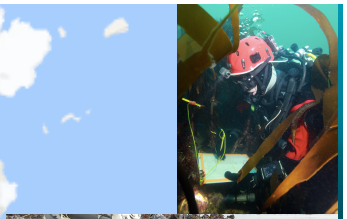
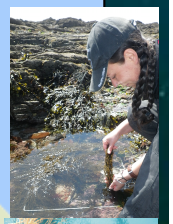
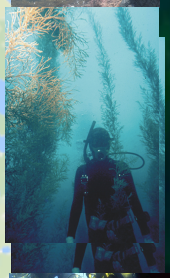
MARFOR - Functional Variability and Dynamics of Responses of Marine Forests to Global Change

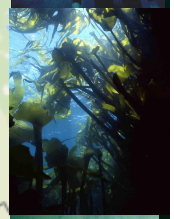
Ester Serrao: eserrao@ualg.pt

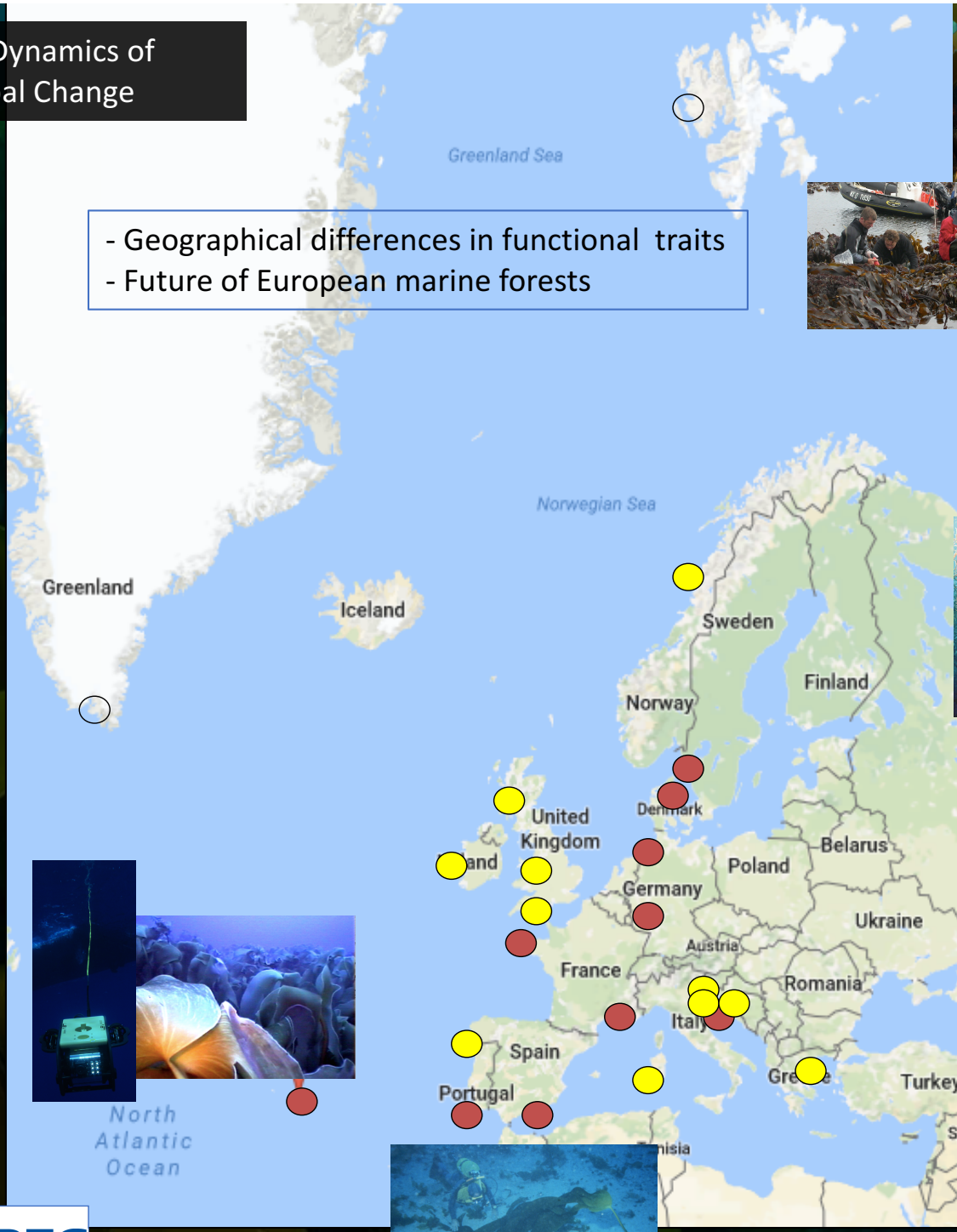
- Geographical differences in functional traits
- Future of European marine forests











Coordinator:
CCMAR, University of Algarve, Portugal

Funded partners:
AWI - Alfred-Wegener Institute, Germany
CNRS UPMC St. Biol. Roscoff, France
University of Goteborg, Sweden
Aix-Marseille University, France
University of Malaga, Spain
University of Azores, Portugal
University of Cologne, Germany

