

IHCantabria

UNIVERSIDAD DE CANTABRIA

I+D+i para un desarrollo sostenible

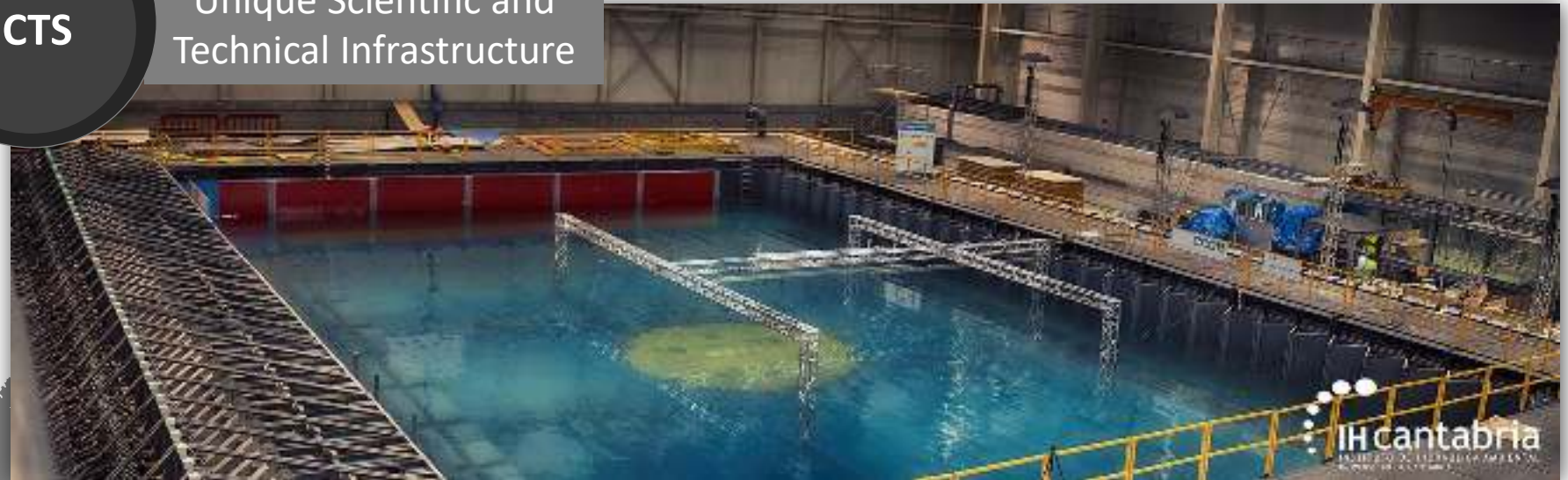


Co-location opportunities for Aquaculture facilities,
decision support for operational activities in coastal
areas

Felipe Fernández & Bárbara Ondiviela || IHCantabria
fernandezf@unican.es & barbara.ondiviela@unican.es

ICTS

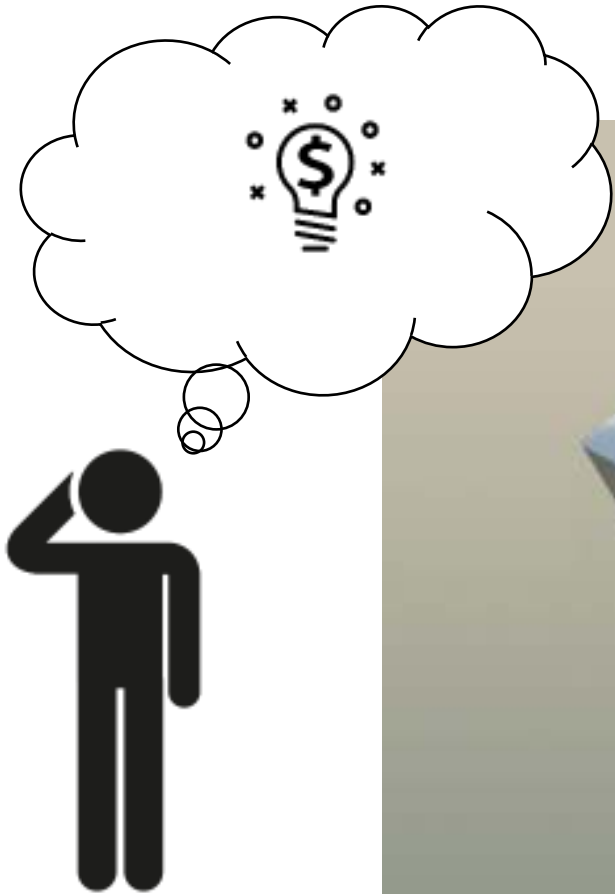
Unique Scientific and
Technical Infrastructure



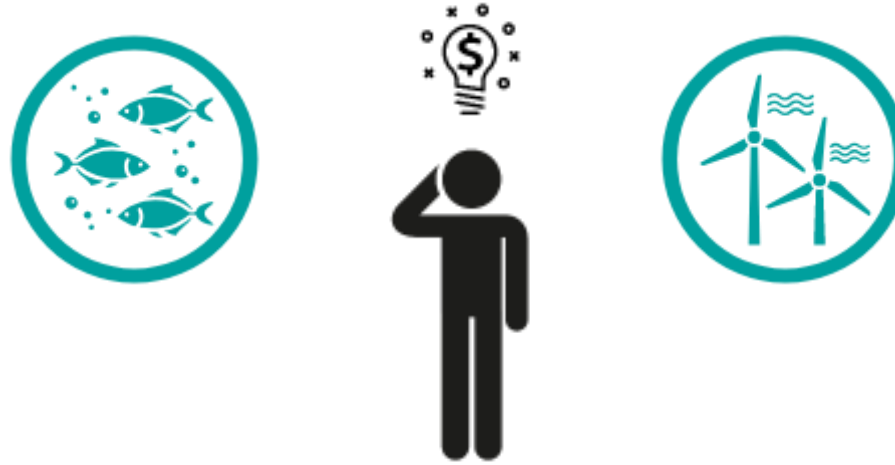
The main objective of IHCantabria is to become a leading international research centre
in the field of water



