



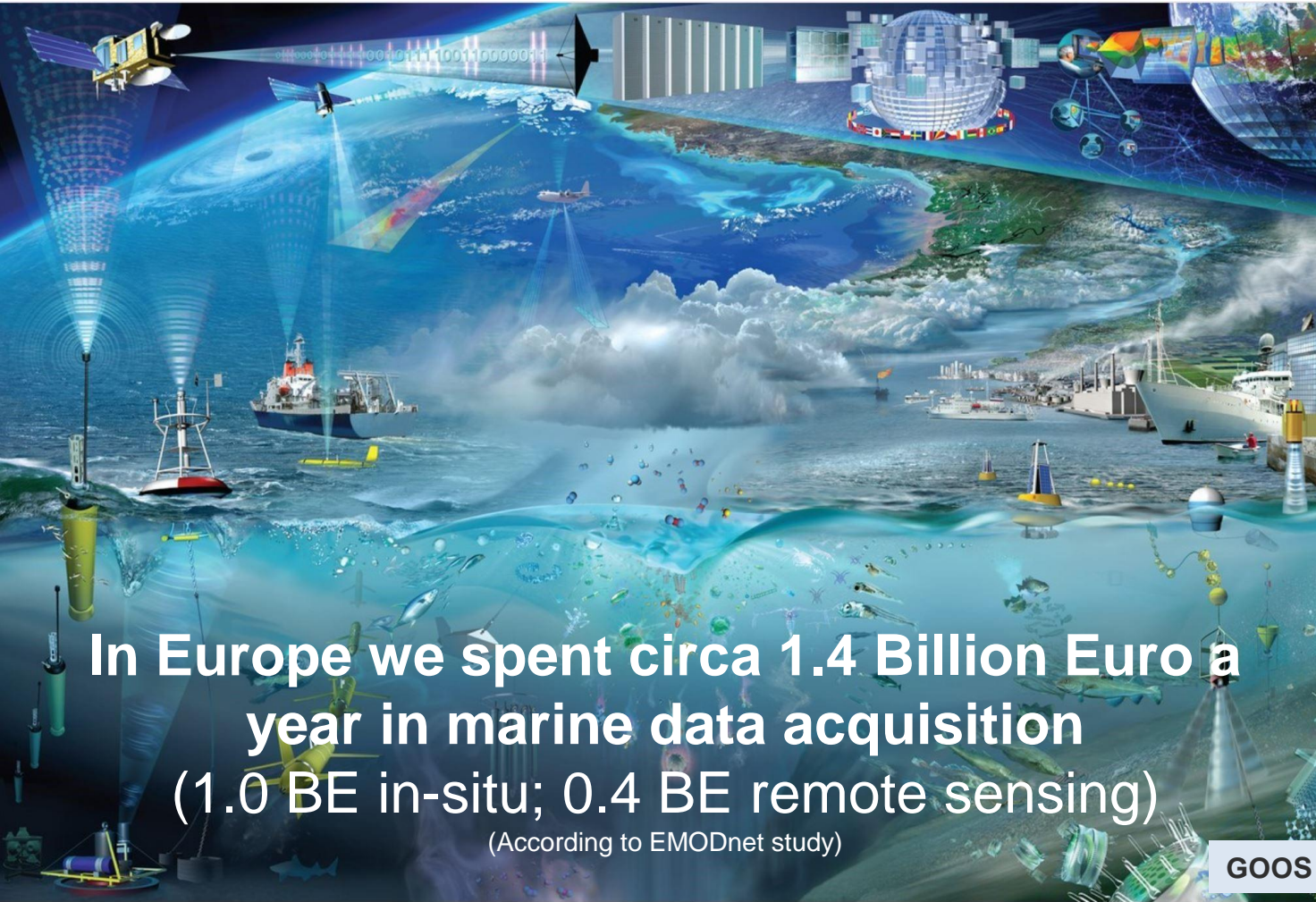
Blue-Cloud – Data Federation

Dick M.A. Schaap – MARIS (Blue-Cloud Technical Coordinator)

EGI 2022 Conference
22 September 2022



Acquisition of marine and ocean data



In Europe we spent circa 1.4 Billion Euro a year in marine data acquisition
(1.0 BE in-situ; 0.4 BE remote sensing)
(According to EMODnet study)

