LifeWatch
BELGIUM
MARITIME INDUSTRY WORKSHOP
23 JANUARY 2020
Get updated on the LifeWatch services
for science and industry!

The Belgian LifeWatch infrastructure

A biodiversity infrastructure supporting science, industry, policy and civil society

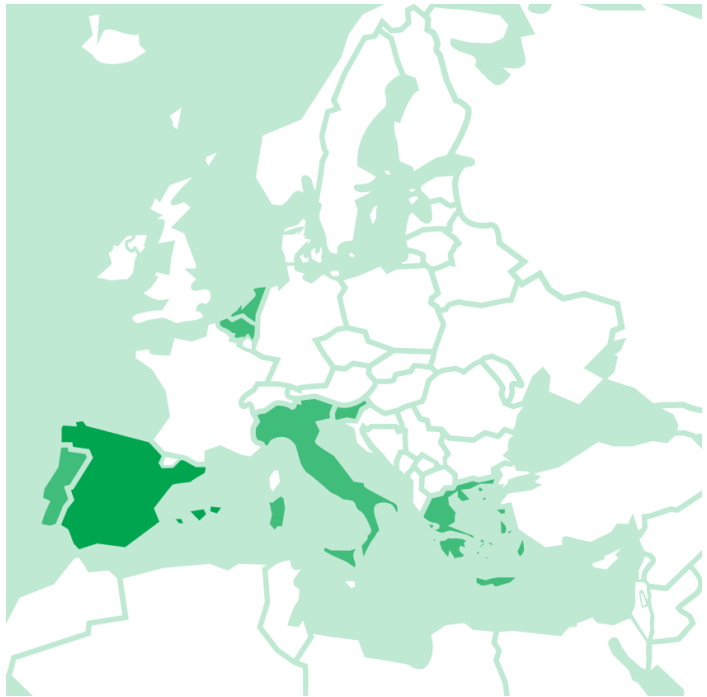
Maritime industry meeting

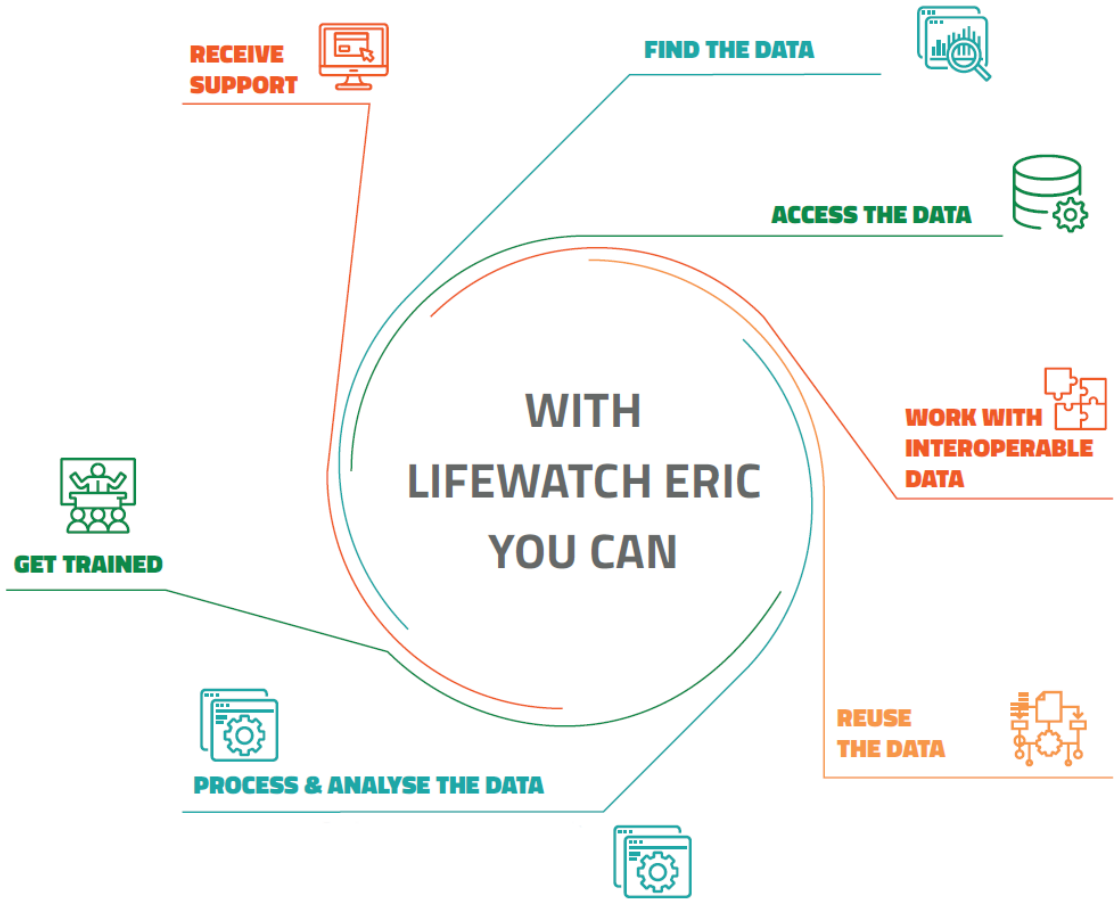
23 January 2020, Ostend, Belgium

LifeWatch ERIC

e-Infrastructure for Biodiversity and Ecosystem Research

A distributed e-Infrastructure to support research and sustainability of biodiversity and ecosystems





5.298 USER CITATIONS	28 OPEN DATA SERVICES	1.713 REGISTERED USERS	20 million TAGGED SPECIES OBSERVATIONS	299 DATASETS RESCUED
232.992 + 66.437 ACCEPTED SPECIES IN SPECIES INFORMATION BACKBONE	242 OPERATIONAL SENSOR STATIONS	1.575 SAMPLES COLLECTED	1.366 DATASETS PUBLISHED	6087 DNA SEQUENCES PRODUCED

LifeWatch BELGIUM

Flanders

fwo

VLIZ

RESEARCH INSTITUTE NATURE AND FOREST

Species Information backbone
Data archeology
Observatory
Data systems & tools
Data services
Marine VRE

Wallonia - Brussels

FÉDÉRATION WALLONIE-BRUXELLES

gembloux agro bio tech

EARTH & LIFE INSTITUTE

Habitat characterization by remote sensing
Ecotopes database

Federal

belspo

BIODIVERSITY.AQ

Biodiversity.be

museum NATURALSCIENCES.BE

AFRICA museum

AntaBIF
Antarctic observations
BopCo
LifeWatch Scientific Node

Outline

Lifewatch Species Information Backbone

Regional marine, terrestrial & freshwater observatory

Data accessibility

LifeWatch BELGIUM

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Regional marine, terrestrial & freshwater observatory

Data accessibility

LifeWatch BELGIUM

LifeWatch Species Information Backbone?

- Facilitate the standardisation of species data
- Authorative global marine species list + related information
- Offer better-quality data & try to avoid duplication of efforts

Taxonomic Information

- World Register of Marine Species (WoRMS), an authorative classification and catalogue of marine species names
- …. but much more:

Trait Data

Is a species planktonic, benthic species, invasive?

Literature

Scientific literature describing marine species

Marine Regions Gazetteer

Geographic locations and areas

LifeWatch Species Information Backbone?

