Digital Infrastructures for Marine Research in the Iberian Atlantic: Implementing FAIR Principles, OGC Standards, and Advanced Data Services



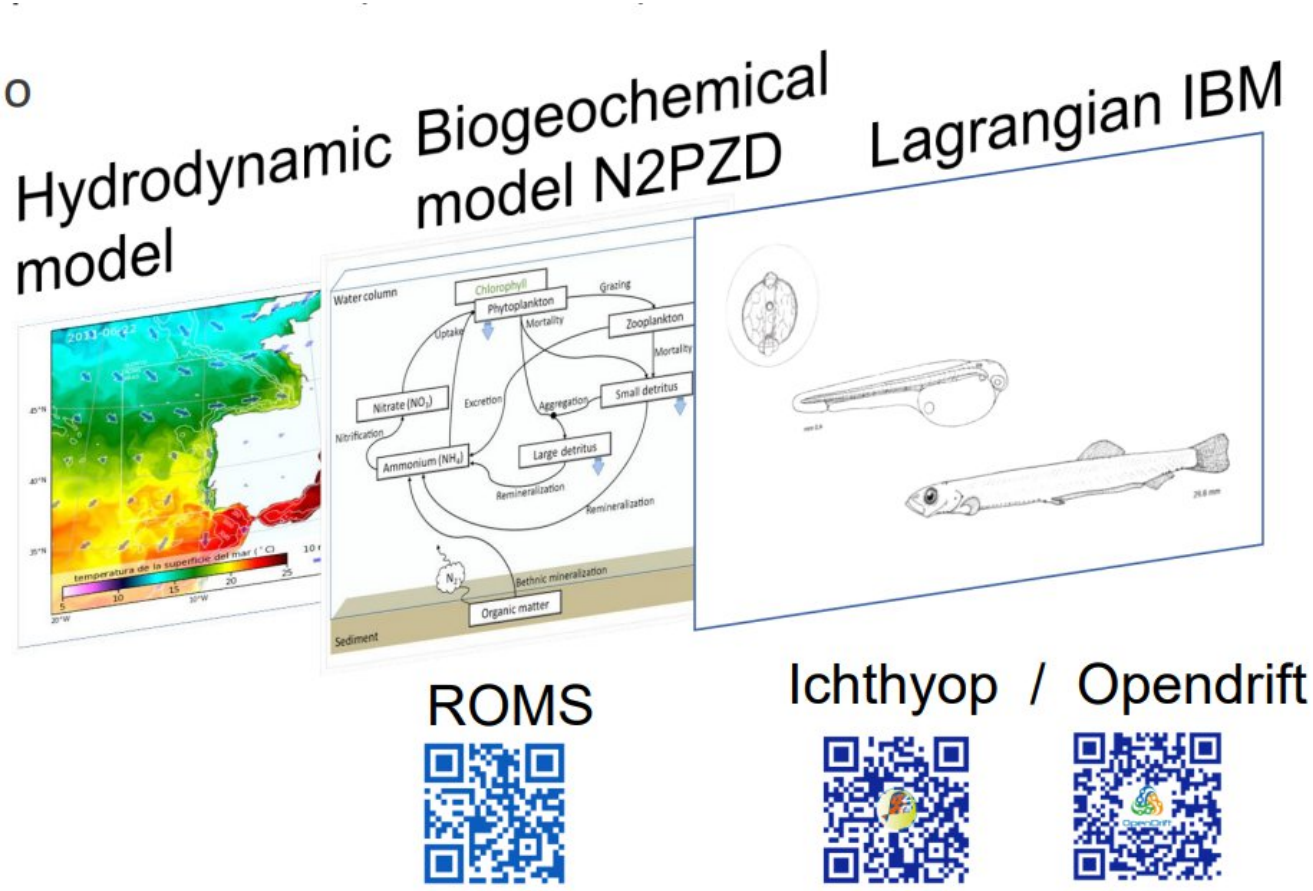
Rodríguez-Abal, D.; Sanz-Pinilla, L.; González-Nuevo, G.; Tel, E.; Ruiz-Villarreal, M.

• daniel.abal@ieo.csic.es

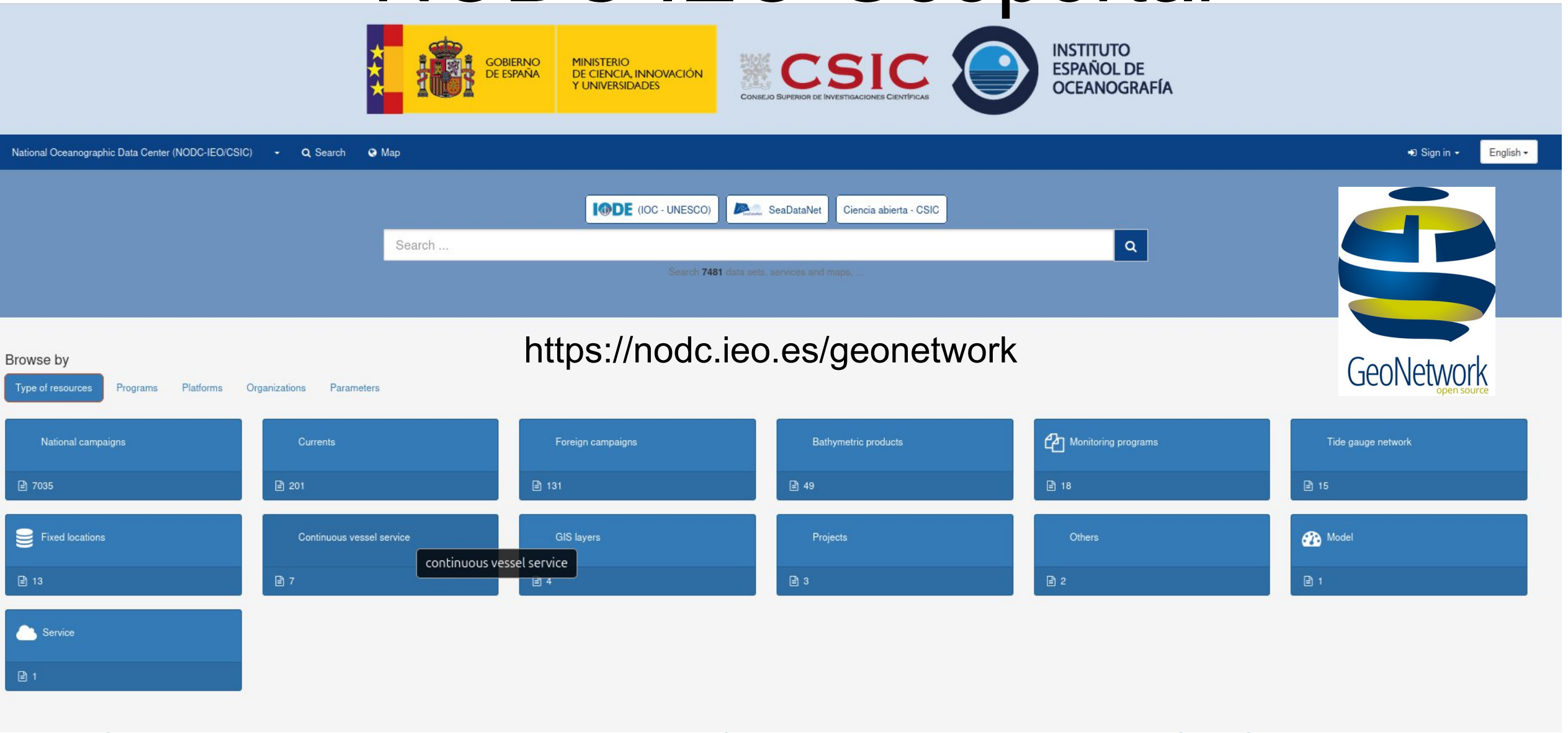
Financiado por la Unión Europea NextGenerationEU
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Plan de Recuperación, Transformación y Resiliencia
XUNTA DE GALICIA
Oceans+
DATACAT

