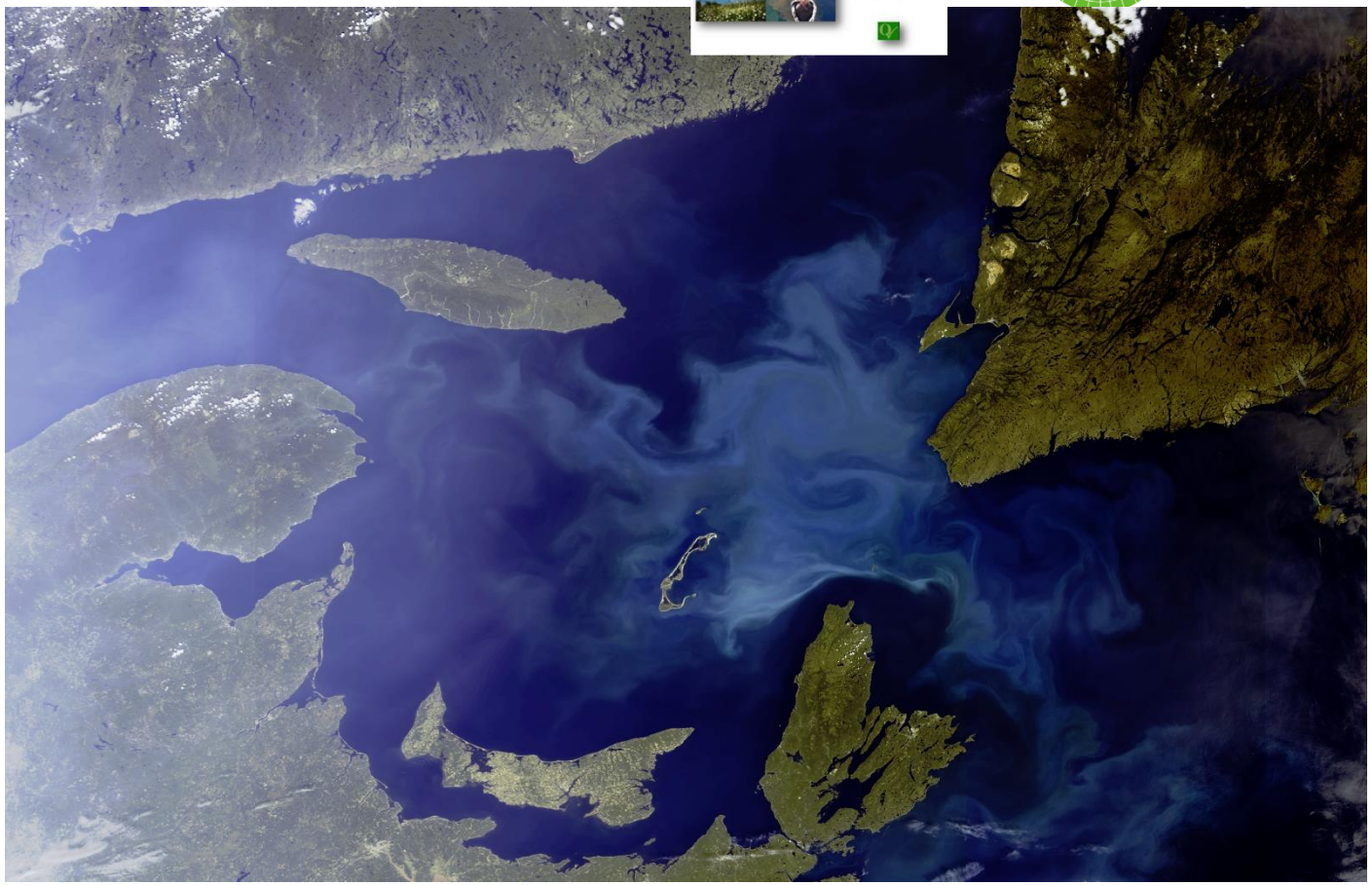
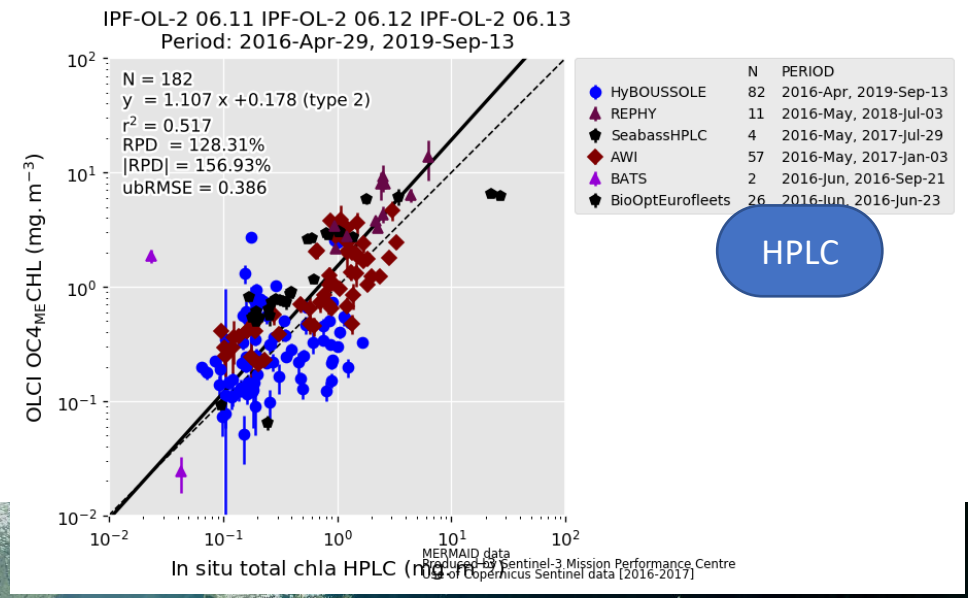


