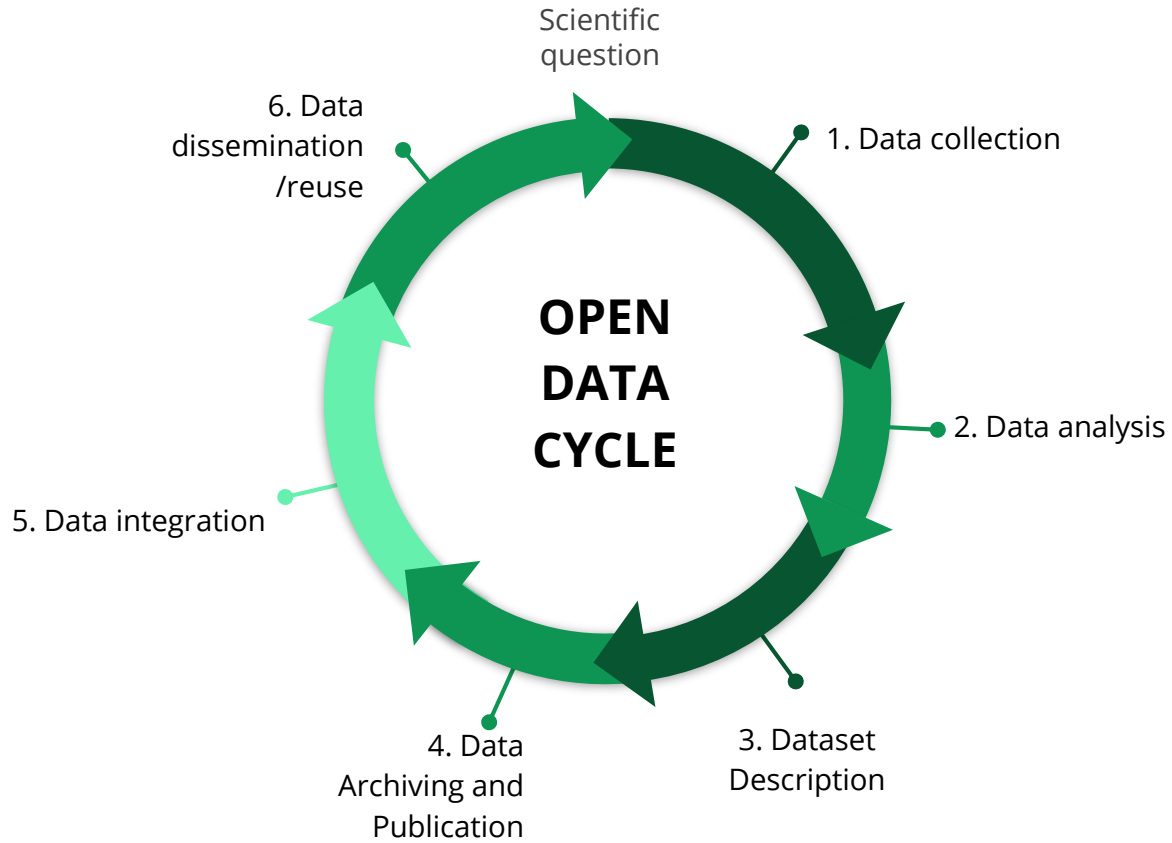


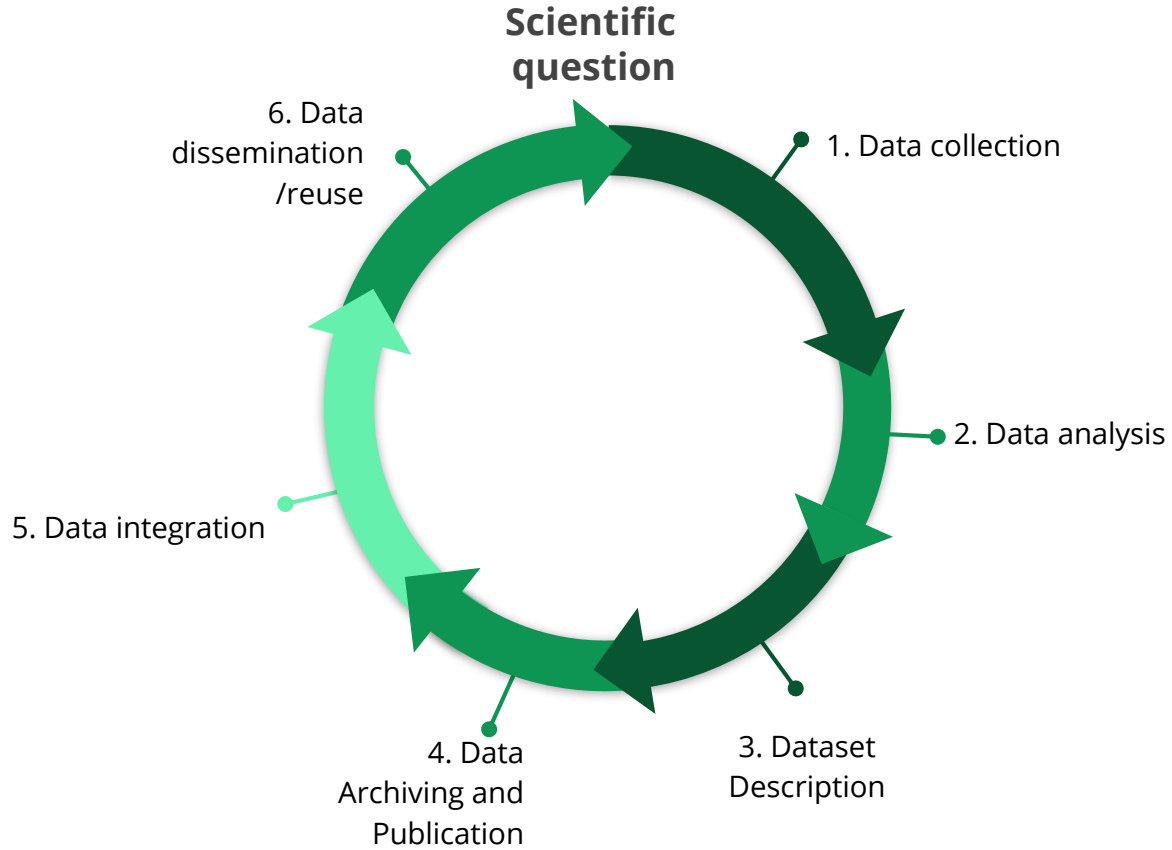
# From observations to ecosystem analysis