IBMs Early Life Stages

- Hydrodynamic model
- Biogeochemical model
- IBM Lagrangian model
  - Eggs
  - Ichthyoplancton



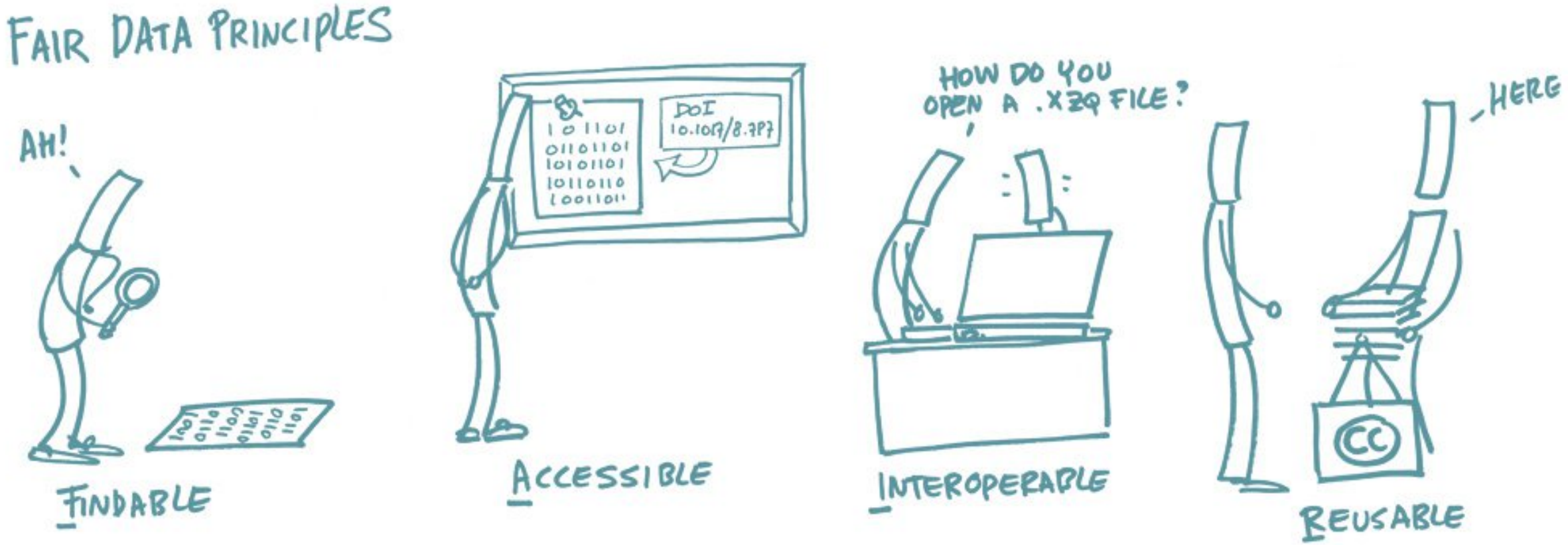
NODC IEO Geoportal



https://nodc.ieo.es/geonetwork

Sanz-Pinilla et al. A geonetwork-based catalogue for marine data management. Earth Sci Inform 19, 14 (2026).

FAIR data



Sonja Bezjak, April Clyburne-Sherin, Philipp Conzett, Pedro Fernandes, Edit Görögh, Kerstin Helbig, Bianca Kramer, Ignasi Labastida, Kyle Niemeyer, Fotis Psomopoulos, Tony Ross-Hellauer, René Schneider, Jon Tennant, Ellen Verbakel, Helene Brinken, & Lambert Heller. (2018). Open Science Training Handbook (1.0). https://book.fosteropenscience.eu/