Self-funded partners:
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Collaborative partners:
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NIBIO - Norwegian Inst. Bioecon. Res., Norway
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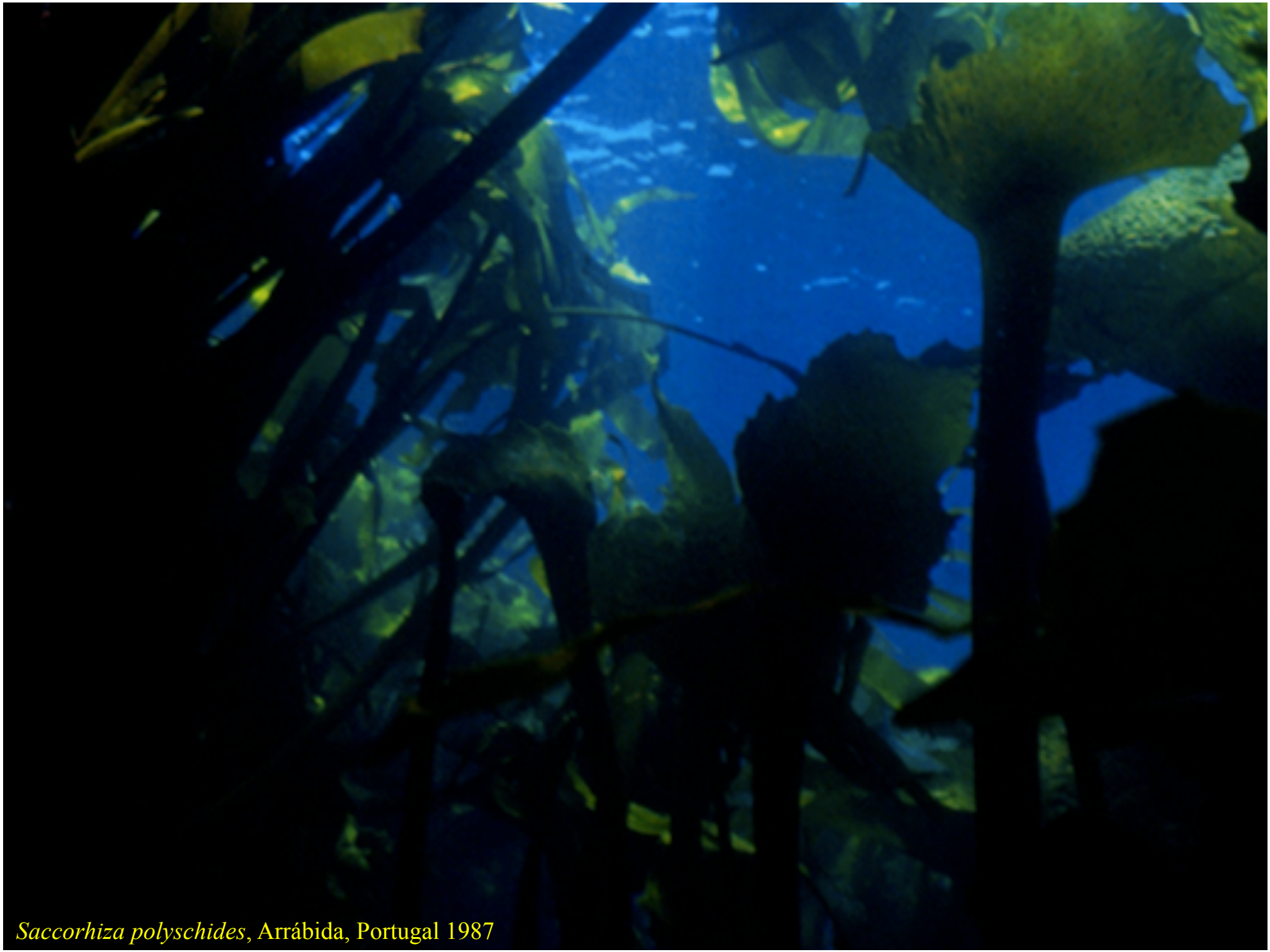

Saccorhiza polyschides, Arrábida, Portugal 1987

MARFOR WP 2 - Modelling spatial distributions, range shifts, connectivity, trajectories

Task 2.3. - Citizen Science for marine forests

AIMS:
- promote CS initiatives for continuous monitoring of the distribution of NE Atlantic marine forests.

Citizen science = the involvement of volunteers in research.

Citizen science is the way to combine research with environmental education and public engagement.

British Ecological Society

marineforests.com

Compile and integrate information to make it useful

Provide **free access** to spatial and temporal data.

Promote citizen awareness and participation

Tasks:

1) build a database of distribution records (over space and time) – citizens create records

2) make this information freely available worldwide. – citizens use it
FAIR principle = data Findable, Accessible, Interoperable and Reusable; Wilkinson et al., 2016).

3) promote public participation, interest and marine literacy – citizens participate

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EXPLORE DATA ADD RECORDS

Marine Forests : Important Habitats Worldwide

Macroalgae, plants and animals like corals and sponges create complex habitats that provide resources, shelter and nursery grounds for many marine organisms.

Macroalgae

Marine forests of seaweeds are mainly formed by large brown algae (not plants) such as kelp or fucoids, but also by red and green algae.

Seagrass meadows

Seagrasses are plants that evolved and adapted to live in the sea. They have roots, leafs and produce flowers and fruits.

Animal gardens

Marine animal forests are mostly formed by invertebrates that live attached to rock, such as coral reefs and gorgonian gardens.