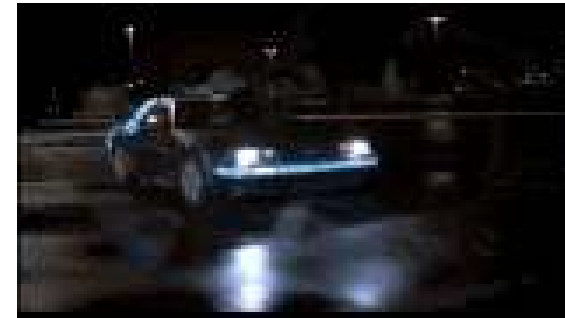
*The Coastal Zone is a **very dynamic environment***



What do you need to take a good decision?



DATA (past – present – future)



... a time machine?

We have built...

“a time machine for marine spatial planning”



1950..... Now..... 2100

Past

- Reanalysis ✓
- Hindcasting



Numerical modelling

Present

- Metocean Buoys ✓
- Radar HF
- Satellite data



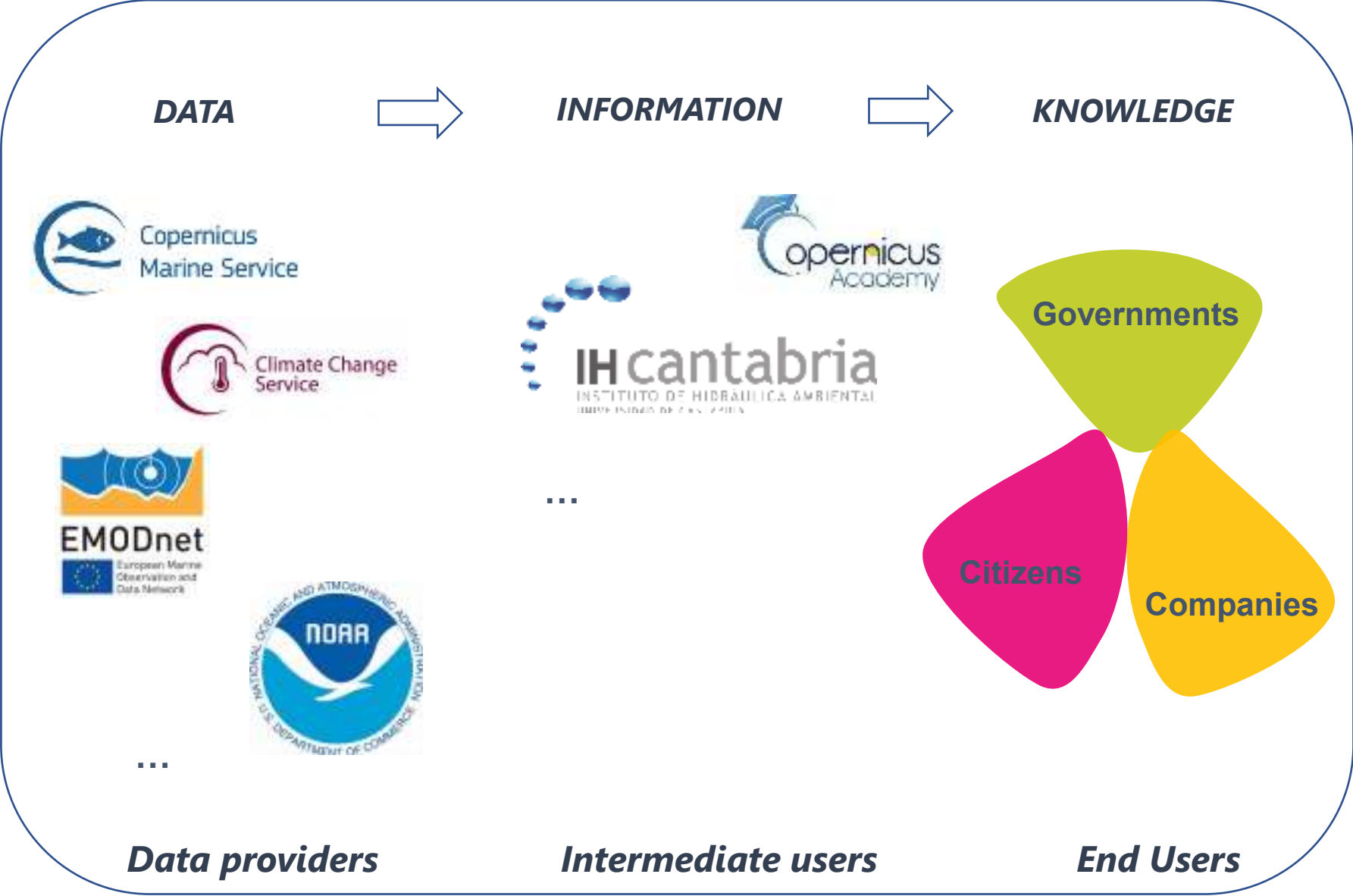
Sensors

Future

- Short Term Forecasting ✓
- Seasonal Forecasting
- Climate change scenarios



Numerical modelling





Our aim is to evaluate current and future opportunities for economic activities in the coastal zone and support their development

Let's focus on the **aquaculture sector!**

ATLAS



Viability ATLAS for the development of offshore aquaculture in the Spanish coasts.