FAIR data = Standards

- Findable
- Accesible
- Interoperable
- Reusable



Catalogue CWS



Node GIS WMS WCS WFS

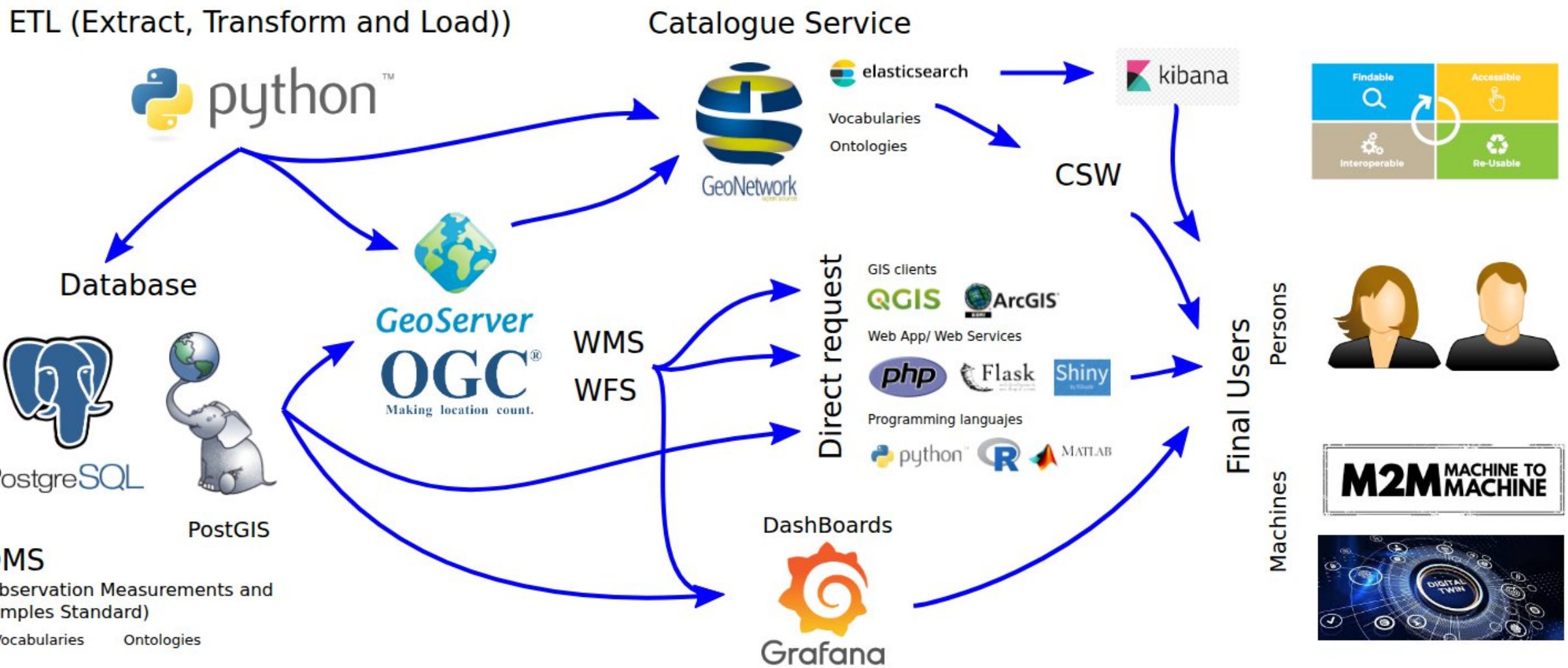


Files ISO19139 GeoJSON



Semantic Vocabularies

Data Ecosytem



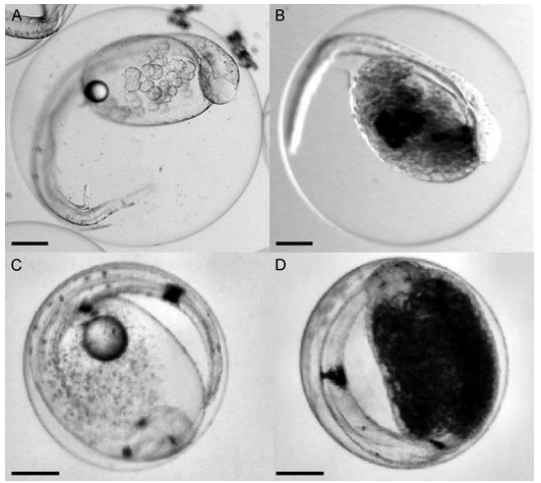
Vocabularies and Ontologies

- Vocabulary: A list of standard terms used in a specific field.
  - https://vocab.nerc.ac.uk/
  - https://vocab.seadatanet.org/search
- Ontology: A formal definition of the types, properties and relationships between entities that exist within a particular domain.
  - https://earthportal.eu/

Vocabularies Example

- Pelagic fish species (S25): *Sardina pilchardus*
  - http://vocab.nerc.ac.uk/collection/S25/current/BE004978/
- Stage of development (S11): Eggs
  - https://vocab.nerc.ac.uk/collection/S11/current/S1122/
- Parameter (S06): Abundance
  - https://vocab.nerc.ac.uk/collection/S06/current/S0600002/
- Units (P06): Number per cubic meter.
  - https://vocab.nerc.ac.uk/collection/P06/current/UPMM/
- Sampling Devices (L22): Calvet
  - https://vocab.nerc.ac.uk/collection/L22/current/NETT0009/
- Sampling net gear deployment (B07): Vertical tow
  - https://vocab.nerc.ac.uk/collection/B07/current/NDT001/







Vocabularies Example:

Natural Environment Research Council, del Reino Unido

The NERC Vocabulary Server (NVS)

Service Status

NVS Home | Vocabularies | Thesauri | Search NVS | SPARQL | Other Tools | About NVS

Concept

eggs

URI	http://vocab.nerc.ac.uk/collection/S11/current/S1122/
Within Vocab	BODC parameter semantic model biological entity development stage terms
Alternative Labels	
Definition	Spherical or ellipsoidal bodies produced by the female of certain animals (e.g. fishes, birds, reptiles).
Date	2017-06-19T16:48:17
Identifier	SDN:S11::S1122
Note	accepted
Has Current Version	3
Version	1 , 2
version	3

Alternate Formats

Other formats for this page:

RDF/XML | Turtle | JSON-LD

Alternate Profiles

Other views of this page:

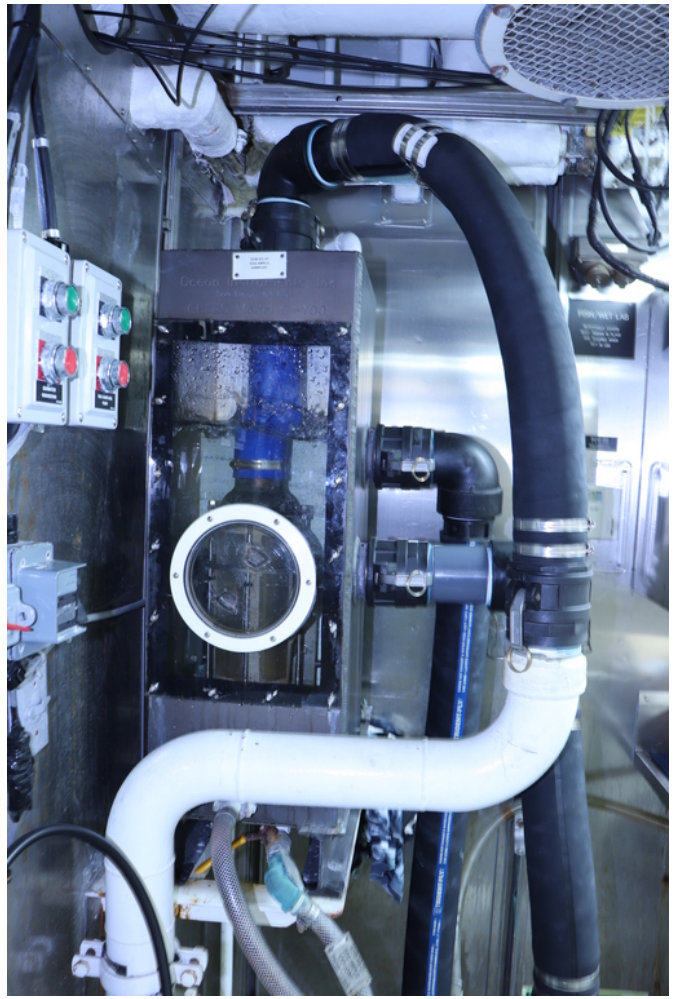
Alternate Profiles ?

NVS html view ?

Why these efforts?