Records from volunteers

Scientific team and support

Project 'Marine Forests' is supported by scientists and volunteer citizens from all around the world.

so far:

Volunteers: 269 **5389 records**

Photo records: 3329

Species identified: 444

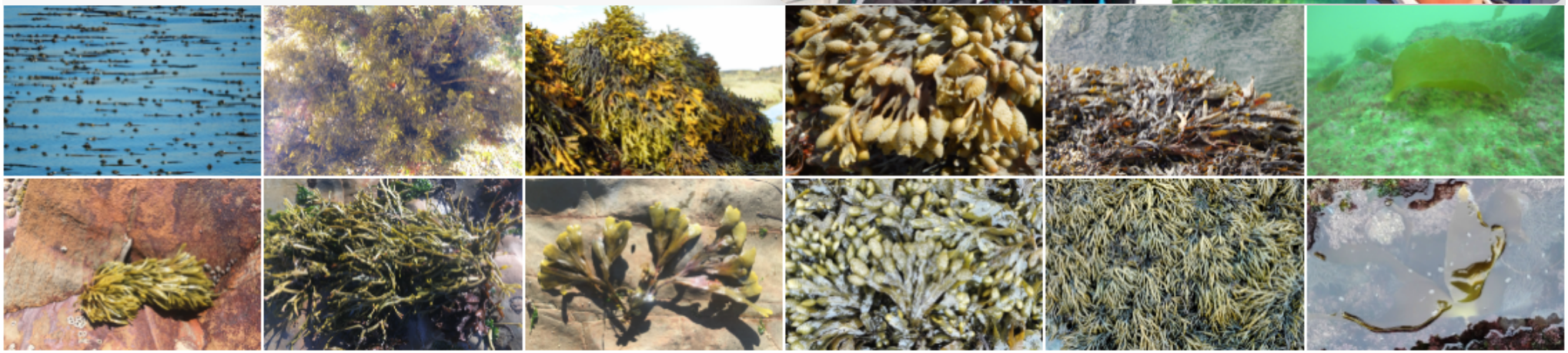
Herbarium photos from volunteers: 270

Literature records from volunteers: 447

Curated records: 438

CITIZEN SCIENTISTS

COORDINATORS

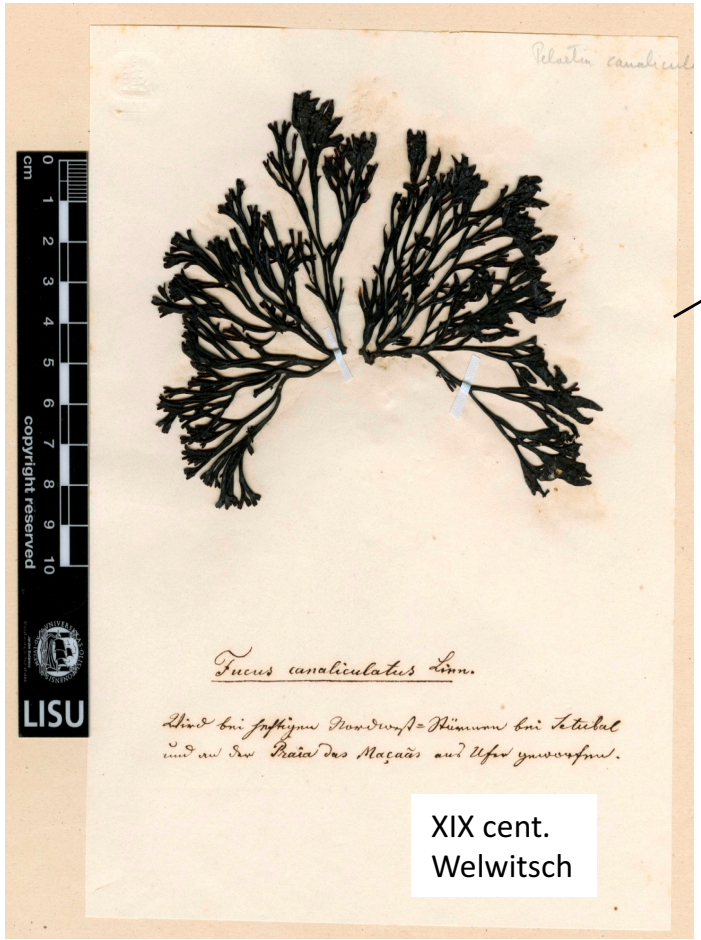


Upwelling refuges - *Fucus guiryi*

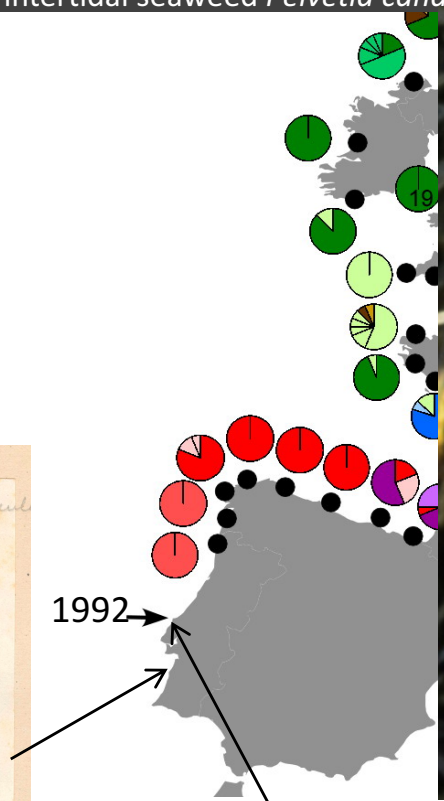
Lourenço CR, Zardi GI, Jacinto R, McQuaid CD, Serrao EA, Pearson GA, Nicastro K. 2016. Hot and cold: upwelling sustains genetically diverse refugia from climate change. J. Biogeography 10.1111/jbi.12744

Pelvetia canaliculata

Neiva, J, Assis, J, Fernandes, F, Pearson, GA, Serrão, EA. (2014) Species distribution models and mitochondrial DNA phylogeography suggest an extensive biogeographical shift in the high-intertidal seaweed *Pelvetia canaliculata*. Journal of Biogeography 42:1137-1148