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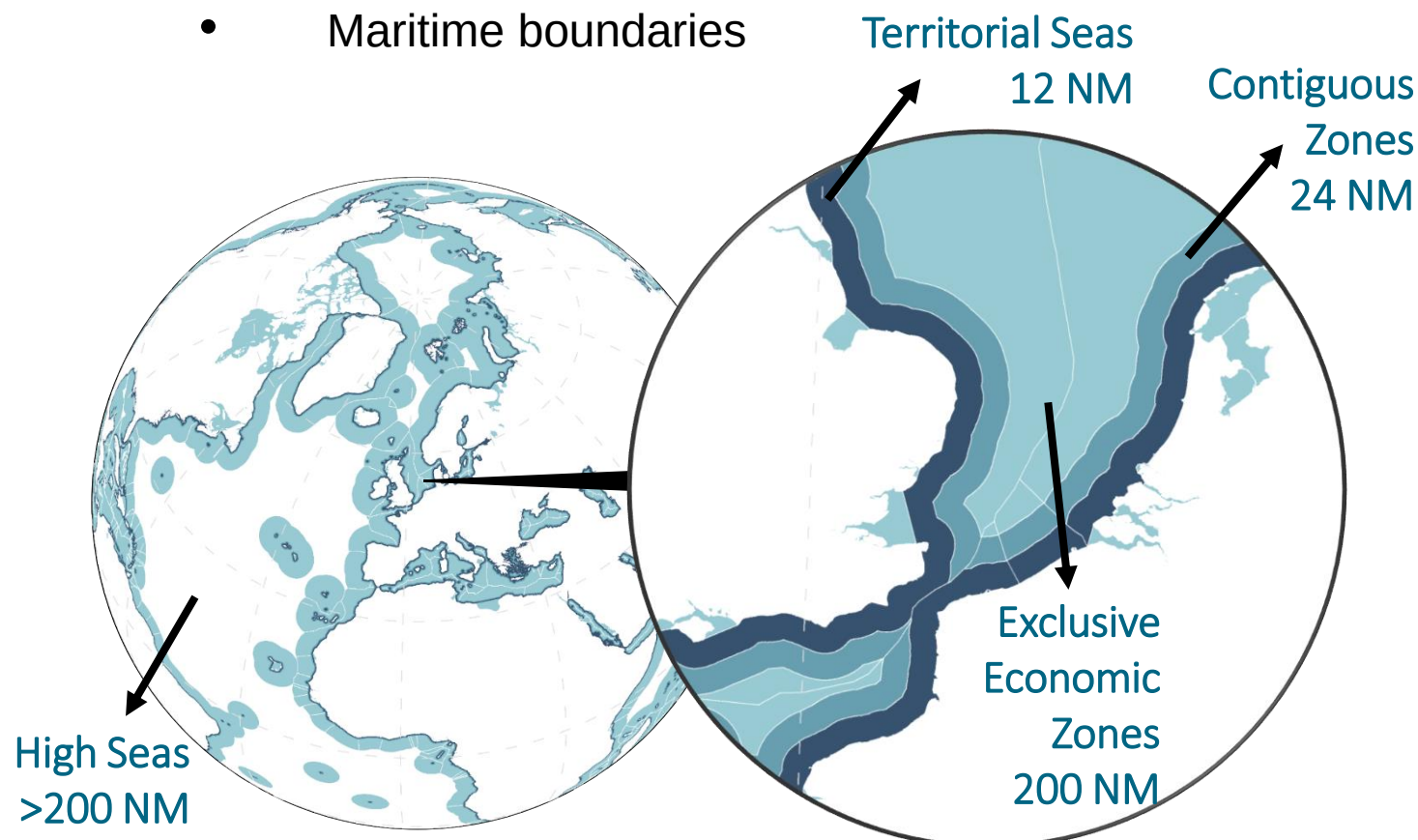
Marine Regions Gazetteer