The data flow generating FAIR data

Lennert Schepers



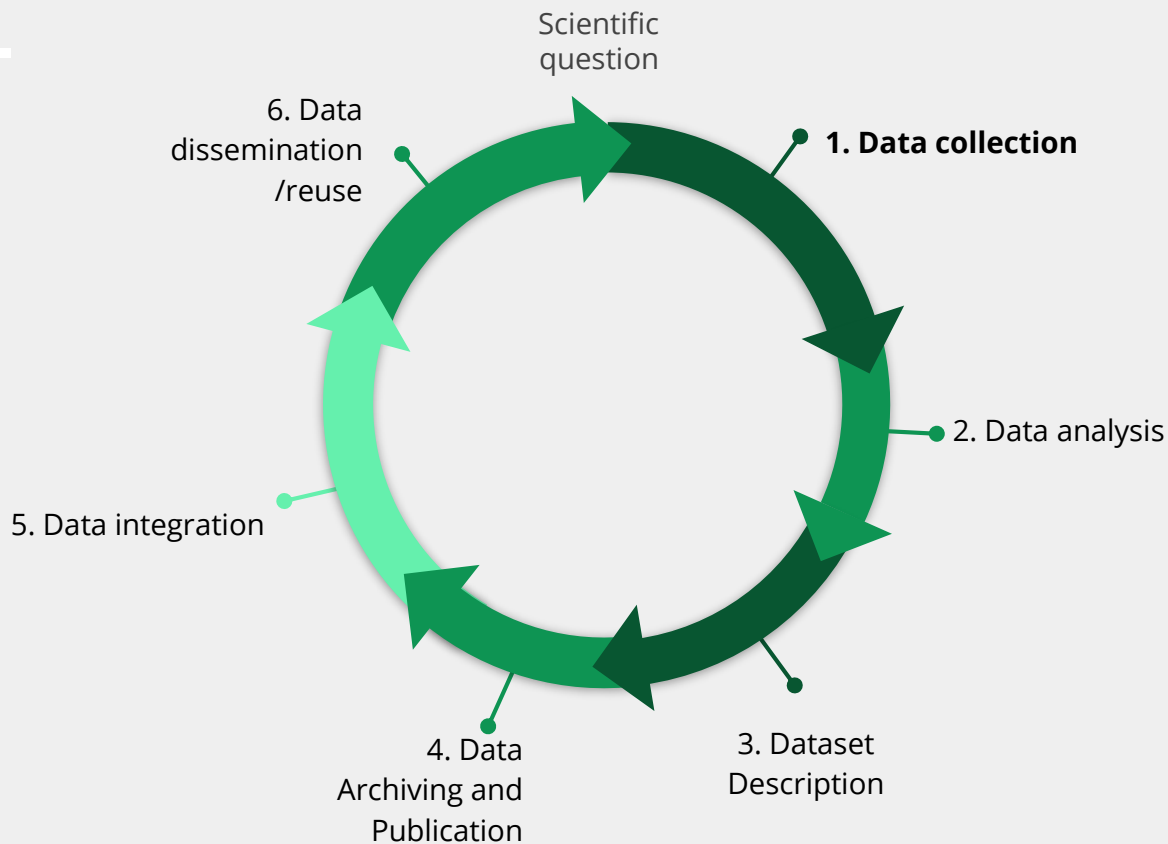




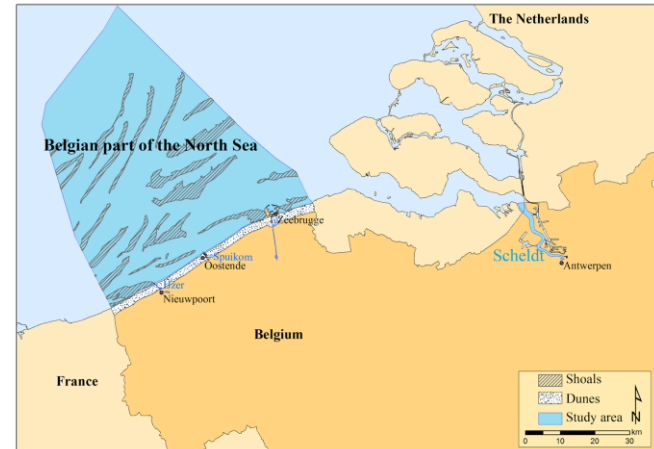


*Calanoida*

# 1. Data collection

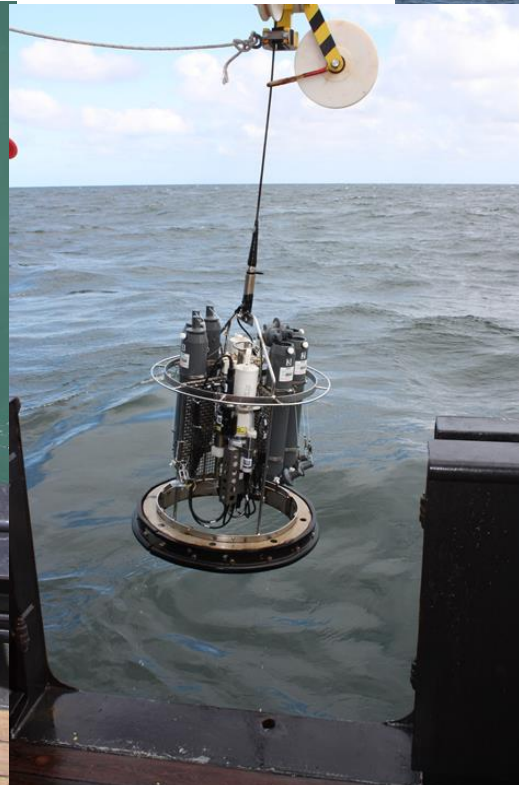
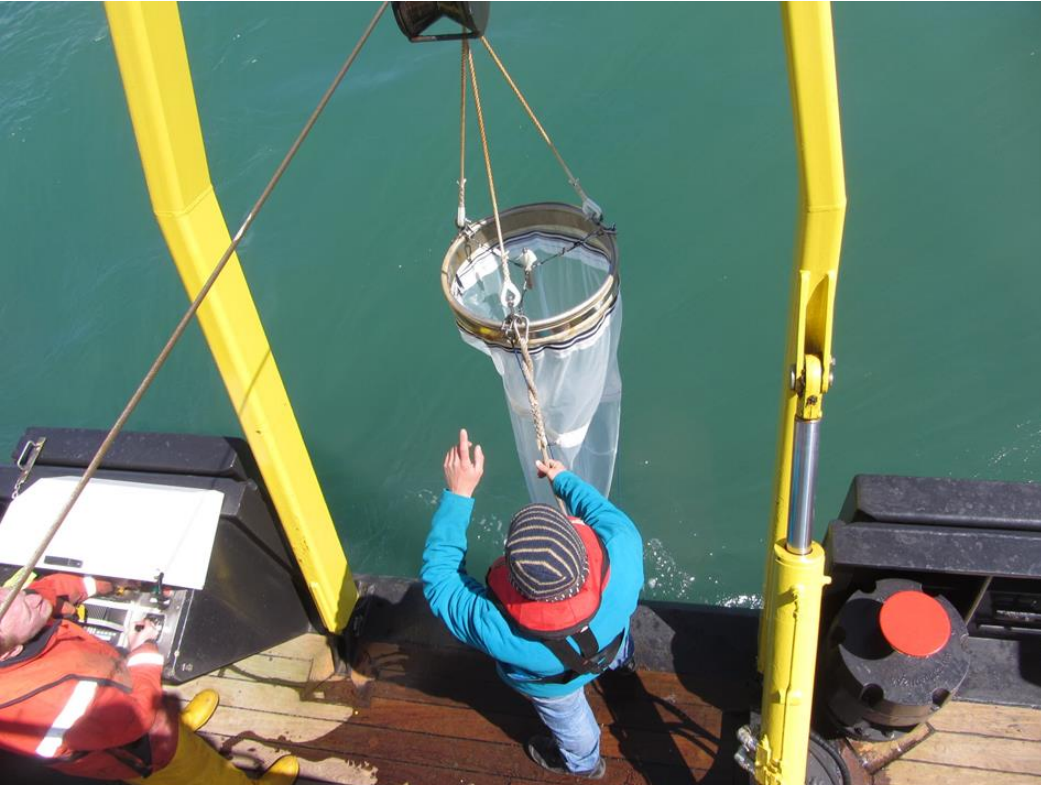


# RV Simon Stevin

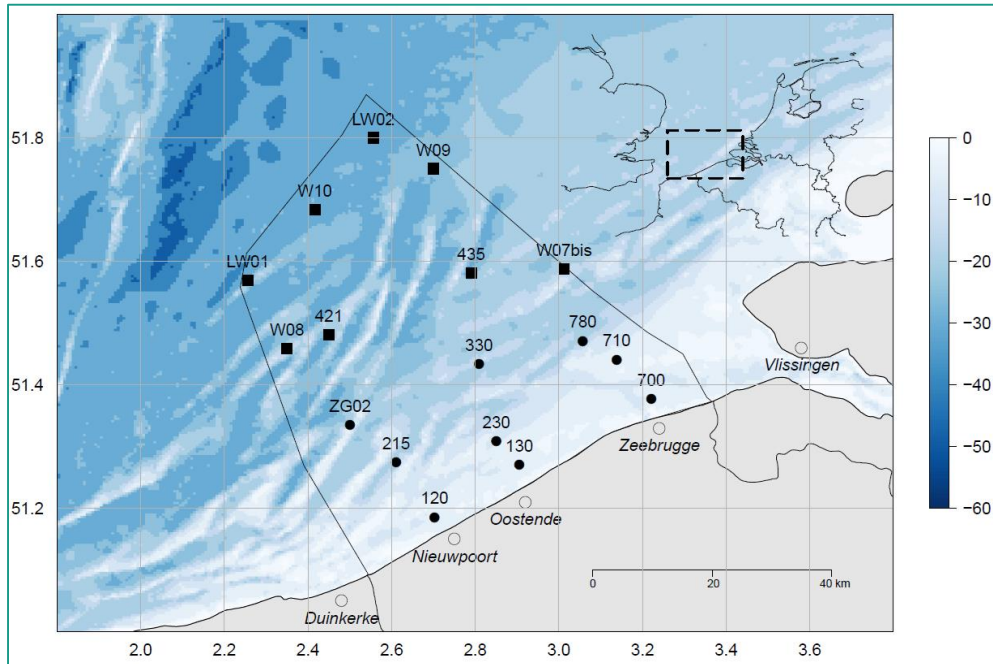


# 1. Data collection

---



# Long term sampling stations



## Monthly sampling campaigns

Nieuwpoort: 120 – 215 – ZG02

Oostende: 130 – 230 – 330


Zeebrugge: 700 – 710 – 780

## Seasonal sampling campaigns

Additional stations: 421 - W08 -  
LW01 - W10 - LW02 - W09 – 435 -  
W07bis



# QA: Standard Operating Procedure

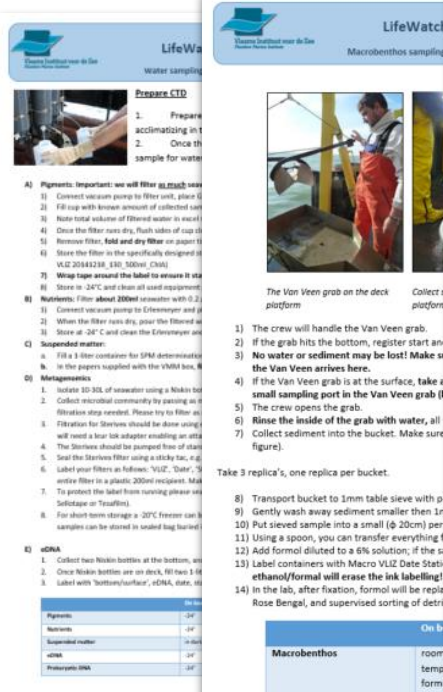


**Phytoplankton sampling**

**A) Samples for phytoplankton**

- 1) Take the blue 50L barrel (blue with orange stripe)
- 2) Clean the 55µm Apstein net carefully, inside and out
- 3) Collect bucket samples, at the side of the boat
- 4) At 50L stop collecting and lift out of the water
- 5) Clean the net from the outside to the inside
- 6) Pour the contents of the net into a 200ml plastic bottle
- 7) Put the sample in the fridge at 4°C
- 8) Don't forget to label: 'VLIZ', 'fyto', 'date', 'time', 'location'

Parameter	Unit
Pigments	µg/L
Microbes	µg/L
Suspended matter	µg/L
eDNA	µg/L
Preservation DNA	µg/L



**Macrobenthos sampling**

**Prepare CTD**

1. Prepare CTD
2. Once the CTD is ready, use it to collect a sample for water

**A) Pigments: important: we will filter at 200µm**

- 1) Connect vacuum pump to filter unit, place it in the bucket
- 2) Fill cup with known amount of collected water
- 3) Note total volume of filtered water in bucket
- 4) Once the filter runs dry, flush sides of cup with water
- 5) Remove filter, fold and dry filter on paper in the bucket
- 6) Store the filter in the specifically designed VLIZ 200µm filter, 150, 500ml, (M&B)
- 7) Wrap tape around the label to ensure it stays on
- 8) Store in 20°C and clean all used equipment

**B) Microbes: Filter about 200ml seawater with 0.2µm filter**

- 1) Connect vacuum pump to Ehrenmeyer and place it in the bucket
- 2) When the filter runs dry, pour the filtered water into the bucket
- 3) Store at 20°C and clean the Ehrenmeyer and bucket