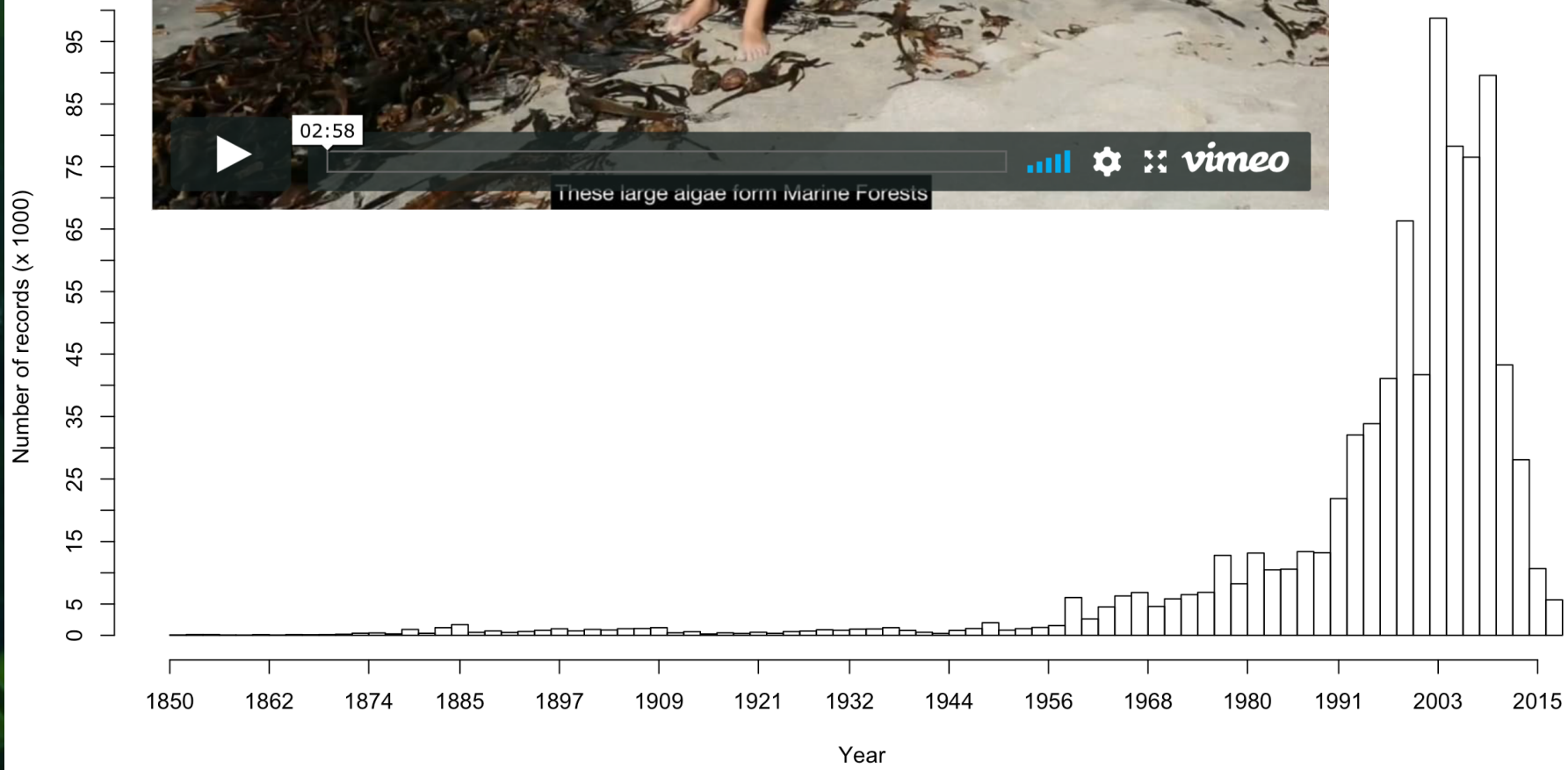


XIX cent.
Welwitsch



Berlengas, 1992, extinct

2018 GBIF Young Researcher Award: Raquel Gaião Silva
from GBIF
02:58
vimeo
These large algae form Marine Forests


Number of records (x 1000)
0
5
15
25
35
45
55
65
75
85
95
1850
1862
1874
1885
1897
1909
1921
1932
1944
1956
1968
1980
1991
2003
2015
Year

Data for citizens

Scientific Name

Region (locality, district, country)