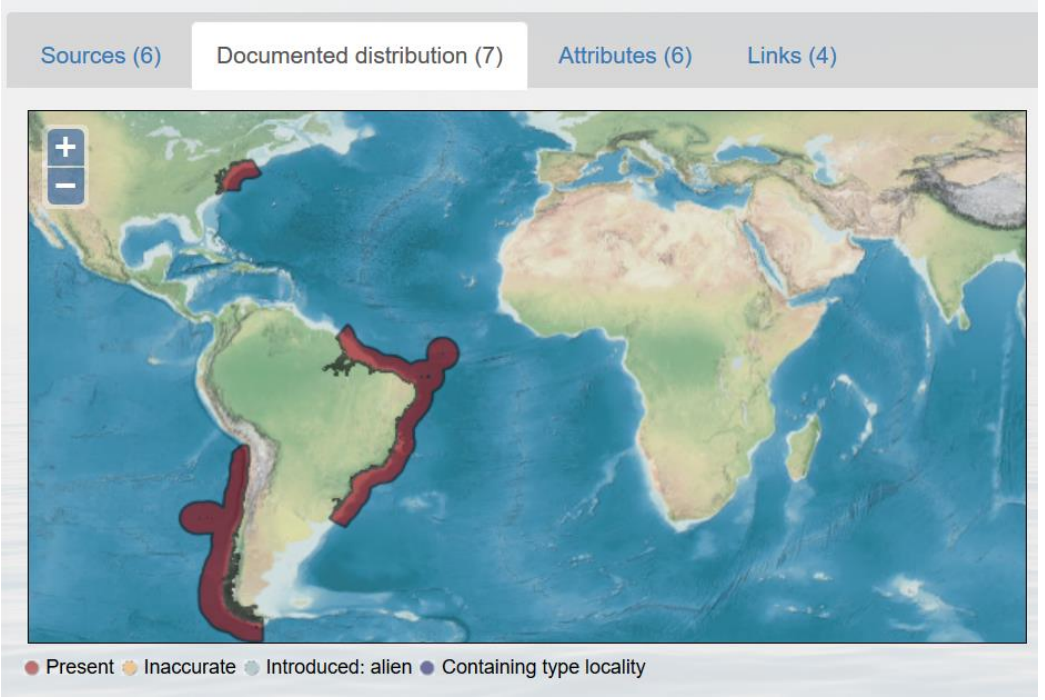
Marineregions.org

a standard for georeferenced marine names

- Marine place names
- Maritime boundaries



WoRMS World Register of Marine Species

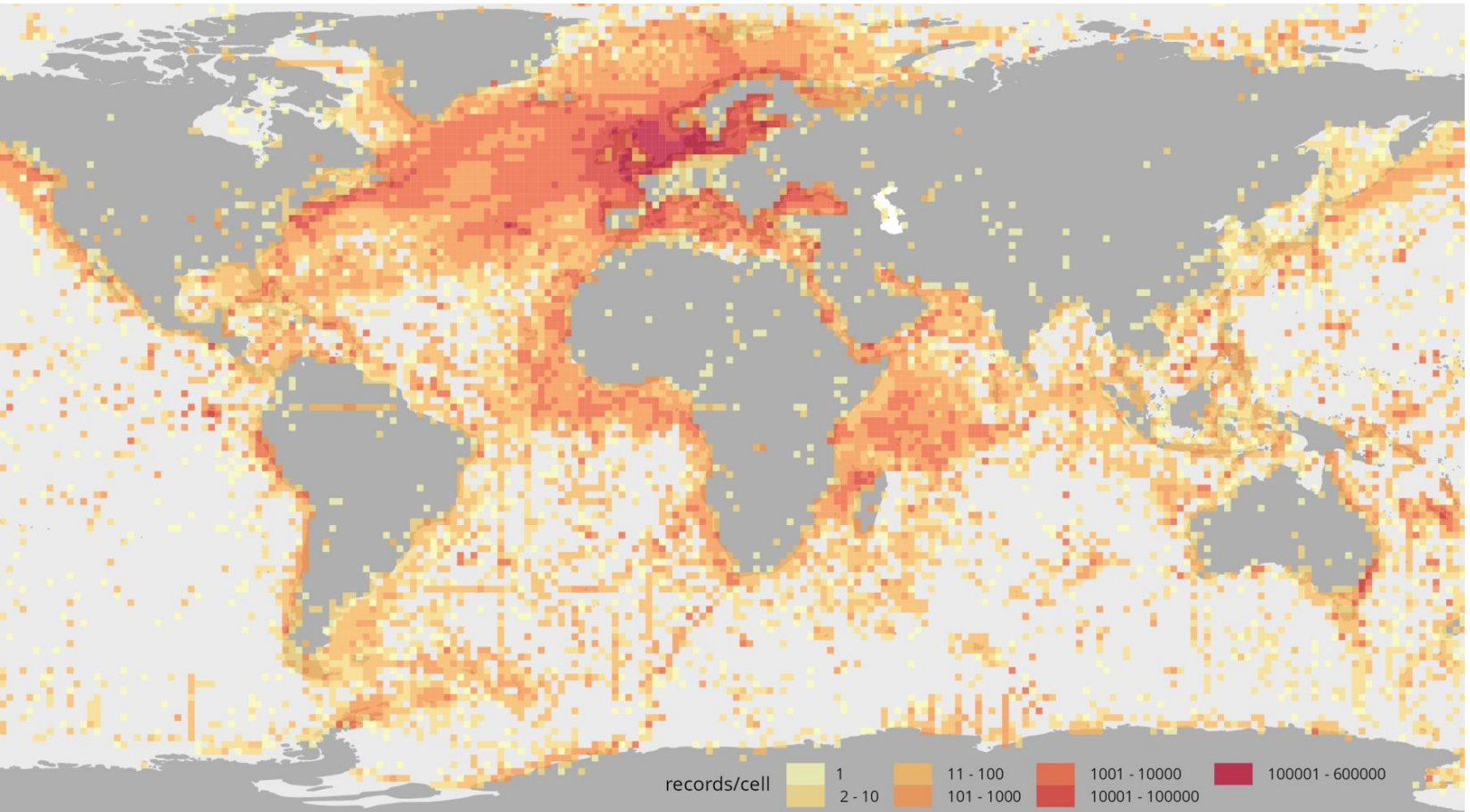


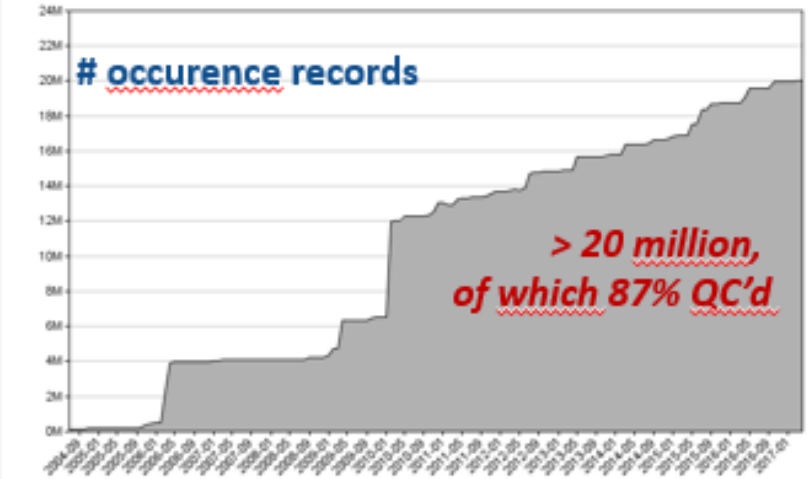
LifeWatch Species Information Backbone?

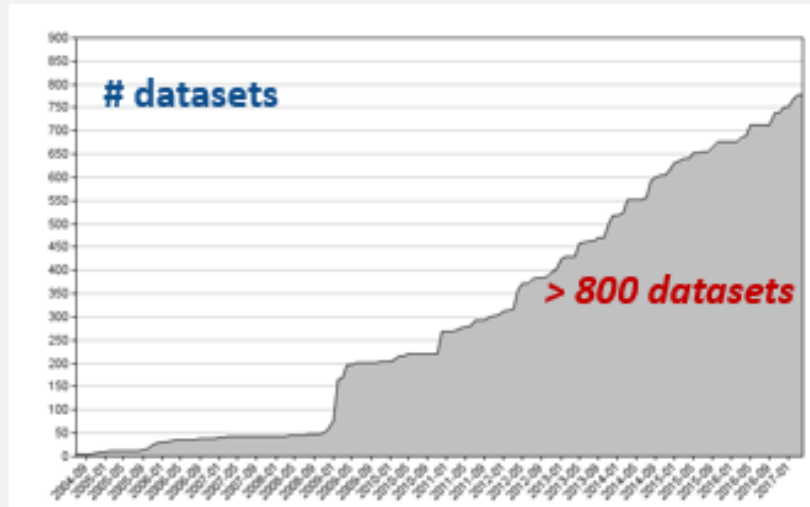
EurOBIS
European Ocean Biogeographic Information System

Biogeographic Data

- Database of European marine biological data



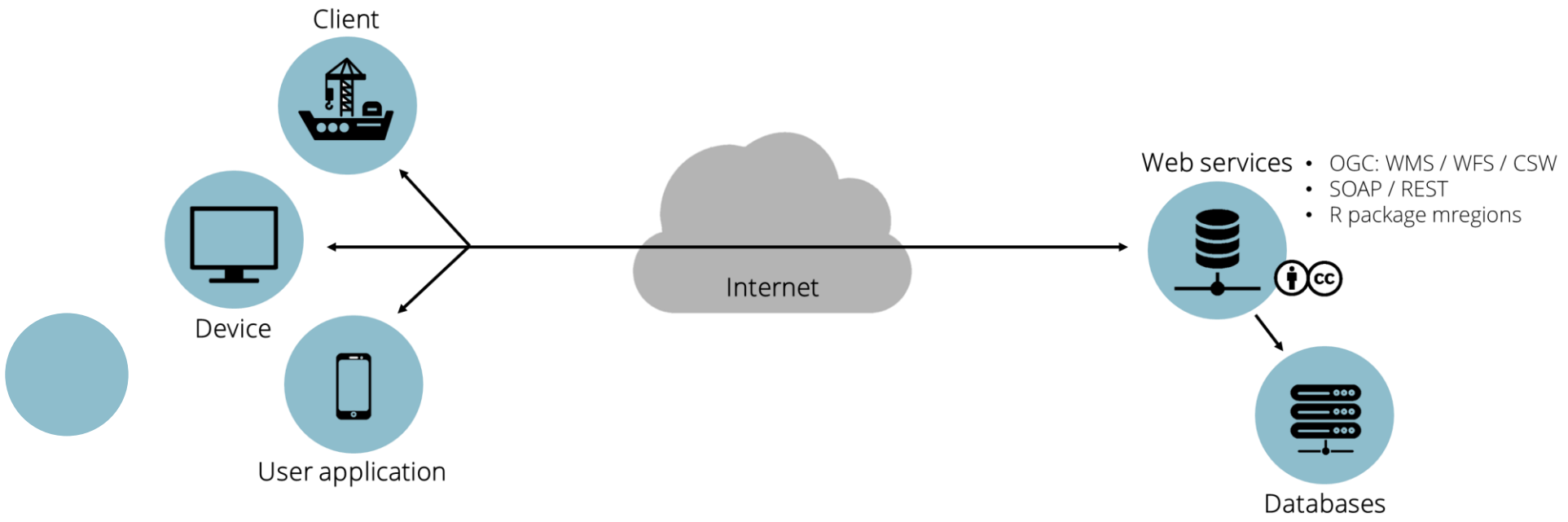




LifeWatch Species Information Backbone?

The LifeWatch Species Information Backbone is open and accessible

You can request **downloads** or **use webservices**



Outline

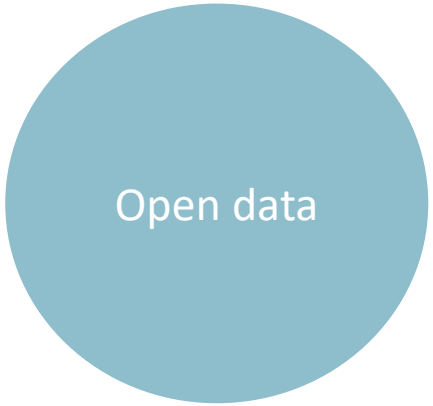
Lifewatch Species Information Backbone

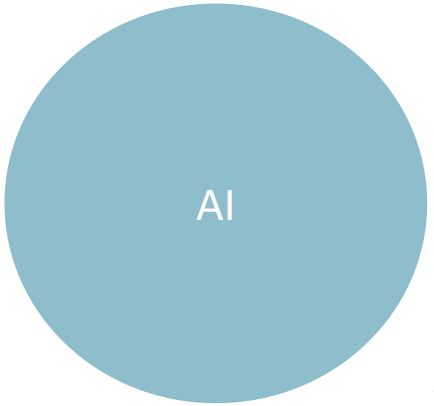
Regional marine, terrestrial & freshwater observatory