Image: Arctus. Sentinel 3, OLCI 20190727

Sentinel-3 Mission Performance Center (S3-MPC)

- **Water-leaving radiance ($\rho_{wN}(\lambda)$)**
  - S3A Retrieval of water reflectance very good results up to 560nm.
  - 665nm band shows poor statistics, longer wavelengths are not validated due to high CV => the water signal is very low in the open ocean and smaller dynamic range compare to blue-green
  - 443, 490, 510 and 560nm perform well in both case 1 and case 2 waters.

  - First test shows OLCI CHL_OC4ME product tends to underestimate HPLC in situ measurements
  - More effort to find diverse measurement (Oligotrophic or Eutrophic)



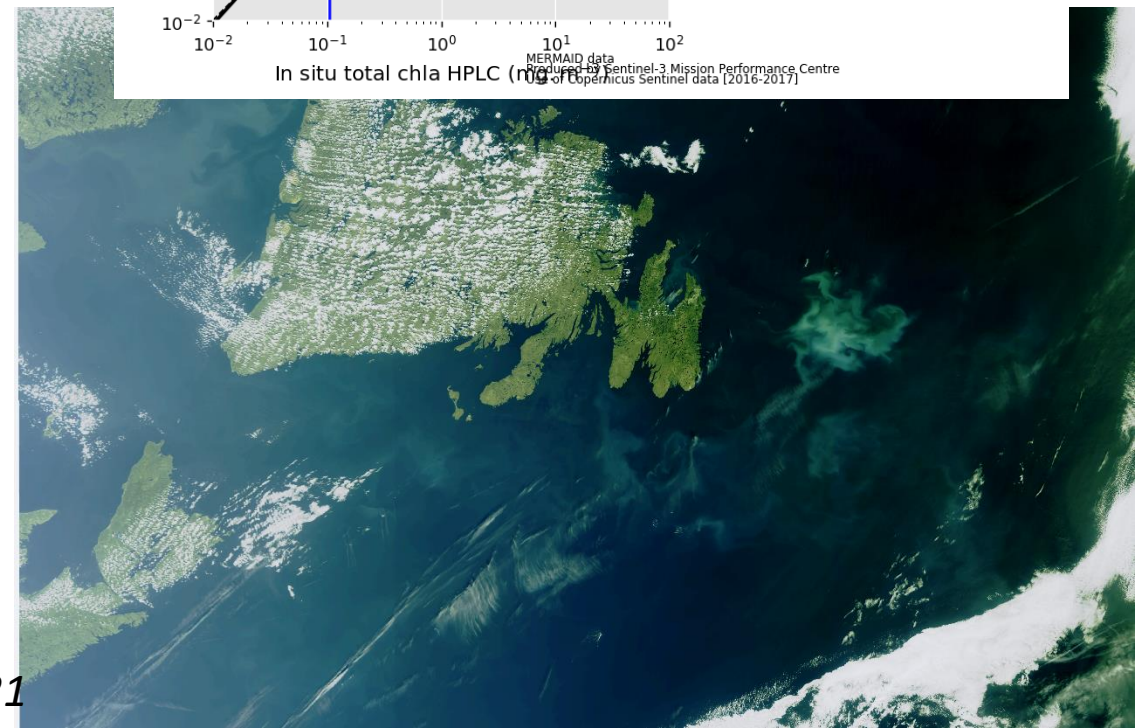
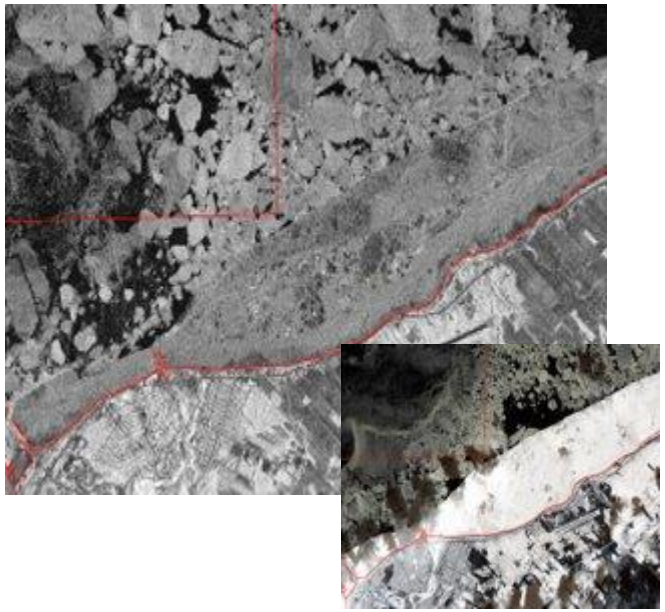