Date : from

Date : to

Pictures

Literature

Herbarium

Curated

Sort by

Sorting

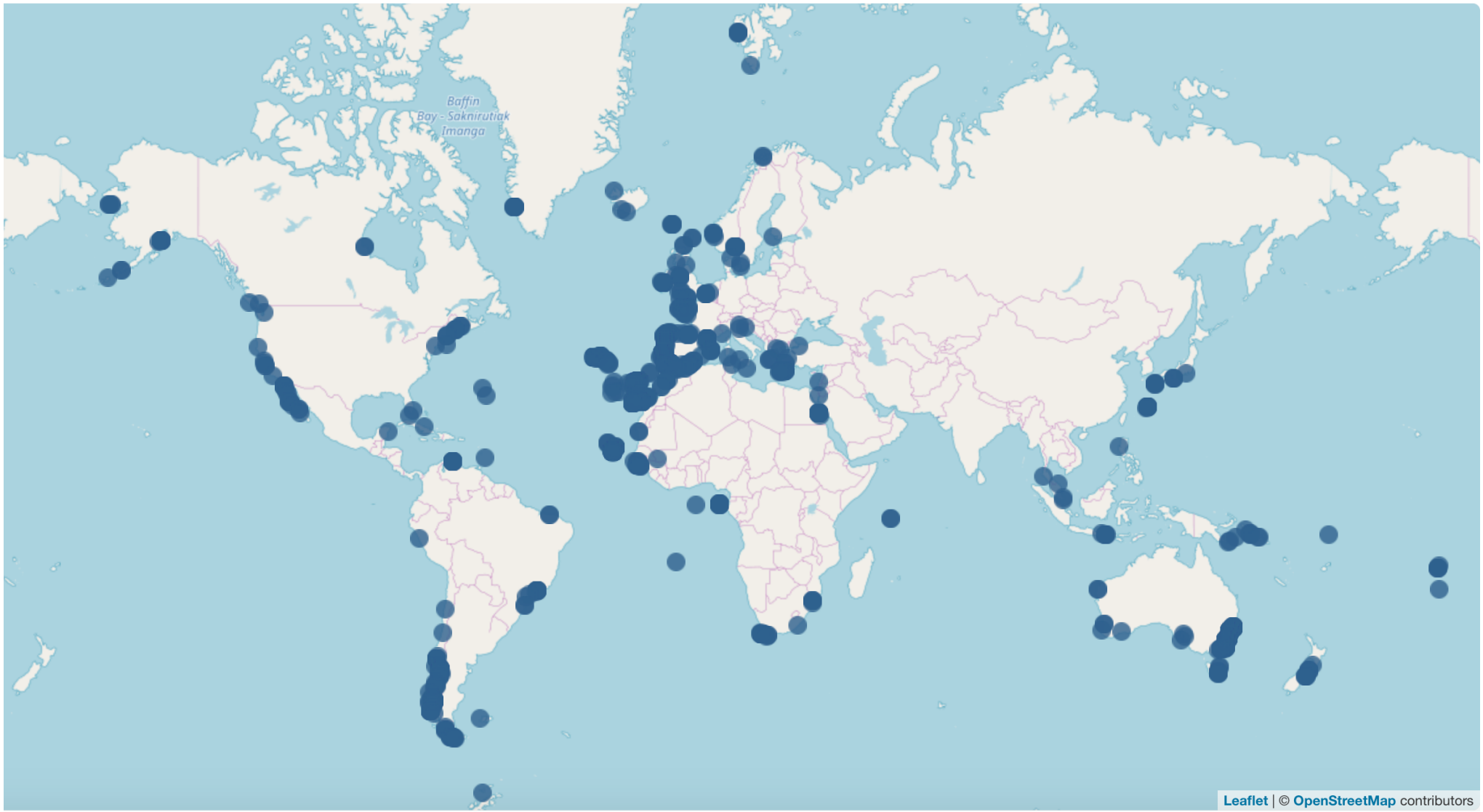
QUERY

5330 records (607 species) with pictures

DOWNLOAD

GALLERY VIEW

TABLE VIEW



Data for citizens

Scientific Name | Region (locality, district, country) | Date : from | Date : to

Pictures | Literature | Herbarium | Curated | Sort by | Sorting

QUERY

5330 records (607 species) with pictures

DOWNLOAD | GALLERY VIEW | TABLE VIEW

Marine forest species

Dictyota

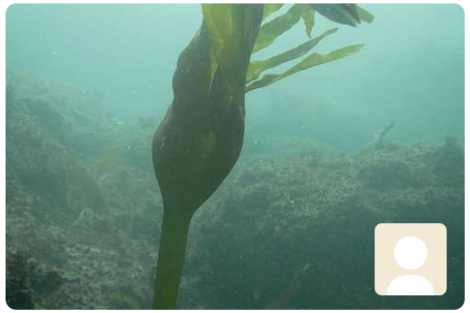
Zostera noltei

Gracilaria

Sporochnus

Pyropia spiralis

Marine forest species



Saccorhiza polyschides

1 2 3 ... 137 138 139 »

Information is being accessed

HOME EXPLORE PARTICIPATE ESTER

GLOBAL MAP ADD RECORDS

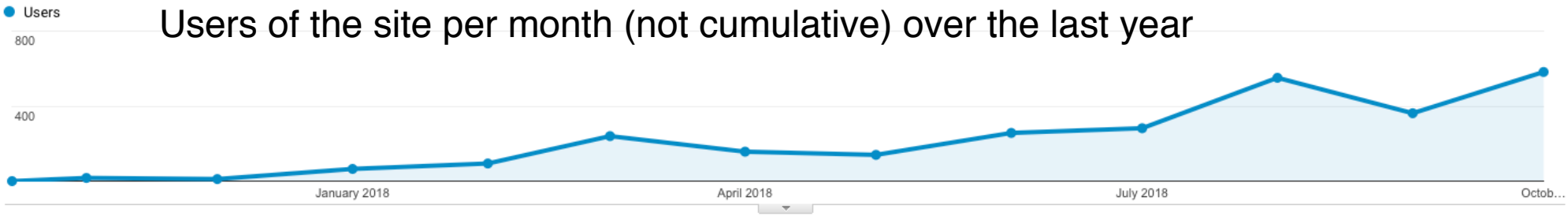
Marine Forests Data

The data provided is available as open source for everyone to use.

Scientific Name | Region (locality, district, country) | Date : from | Date : to

Pictures Literature Herbarium Curated

Users of the site per month (not cumulative) over the last year



Users	New Users	Sessions	Number of Sessions per User	Page Views
2,498	2,498	6,199	2.48	58,800

Pages/Session	Avg. Session Duration	Bounce Rate
9.49	00:10:16	41.02%

Data

Useful for the scientific question

indepently verifiable

(photos, herbarium, museum collections, but .... literature...)