Data accessibility

LifeWatch BELGIUM

Regional marine, terrestrial & freshwater observatory





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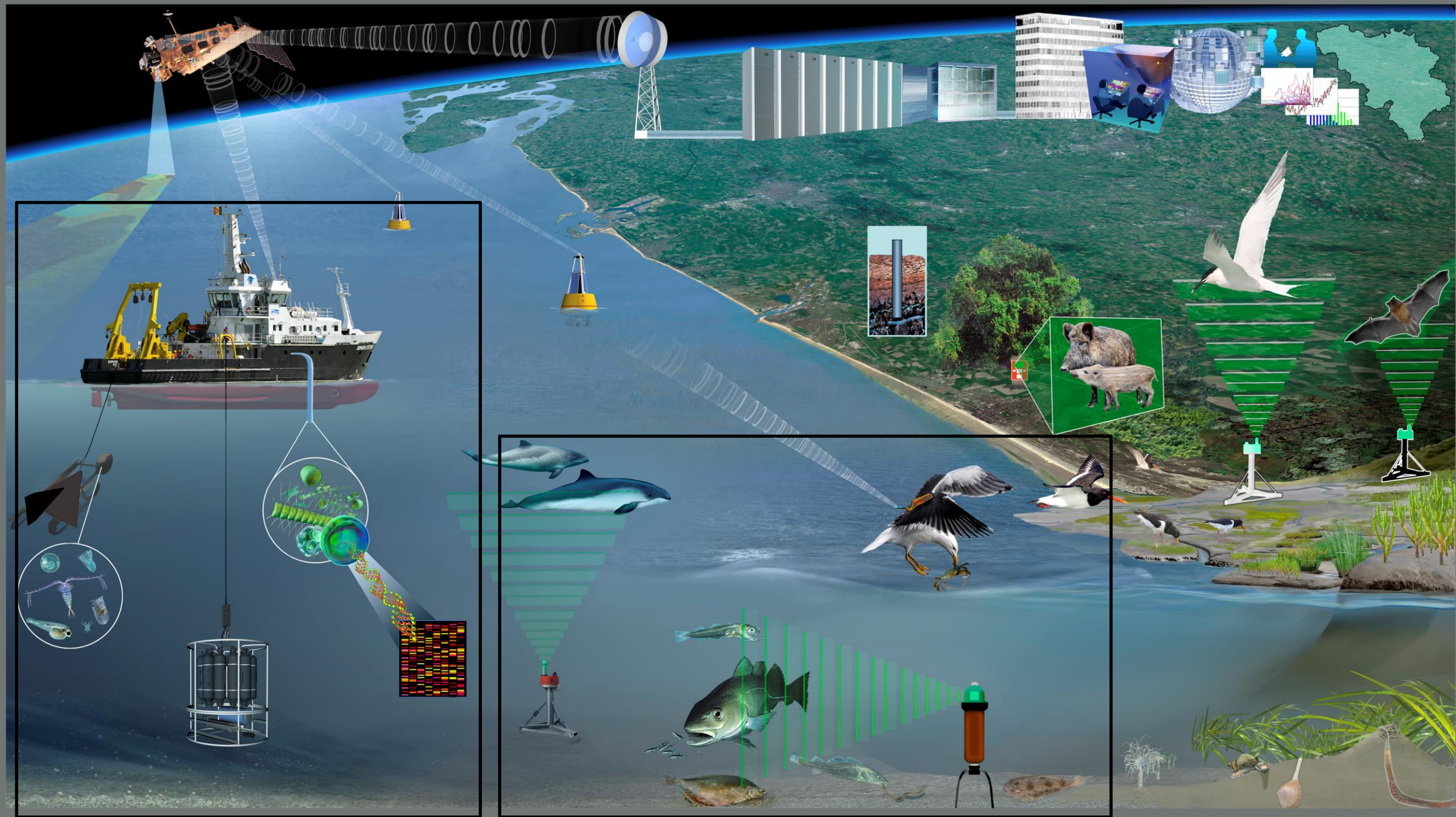