Image: Arctus. Sentinel 3, OLCI 20190921

Our Key Projects



Earth observation solutions addressing coastal erosion issues, their impacts on ecosystems and the risks to infrastructure assets (CCIER 2019-2021)

The project assesses the impacts of climate change on coastal ecosystems and their vulnerability due to coastal erosion. In this regard, the project represents the first step towards implementing an effective monitoring system capable of providing up-to-date information on coastal areas.

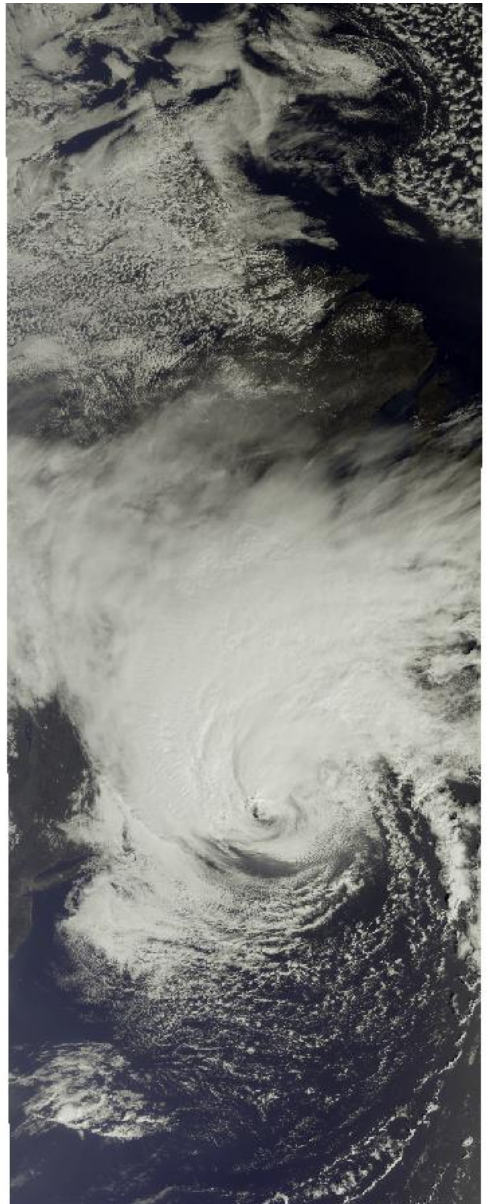


Image: Arctus. Sentinel 3, OLCI 20190907 Dorian over Nova Scotia

Earth observation solutions addressing coastal erosion issues, their impacts on ecosystems and the risks to infrastructure assets

Waterline time-series with high resolution data freely available.