Sponsors & Partners



[+ Info](#)

RENAQUA

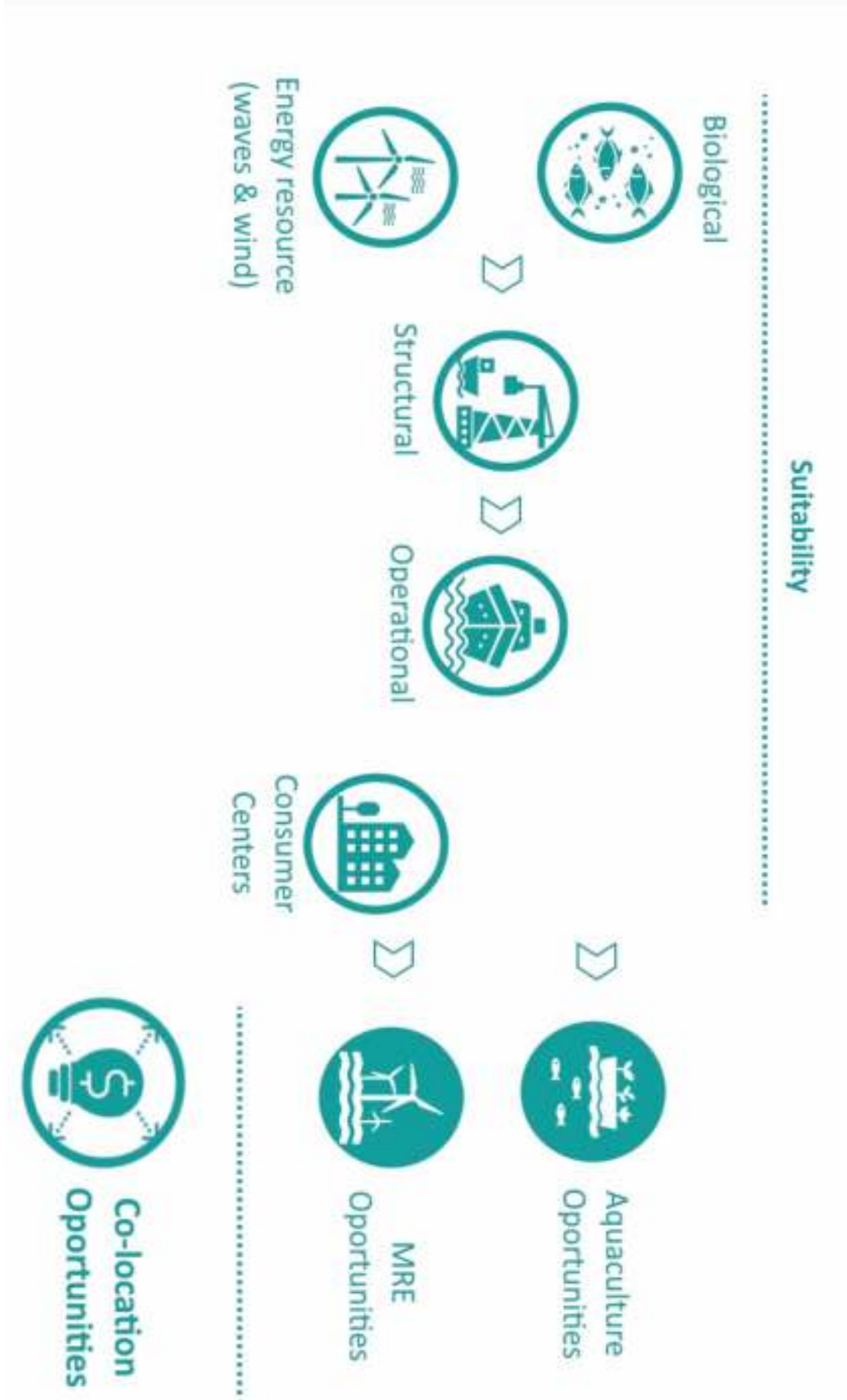


Co-location Opportunities for RENEwable energies and AQUAculture facilities, decision support for operational Multi-Use Platform activities at coastal areas

Sponsors & Partners



[+ Info](#)



2018

- ✓ 2018 Weis, C., Ondiviela, B., Guanche, R., Castellanos, O.F., Juanes, J.A. A global integrated analysis of open sea fish farming opportunities Aquaculture 497 234-245



- ✓ 2018 Weis, C., Ondiviela, B., Guinda, X., Del Jesus, F., González, Javier, Juanes, J.A. Co-location opportunities for renewable energies and aquaculture facilities in the Canary Archipelago Ocean & Coastal Management 166 62-71



- ✓ 2018 Weis, C., Ondiviela, B., Guanche, R., Castellanos, O.F., Juanes, J.A. Development of a tool to Identify Potential Zones for Greater Amberjack Proceedings of the ASME 2018 Greater Amberjack Proceedings of the ASME 2018 37th International Conference on Ocean, Offshore and Arctic Engineering 77870-1-7 DOI:10.1115/OMAE2018-77870