Samplig Devices

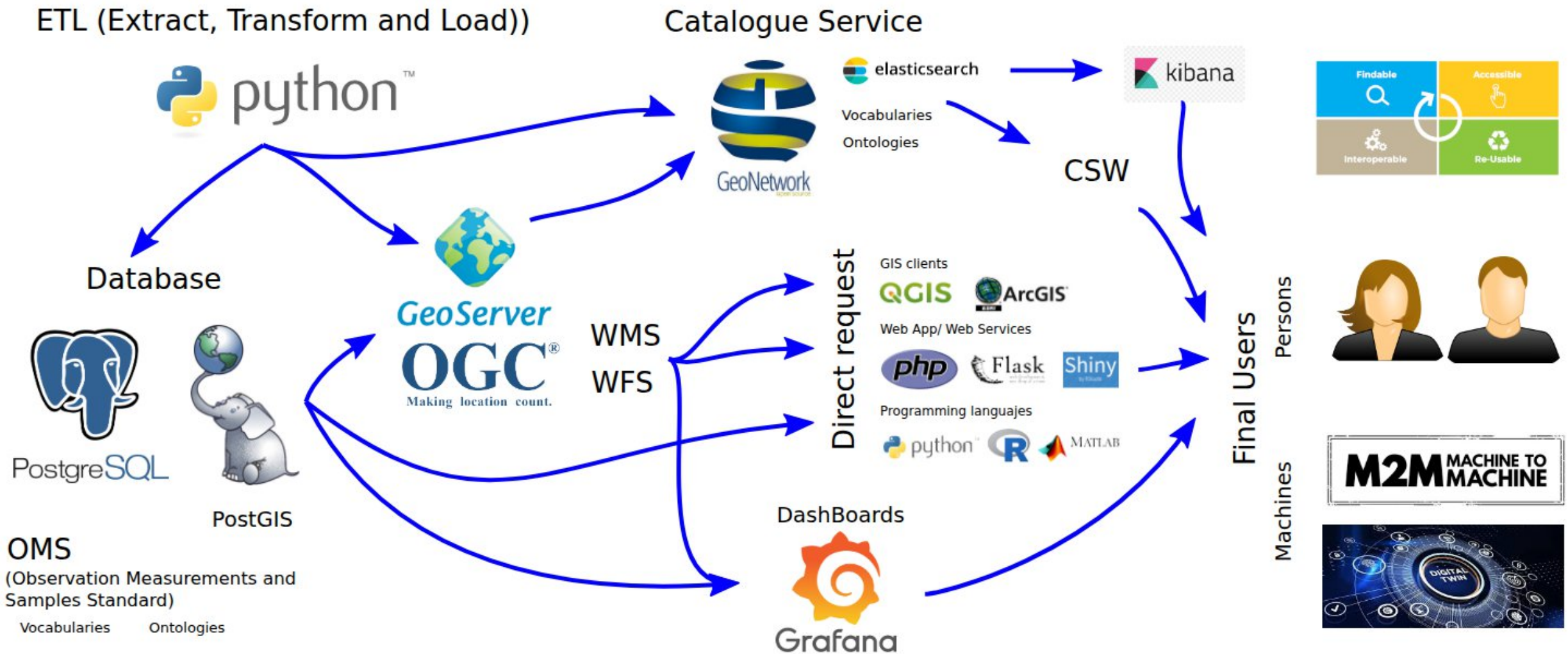
CUFES



CALVET



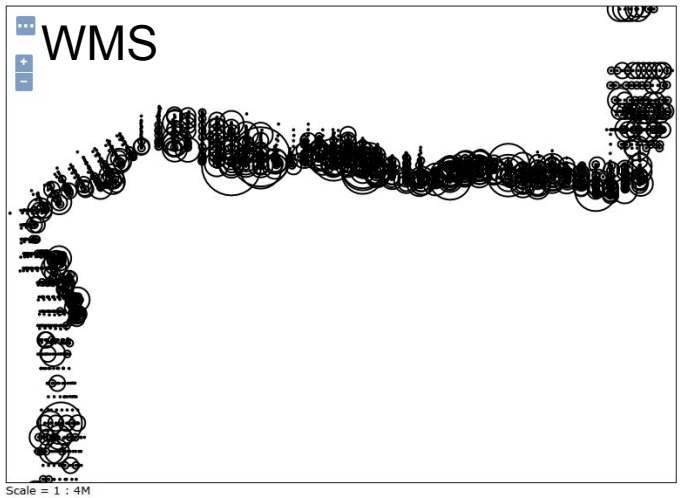
Data Ecosystem



Data dissemination: Geoserver

- Spatial data infraestructure (SDI)
- Direct connection postgresql
  - PostGIS Support
- Limited catalogue services
- OGC standard services
  - Web map service (WMS)
  - Web feature service (WFS)