From Landsat 5 to Sentinel 2 ~ 20 years of data

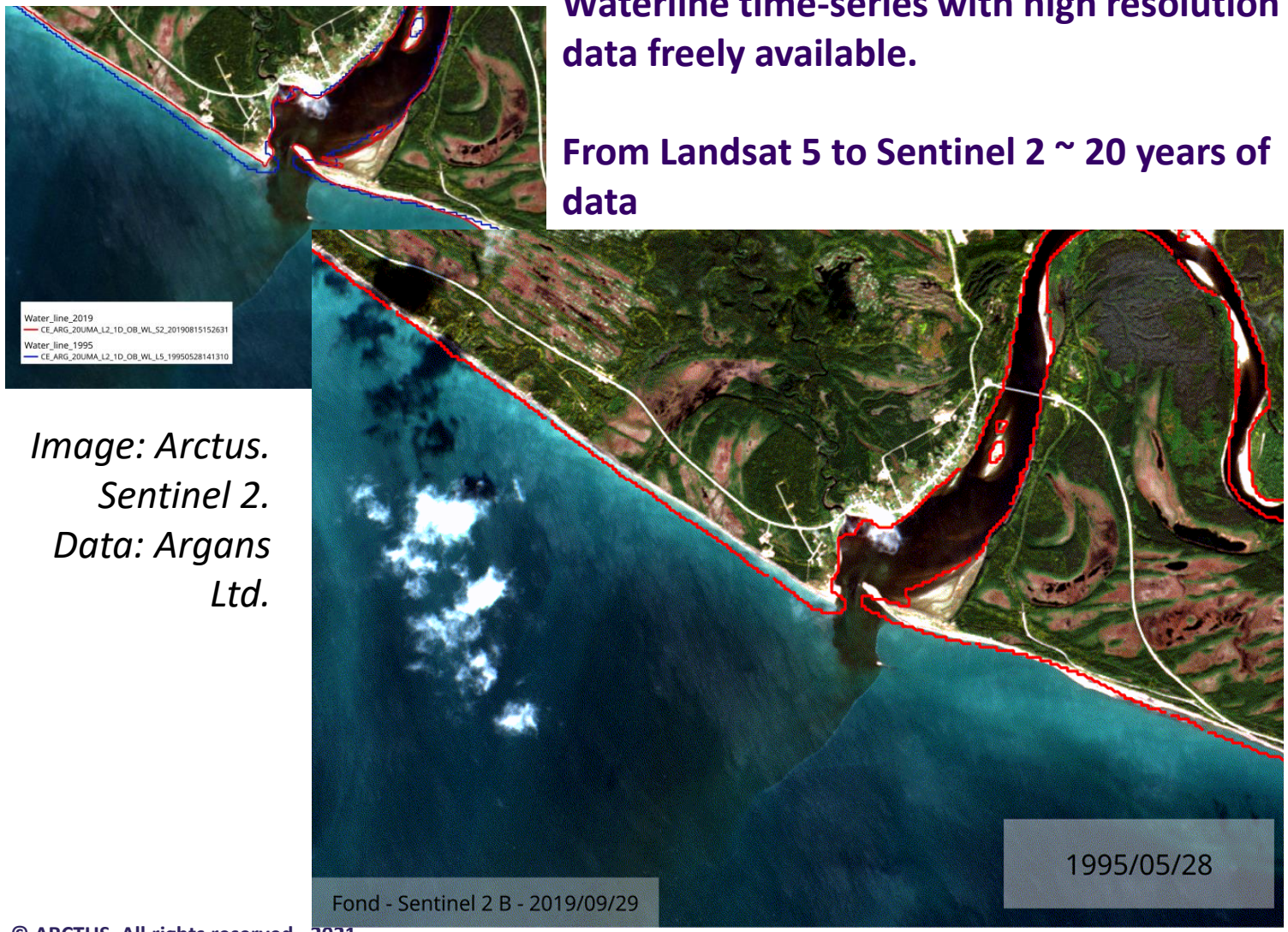
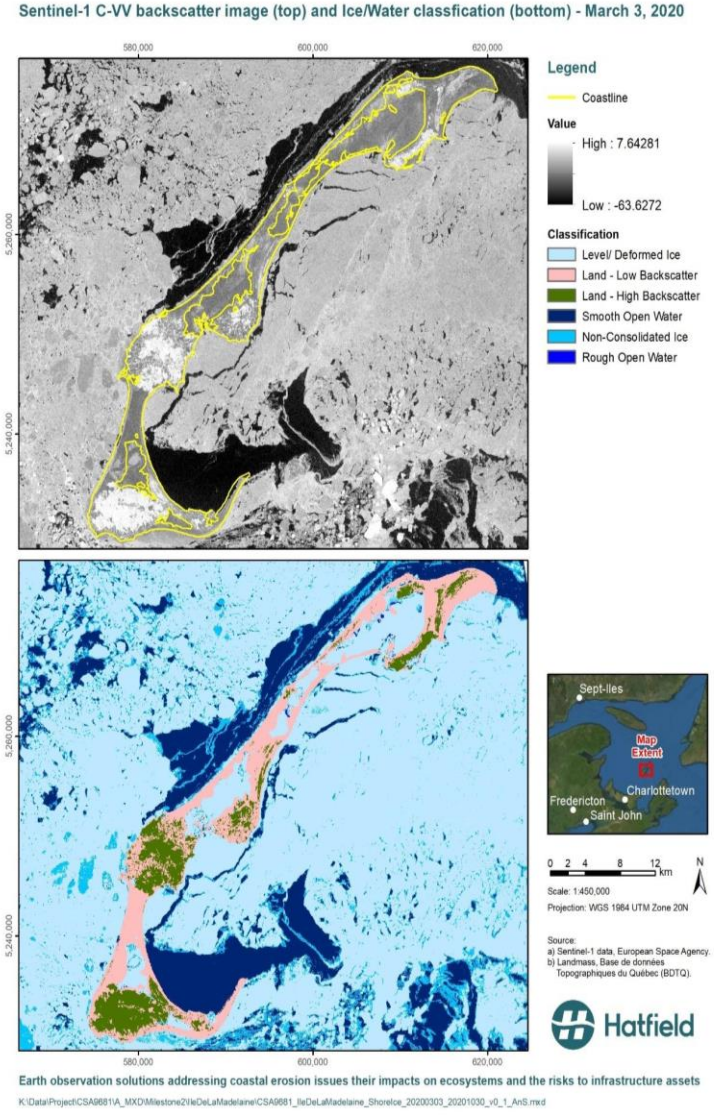