LifeWatch Observatory

Marine observatory

Imaging

Tracking

acoustics

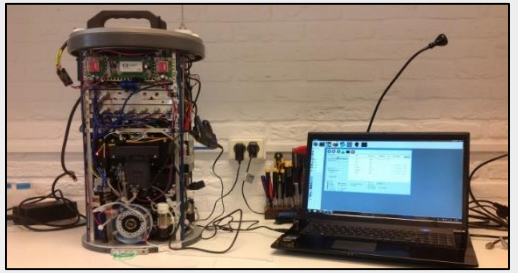
Monthly sampling campaign

ZooSCAN

Video Plankton Recorder

FlowCAM

Flow cytometer

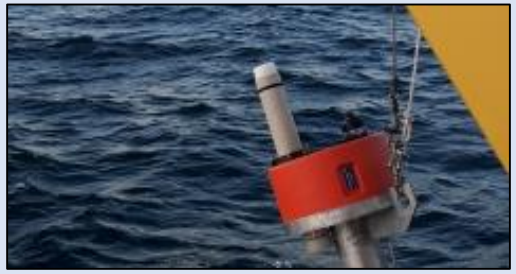


Monthly sampling stations

Acoustic receiver network

GPS bird tracking network

Passive acoustic network



Batcorder network

Sensor networks

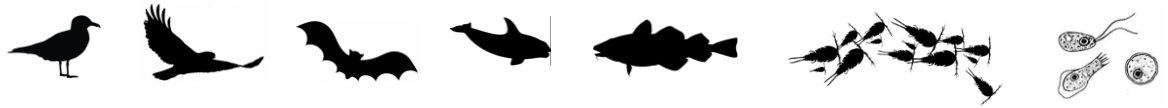
Groundwater monitoring network

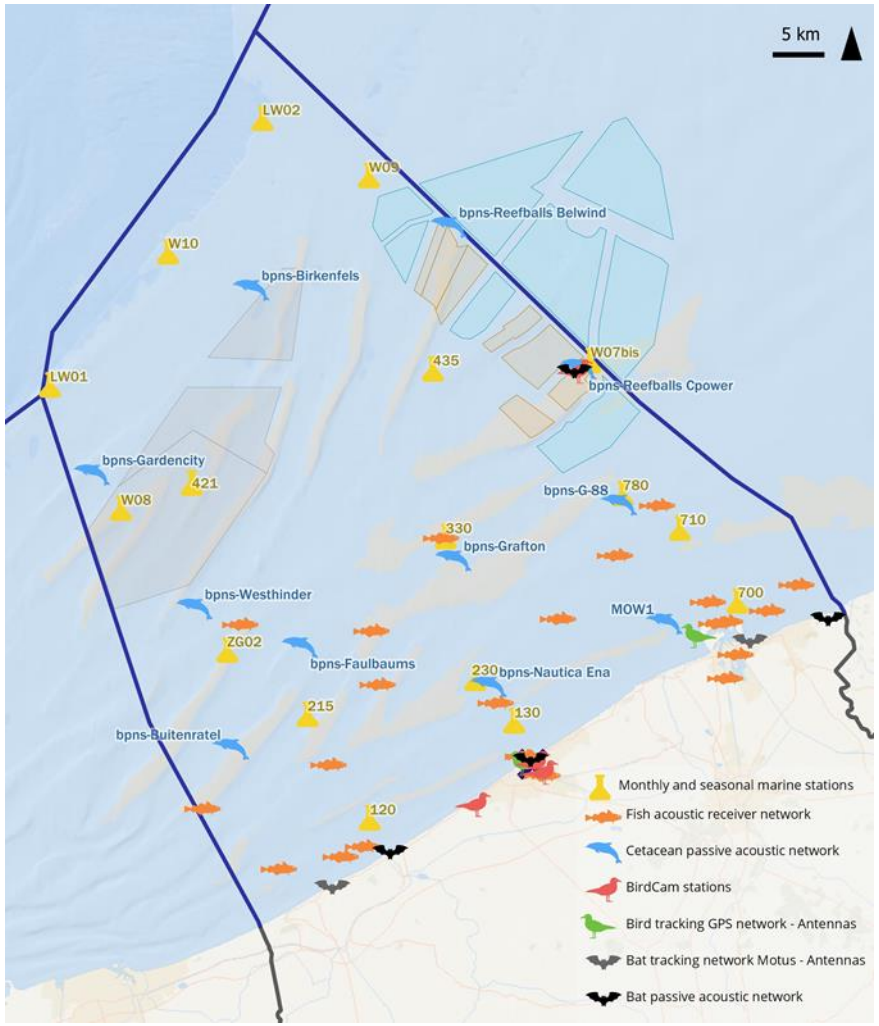
KLIVEG Climate monitoring

CATREIN Camera traps

Birdcams

LifeWatch Marine observatory: campaigns and sensor networks





1.713
REGISTERED USERS

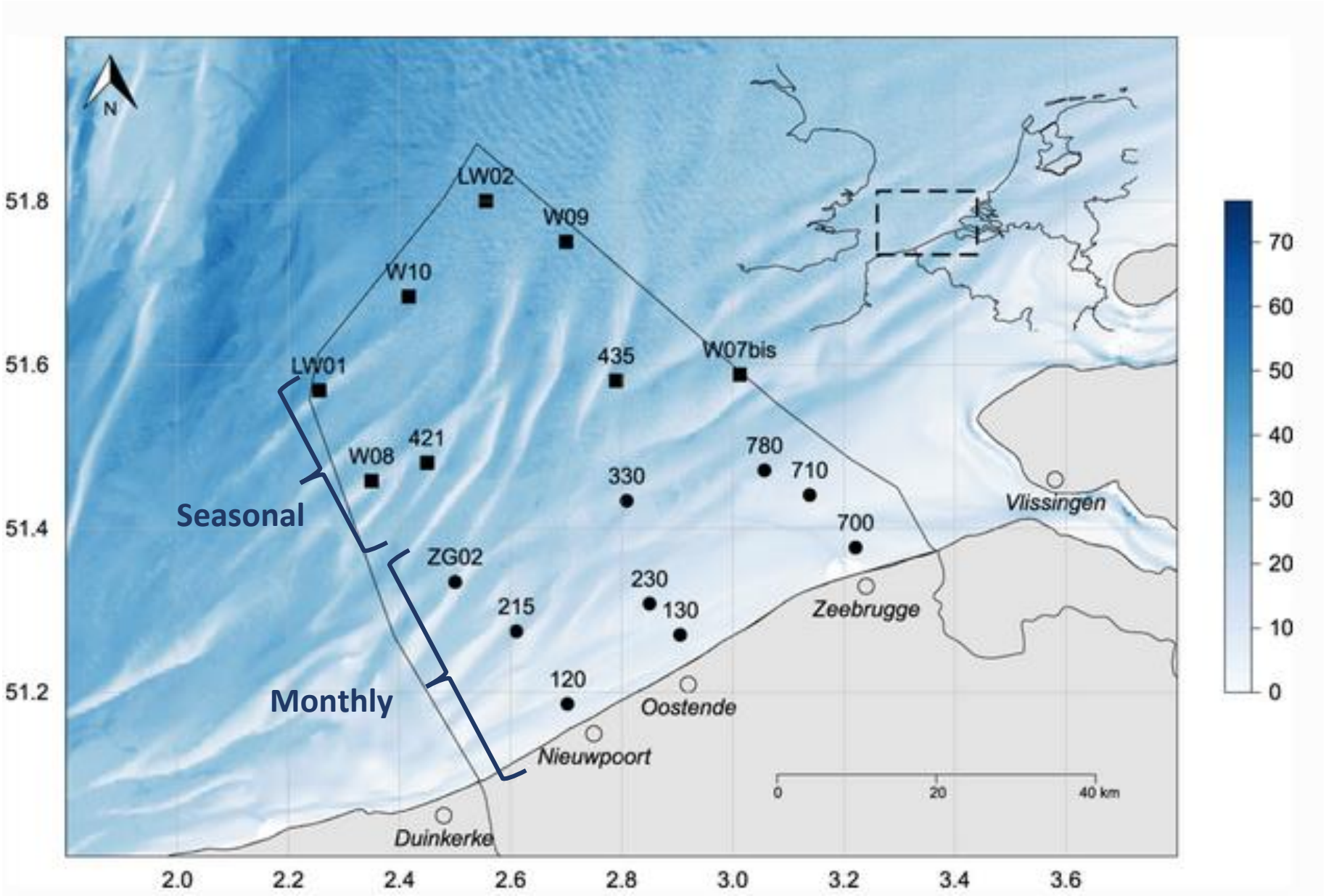
242
OPERATIONAL SENSOR STATIONS

1.575
SAMPLES COLLECTED

20 million
TAGGED SPECIES OBSERVATIONS

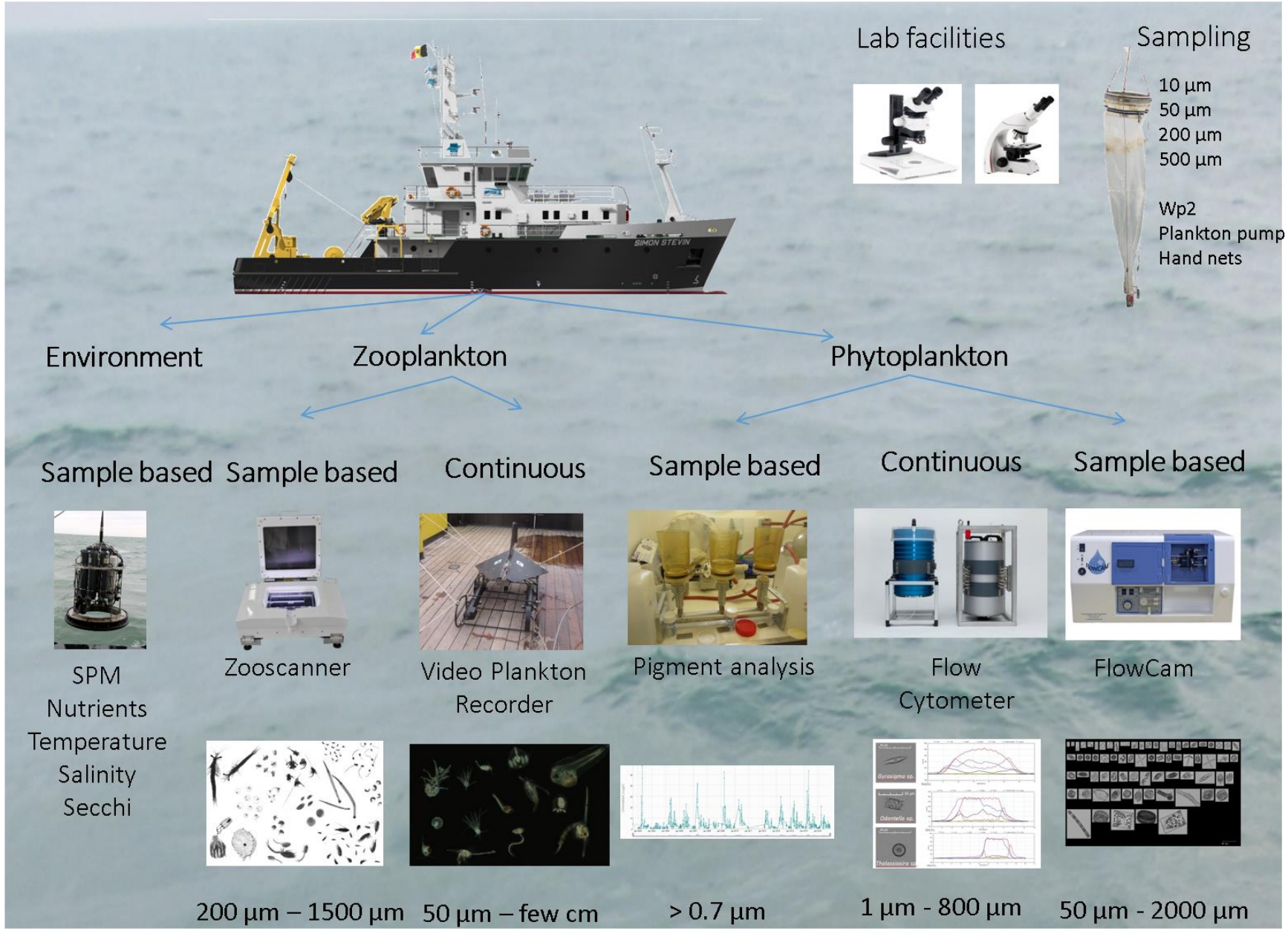
Output
51 published data sets
162 publications
50 peer reviewed papers