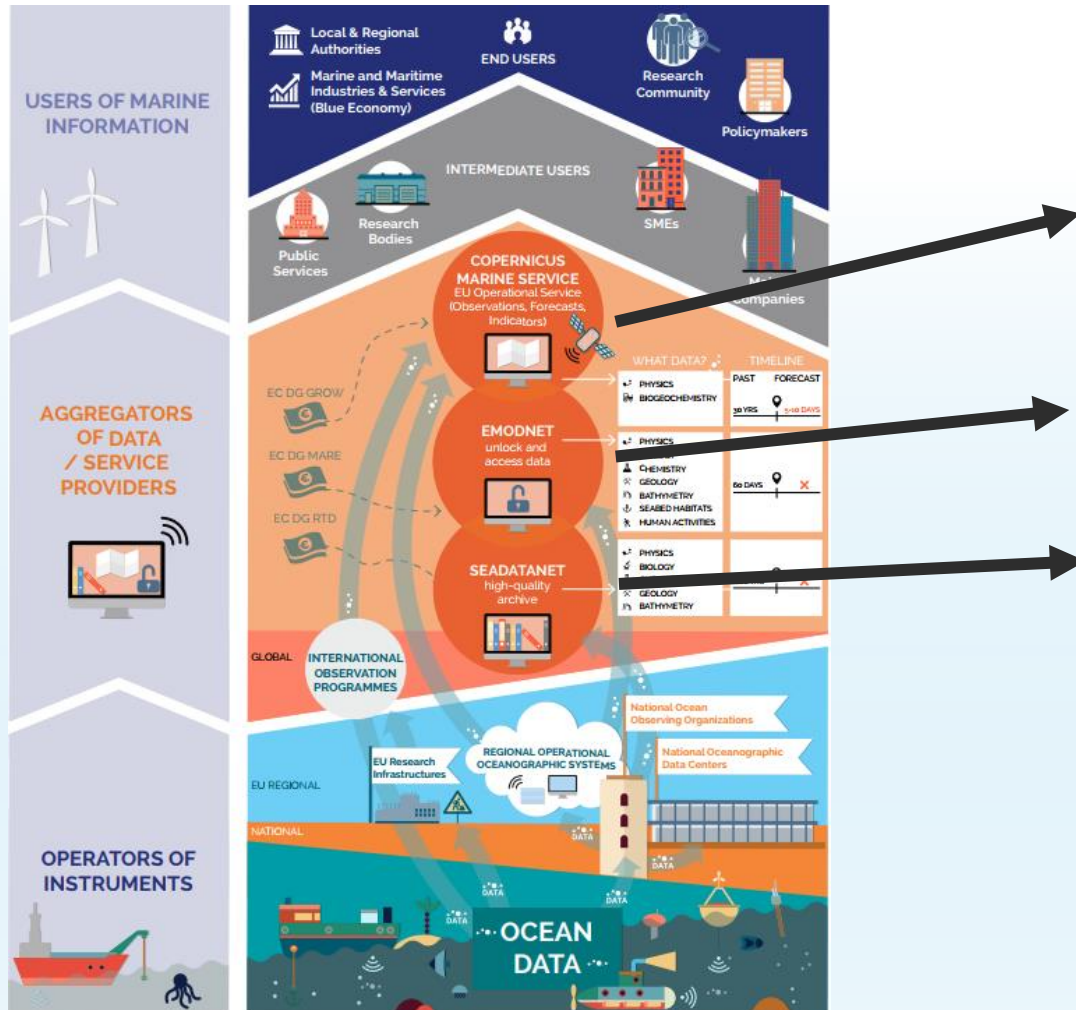
- Scientific Research to gain knowledge and insight
- Modelling (including hindcast, nowcast, forecast)
- Economic activities: shipping, offshore industry, dredging industry, fisheries, tourism, engineering ..
- Environmental Management: monitoring and assessment (water quality, climate status, stock assessment)
- Marine Conventions and Directives, in Europe: Water Framework Directive (WFD), Marine Strategy (MSFD), Marine Spatial Planning (MSP), Coastal Zone Management
- EU Strategies, such as Green Deal, Blue Environment, Blue Economy

Image source: GOOS



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European landscape marine data management



Data aggregators and providers of data products and services

Blue-Cloud Mission 2022

“to promote the sharing of *data, processes and research findings* in the marine domain by delivering a collaborative web-based environment that enables *open science*, underpinned by simplified access to an unprecedented wealth of marine data resources and interoperable added-value services and products”