Image: Arctus. Sentinel 2. Data: Argans Ltd.

Sea-Ice detection with Sentinel1



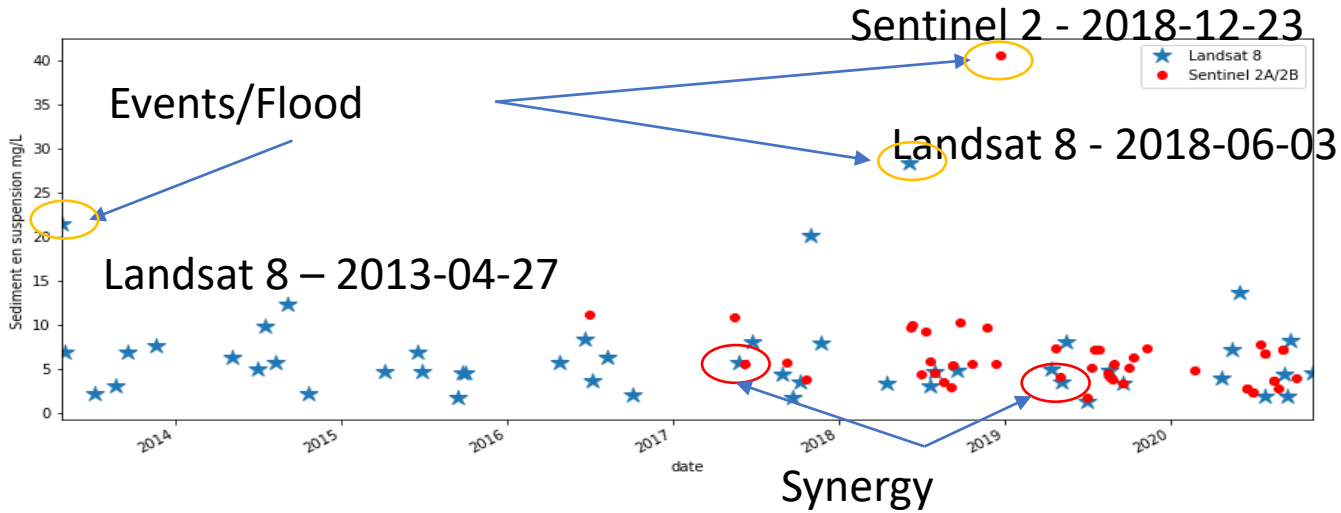
Earth observation solutions addressing coastal erosion issues, their impacts on ecosystems and the risks to infrastructure assets