LifeWatch Marine observatory: monthly and seasonal campaigns



LifeWatch BELGIUM

LifeWatch Marine observatory: monthly and seasonal campaigns

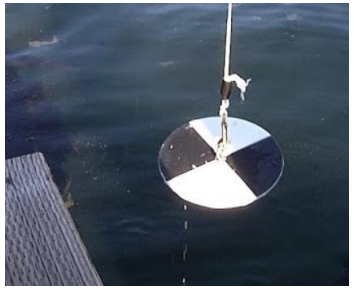


LifeWatch Marine observatory: monthly and seasonal campaigns

Abiotic data

Type	More specific	Periodicity	Since	Stations
Nutrients	Nitrates, Nitrites, Ammonia, Silicates, Phosphates	M+S	2002	Yes
Pigments	24 types (chl, diatoxines, ...)	M+S	2002	Yes
Suspended Particular Matter		M+S	2002	Yes
Secchi disk depth		M+S	2002	Yes

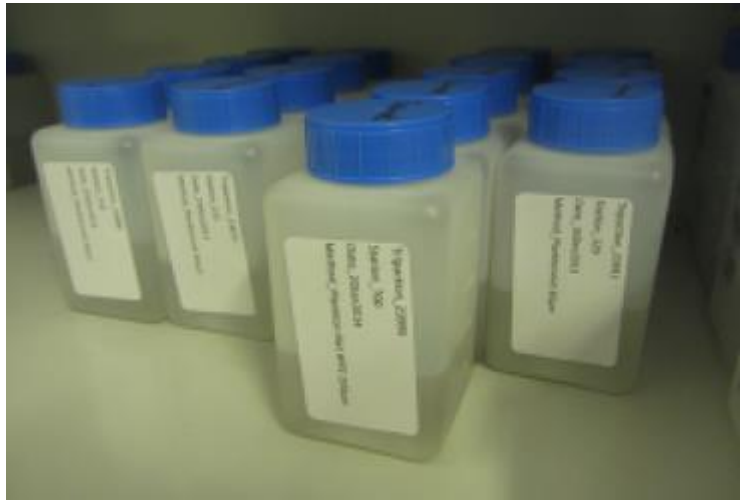
LifeWatch BELGIUM



LifeWatch Marine observatory: monthly and seasonal campaigns

Bio-archived samples

	Periodicity	Since	Station
Zooplankton	M+S	2014	Yes
Phytoplankton	M+S	2015	Yes
Macrobenthos	S	2012	Yes
Bacteria	M+S	2014	Yes
eDNA	M+S	2014	Yes



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EMBRC EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

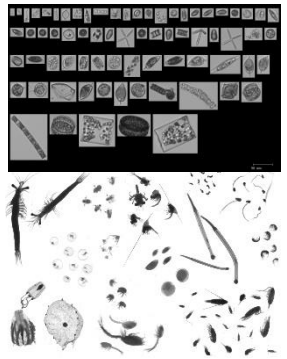
LifeWatch Marine observatory: monthly and seasonal campaigns

Biotic data

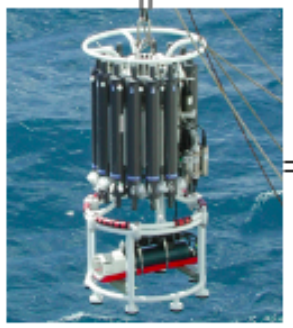
Parameter	Sensor	Periodicity	Since	Stations
Zooplankton abund.	Zooscan	M+S	2014	Yes
Zooplankton abund.	Video Plankton Recorder	On request		trajectory
Phytoplankton abund.	FlowCam	M+S	2012	Yes
Phytoplankton abund.	Flow Cytometer	On request		trajectory
Phytoplankton abund.	Fluorometer (FRRF)	M+S	2018	trajectory

~ Plankton Imaging Platform

Current focus on AI – Machine learning algorithms to automate identification of plankton species.



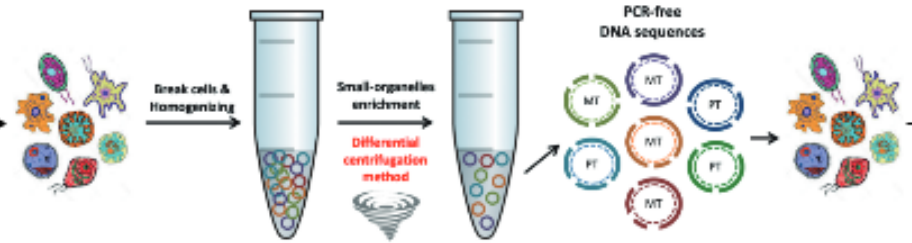
LifeWatch BELGIUM



Environmental sample metadata:

CTD
nutrients
pigments
...

Metagenome analysis



FlowCam

CNN classifier

Taxonomic composition

Cell abundance

Complete sample description

Data visualization & download

Data explorer

CNN = convolutional neural network

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RV- Underway Data

Water column parameters:

- Seawater Temperature
- Seawater Salinity
- Seawater Dissolved Oxygen
- Chlorophyll-a

Meteorological parameters:

- Air temperature
- Wind speed, direction
- Air pressure
- Relative air humidity

Later Phase:

- Seawater pCO2 (surface)
- Atmospheric CO2
- Active Fluorescence (GPP estimation)

Availability:

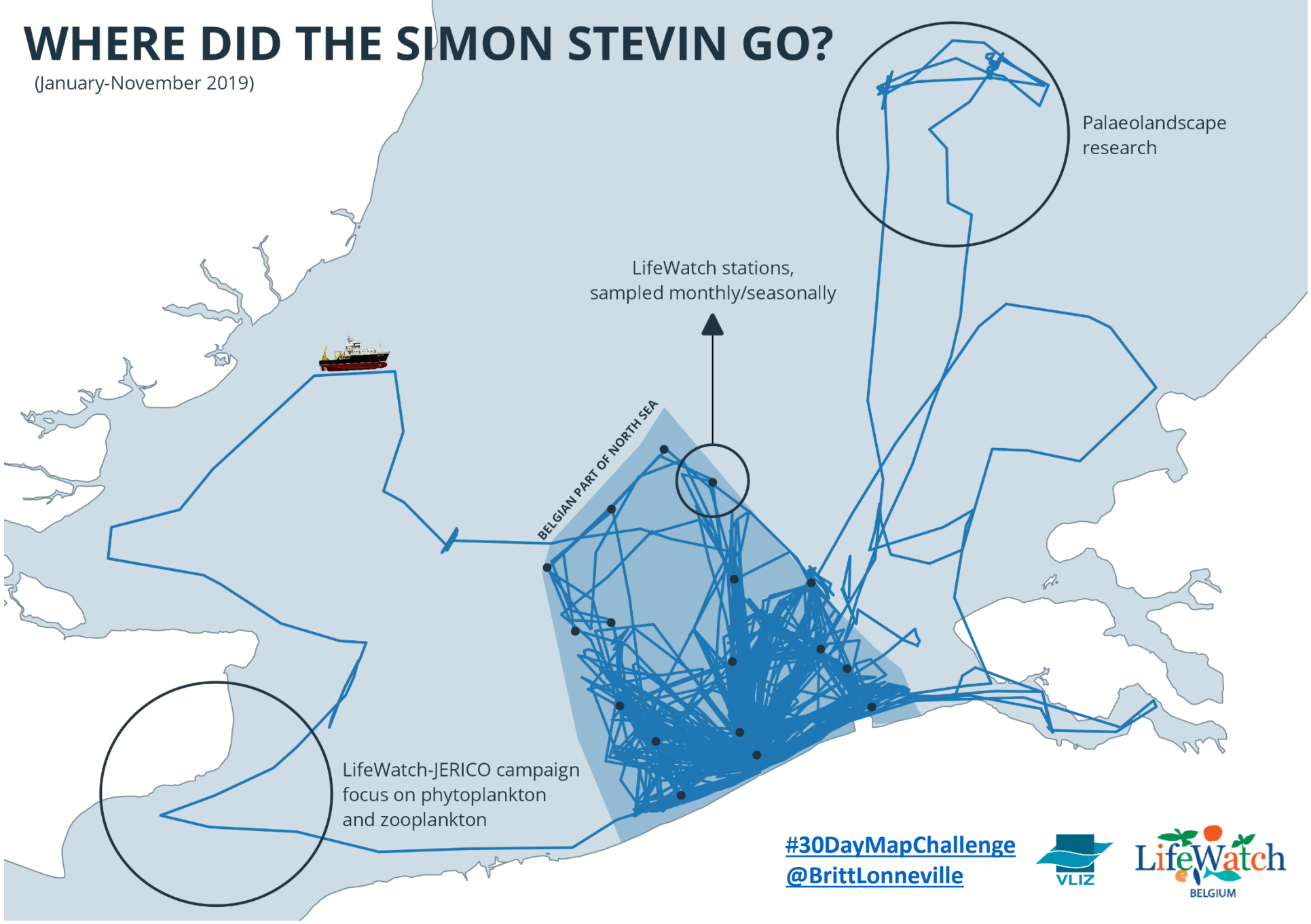
- Since 2002/2014
  - ~ parameter
  - ~ some data gaps
- 1 day time lag
- Continuous measurements (1 min, 10 min, 1 hour, 1 day)
- On average: 150 sail days