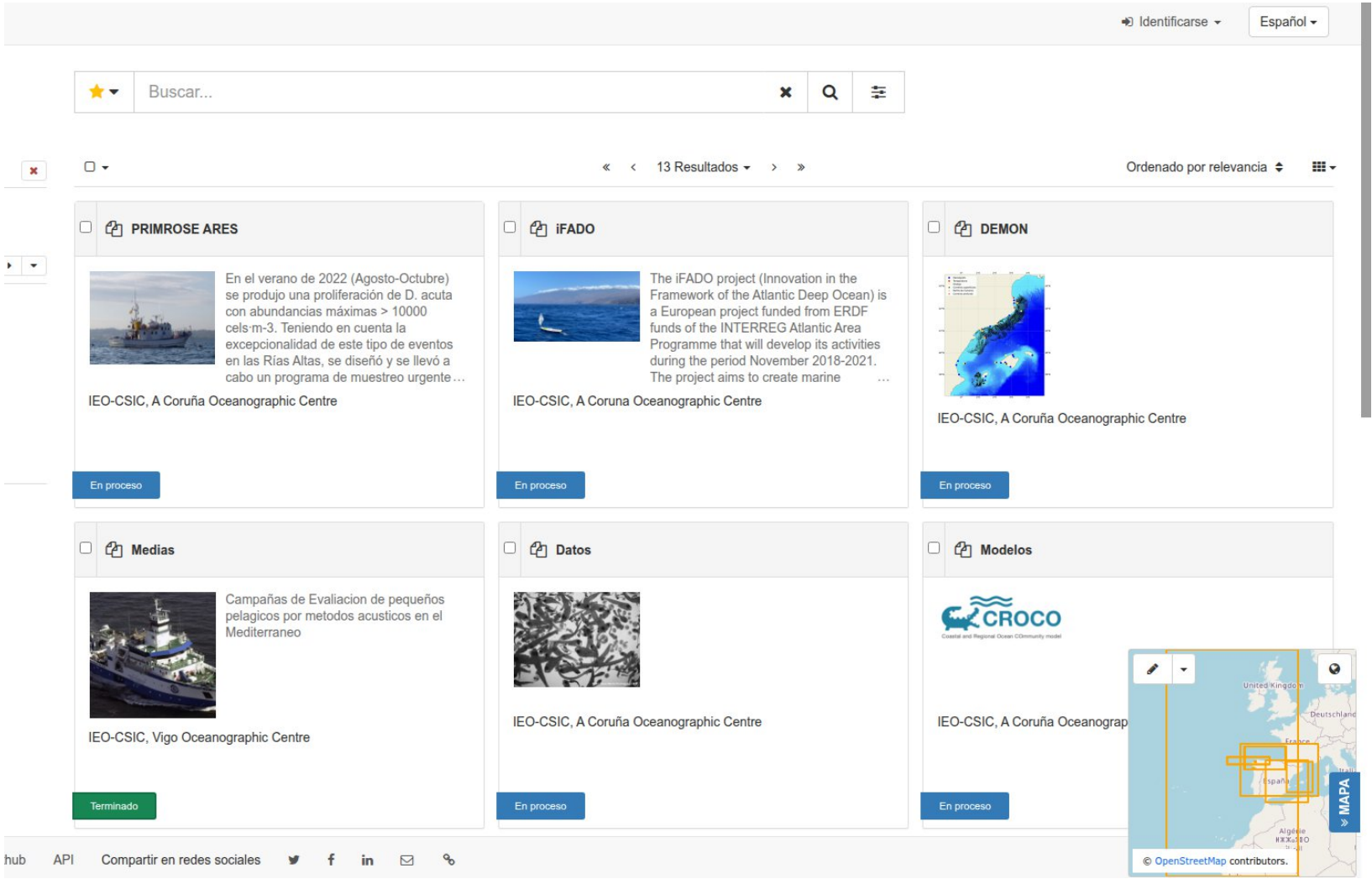






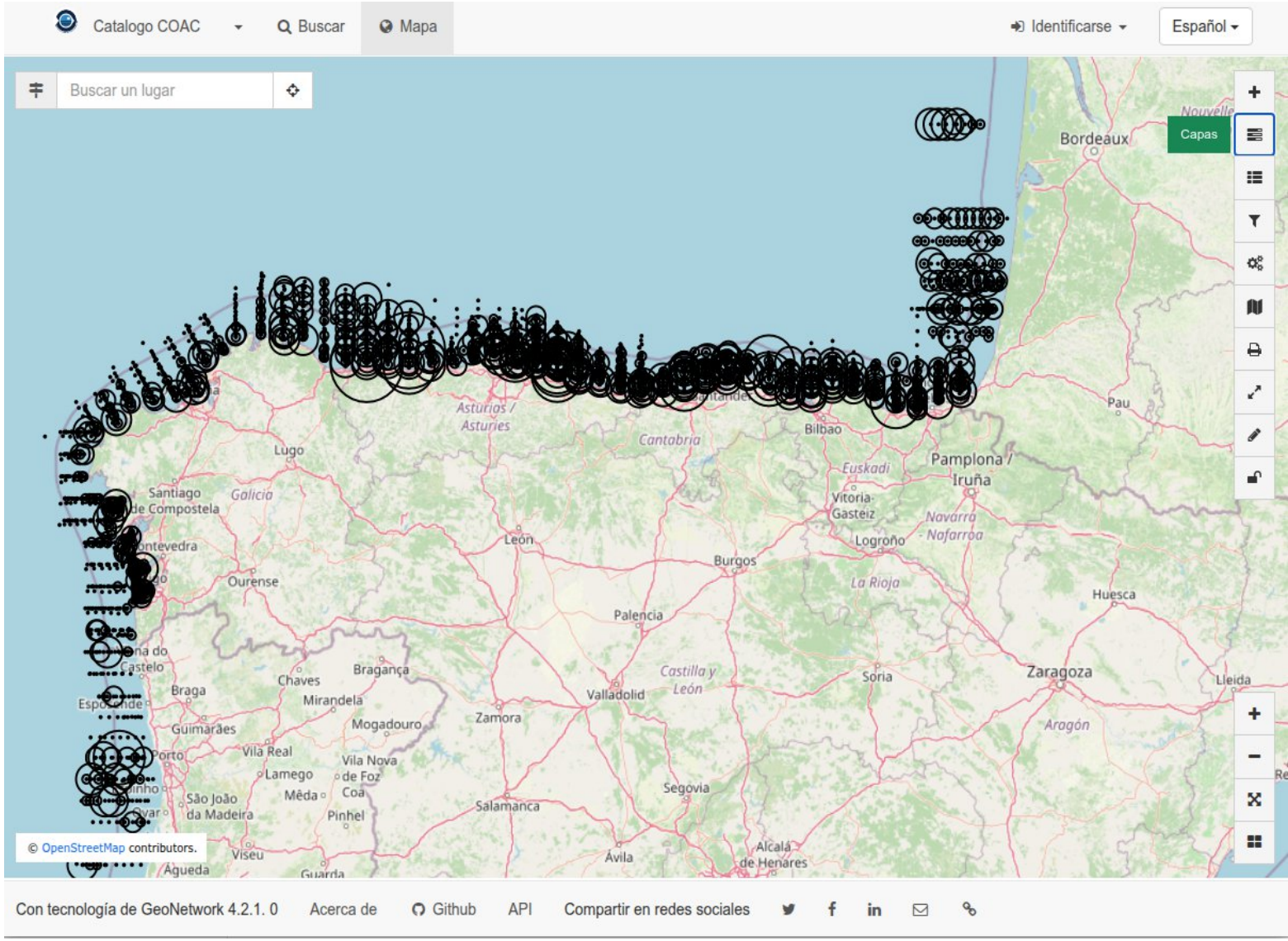
Data dissemination: Geonetwork

- Data catalogue
  - Human Interface
    - Map visualization
    - Filter and download
  - Machine (supervised)
    - Catalogue Service (CSW)
    - Filter and redirect to the source

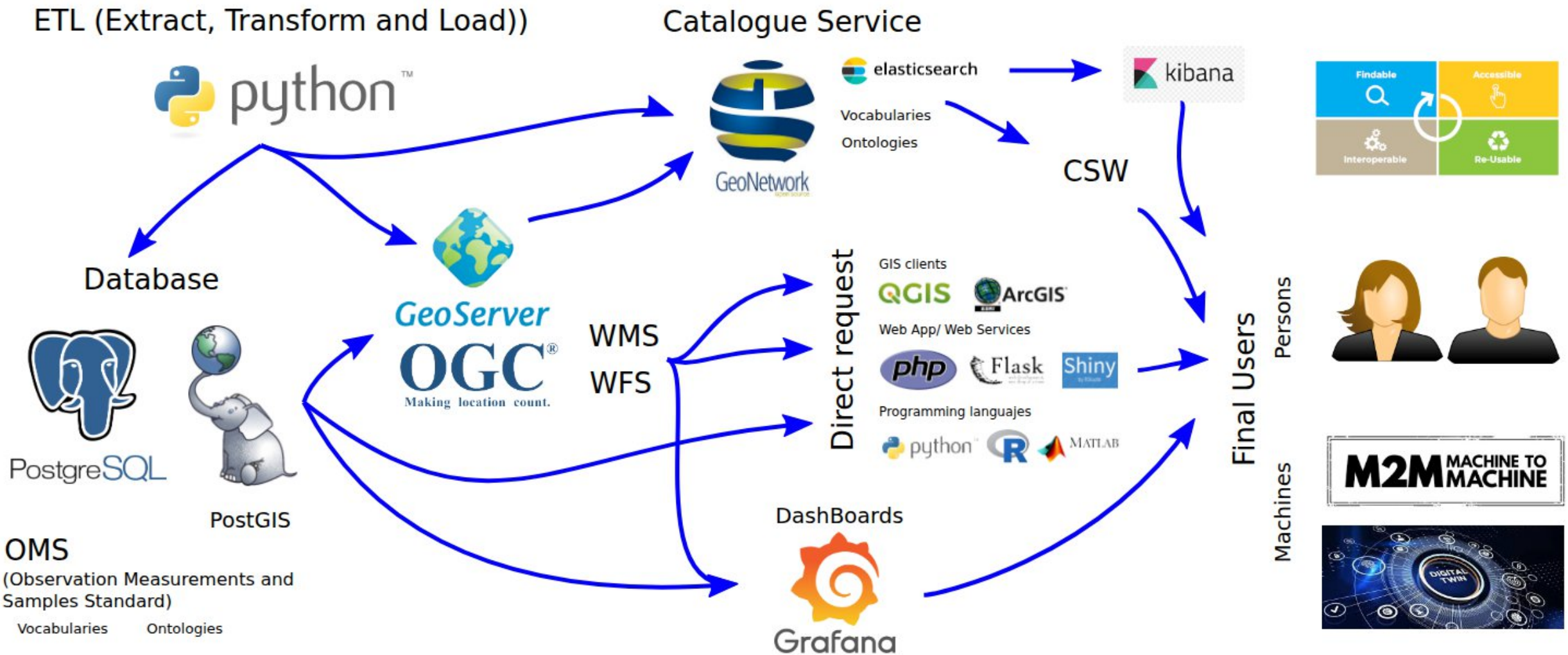


Data dissemination: Geonetwork

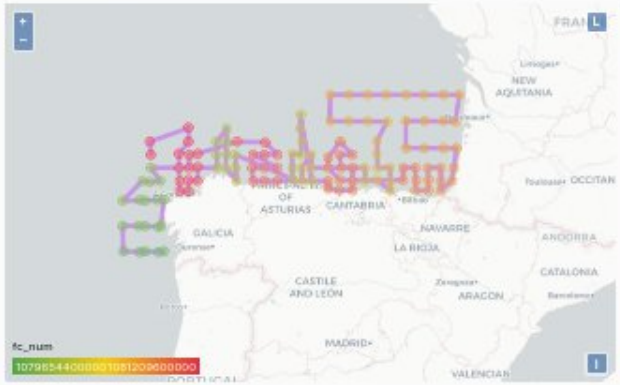
- Data catalogue
  - Human Interface
    - Map visualization
    - Filter and download
  - Machine (supervised)
    - Catalogue Service (CSW)
    - Filter and redirect to the source