- ✓ 2018 Jurado Fuentes, Alfonso, Sánchez, Patricia, Armesto, J.A., Guanche, R., Ondiviela, B., Juanes, J.A. Experimental and Numerical Modelling of an Offshore Aquaculture Cage for Open Ocean Waters Proceedings of the ASME 2018 Cage for Open Ocean Waters Proceedings of the ASME 2018 37th International Conference on Ocean, Offshore and Arctic Engineering 7760-110 doi:10.1115/OMAE2018-77600



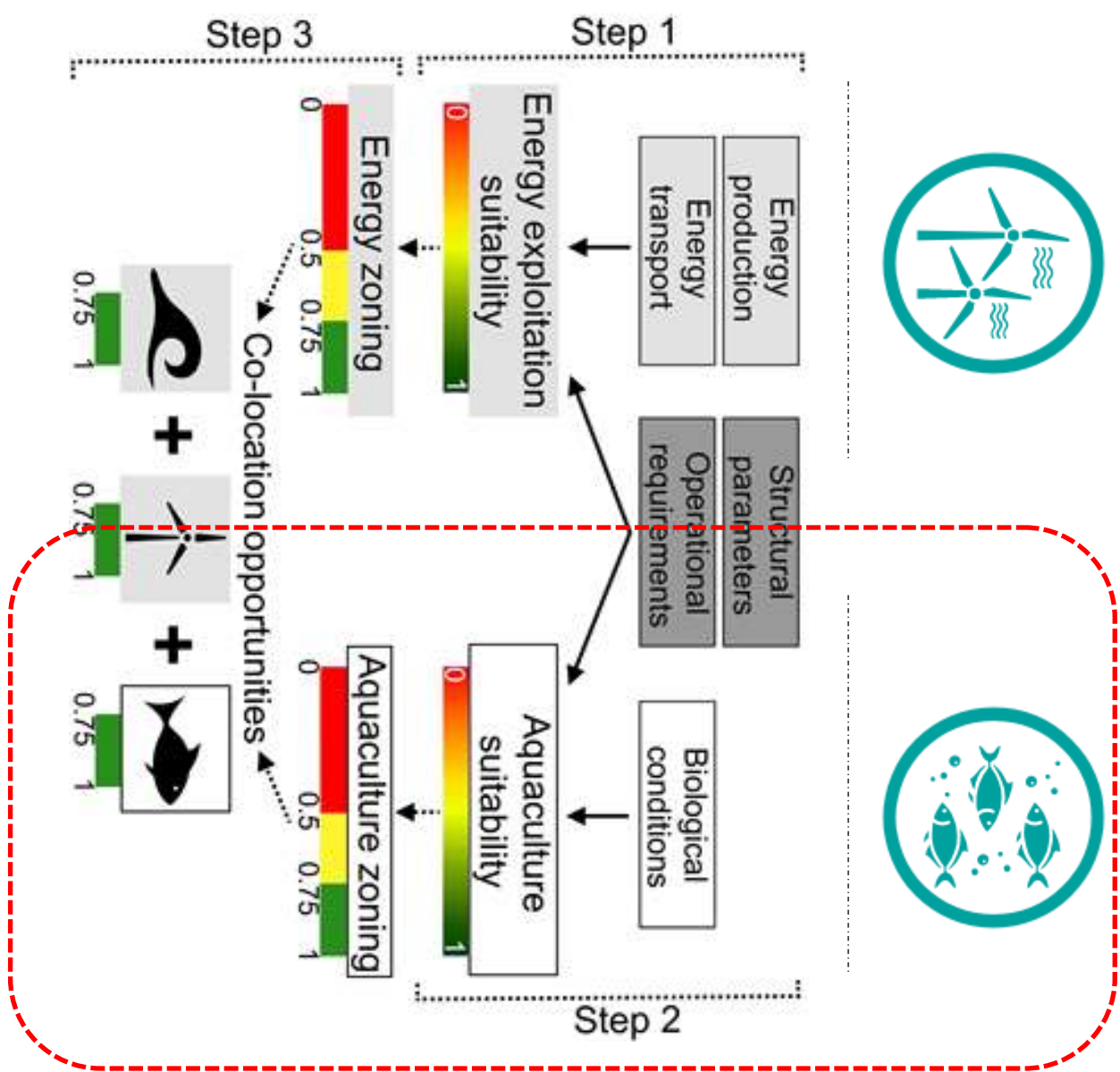
- ✓ 2018 Weis, C., Guanche, R., Ondiviela, B., Castellanos, O.F., Juanes, J.A. Marine renewable energy potential: A global perspective for offshore wind and wave exploitation Energy Conversion and Management 177 43-54 DOI:10.1016/j.enconman.2018.09.059



2017

- ✓ 2017 Camus, P., Losada, I.J., Itzaguirre, C., Espejo, A., Menéndez, M., Pérez, J. Statistical wave climate projections for coastal impact assessments. Earth's Future, V. 5, p. 918-933. DOI:10.1002/efrt2.234