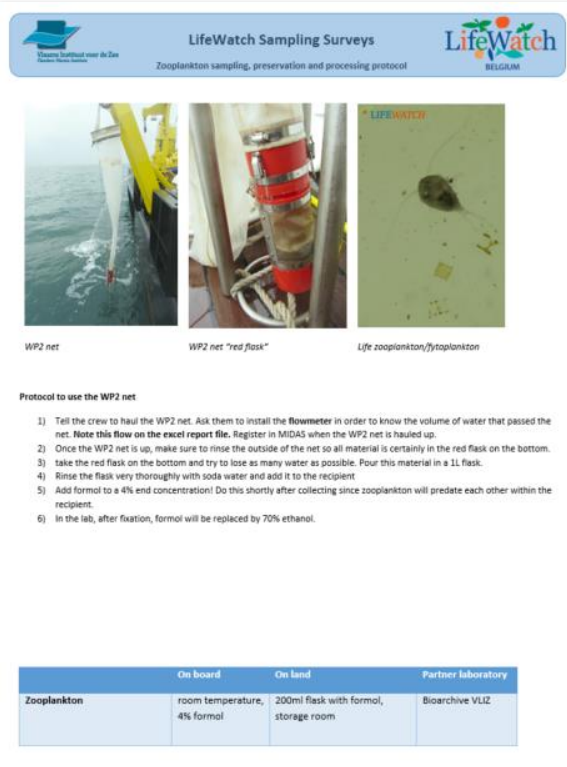
**C) Suspended matter:**

- a. Fill a 3 liter container for SPM determination
- b. In the papers supplied with the WML box, fill in the information




**D) Management:**

1. Isolate 10-30L of seawater using a Niskin bottle
2. Collect microbial community by passing it through a 0.2µm filter
3. Filtration for Steriles should be done using a 0.2µm filter
4. The Steriles should be pumped from the ship
5. Seal the Steriles filter using a sticker for 4°C
6. Label your filters as follows: 'VLIZ', 'Date', 'Time', 'Location'
7. To protect the label from turning please use Sellotape or Tesafilm
8. For short term storage a -20°C freezer can be used (samples can be stored in sealed bag/bottle)

Parameter	Unit
Pigments	µg/L
Microbes	µg/L
Suspended matter	µg/L
eDNA	µg/L
Preservation DNA	µg/L



**LifeWatch Sampling Surveys**  
Zooplankton sampling, preservation and processing protocol

**WP2 net**      **WP2 net "red flask"**      **Life zooplankton/fytoplankton**

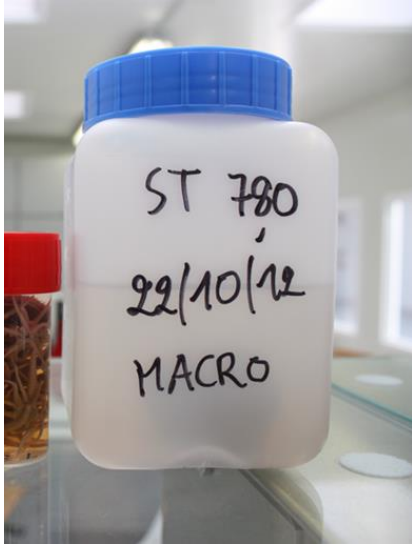
**Protocol to use the WP2 net**

- 1) Tell the crew to haul the WP2 net. Ask them to install the flowmeter in order to know the volume of water that passed the net. **Note this flow on the excel report file. Register in MIDAS when the WP2 net is hauled up.**
- 2) Once the WP2 net is up, make sure to rinse the outside of the net so all material is certainly in the red flask on the bottom.
- 3) Take the red flask on the bottom and try to lose as many water as possible. Pour this material in a 1L flask.
- 4) Rinse the flask very thoroughly with soda water and add it to the recipient
- 5) Add formal to a 4% end concentration! Do this shortly after collecting since zooplankton will predate each other within the recipient.
- 6) In the lab, after fixation, formal will be replaced by 70% ethanol.

	On board	On land	Partner laboratory
<b>Zooplankton</b>	room temperature, 4% formal	200ml flask with formal, storage room	Bioarchive VLIZ

# 1. Data collection - result

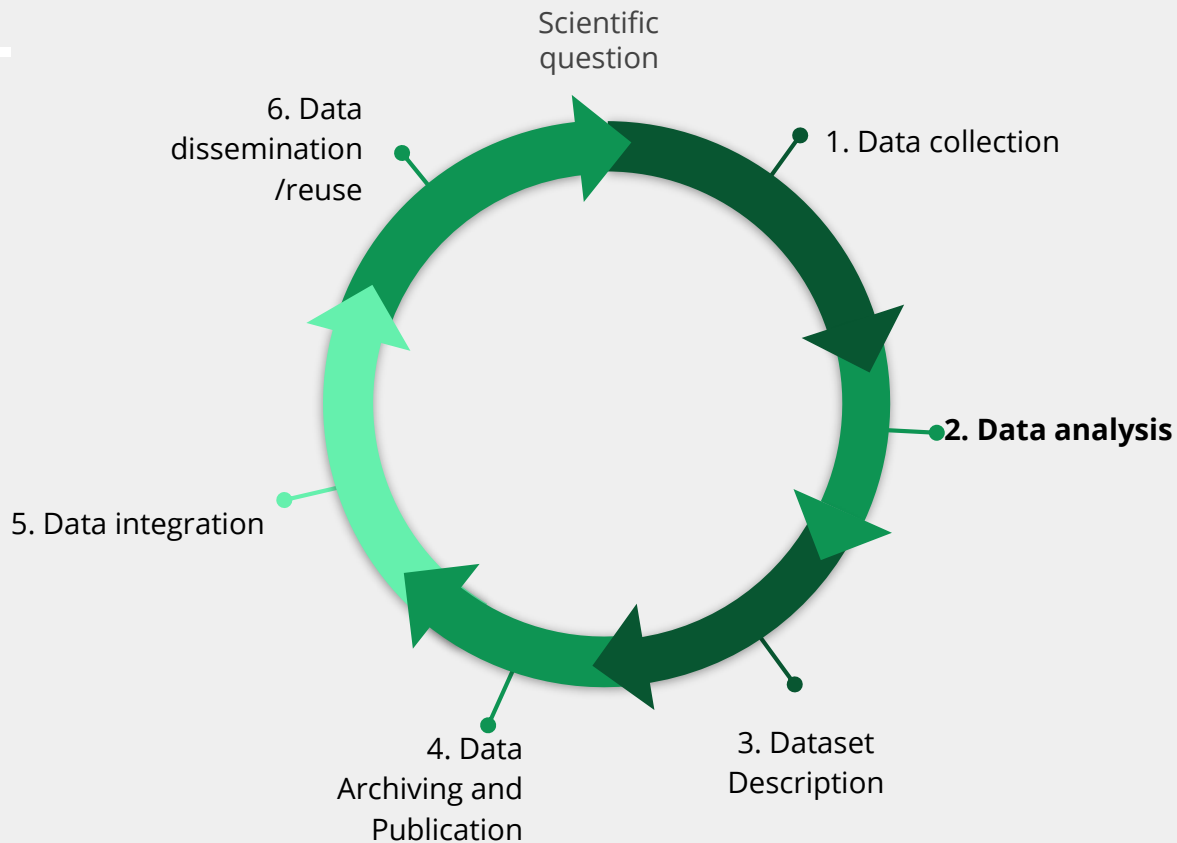
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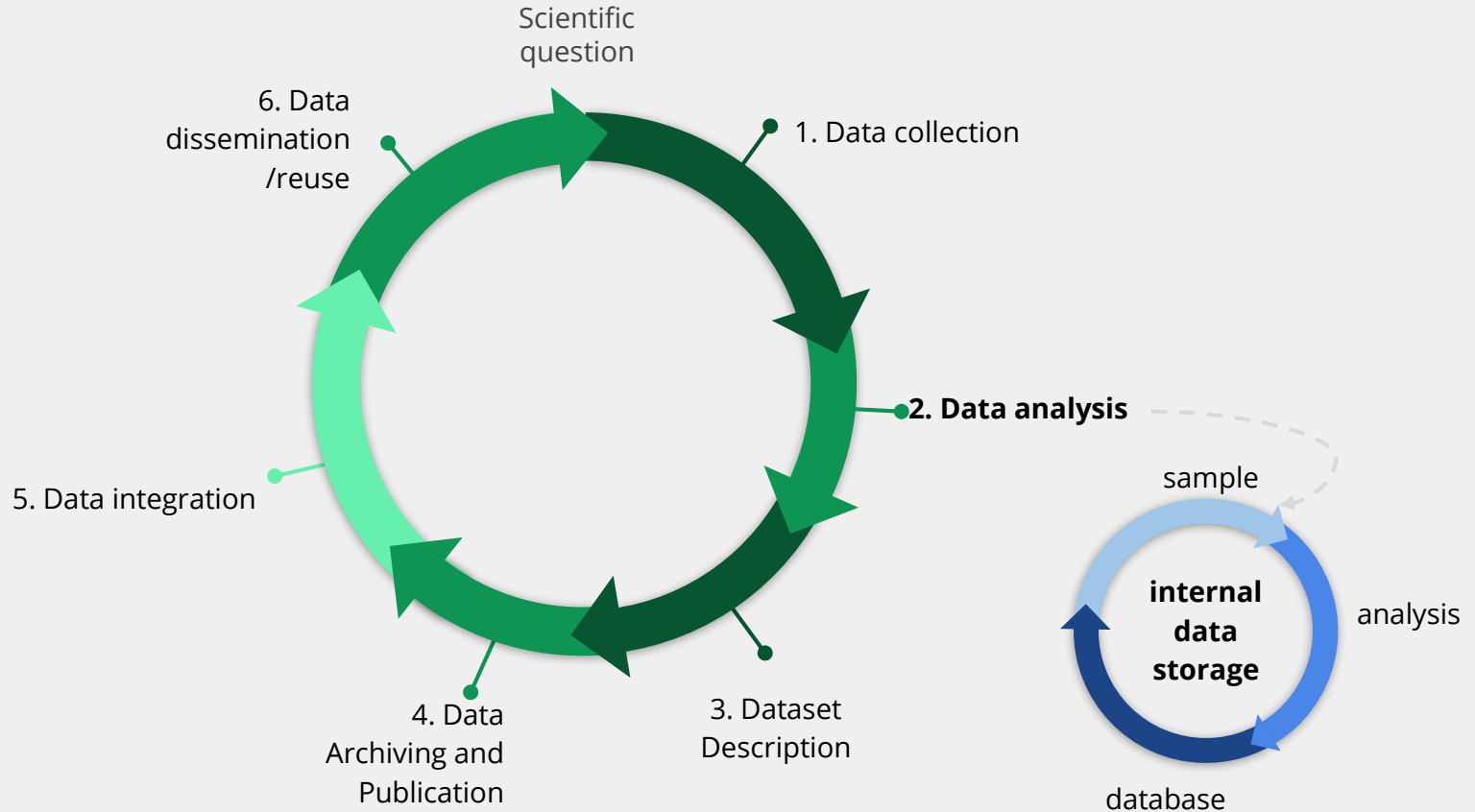
Result:

- sample taken according to well-defined protocol
- Water quality parameters in database

# 2. Data analysis

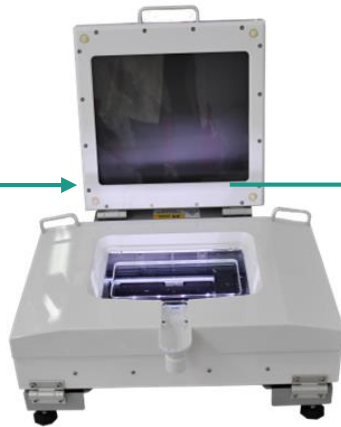
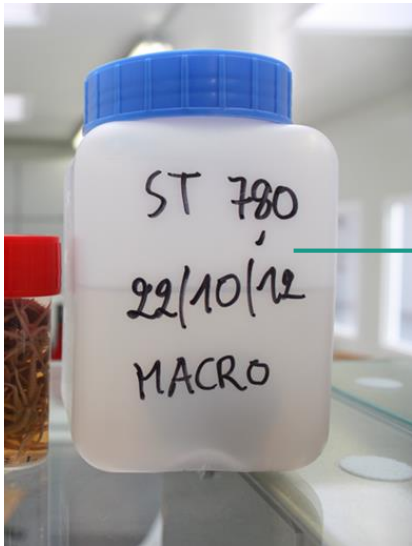
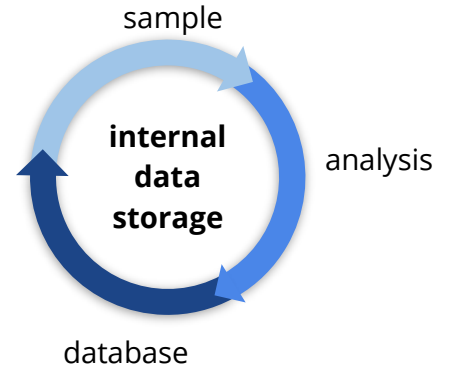


# 2. Data analysis



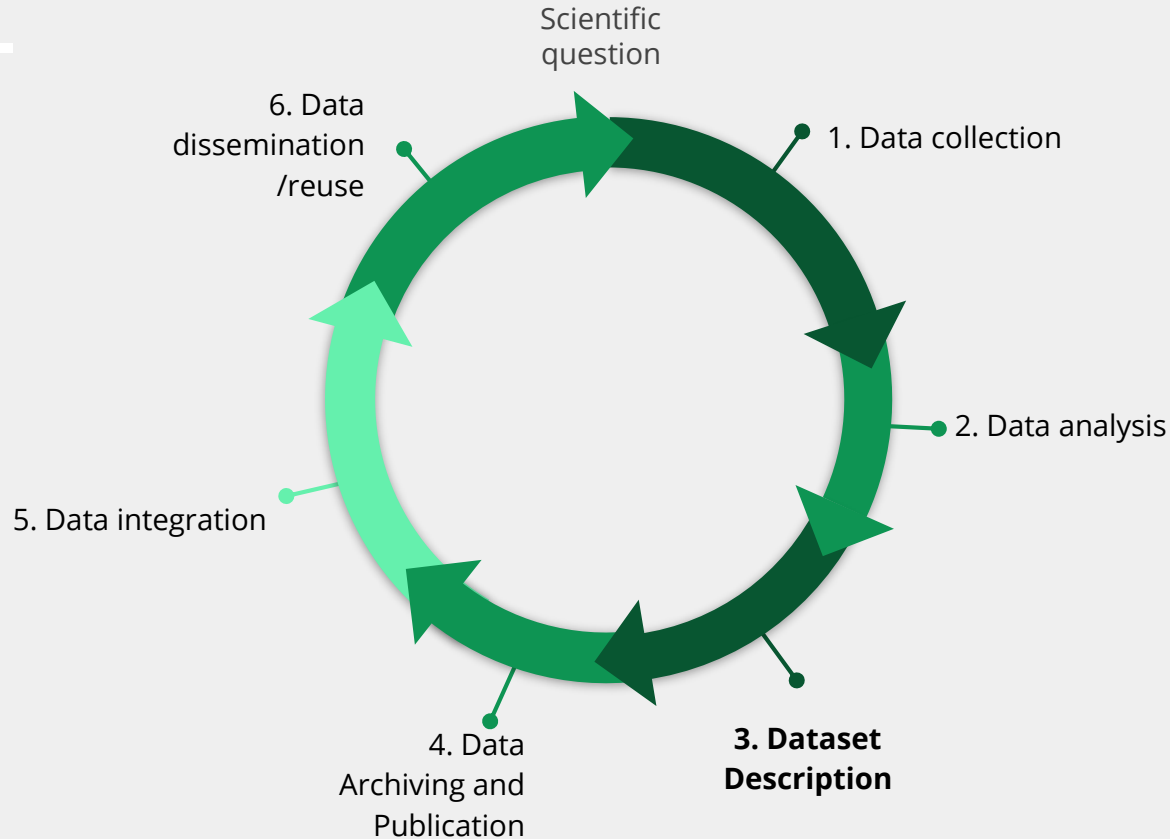
## 2. Data analysis

From sample to image to observation



LocationID	Longitude	Latitude	EventID	SamplingEvent	Location	Month	Year	SampleID	ScientistName	Year	Depth_m	Size
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Esterefa	3.30	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Nephtosira	03.00	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Nephtosira	6.70	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Sudolops amger	3.30	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Pygospio elegans	3.30	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Tharyx musca	36.70	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Nematostella oleracea	213.30	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Ceratonereis bicanalicata	03.00	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Mollusca mollusca	6.70	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Mollusca mollusca	3.30	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Planorbis planorbis	3.30	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Alia alia	6.70	
Belgische Kust en Vliestreek	2.52387	51.24206	Staatn 0786	Vaerivergad	0786-06-01	5	5	5	5	Duvalius duvalii	6.70	
Belgische Kust en Vliestreek	3.38022	51.38089	Staatn 1853	Vaerivergad	0786-01-05	8	8	8	8	Lagodon rhomboides	3.30	
Belgische Kust en Vliestreek	3.38022	51.38089	Staatn 1853	Vaerivergad	0786-01-05	8	8	8	8	Ensis limba	3.30	
Belgische Kust en Vliestreek	3.38022	51.38089	Staatn 1853	Vaerivergad	0786-01-05	8	8	8	8	Nephtosira	03.00	
Belgische Kust en Vliestreek	3.38022	51.38089	Staatn 1853	Vaerivergad	0786-01-05	8	8	8	8	Sudolops amger	6.70	
Belgische Kust en Vliestreek	3.38022	51.38089	Staatn 1853	Vaerivergad	0786-01-05	8	8	8	8	Spidellus	6.70	

# 3. Dataset description



# 3. Data set description

FAIR - Findable

IMIS

[Publications](#) | [Institutes](#) | [Persons](#) | [Datasets](#) | [Projects](#)

19 records found with search conditions : Title = 'lifewatch'

[Expand all](#) [Collapse all](#)

- ETN data: fish acoustic receiver network, [more](#)
- LifeWatch observatory - Permanent acoustic receiver network in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory - Permanent acoustic receiver network in the Western Scheldt, Array 2: Belgium, [more](#)
- LifeWatch observatory - Permanent acoustic receiver network in the Western Scheldt, Array 1: Belgium, [more](#)
- BVMtool**: LifeWatch computational tool for marine Biological Valuation Mapping, [more](#)
- LifeWatch observatory data: CTD temperature and salinity measurements in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory data: GPS tracking network for large birds, [more](#)
- LifeWatch observatory data: buoy data, [more](#)
- LifeWatch observatory data: fish acoustic receiver network, [more](#)
- LifeWatch observatory - Acoustic telemetry range-test dataset, performed in the C-Power wind farm, [more](#)
- LifeWatch observatory - Permanent acoustic receiver network in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory - Permanent acoustic receiver network in the Western Scheldt, Array 2: Belgium, [more](#)
- LifeWatch observatory - Permanent acoustic receiver network in the Western Scheldt, Array 1: Belgium, [more](#)
- LifeWatch observatory - Temporarily acoustic receiver network for range testing, performed in the C-Power wind farm, [more](#)
- LifeWatch observatory data: genetic data in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory data: long term collections of macrobenthos in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory data: nutrient, pigment, suspended matter and secchi measurements in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory data: passive acoustic network (CPOD) for Cetacean detection, [more](#)
- LifeWatch observatory data: phytoplankton observations by imaging flow cytometry (CytoSense) in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory data: phytoplankton observations by imaging flow cytometry (FlowCam) in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory data: reference collection of unique observations in the Belgian Part of the North Sea, [more](#)
- LifeWatch observatory data: sensor network for bat detection, [more](#)
- LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea, [more](#)

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


### Citable as data publication

Flanders Marine Institute (VLIZ), Belgium (2019): LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea. <https://doi.org/10.14284/329>

[Download Data](#)

Previous versions (2) [view](#)

Contact: [data@vliz.be](mailto:data@vliz.be)

Availability:  This dataset is licensed under a [Creative Commons Attribution 4.0 International License](#).