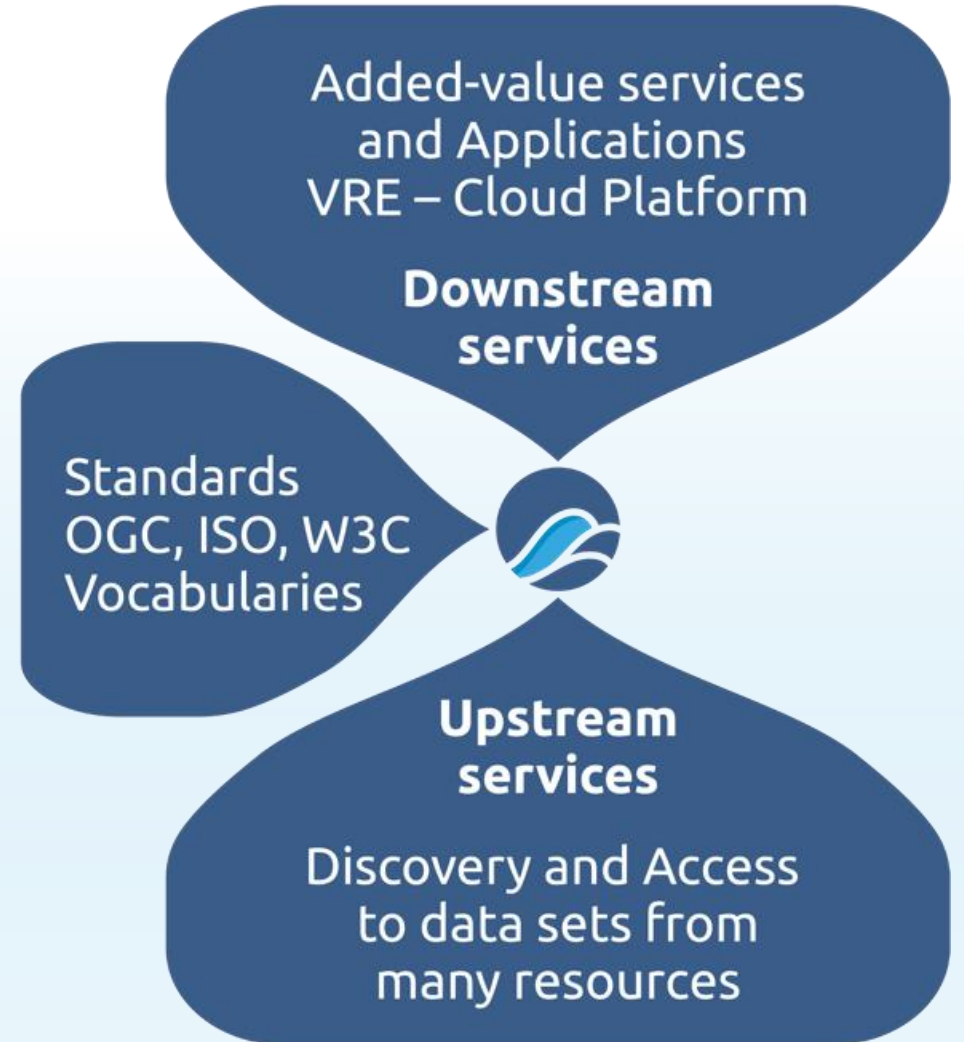
Marine thematic contribution to European Open Science Cloud (EOSC)

October 2019 – March 2023; 20 partners



Blue-Cloud overarching concept

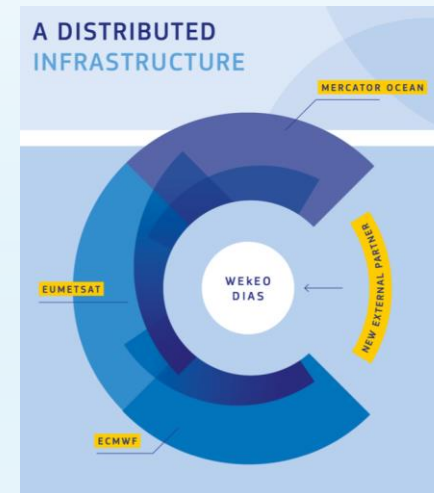
- Developing and deploying Virtual Research Environment (VRE) with an array of services for configuring and running Virtual Labs for specific analytical workflows, use cases, and demonstrators
- Applying common standards and interoperability solutions for providing harmonized metadata and data
- Developing and deploying harmonized discovery and access to established European marine data management and processing infrastructures





Blue Cloud

Blue-Cloud federation of major infrastructures



ICOS

Ocean Thematic Centre

Blue Data infrastructures

E-infrastructures

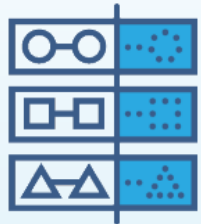


Blue Cloud

Key products and services



● **Blue-Cloud Data Discovery & Access service**, federating key European data management infrastructures, to facilitate users in finding and retrieving multi-disciplinary datasets from multiple repositories



● **Blue-Cloud Virtual Research Environment infrastructure** to provide a range of services and to facilitate orchestration of computing and analytical services for constructing, hosting and operating Virtual Labs for specific applications