Can all possible sources of errors and bias

be corrected or accounted for? – data curation

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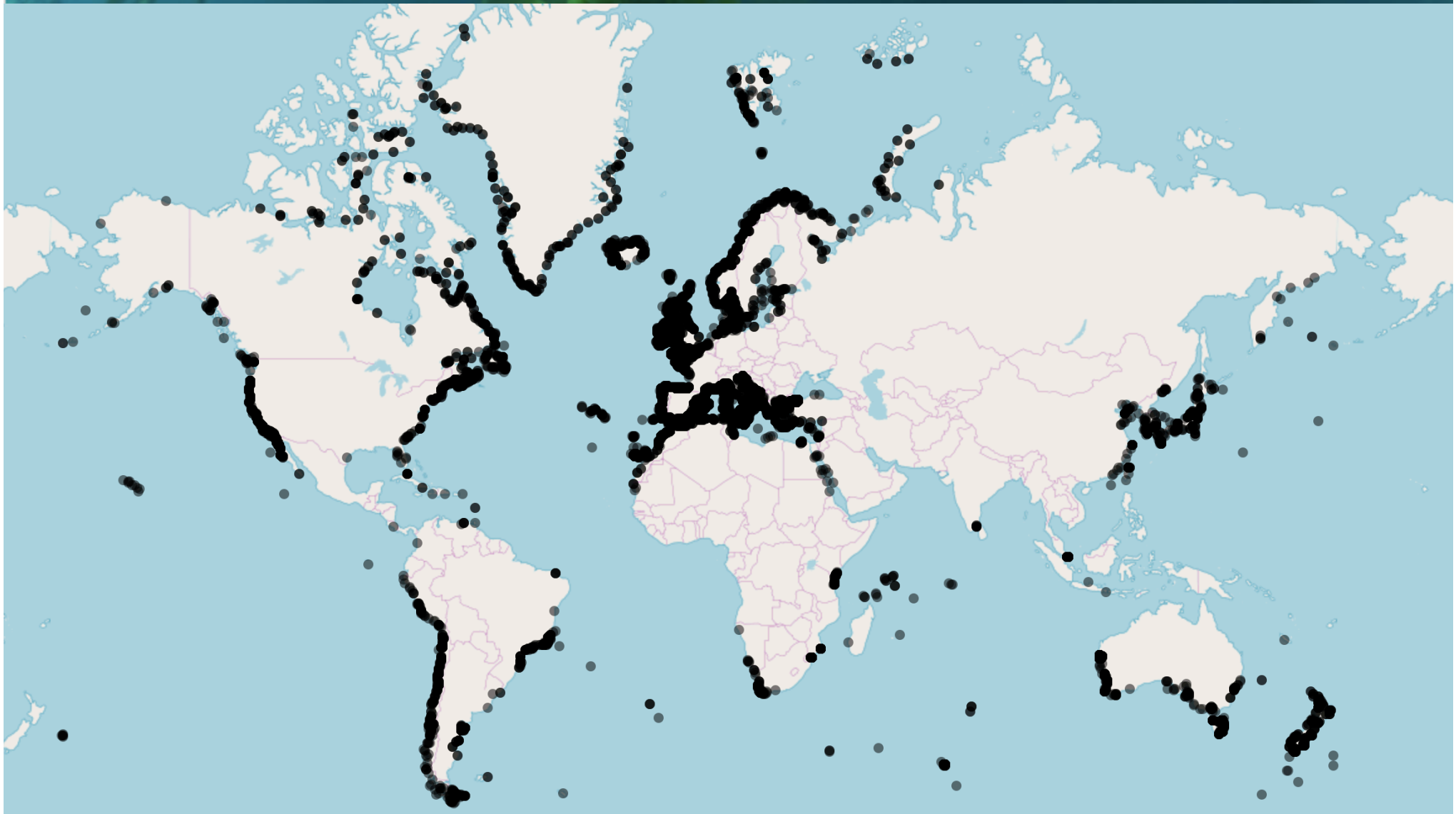
Results so far

Records from literature where coordinates were found (25,649)



Database steps and citizen contributions

Full species taxonomy - WORMS API
Species description - encyclopedia of life API

Data for each record:
location (coordinate, uncertainty and site names)
date (added and observation)
Depth

Full reference of record - CROSSREF API

Optional:
Sample catalog (storage, location, labelling)
Extra: abundance and sampling method

Data Import (Raw Data)

Photos
Literature
Herbarium
External database (OBIS; GBIF, EoL, RLS, Macroalgal portal)

Volunteers

Automatic cleaning processes

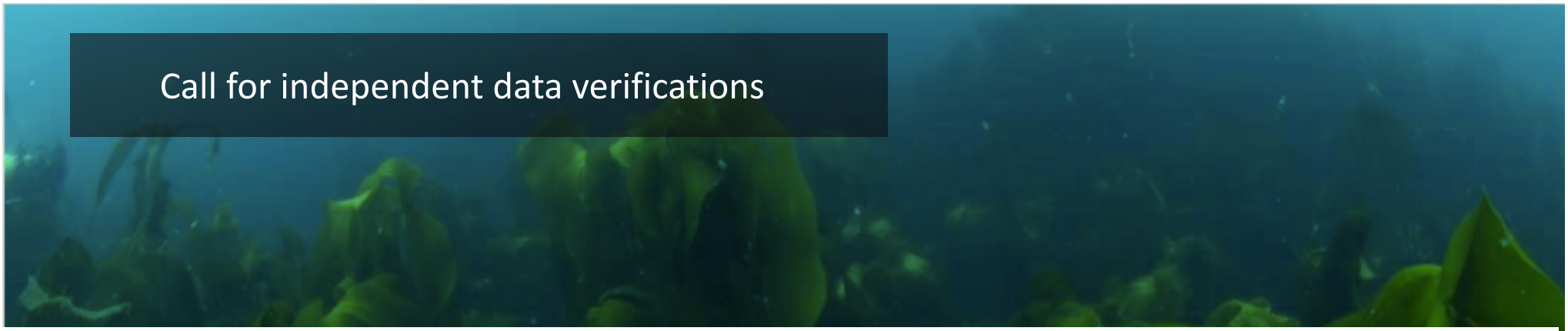
WORMS Taxonomic standardisation
CROSSREF Literature standardisation
Geolocation for records with no coordinate information
Removing duplicate records