Aquaculture



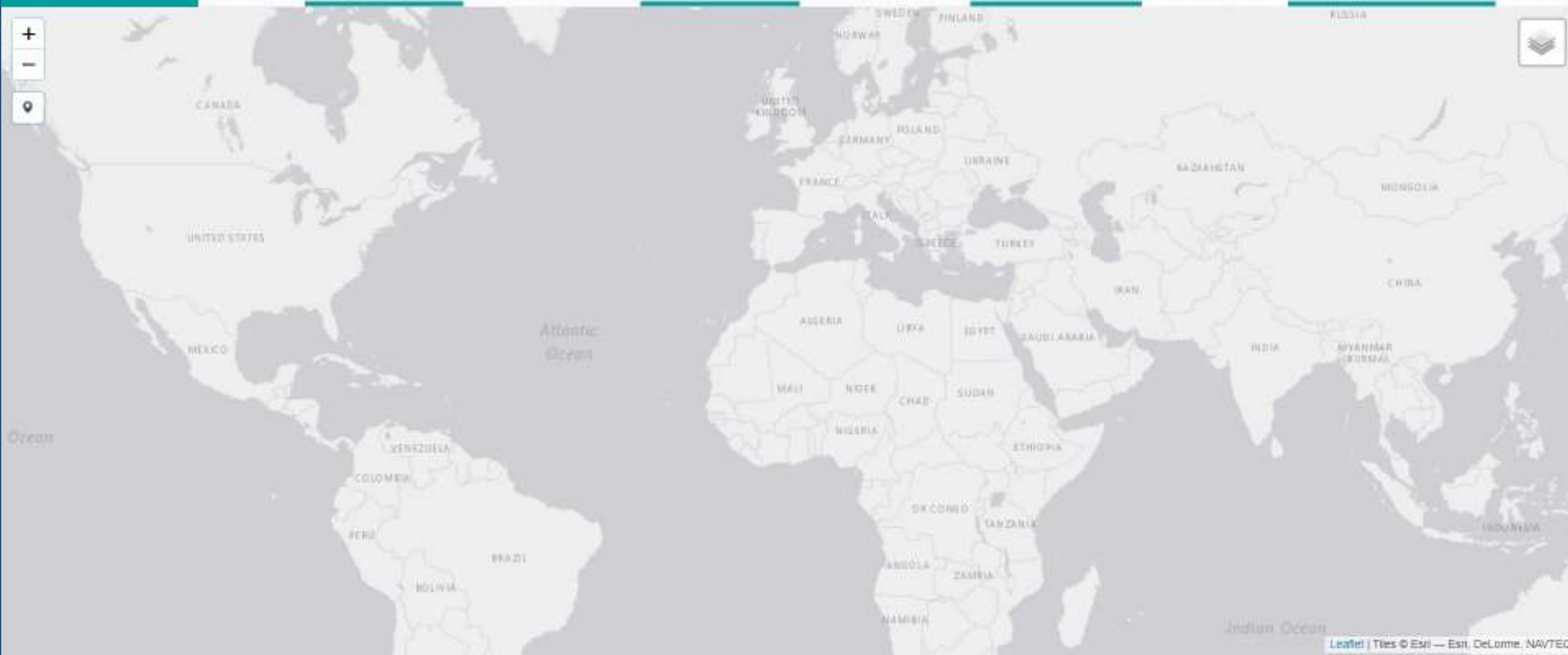
Marine Energy

Biological Suitability

Structural Suitability

Operational Suitability

Fish Farming Opportunities



Blue Time Machine



MARINE SPATIAL PLANNING

v2.2.1

Global

National

Regional

Local



Aquaculture



Marine Energy

Structural Suitability

Operational Suitability

Fish Farming Opportunities



Biological Suitability

☐ *Argyrosomus regius*

☒ *Dicentrarchus labrax*

☐ *Rachycentron canadum*

☐ *Salmo salar*

☐ *Senioides dumerilii*

☐ *Scorpaenidae*

☐ *Thunnus thynnus*

Dicentrarchus labrax



Blue Time Machine

Legend | Top © Esri — Esri, DeLorme, NAVTEQ

MARINE SPATIAL PLANNING

v2.2.1

Global

National

Regional

Local



Aquaculture



Marine Energy

Biological Suitability



Structural Suitability

☐ Structural Suit. Index

Operational Suitability

Fish Farming Opportunities



Suitability: 23%



Blue Time Machine

Legend | Tides @ Ebb - Ebb Currents NAVTOD

MARINE SPATIAL PLANNING

v2.2.1

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Local



Aquaculture



Marine Energy

Biological Suitability

Structural Suitability



Operational Suitability

☐ Operational Suit. Index

Fish Farming Opportunities

Fish



Suitability: 87%



Blue Time Machine

Legend | TMS © Esri — Esri, DeLorme, NAVTEQ

MARINE SPATIAL PLANNING

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National

Regional

Local



Aquaculture



Marine Energy

Biological Suitability

Structural Suitability

Operational Suitability



Fish Farming Opportunities

☐ *Argyrosomus regius*

☒ *Dicentrarchus labrax*

☐ *Rachycentron canadum*

☐ *Salmo salar*

☐ *Seniöla dumerilii*

☐ *Sparus aurata*

☐ *Thunnus thynnus*

Dicentrarchus labrax

0 50 100

Blue Time Machine

Legend | TMS © Esri — Esri, DeLorme, NAVTEQ

MARINE SPATIAL PLANNING

v2.2.1

Global

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Aquaculture



Marine Energy

Biological Suitability

Structural Suitability

Operational Suitability

Fish Farming Opportunities

Decapod crustaceans

0 50 100



Blue Time Machine

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v2.2.1

Global

National

Regional

Local



Aquaculture



Marine Energy

Biological Suitability

Structural Suitability

Operational Suitability

Fish Farming Opportunities



- ☒ Gray - ESRI
- ☐ Oceans - ESRI
- ☐ Dark - Carto
- ☒ EMODnet - Bathymetry
- ☐ Bathymetry
- ☒ EMODnet - Geology
- ☐ Seabed Substrates
- ☐ Sea-floor Geomorphology
- ☒ EMODnet - Seabed Habitats
- ☐ EUNIS Broad-scale habitats
- ☐ EUNIS Medium-scale habitats
- ☒ EMODnet - Human Activities
- ☐ Vessels Density (2017)
- ☐ Ocean Energy Facilities
- ☐ Aquaculture Finfish Farms