Data Ecosystem



CAREVA0304



SAREVA0397



SARACUS 0488



PELACUS / MPH 1990-04



PROSARP (part-1) 1992-03



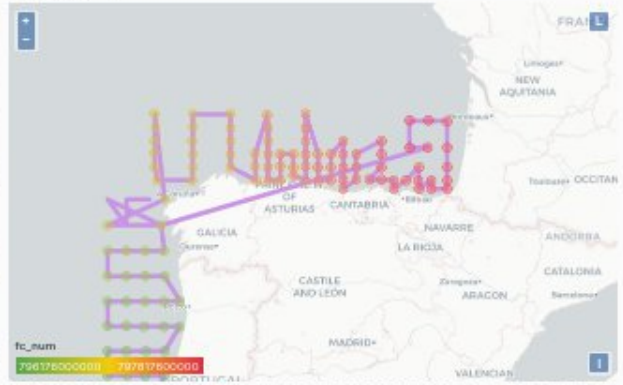
ICTIO-NORTE 1992-04



BIOMAN 1992-05



MPH-0395



SEFOS-0595



CAREVA 1998-03



JUREVA 1998-04



SAREVA 1999-03



SEAMAR-04 2000-03

SEAMAR-05 2000-04

CAREVA 2001-03

JUREVA 2001-04

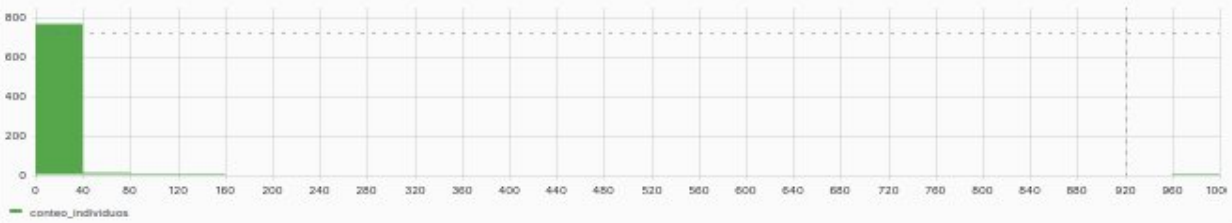
campana: Pelacus 0408 | ano_salida: 1988 | ano_fin: 1988 | perfil: All