### Special collections:

AssemblePlus	EMBRC
Belgian marine datasets	IMIS themes
Belgian marine, coastal & estuarine areas	Lifewatch acknowledged
Diversiteit soorten	LifeWatch Observatory
Diversiteit soorten: Plankton	

### Description

In the framework of the Lifewatch marine observatory a number of fixed stations on the Belgian Part of the North Sea (BPNS) are visited on a monthly or seasonal basis using the RV Simon Stevin. A grid of nine stations covers the coastal zone and are sampled monthly. Eight additional stations, located further at sea, are sampled on a seasonal basis. This dataset contains zooplankton observations in the Belgian Part of the North Sea (BPNS) since 2012.

### Scope

**Themes:** Biology > Zooplankton  
**Keywords:** Marine, Zooplankton, ANE, Belgium, Belgian Continental Shelf (BCS)

### Geographical coverage

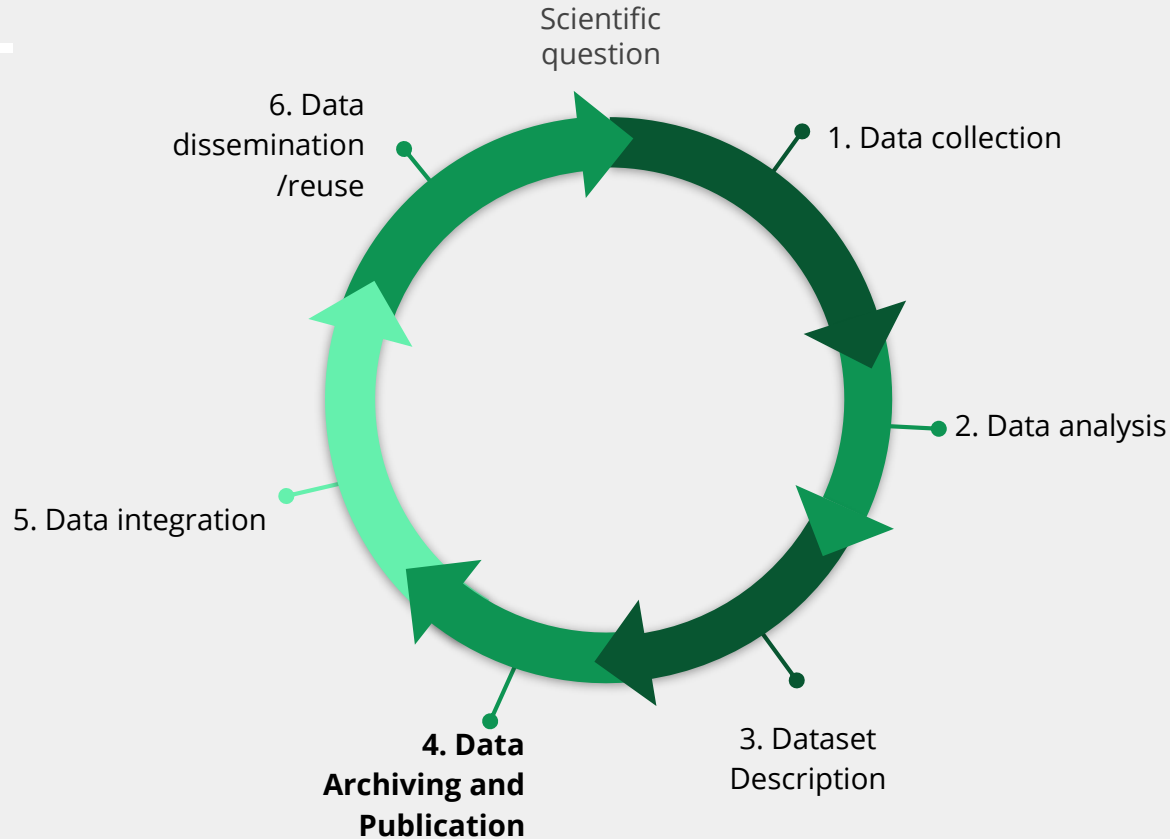
ANE, Belgium, Belgian Continental Shelf (BCS) [Stations \[Marine Regions\]](#)

### Temporal coverage

From 24 July 2012 on [In Progress]

<http://www.vliz.be/imis?module=dataset&dasid=4687>

# 4. Data Archiving and Publication





## 4. Archiving: Marine Data Archive

### Marine Data Archive



Intro

Archive

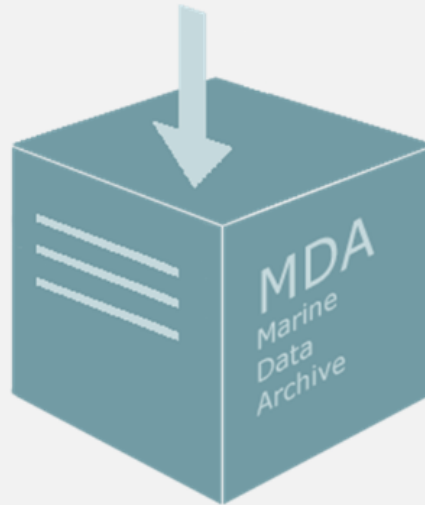
Manual

Policy

Register

Contact

FAQ



MDA... a secure, online system to **archive data files** in a **well-documented manner**.

[Log in](#)

<https://marinedataarchive.org>



# Data publication

FAIR - Accessible

<http://www.vliz.be/imis?module=dataset&dasid=4687>

<https://doi.org/10.14284/394>

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


### Citable as data publication

Flanders Marine Institute (VLIZ), Belgium (2019): LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea.  
<https://doi.org/10.14284/329>

[Download Data](#)

Previous versions (2) [view](#)

Contact: [data@vliz.be](mailto:data@vliz.be)

Availability:  This dataset is licensed under a [Creative Commons Attribution 4.0 International License](#).

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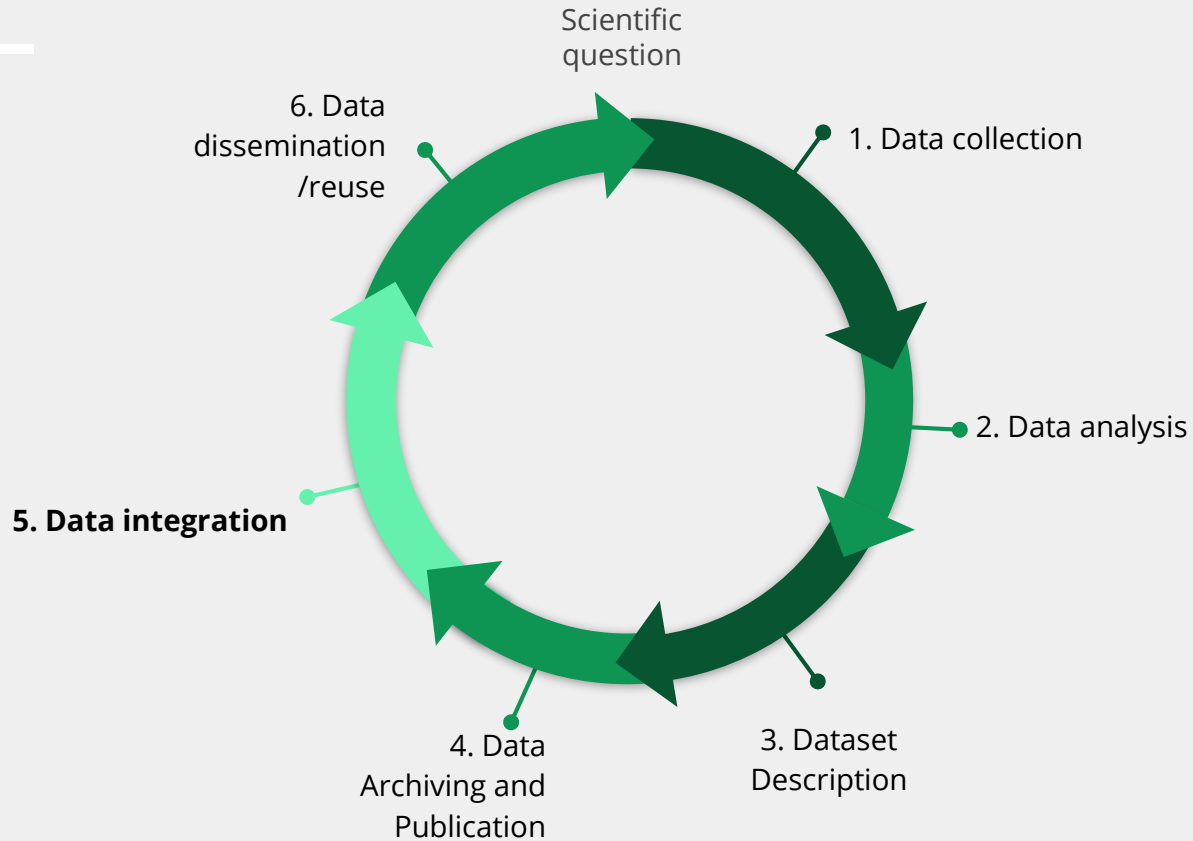
### Scope