Fish a matter of scales



Aquaculture Monitor



Zoo & Phytoplankton EOY products



Plankton Genomics



Marine Environmental Indicators

● **Blue-Cloud Virtual Labs**, configured with specific analytical workflows to serve as **Demonstrators**, which can be adopted and adapted for other inputs and analyses



Blue Cloud Discovery and Access service

Blue Cloud



Facilitates users:

- Federated search for discovering interesting data sets (currently more than 10 million) in a common way
- Federated retrieval of identified data sets using a shopping basket mechanism
- Download of data sets or push to Blue-Cloud VRE

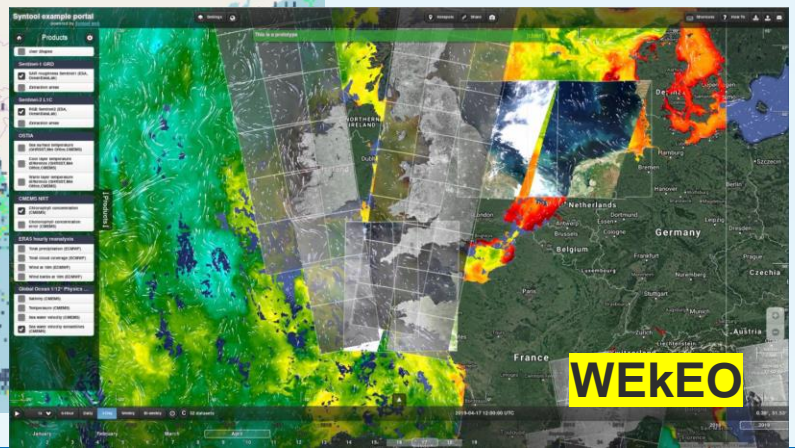
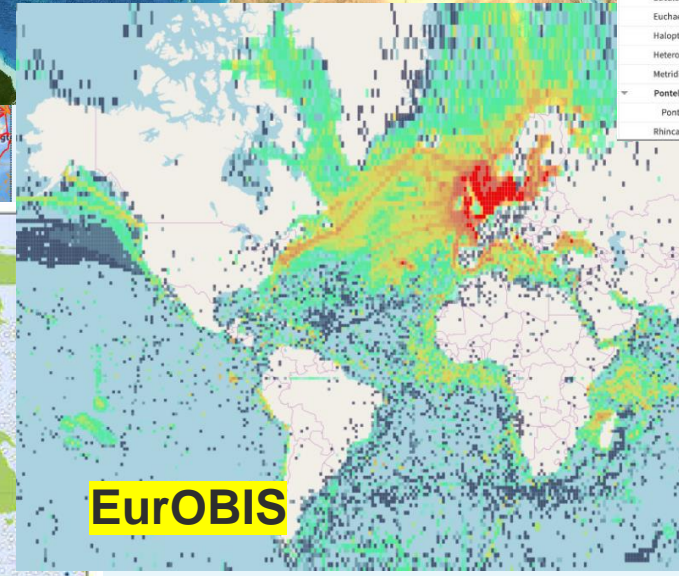
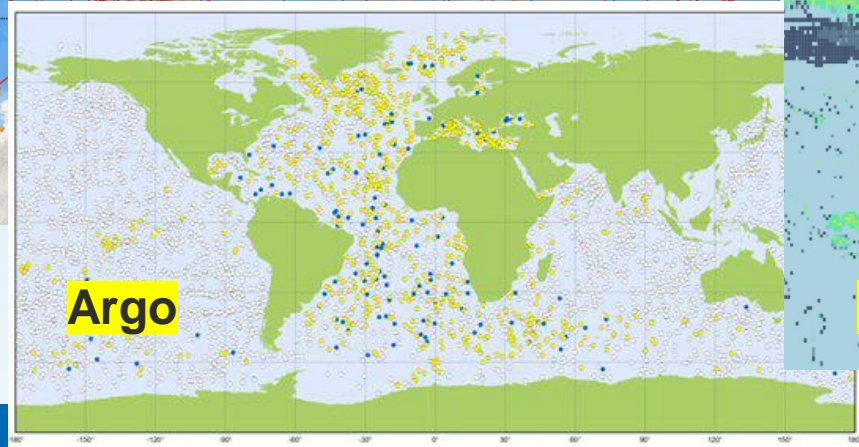
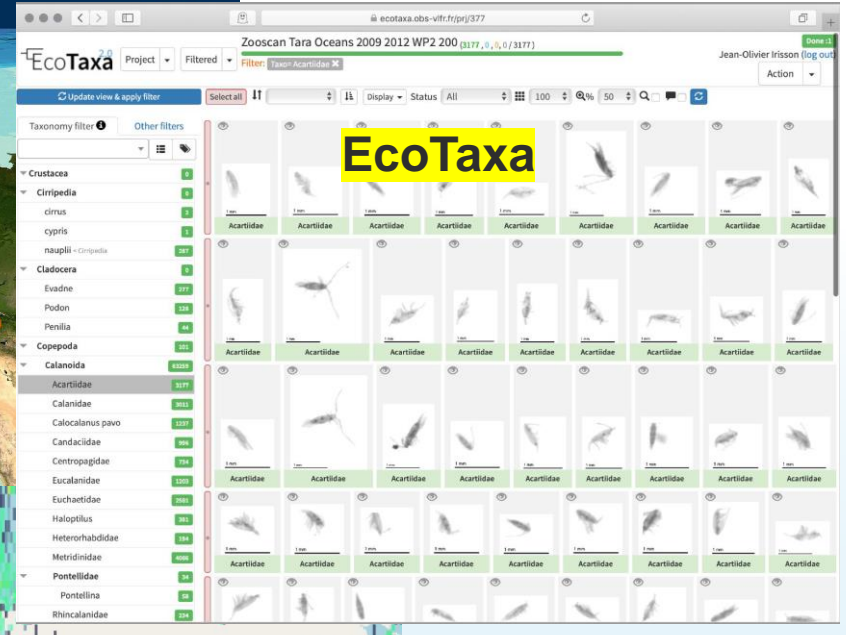
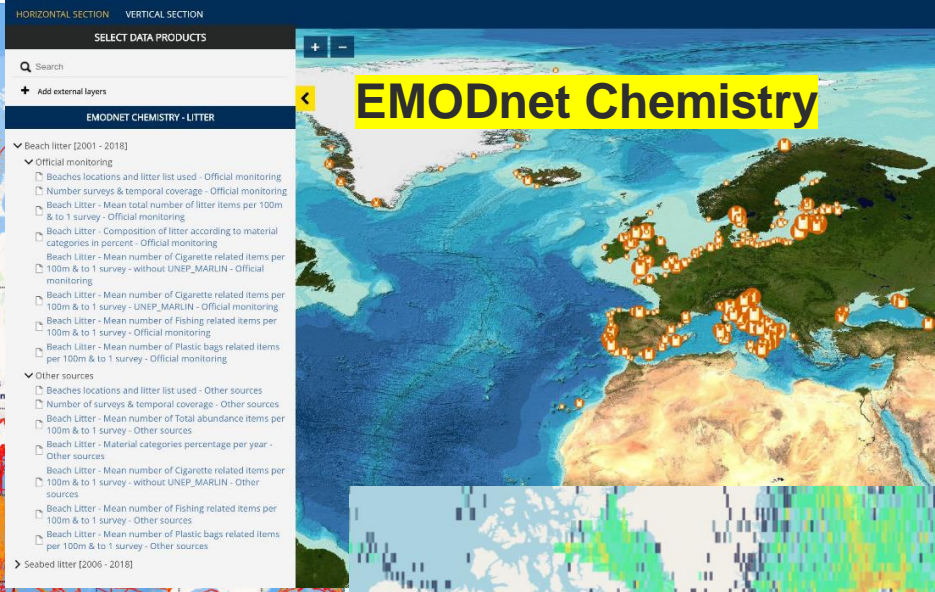
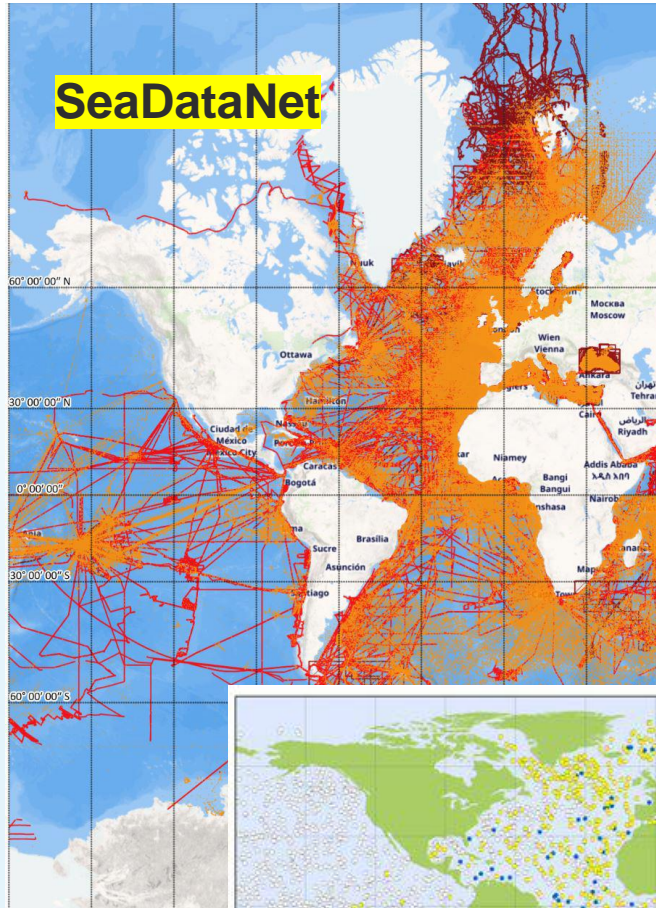
Facilitates managers of Blue Data Infrastructures:

- Wider outreach to potential users
- Stay informed about data requests and users for their repository
- Periodic reporting of downloads from their repository
- Built and operated by MARIS, CNR-IIA, and CINECA (EUDAT)



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Illustrations of data coverage





Approach

- **Federated discovery and retrieval** of data sets and data products from the Blue Data Infrastructures
- **Concept of two-step search approach:**
 - First step: identifying interesting data collections and products with few criteria
 - Second step: drilling down with more criteria to select specific data at granule level, where possible, otherwise at collection/products level
- Metadata and Data Brokerage services interacting **Machine-to-Machine** with web services and APIs as provided and operated by the Blue Data Infrastructures

Filter search


 Free search

Date search

 From

 To

Geographic search

Blue Data infrastructures		Level 2 Search	Level 1 Results (25848)	Level 1 Total	Last update
 EcoTaxa	<input type="button" value="Level 2 Search"/>	10	10	2022-06-19	
 ELIXIR-ENA	<input type="button" value="Level 2 Search"/>	32	32	2022-06-19	
 EMODnet Chemistry	<input type="button" value="Level 2 Search"/>	210	210	2022-06-19	
 EuroArgo - Argo	<input type="button" value="Level 2 Search"/>	16998	16998	2022-05-01	
 EurOBIS - EMODnet Biology	<input type="button" value="Level 2 Search"/>	1024	1024	2022-06-19	
 ICOS data portal	<input type="button" value="Level 2 Search"/>	195	195	2022-05-08	
 SeaDataNet	<input type="button" value="Level 2 Search"/>	859	859	2022-05-29	
 SeaDataNet-products	<input type="button" value="Level 2 Search"/>	49	49	2022-06-19	
 Socat	<input type="button" value="Level 2 Search"/>	6471	6471	2022-05-29	

<https://data.blue-cloud.org>


Filter search


 You searched for: Reset all 
EuroArgo - Argo

 Free search

 Date search
 From

 To

 Geographic search
 

 < Back to search Results found: 16998 << (1 - 100) >> 100 500 1000 VIEW MAP 

ID	Title	Start date	End date	Level2
 78501	6461 - 5905972 - Argo UW-SOCCOM	20180830	20190928	<input type="button" value="Level 2 details"/>
 78843	APEX Profiling Float - 4901132 - Argo Canada	20090715	20140109	<input type="button" value="Level 2 details"/>
 78347	0587 - 1902334 - Argo JAMSTEC	20191225	20220423	<input type="button" value="Level 2 details"/>
 78625	SOLO Profiling Float - 4900333 - Argo SIO	20030331	20060628	<input type="button" value="Level 2 details"/>
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 79669	APEX Profiling Float SBE 5389 - 2901303 - Argo INDIA	20110212	20200425	<input type="button" value="Level 2 details"/>
 78812	NAVIS-A-SBE - 2902536 - Argo JAMSTEC	20150601	20200914	<input type="button" value="Level 2 details"/>
 78723	APEX Profiling Float IR_SBE_5374 - 5903740 - Argo UW	20120305	20171125	<input type="button" value="Level 2 details"/>
 78889	PROVOR Profiling Float - 6901881 - Argo GREECE	20131101	20140901	<input type="button" value="Level 2 details"/>
 79762	SOLO Profiling Float SBE - 5903757 - Argo SIO	20110821	20160320	<input type="button" value="Level 2 details"/>
 78817	APEX Profiling Float - 3900500 - Argo UW	20051217	20200603	<input type="button" value="Level 2 details"/>