Last 6 hours | Refresh | Share | Edit

Ruta de Campaña



Nº huevos totales en la campaña



Distribución de especies



Mapa de Temperatura



Mapa de Salinidad

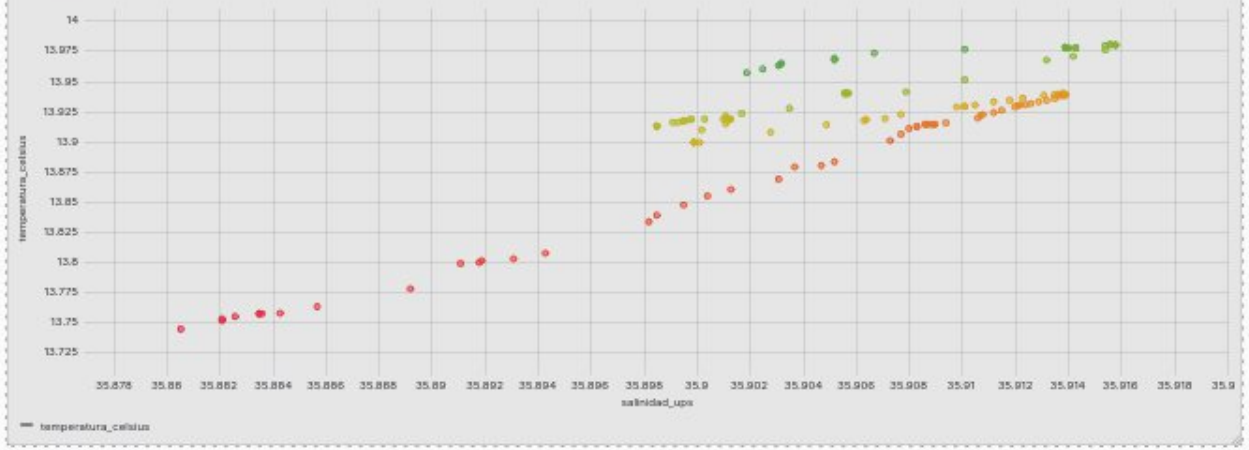


campana: PELACUS 0300 | ano_salida: 1988 | ano_fin: 2023 | perfil: 5

Last 6 hours | Refresh | Share | Save | Exit edit



Diagrama T-S



Fase de vida



Distribución de especies

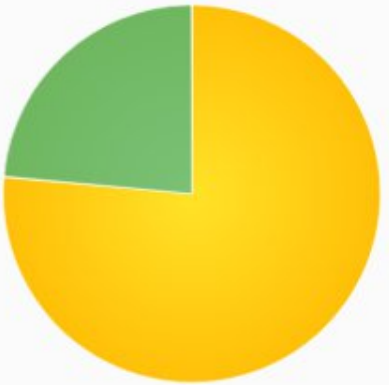


Diagrama de Temperatura

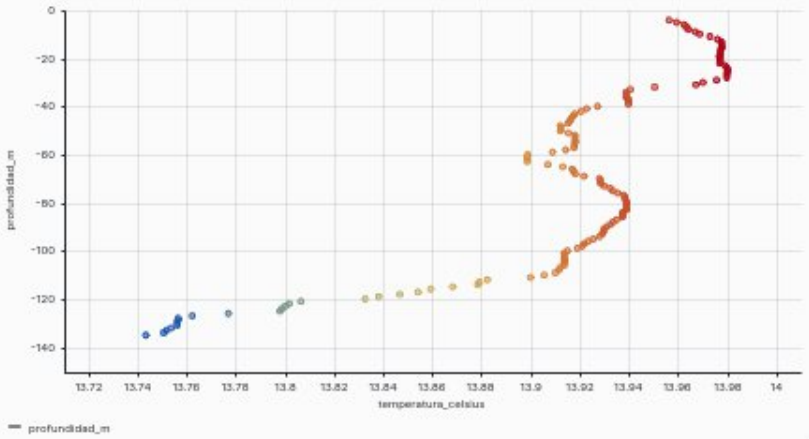


Diagrama de Salinidad

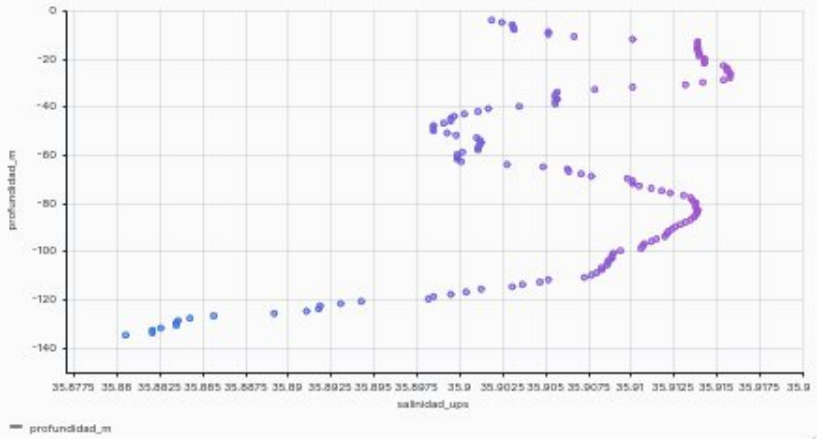
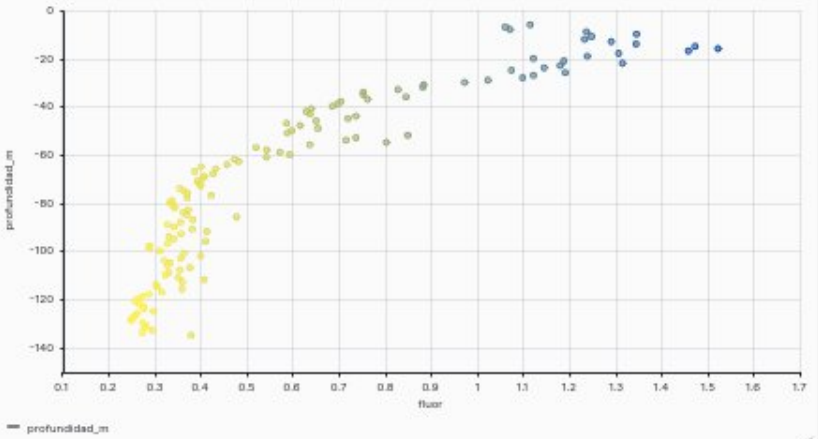
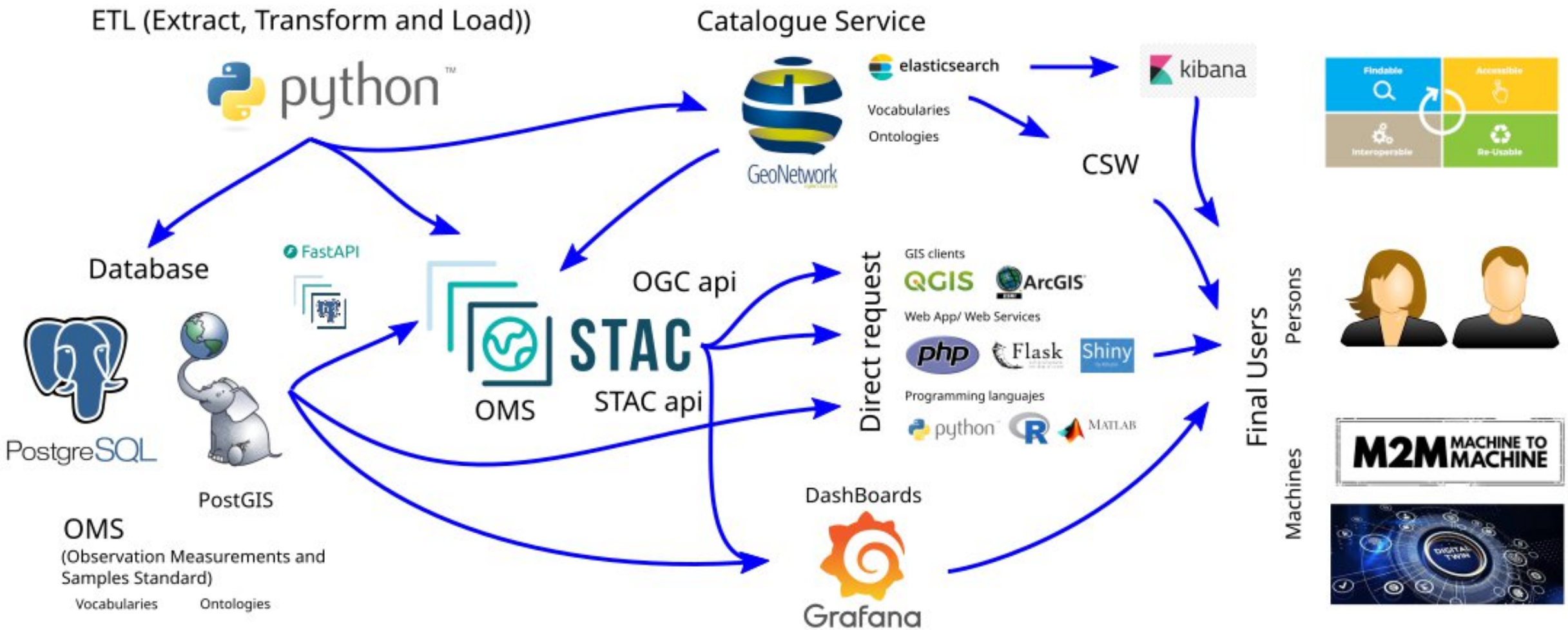


Diagrama de Fluor



Add panel | Group panels

Data Ecosystem



Data Ecosystem

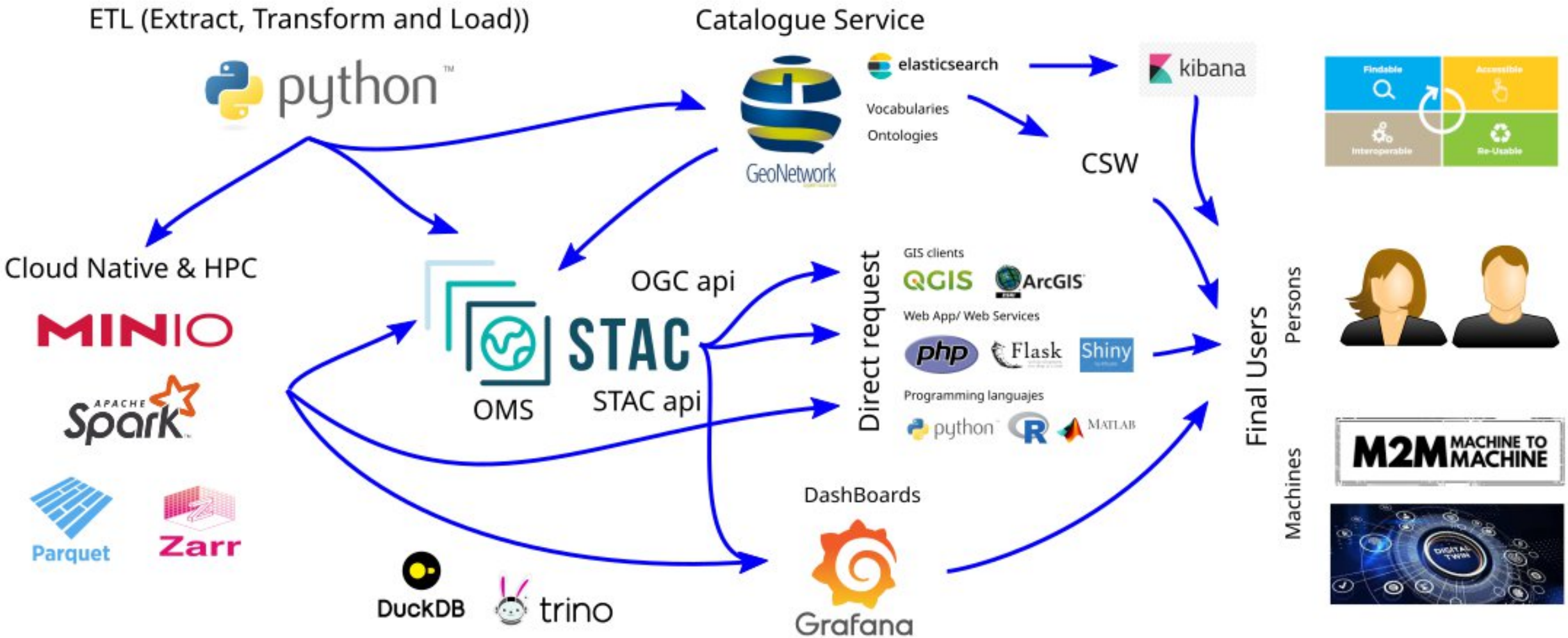
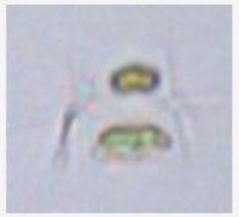
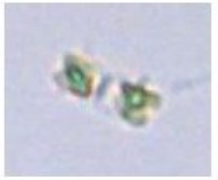
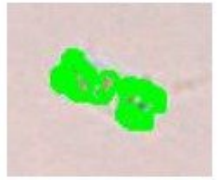
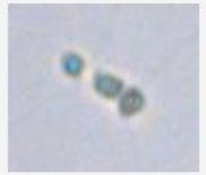


Image analysis

	ind/colonia	image
167	individuo	
73	colonia	

Examples of individual phytoplankton cells and phytoplankton cell colonies captured using a FlowCam. Source: own work.