Total suspended sediment time-series with Landsat – Sentinel 2 synergy

ρ_s RGB L8/OLI 2013-04-27 (15:07 UTC)

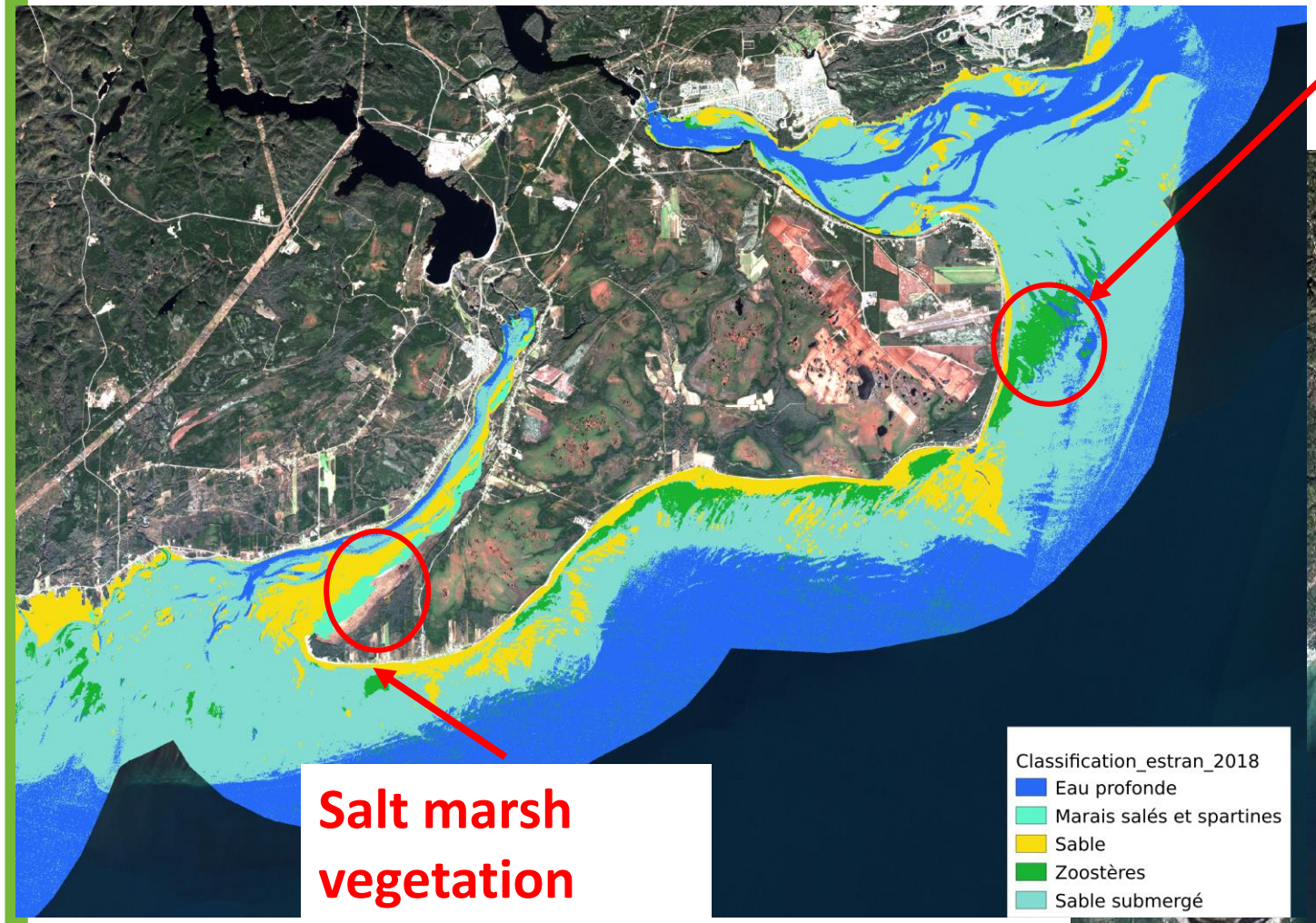
ρ_s RGB S2B/MSI 2018-12-23 (15:28 UTC)

ρ_s RGB L8/OLI 2018-06-03 (15:11 UTC)



Earth observation solutions addressing coastal erosion issues, their impacts on ecosystems and the risks to infrastructure assets

Coastal habitat classification



Zoostera

Our Key Projects (Just started)