<https://data.blue-cloud.org>

Filter search

You searched for: **EuroArgo - Argo** Reset all

EuroArgo - Argo 🗑️

Free search

Date search

From

To

Geographic search

North

West

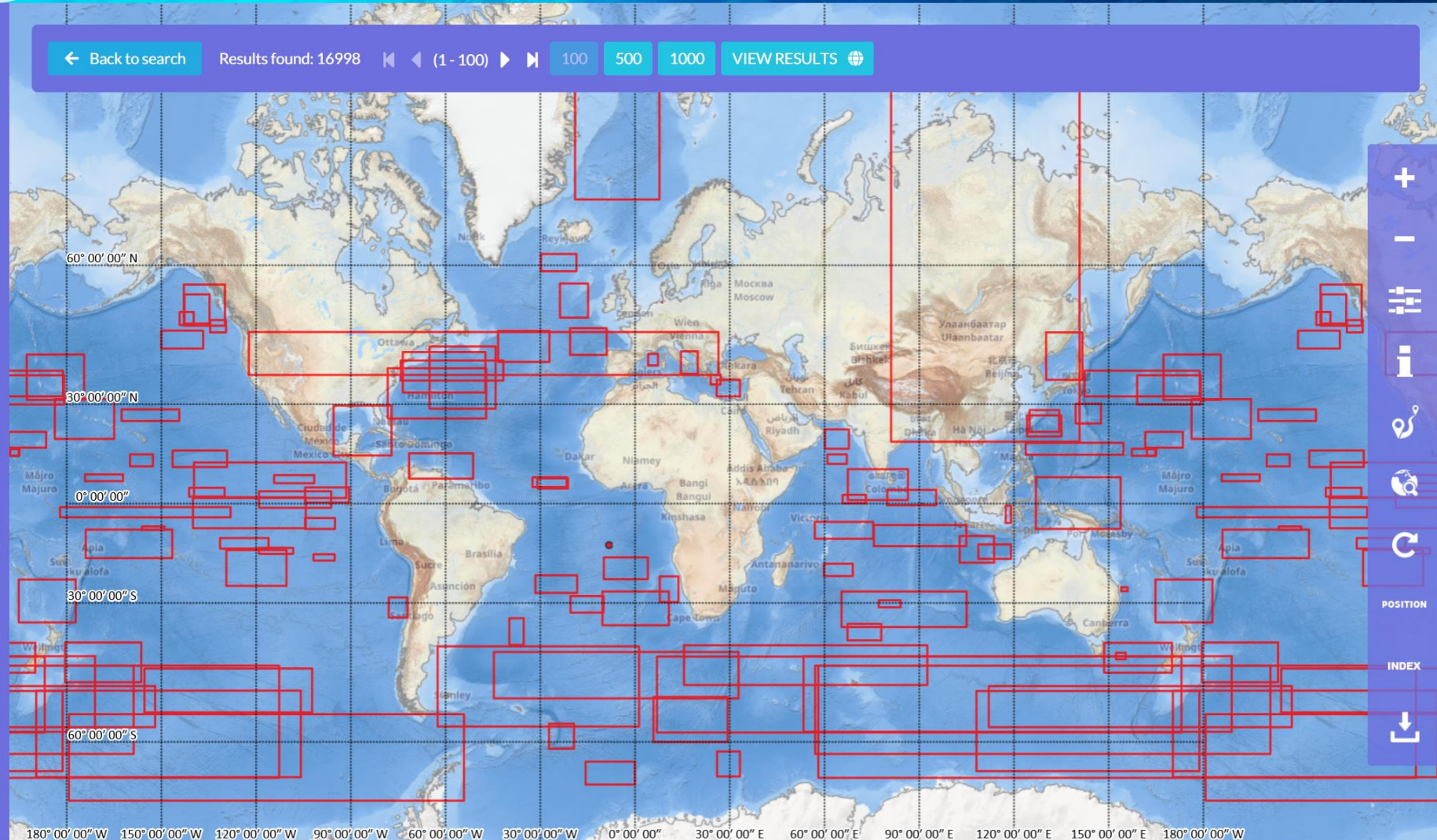
East

South

SEARCH

RESET

← Back to search Results found: 16998 (1 - 100) 100 500 1000 VIEW RESULTS



<https://data.blue-cloud.org>



Filter search

You searched for: **7900212** Reset all

Free search

Date search
From

To

Geographic search

Variables

SUBSURFACE PRESSURE 296
 SUBSURFACE SALINITY 296
 SUBSURFACE TEMPERATURE 296

Results found: 296 in 0.07 Seconds (1 - 100) 100 296 VIEW MAP

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<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	194	2020-05-04T02:05:25.000Z
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<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	135	2018-10-10T02:49:11.000Z
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<input type="radio"/> SOLO2IR_SBE_	7900212	IRIDIUM	33	2015-12-22T18:00:27.000Z
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<https://data.blue-cloud.org>