**Themes:** Biology > Zooplankton  
**Keywords:** Marine, Zooplankton, ANE, Belgium, Belgian Continental Shelf (BCS)

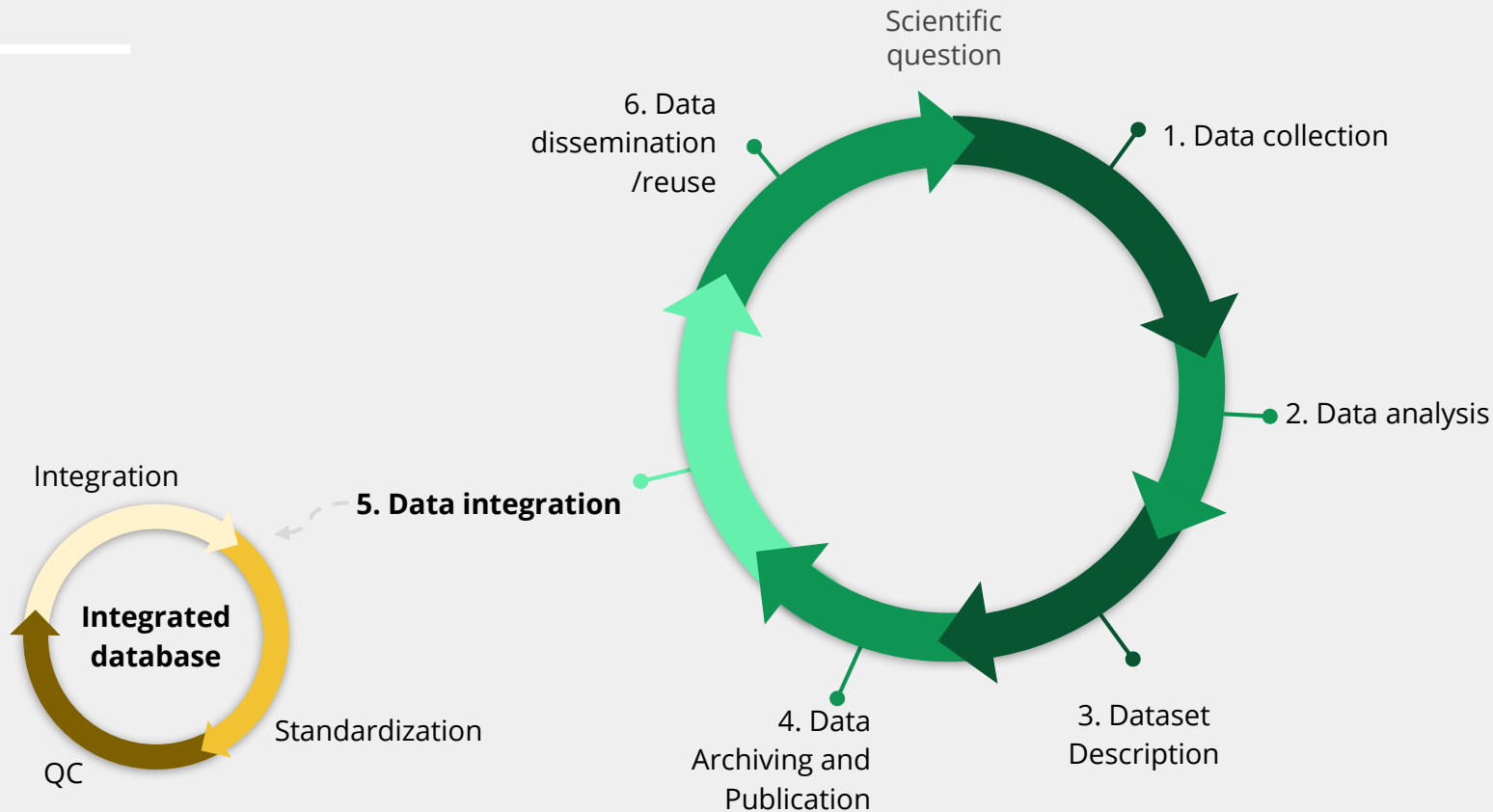
### Geographical coverage

ANE, Belgium, Belgian Continental Shelf (BCS) [Stations](#) [\[Marine Regions\]](#)

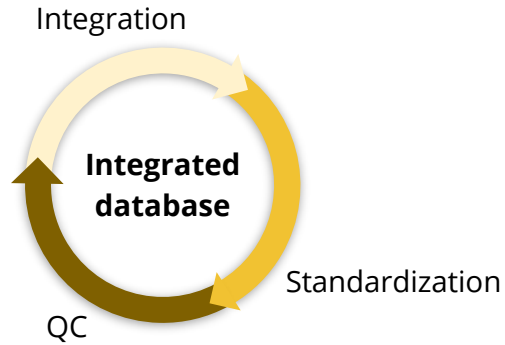
# 5. Data Integration



# 5. Data Integration



# 5. Data Integration



Integrated marine biological database:

- EurOBIS

**LifeWatch Species Information Backbone:**

- EurOBIS
- World Register of Marine Species
- Marine Regions



# Data standardisation

Taxonomic quality control

Dataset	Scientific names	After tax. check
1	<i>Calanus fimarchicus</i>	
2	<i>Calanus finmarchicus</i>	<i>Calanus finmarchicus</i>
3	<i>Calanus elegans</i>	
4	<i>Cetochilus finmarchicus</i>	



*Calanus finmarchicus*



urn:lsid:marinespecies.org:taxname:104466

# Data standardisation

## Controlled vocabularies

L
<b>Biomass</b>
0.0911392405
0.000721519
0.0005063291
0.053164557
0.003
0.0835443038
0.0015949367
0.0016075949
0.0000126582
0.0000253165
0.0002531646
0.0005696203

Biomass?



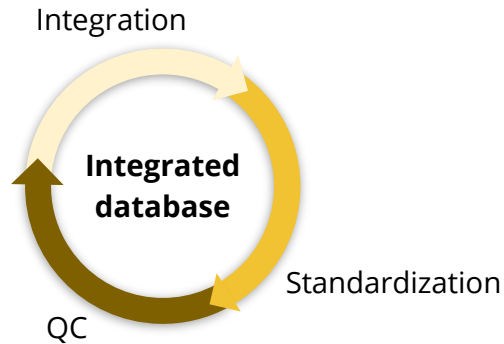
- Dry weight?
- Ash-free?
- Wet weight?
- Units?

Conceptid (12)	Preflabel
ODRYBM01	Dry weight biomass (in assayed sample) of biological entity specified elsewhere
OWETBM01	Wet weight biomass (in assayed sample) of biological entity specified elsewhere
SDBIOL03	Ash-free dry weight biomass of biological entity specified elsewhere per unit area of the bed
SDBIOL04	Wet weight biomass of biological entity specified elsewhere per unit volume of the water body
SDBIOL05	Wet weight biomass of biological entity specified elsewhere per unit area of the bed
SDBIOL07	Ash-free dry weight biomass of biological entity specified elsewhere per unit volume of the water body
SDBIOL08	Dry weight biomass of biological entity specified elsewhere per unit area of the bed
SDBIOL09	Dry weight biomass of biological entity specified elsewhere per unit volume of the water body

<http://vocab.nerc.ac.uk/collection/P01/current/ODRYBM01/>

# 5. Data Integration

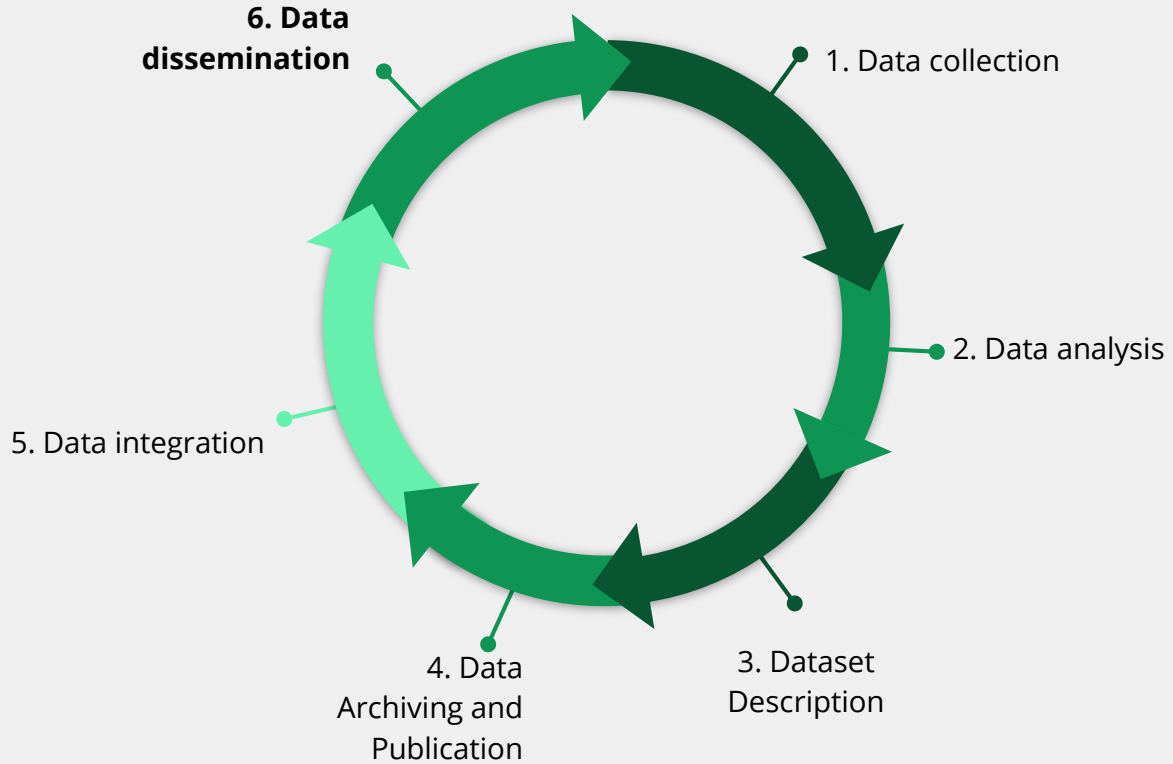
**FAIR** - Findable - Accessible - Interoperable - Reusable