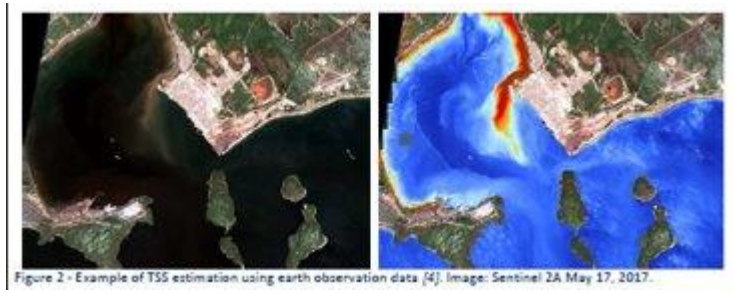
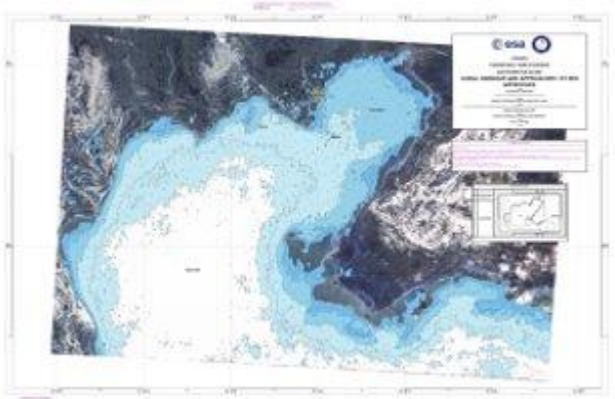


Figure 2 - Example of TSS estimation using earth observation data (4). Image: Sentinel 2A May 17, 2017.

Earth Observation Solutions for Environmental Monitoring of Industrial Port Zones – a smartEarth project

A cloud-based Near Real-Time Earth Observation monitoring system will be developed and tailored to meet the management needs of industrial port zones authorities, in terms of environmental protection and sustainable development. This project is conducted jointly with the Institut Nordique de Recherche en Environnement et Santé au Travail, in Sept-Iles QC.



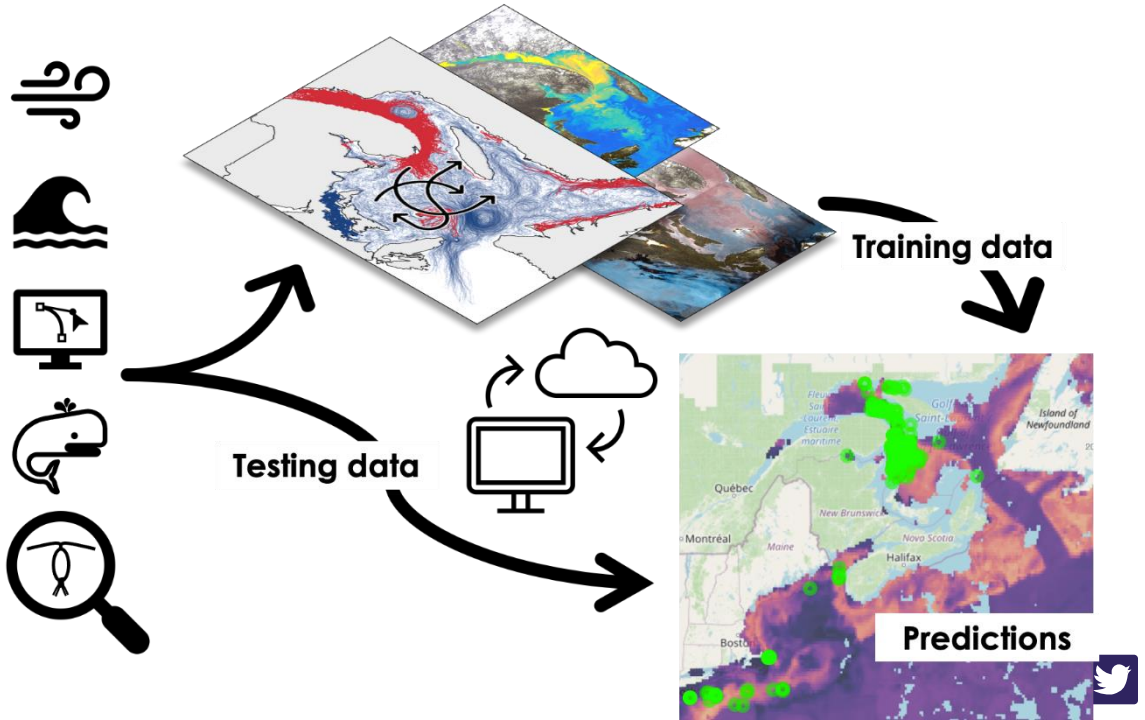
Artificial intelligence for satellite-derived bathymetry
A QuébecInnove project