Blue Time Machine

MARINE SPATIAL PLANNING

v2.2.1

Global

National

Regional

Local

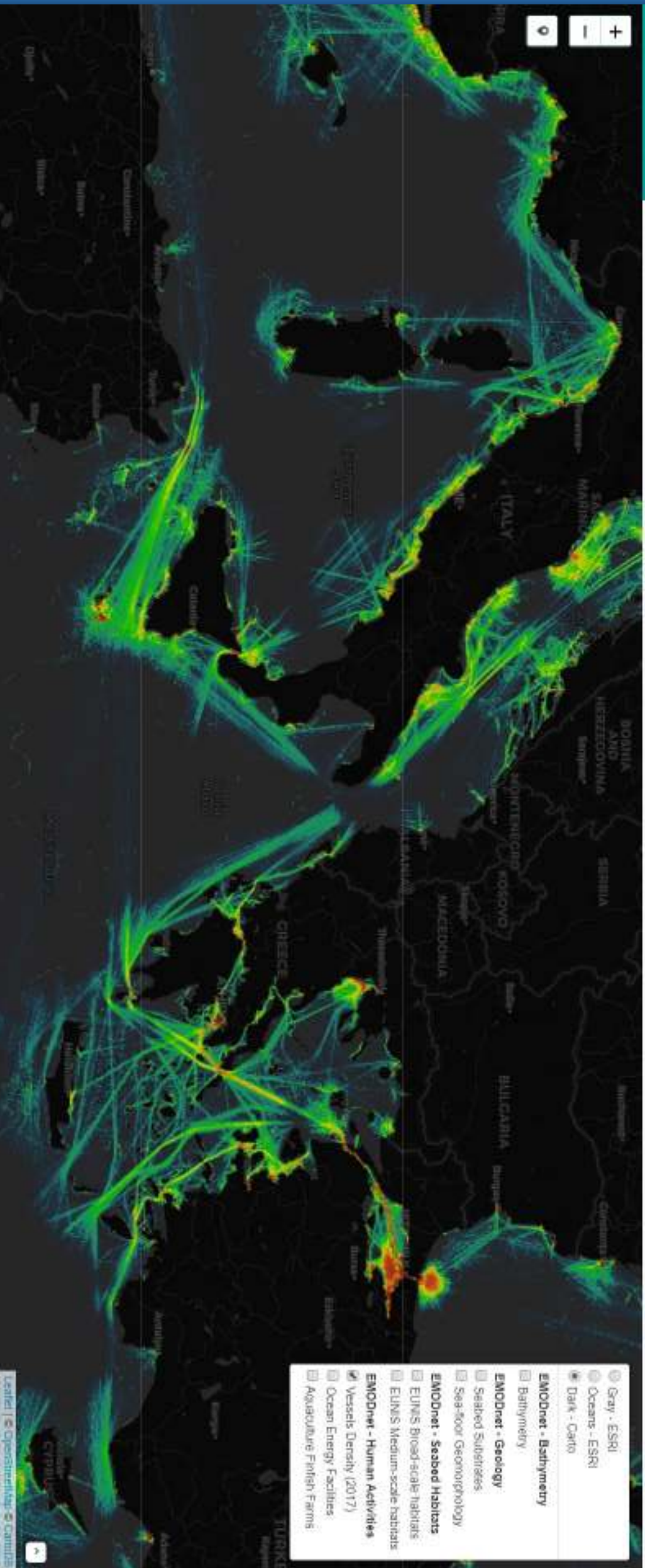


Aquaculture (PIACUA)

Energy (TRL+)



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- ☐ Aquaculture Finnish Farms