ICOS INTEGRATED CARBON OBSERVATION SYSTEM

LifeWatch BELGIUM

WHERE DID THE SIMON STEVIN GO?

(January-November 2019)



#30DayMapChallenge
@BrittLonneville

VLIZ

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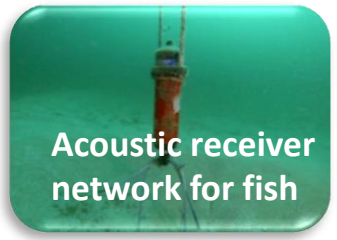
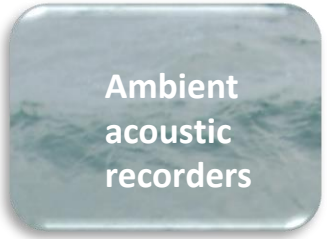
LifeWatch Marine observatory: sensor networks

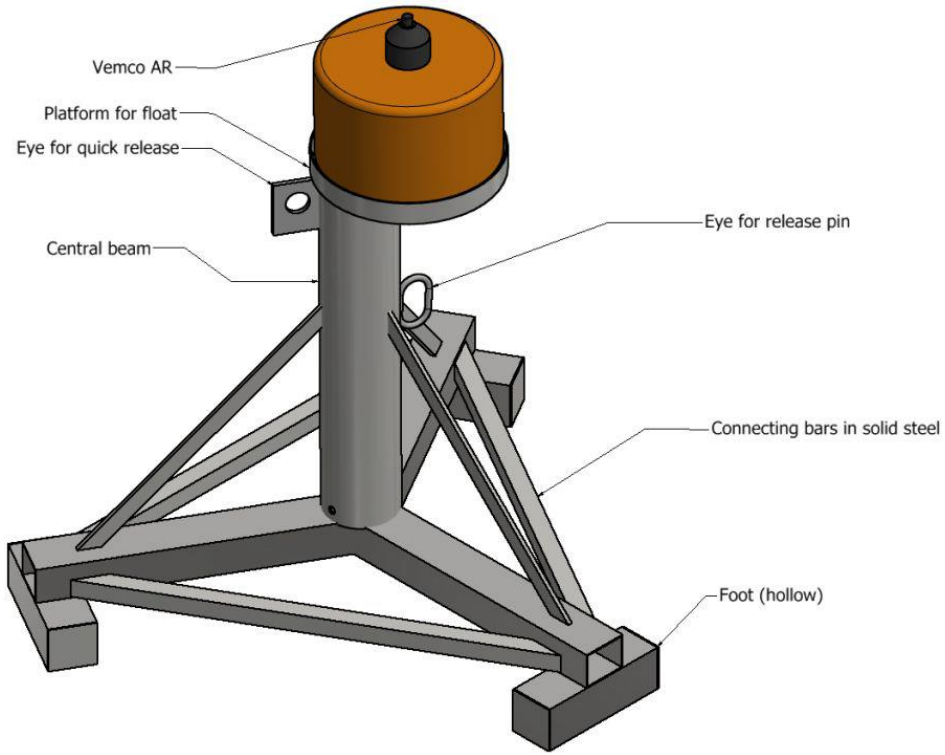


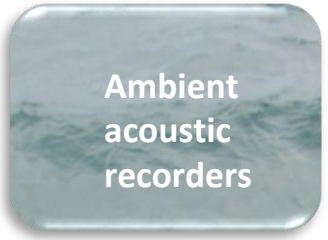


LifeWatch Marine observatory: sensor networks

Modular tripod

- Easy to deploy and retrieve sensors on the sea floor
- Nothing is left behind (demand of offshore industry)
- Can be adjusted to host other sensors
- Acoustic release
- Used for fish, porpoise and sound sensor networks





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LifeWatch Marine observatory: sensor networks

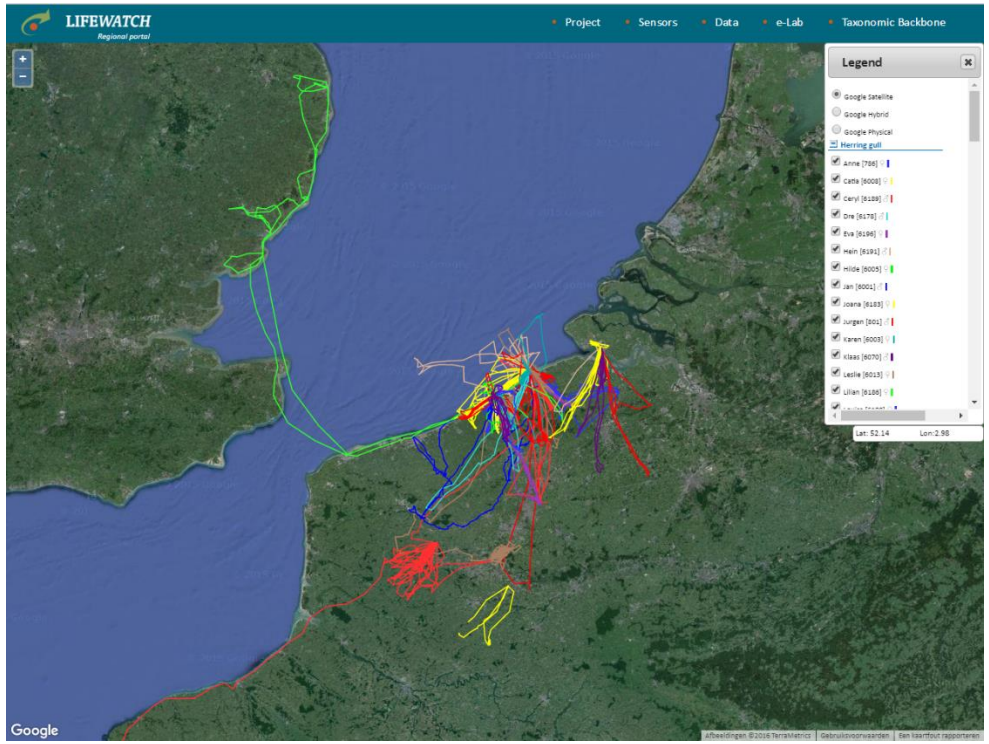
Sensor Network	Technique	Periodicity	Since	locations
CPOD	Acoustic	continuous	2014	10
Batcorder **Motus**	Acoustic	continuous	2017 2018	4-2
Fish Tracking Network	Acoustic	continuous	2014	160 tagged organisms
Bird Tracking Network	GPS trackers	continuous	2013	constant

LifeWatch
BELGIUM

LifeWatch Marine observatory: European scale

ETN - European tracking network

Data platform, featuring **74369337** detections



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LifeWatch Marine observatory: Thornton Buoy

ICOS INTEGRATED CARBON OBSERVATION SYSTEM

Parameters measured (*in situ*):

- Seawater Temperature
- Seawater Salinity
- Seawater pCO2 (surface)
- Atmospheric CO2
- Wind (speed, direction)
- Seawater Dissolved Oxygen
- Chlorophyll-a
- Turbidity (Suspended matter)

Parameters measured (Lab):

- Total Inorganic Carbon
- Total Alkalinity
- pH
- Dissolved Oxygen
- Inorganic Nutrients

Availability:

- Since mid 2017
- measurements (15 min – max 4 hours)
- Soon available through LifeWatch Data Explorer and ICOS Data Portal

Near C-Power wind park

Outline

Lifewatch Species Information Backbone

Regional marine, terrestrial & freshwater observatory

Data accessibility

LifeWatch BELGIUM

Data accessibility

LifeWatch Data Explorer:
Online tool for exploration, visualisation and downloading data.