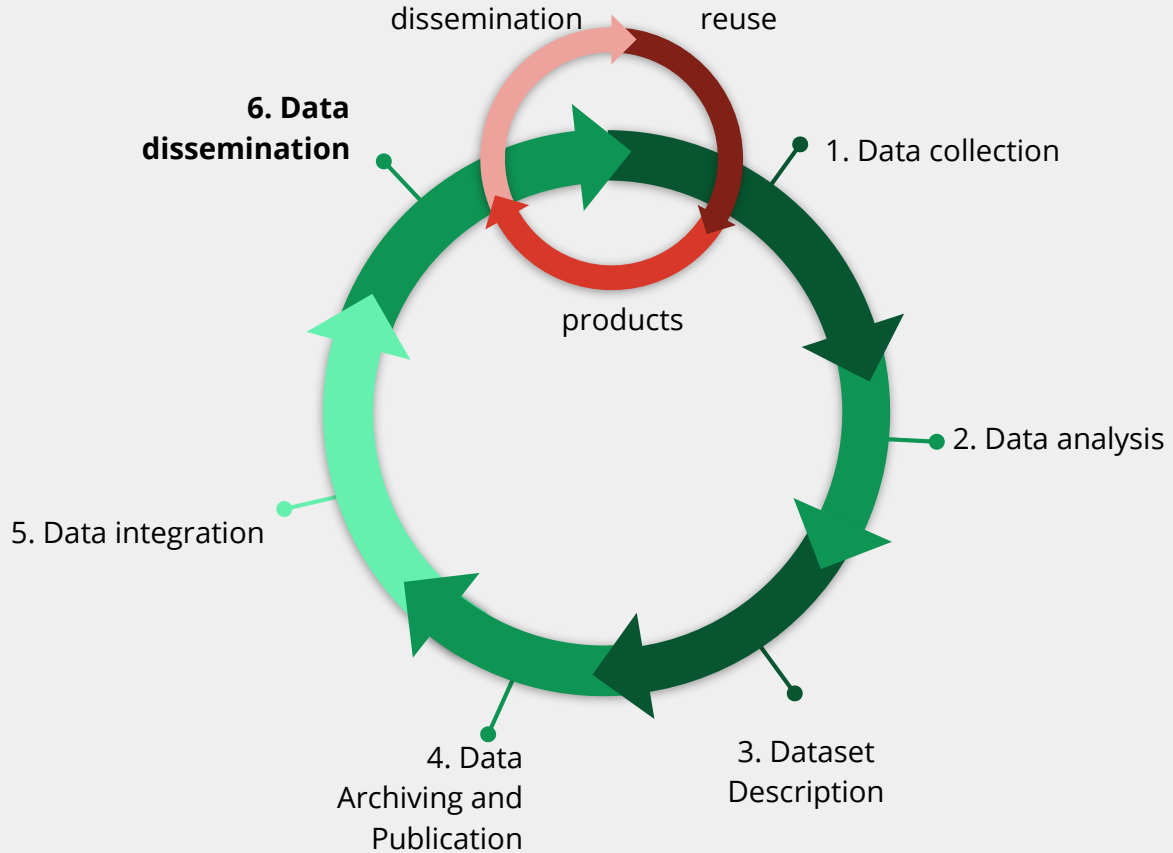


# 6. Data dissemination

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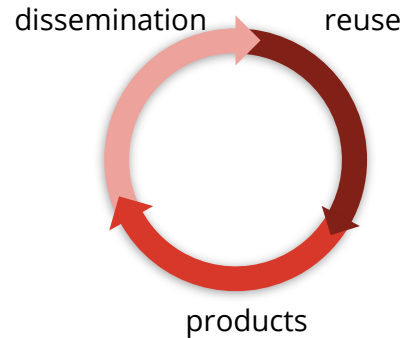
# 6. Data dissemination



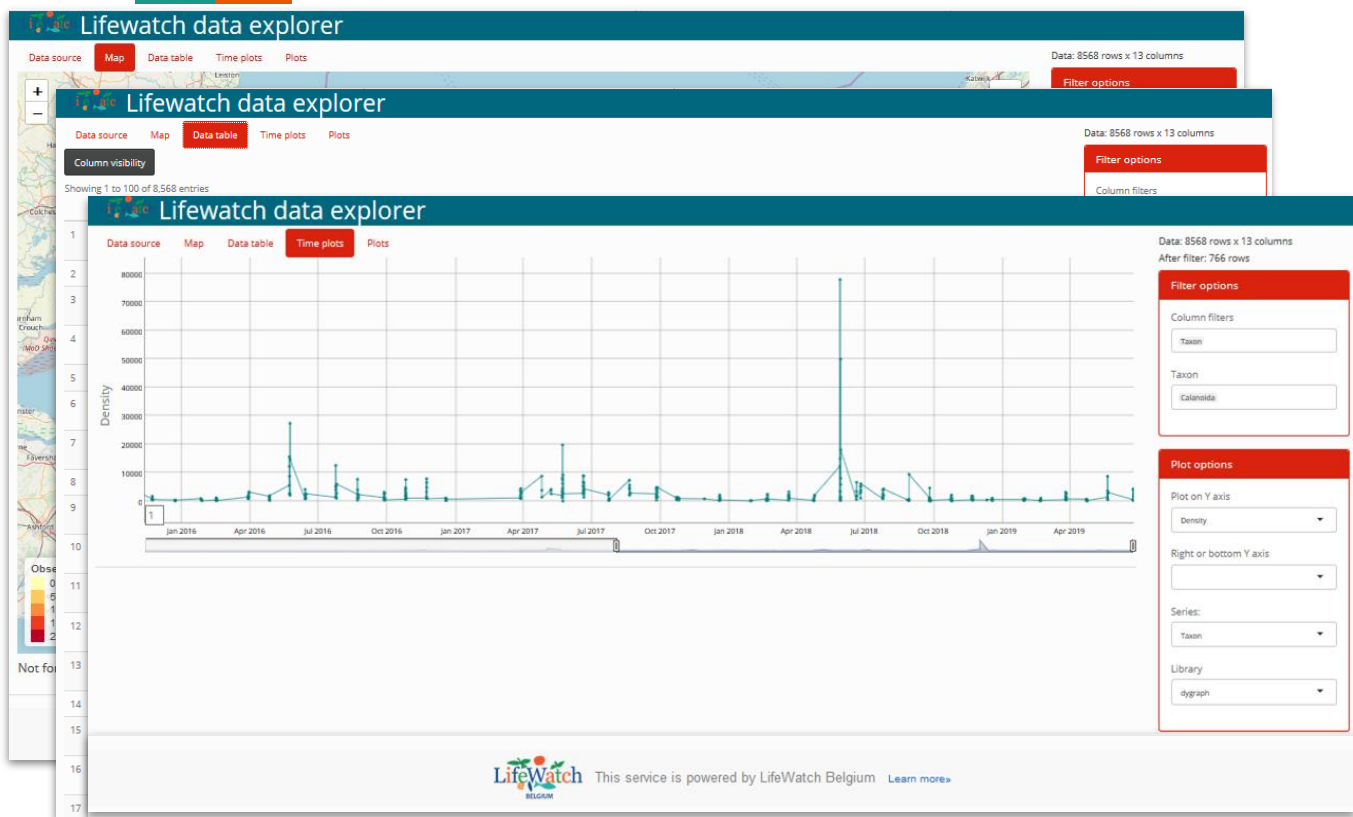
# 6. Data dissemination

**FAIR** - Findable - Accessible - Interoperable - Reusable

- LifeWatch Data Explorers
- Kustportaal
- Data paper
- EMODnet Biology



# 6. Data dissemination: data explorer



Interactive viewer to visualize the data

<http://rshiny.lifewatch.be/zooscan-data/>

# 6. Data dissemination: data explorer



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



LifeWatch Data Explorer -  
Phytoplankton data

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

# 6. Data dissemination: data portals

The screenshot displays the Kustportaal website interface. At the top, a teal navigation bar contains the KUSTPORTAAL logo and menu items: HOME, THEMA'S, STATISCHE KAARTEN, DYNAMISCHE KAARTEN, OPEN DATA, and OVER KUSTPORTAAL. A language selector shows 'NL' and 'EN'. Below this, a second teal bar features the logo and a simplified menu: HOME, THEMA'S, STATISCHE KAARTEN, DYNAMISCHE KAARTEN, and OPEN DATA. The main content area is split into a left sidebar and a right map. The sidebar, titled 'PLANK', includes a 'Home' link and a text block: 'Plankton is de stroming van fytoplankton, cyanobacteriën, bestaande uit protozoa, maar Plankton is de mariene voedselbron in de hogere fytoplankton opgenomen aanvoer van ontstaat. Bij bodemdieren Het planktonplanktongemeenschap (Ginderdeuren 2013). Daar fytoplankton de belangrijkste voedselbron is van zooplankton, kan een wijziging in de'. The map shows the Belgian coast with yellow circular markers indicating plankton data points. A 'Kaartgegevens' (Map Information) panel is overlaid on the left side of the map, showing 'Achtergrondlaag' set to 'OpenStreetMap', 'Actieve lagen (2)' (Active layers) with 'Zooplankton (Belgisch deel van de Noordzee)' and 'Belgisch deel van de Noordzee', and buttons for 'Voeg nieuwe laag toe +' and 'Bewaar kaart'.

## 6. Data dissemination: data papers



The screenshot shows the header of a Geoscience Data Journal article. The header is dark blue with the journal title in white. On the right is the RMetS logo. Below the header, the article type 'DATA PAPER' is shown with an open access icon and the text 'Open Access'. There are also icons for Creative Commons, a person, and a bar chart. The article title is 'LifeWatch observatory data: Zooplankton observations in the Belgian part of the North Sea'. The authors listed are Jonas Mortelmans, Jolien Goossens, Luz Amadei Martínez, Klaas Deneudt, André Cattrijsse, and Francisco Hernandez. The publication date is 'First published: 10 April 2019' and the DOI is 'https://doi.org/10.1002/gdj3.68'.

**Geoscience Data Journal** 

DATA PAPER |  Open Access |   

**LifeWatch observatory data: Zooplankton observations in the Belgian part of the North Sea**

Jonas Mortelmans , Jolien Goossens, Luz Amadei Martínez, Klaas Deneudt, André Cattrijsse, Francisco Hernandez

First published: 10 April 2019 | <https://doi.org/10.1002/gdj3.68>

Data paper: much more than data!