Leaflet | © OpenStreetMap contributors, © Carto



Blue Time Machine

MARINE SPATIAL PLANNING

v2.2.1

Global

National

Regional

Local

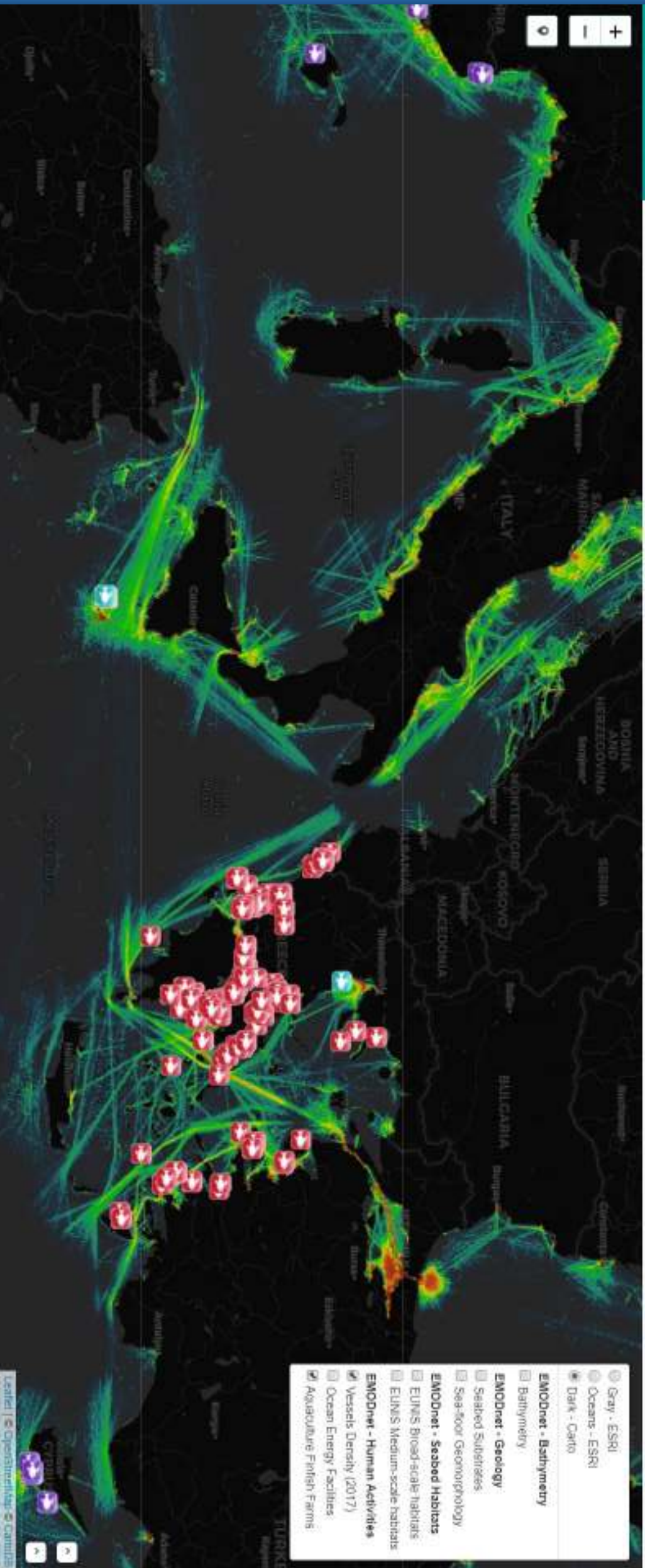


Aquaculture (PIACUA)

Energy (TRL+)



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Blue Time Machine

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Global

National

Regional

Local

[Aquaculture \(PIACUA\)](#)[Energy \(TRL+\)](#)

Blue Time Machine

Data Hub

\$ Blue Growth

Tools

When

Past

Present

Short-term Forecast

Climate Change



Where

Spatial Filter



What

☒ Ocean salinity☐ Ocean temperature☐ Metro☐ Ocean waves☐ Ocean currents

Products

Name

Variable

Units

Type

Source

Time Resolution (h)

(Lon) Spatial Res.

(Lat) Spatial Res.

Catalog

Graph



Search Data

No data Available



<https://vimeo.com/ihcantabria/btm>

Lets look for good locations for our business!