Filter search

You searched for: **7900212** Reset all

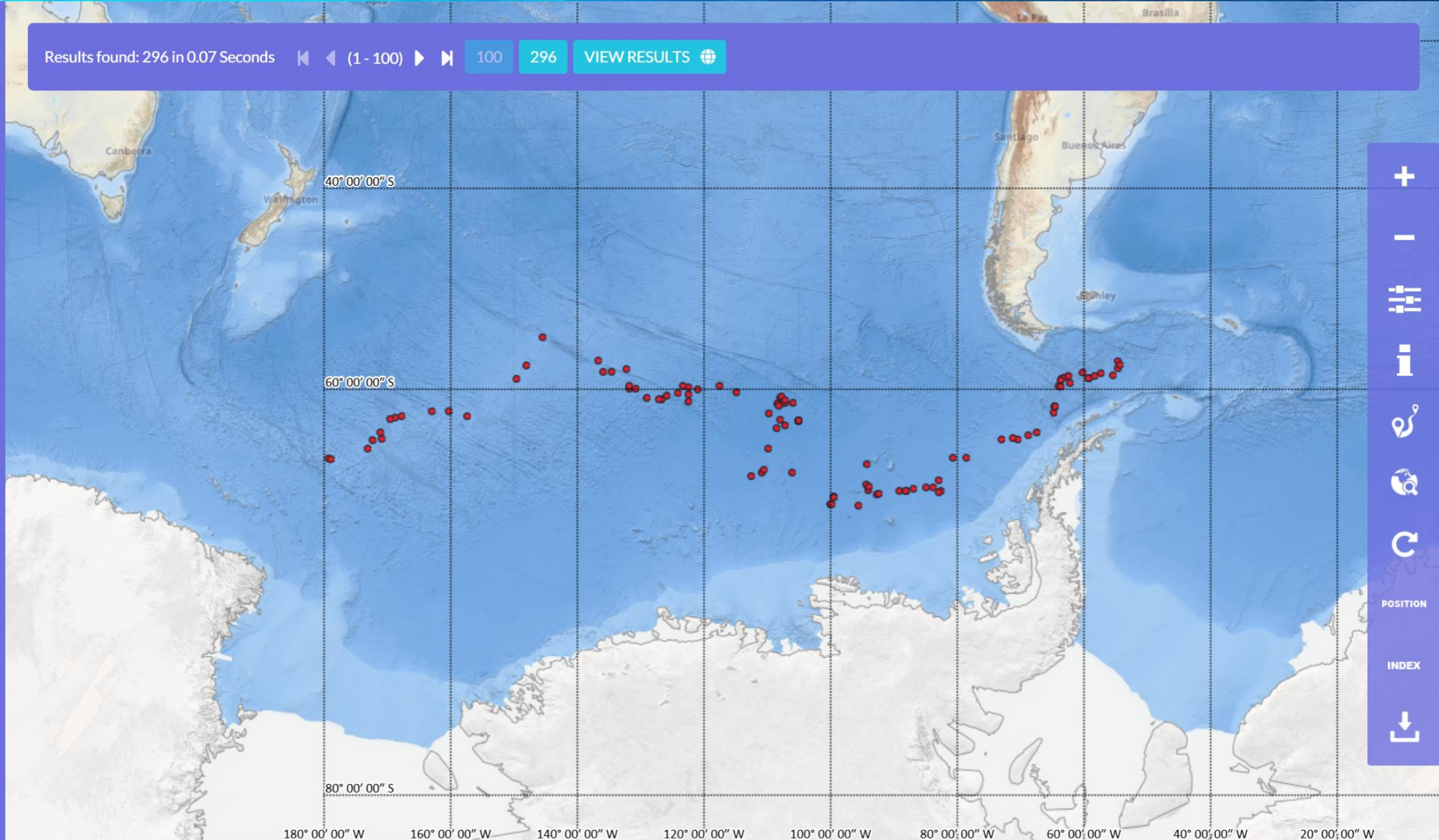
Free search

Date search
From
To

Geographic search

Variables

SUBSURFACE PRESSURE	296
SUBSURFACE SALINITY	296
SUBSURFACE TEMPERATURE	296



<https://data.blue-cloud.org>

Level 2 Interfacing - Protocols

SeaDataNet	Dedicated API
SeaDataNet Products	OGC CSW service
EMODnet Chemistry	OGC CSW service
EuroArgo - Argo	Dedicated API
EurOBIS – EMODnet Biology	DCAT service
Ecotaxa	Dedicated API
ELIXIR - ENA	Dedicated API
ICOS Marine	SPARQL service
SOCAT	ERDDAP service



Planned developments BC2026

- Expanding the service coverage with more Blue Data Infrastructures
- Adding semantic brokerage for harmonising terminologies as used for parameters, platforms, devices, and others by mapping between vocabularies used in Blue Data Infrastructures
- Adding data subsetting functionality to facilitate querying and extracting data sets for specific data criteria, like all temperature values at specific depth range and geographic area and with specific quality flags
- Building data lake facilities for compiling and maintaining data lakes of selected data types (e.g. EOVs) as buffers for further elaborating into validated and aggregated data collections and for feeding DTO systems



Blue-Cloud

Piloting innovative services for Marine Research & the Blue Economy

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