Automatic flagging processes

Records on land
Filter records based on light / oxygen (Bio-ORACLE)
Unlikely records based on marine ecoregions

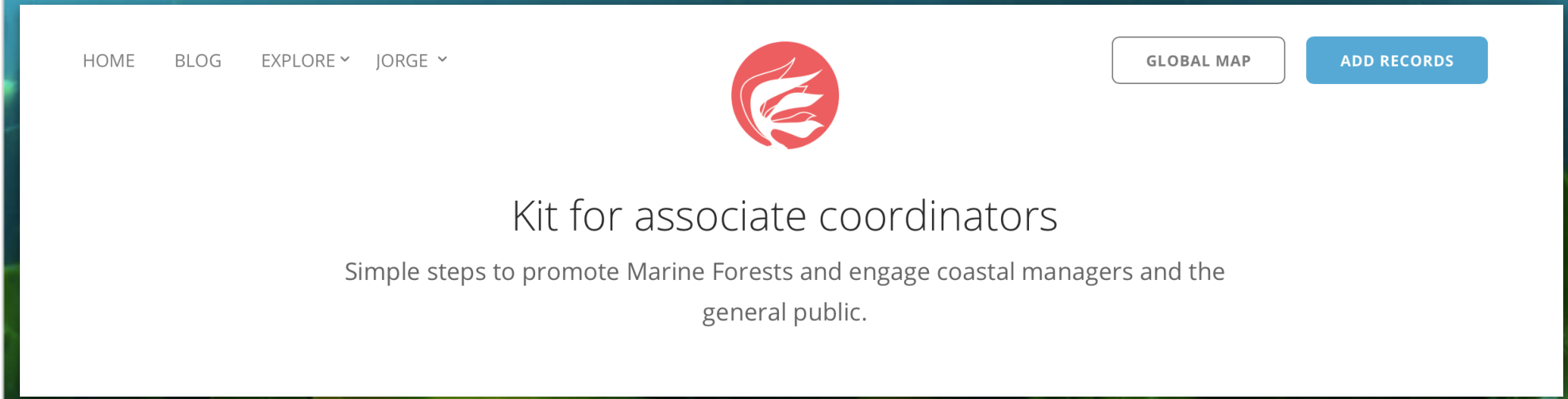
Manual flagging processes (curators)

Records curated by specialist



Call for independent data verifications

All photographs of marine forests are very useful records of their existence in space and time. However, many records cannot be identified to species level just from photographs. Before using the data check the source and validation level (has the species name been curated), consult experts on the taxon and/or region, and make independent data verifications.