00:14

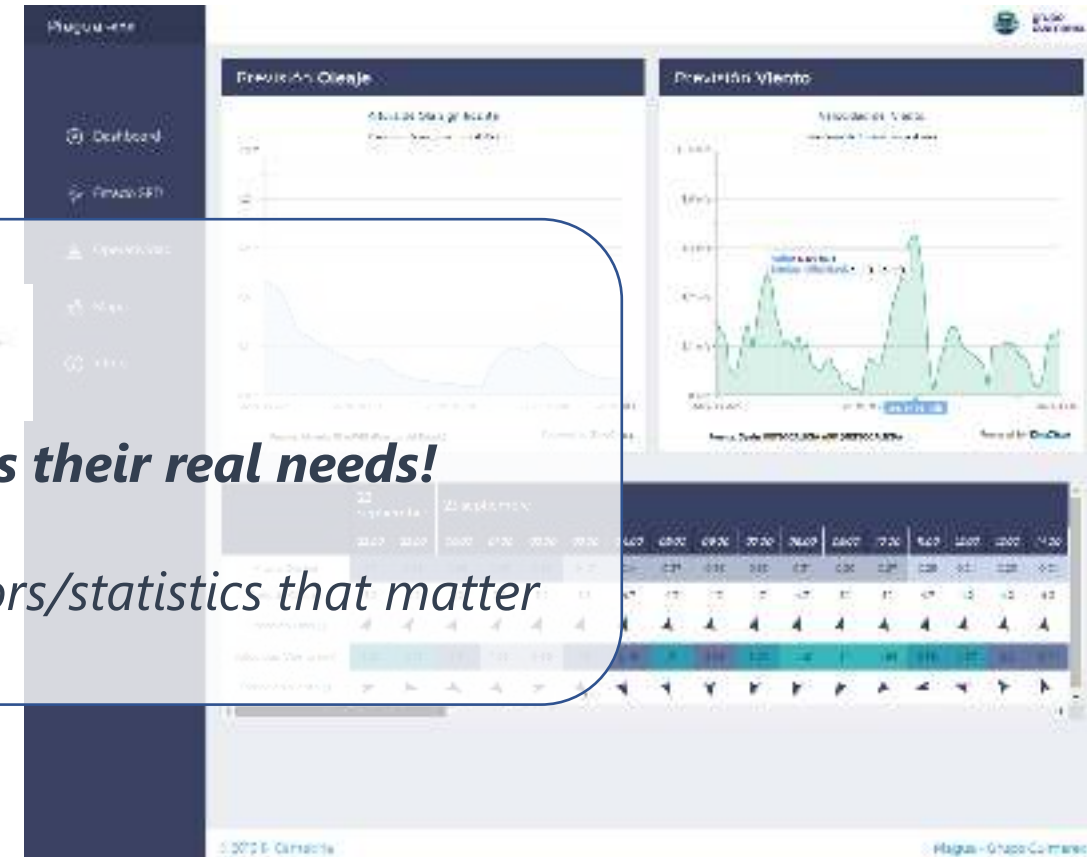
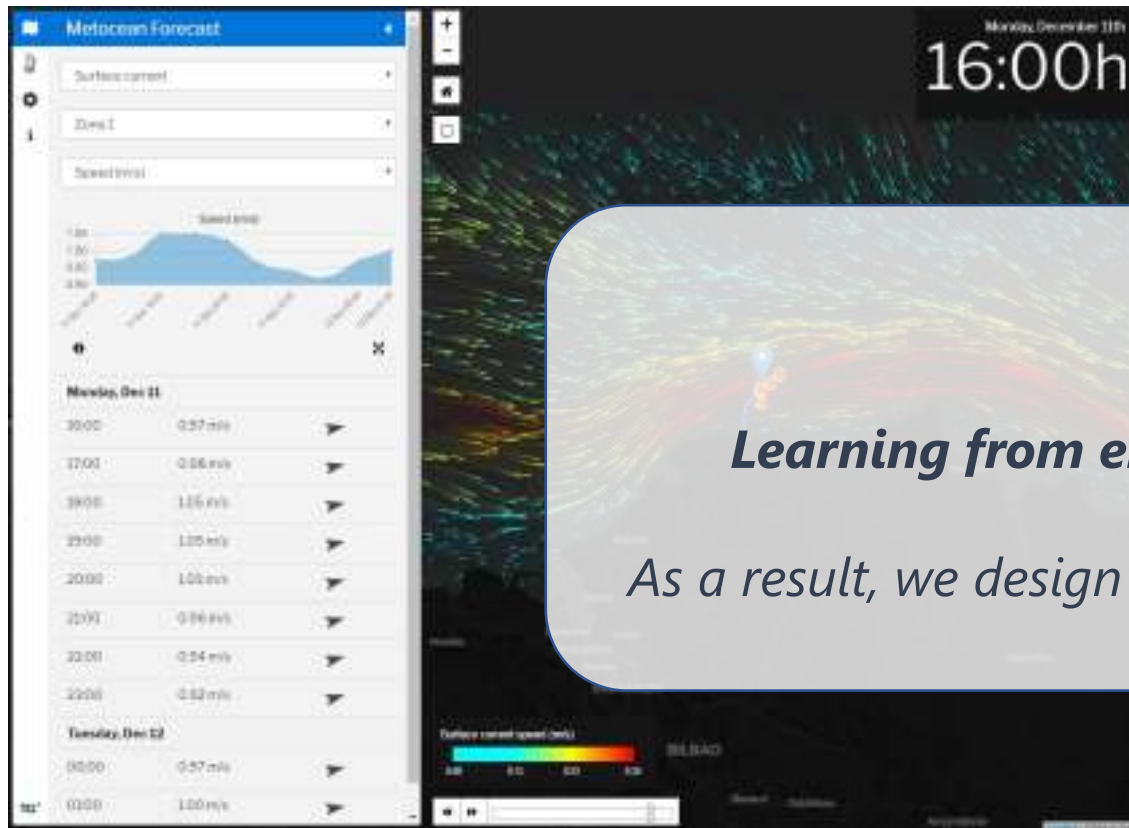
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📺

Marine Renewable energies
BIMEP Test Site
<http://dss.trlplus.com/>

Aquaculture
PIAGUA (Grupo Culmarex)



Learning from end users their real needs!

As a result, we design indicators/statistics that matter

 Dashboard Estado SFR Operatividad Mapa + Info

Piagua

Estado actual

 22.5 °C 09:32

Almería

 23/09/2019 0.3 m
5.1 s Olenje 3.4 m/s Viento 24.1 C°

Temperatura

 37.3 ups

Salinidad

 0 m/s Corrientes -0.5 m

Mareas

Índice SFR

Peces de hasta 100g

 88 %

Peces de entre 400g y 500g

 95 %

Índice Operatividad

Estado

 Optimo

Previsión Oleaje

Previsión Viento

Previsión Compleja Viento Complejo

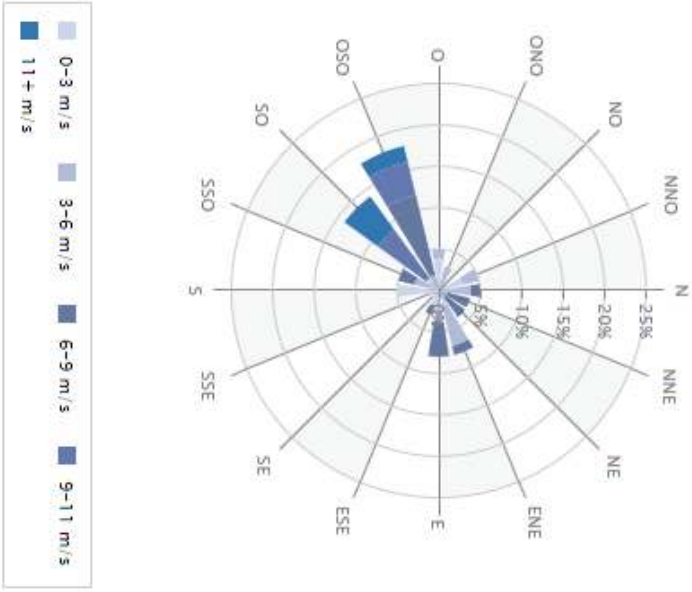
Velocidad y Dirección del Viento

Previsión de los próximos 4 días



Datos del viento

Resumen de la dirección y fuerza del viento



THANK YOU!!



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