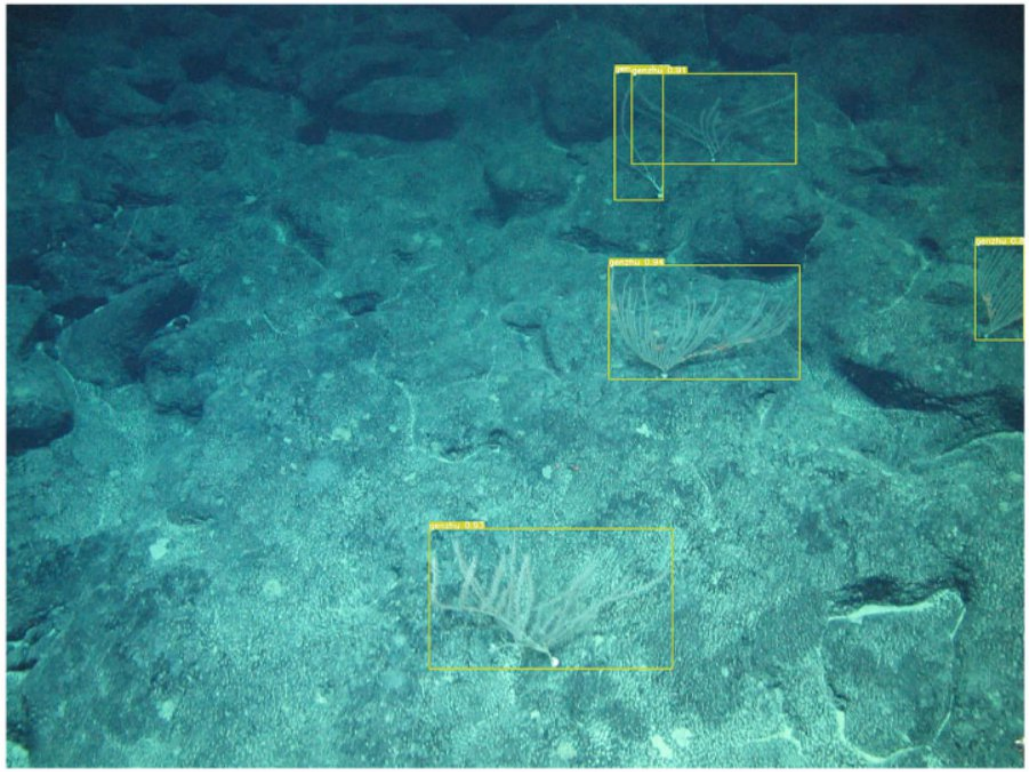
	particula	conteo	image	canny
108	4_743	6		
1093	10_6375	10		
396	4_2746	11		
953	10_4783	4		
468	4_3330	5		

Results of applying the Canny algorithm for edge detection and cell counting in phytoplankton photographs taken with a FlowCam. Source: own work.

Computer vision in video



Results of applying YOLOv8 to frames from the AMORES project video without any specific training. Source: Own work.



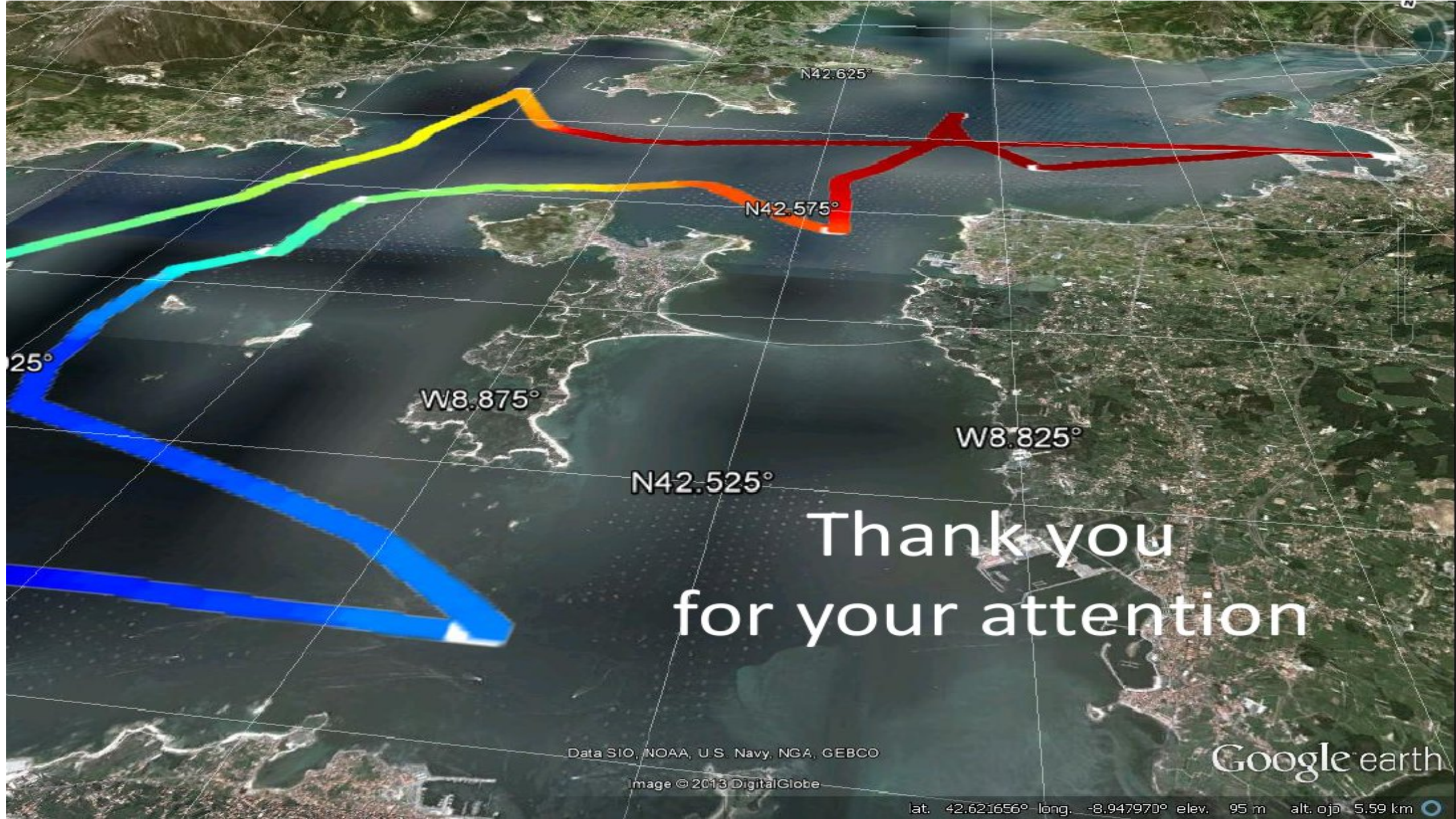
Detection results following specific training of DS-YOLO (based on YOLOv5) for benthic megafauna.

Source: Wang et al. (2024). *Quantitative detection algorithm for deep-sea megabenthic organisms based on improved YOLOv5*. Frontiers in Marine Science, 11. https://doi.org/10.3389/fmars.2024.1301024

Conclusions

- We are moving from FAIR for people to FAIR for machines (AI-ready).
- These advances enable us to accelerate knowledge-generation processes as an institution.
- Making data available in this way means it can be used by other sectors of society, thereby amplifying the impact of data.

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N42.525°
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lat. 42.621656° long. -8.947970° elev. 95 m alt. ojo 5.59 km