- Select timeframe
- Data table
- Plot options
- Download

OPEN DATA (cc-by license)

http://lifewatch.be/en/lifewatch-data-explorer

LifeWatch Data Explorer

The LifeWatch data explorer provides data access and facilitates exploratory analysis of data generated by the local marine-freshwater-terrestrial LifeWatch observatory.

rshiny.lifewatch.be

LifeWatch Data Explorer - Manual

LifeWatch Data Explorer - Underway data

LifeWatch Data Explorer - Monitoring station data

LifeWatch Data Explorer - Zooplankton data

LifeWatch Data Explorer - Bird GPS tracking data

LifeWatch Data Explorer - Fish telemetry data

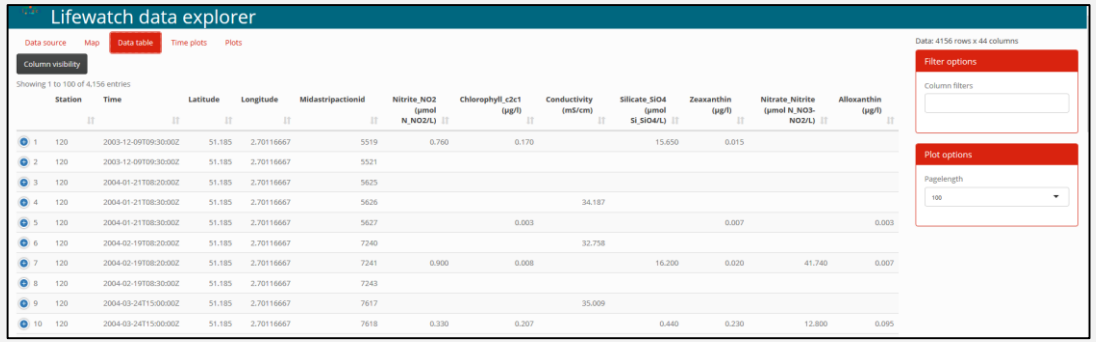
LifeWatch Data Explorer - Batcorder data

LifeWatch Data Explorer - C-POD data

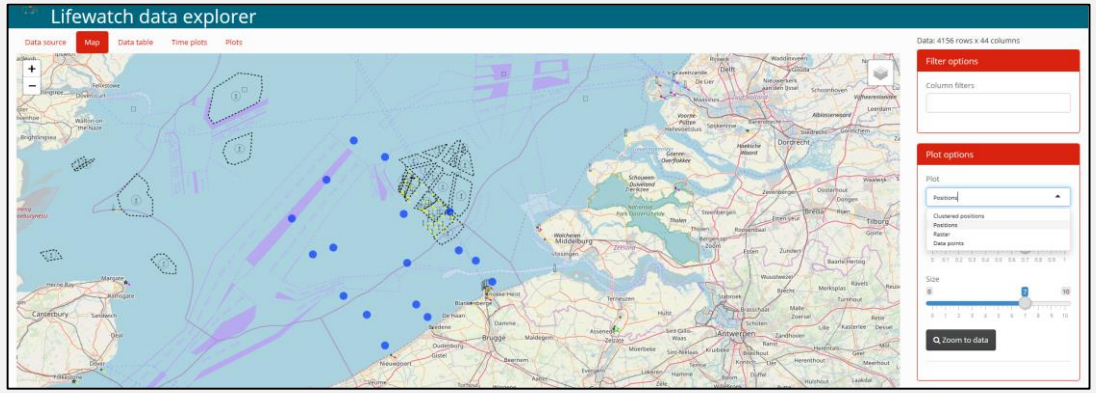
= All data open access

= Some data under moratorium

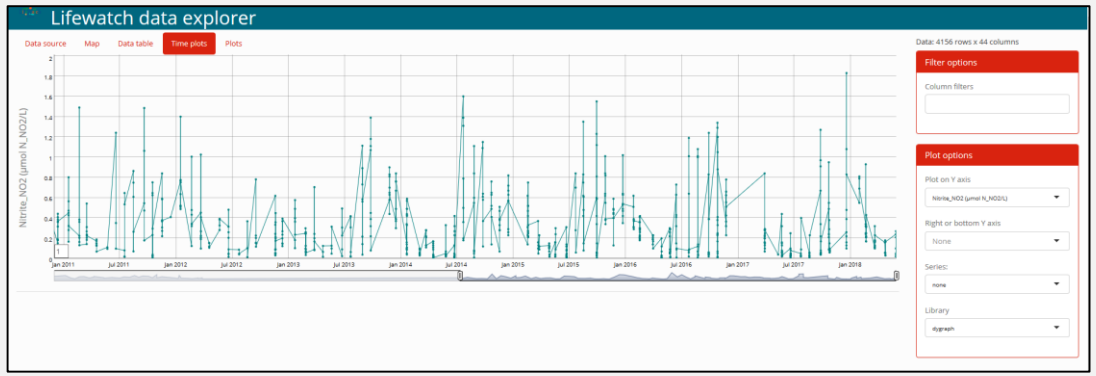
Data table



Map visualization



Interactive plotting



Other options

LifeWatch observatory data: nutrient, pigment, suspended matter and secchi measurements in the Belgian Part of the North Sea

Citation: Flanders Marine Institute (VLIZ), Belgium (2018): LifeWatch observatory data: nutrient, pigment, suspended matter and secchi measurements in the Belgian Part of the North Sea.

Abstract More Info

LifeWatch observatory data: passive accoustic network (CPOD) for Cetacean detection

Citation: Flanders Marine Institute (VLIZ), Belgium (2015): LifeWatch observatory data: passive accoustic network (CPOD) for Cetacean detection

Abstract More Info

LifeWatch observatory data: phytoplankton observations in the Belgian Part of the North Sea

Citation: Flanders Marine Institute (VLIZ), Belgium (2015): LifeWatch observatory data: phytoplankton observations in the Belgian Part of the North Sea

Abstract More Info

LifeWatch observatory data: reference collection of unique observations in the Belgian Part of the North Sea

Citation: Flanders Marine Institute (VLIZ), Belgium (2017): LifeWatch observatory data: reference collection of unique observations in the Belgian Part of the North Sea

Abstract More Info

LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea

Citation: Flanders Marine Institute (VLIZ), Belgium (2017): LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea

Abstract More Info

GitHub

33 repositories

github.com/topics/lifewatch

Software packages

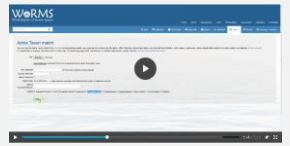
10 new packages in 2017 (21 in total):

etn	pydov
marinespeed	grofwildjacht
OpenSeaLab	bioRad
sdmpredictors	niche_vlaanderen
wateRinfo	pywhip

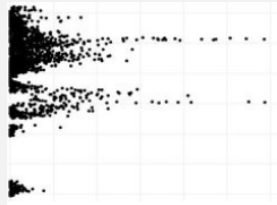
Tutorials & Use cases

Documentation and illustration of LifeWatch web services

E-lab



Taxon match tool tutorial video



Data analysis workshop

info@Lifewatch.be

Lifewatch at your service

info@lifewatch.be
https://www.lifewatch.be