This project consists in using a set of neural networks to assess coastal environments automatically identified by an unsupervised classification algorithm, in order to realize a proof of concept on the use of artificial intelligence for satellite-derived bathymetry. This method, complementary to traditional bathymetric surveys, is developed in collaboration with the Interdisciplinary Centre for the Development of Ocean Mapping.

Our Key Projects (Just started)

SIMBA – Système Intégré de Modélisation de la Baleine noire de l'Atlantique nord - a SmartWhales project

This system will help predict the presence of a critically endangered species in the Northwest Atlantic shelf. Our international consortium (Canada, USA, France) will develop models based on high-resolution operational circulation models and satellite-derived bio-optical variables using NARW's preferred prey (Calanus sp.) as a sentinel species.



Customers and Partners

Space Agencies

esa

CSA ASC

EUMETSAT

Private Companies

Hatfield

PORT MONTRÉAL

CIDCO

Inrest

Public Authorities

Économie, Science et Innovation Québec

Public Services and Procurement Canada

QUÉBECINNOVE

Academia

ArcticNet

UNIVERSITÉ LAVAL

LOOKNorth
a C-CORE Centre of Excellence

NIVA
Norsk institutt for vannforskning

Bigelow Laboratory for Ocean Sciences

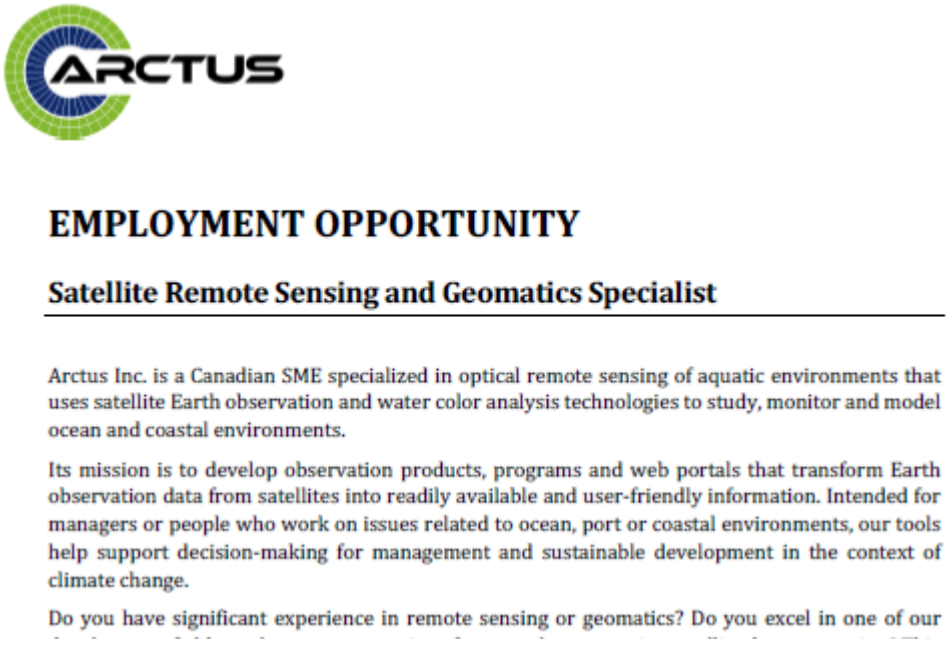
uOttawa

UQAR SMER

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Opportunity

Remote sensing specialist



EMPLOYMENT OPPORTUNITY

Satellite Remote Sensing and Geomatics Specialist

Arctus Inc. is a Canadian SME specialized in optical remote sensing of aquatic environments that uses satellite Earth observation and water color analysis technologies to study, monitor and model ocean and coastal environments.

Its mission is to develop observation products, programs and web portals that transform Earth observation data from satellites into readily available and user-friendly information. Intended for managers or people who work on issues related to ocean, port or coastal environments, our tools help support decision-making for management and sustainable development in the context of climate change.

Do you have significant experience in remote sensing or geomatics? Do you excel in one of our

https://arctus.ca/opportunity/

Do not hesitate to send your C.V.!!

Thank You
For Your Attention

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