- Detailed description of whole workflow, from sample to data integration
- How to access the data
- ...

<https://doi.org/10.1002/gdj3.68>

# 6. Data dissemination: EMODnet Biology

The screenshot displays the EMODnet Biology website. At the top, there is a header with the EMODnet logo and the text "BIOLOGY Dive into data on Europe's marine life". Below the header is a navigation menu with links: ABOUT, DATA & DATA PRODUCT ACCESS, ATLAS OF MARINE LIFE, NEWS & EVENTS, TERMS & CONDITIONS, GET INVOLVED!, and HELPDESK. The main content area is titled "Data Catalog" and features a search bar. A specific data entry is highlighted: "LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea". This entry includes a citation: "Flanders Marine Institute (VLIZ), Belgium (2020): LifeWatch observatory data: zooplankton observations in the Belgian Part of the North Sea. https://doi.org/10.14284/394" and a "Download Data" button. Below the entry, there are two sections: "Access data" and "Archived data". The "Access data" section contains logos for EMODnet (with a location pin icon), EMODnet (with a globe icon), and OBIS. The "Archived data" section contains the IPT logo.

Portal on EurOBIS database

- Download toolbox
- Viewer
- Webservices

Ensures data flow to EurOBIS



# 8. Data reuse: from data to data products

**Bacillariophyceae**  
Phytoplankton community analysis in the Northern Adriatic  
Source: EMODnet Biology, OGS & Deltaris  
[Visualize](#)

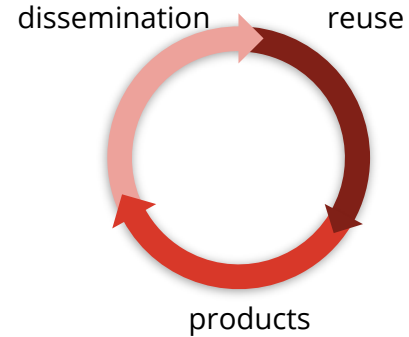
**1950-1999 - Autumn**  
Gridded abundance maps of most common Atlantic Copepod species  
Source: EMODnet Biology, VUJZ, Ulg And MBA  
[Visualize](#)

**1990 - 1999** | **2000 - 2013**  
Trends in abundance of fish species in the North Sea  
Source: EMODnet Biology, ICES  
[Visualize](#)

**Data workflow analyzing trends of Swedish zooplankton species**  
Source: EMODnet Biology, Deltaris  
[Visualize](#)

**Distribution of macrobenthos living modes in European seas**  
Source: EMODnet Biology  
[Visualize](#)

**Long term zooplankton time series analysis from the West Med Sea**  
Source: CNRS, Deltaris  
[Visualize](#)

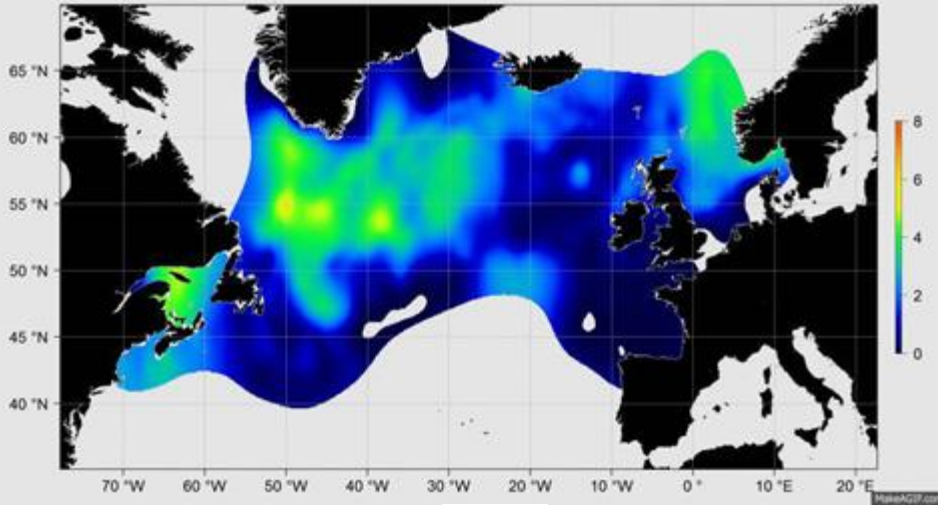


**BIOLOGY**

*Dive into data on Europe's marine life*

# 8. Data reuse: from data to data products

1958/1967 – Summer



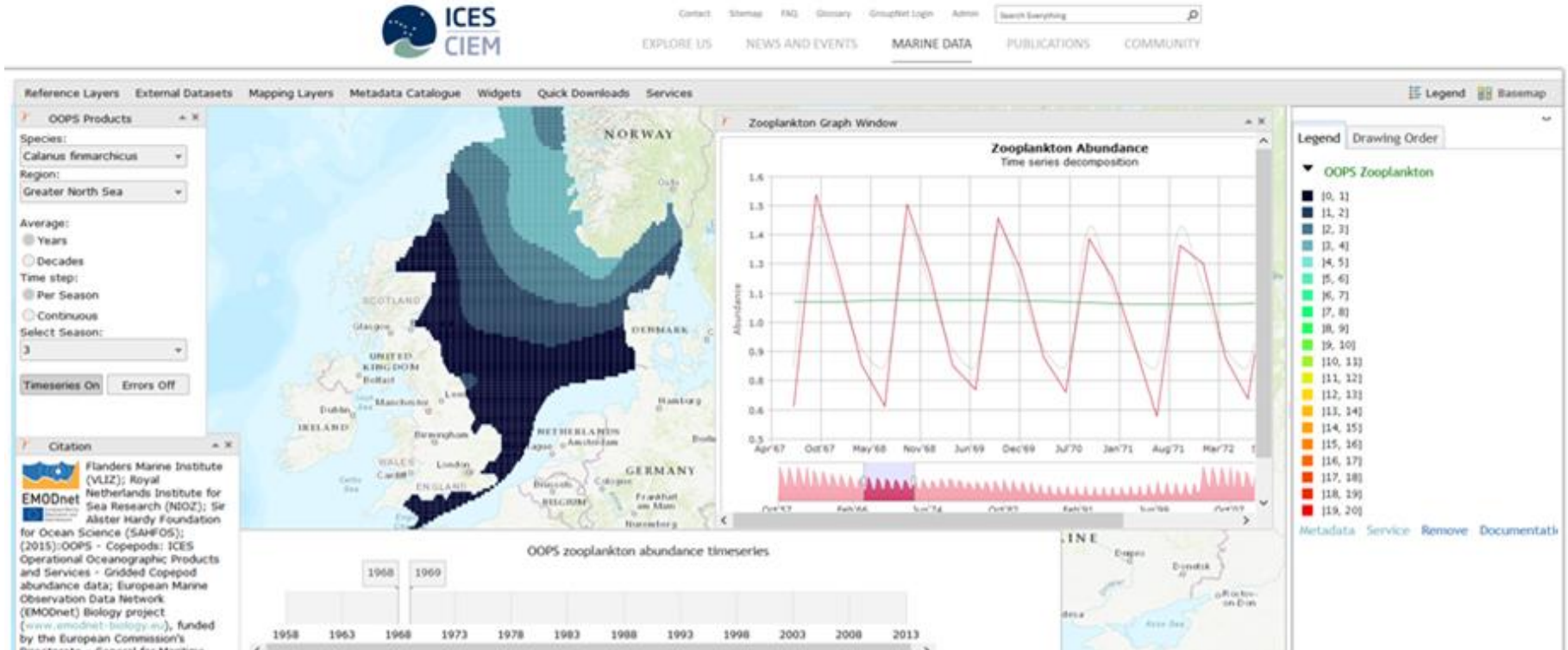
*Calanus finmarchicus*



**BIOLOGY**

*Dive into data on Europe's marine life*

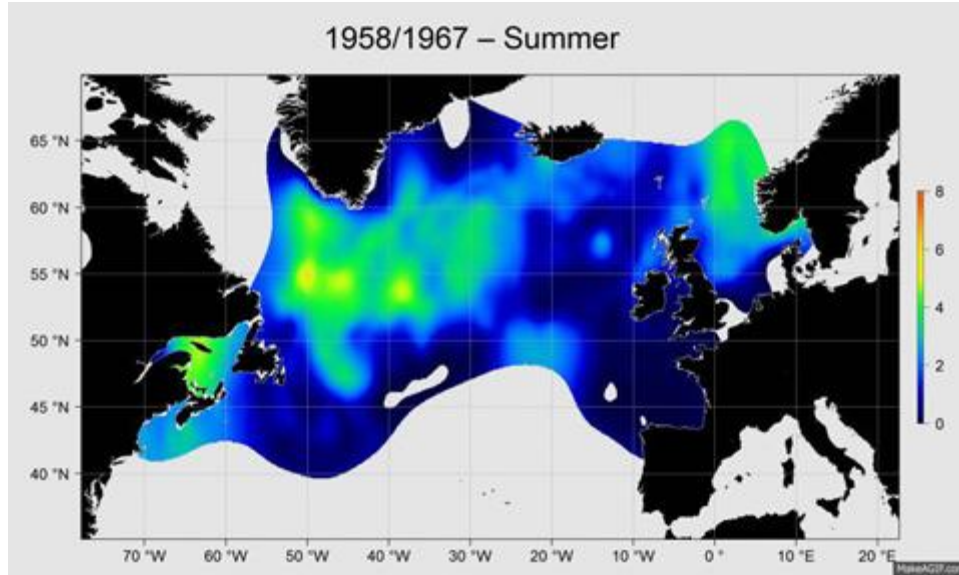
# 8. Data reuse: from data to data products



ICES' Operational Oceanographic Products and Services (OOPS)

<http://gis.ices.dk/sf/index.html?widget=oops-z>

# 8. Data reuse: from data to data products



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SCIENCE CLOUD**



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Information System**



Thank you