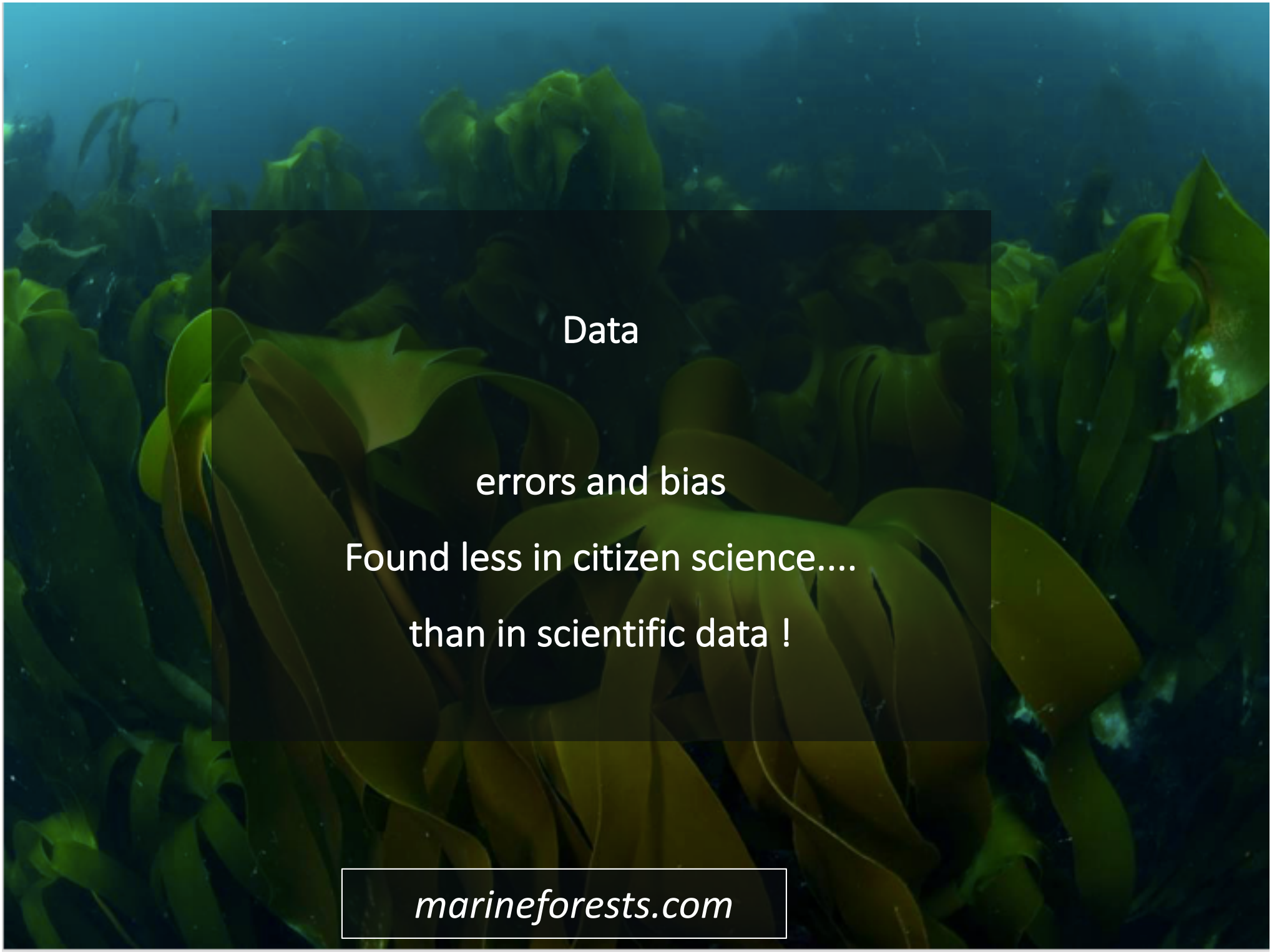


Associate coordinators:

Curate data (correct species and distributions).

Disseminate, find local volunteers

Inform citizens, stakeholders that this information is/will be available for them.



Data

errors and bias

Found less in citizen science....

than in scientific data !

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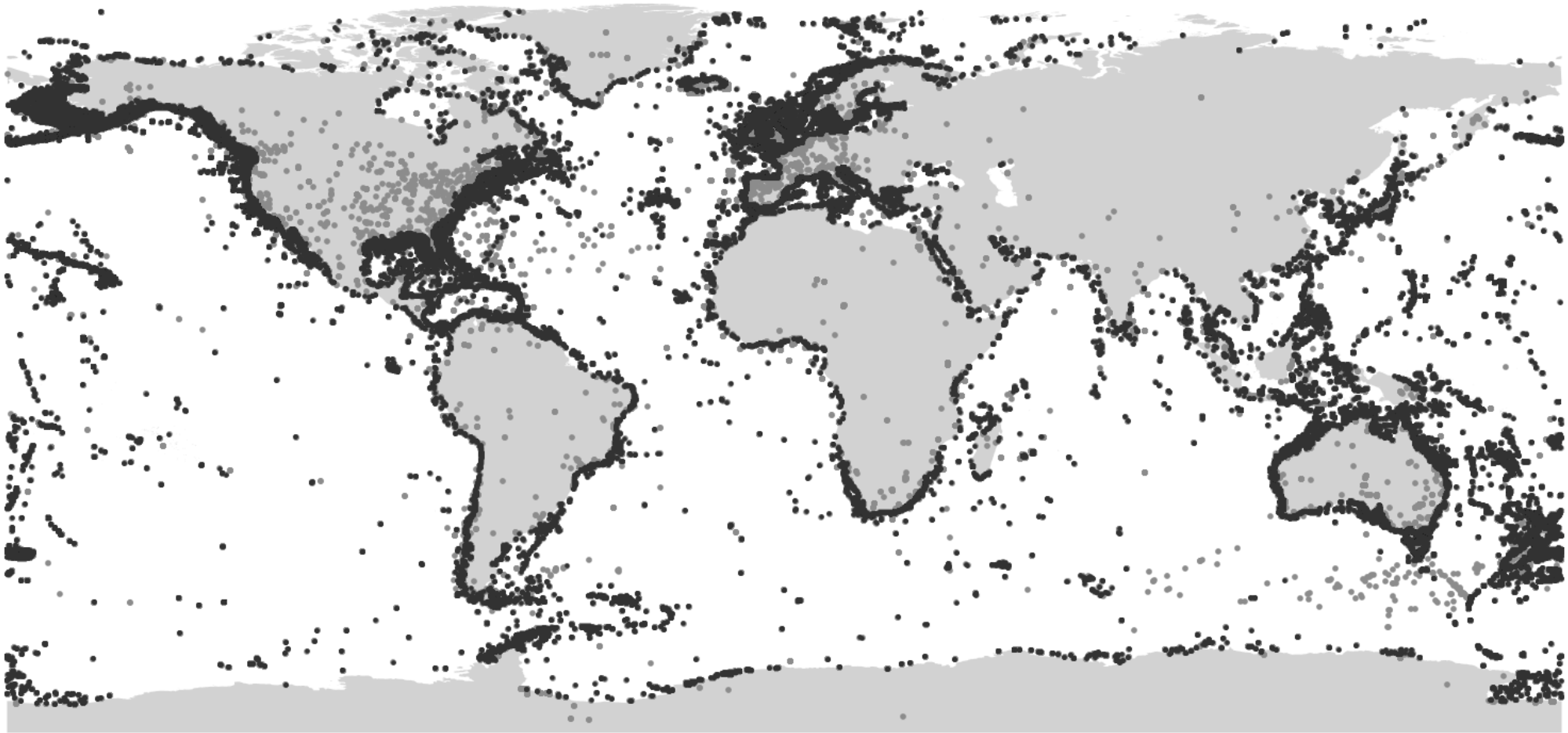
Database summary

All data collected – no filters
Errors are mainly from scientific sources including global databases like OBIS/GBIF
These were curated in the database by algorithms and volunteer experts



Database summary

Example of curated data: kelp forests
(can be extracted per species, per group, per region, etc)

Light filtered to minimum threshold level from: Graham, M. H., Kinlan, B. P., Druehl, L. D., Garske, L. E. & Banks, S. Deep-water kelp refugia as potential hotspots of tropical marine diversity and productivity. Proc. Natl. Acad. Sci. U. S. A. 104, 16576–16580 (2007).

Outcomes:

- Creating interest in people who were not interested
- Raising the participation of motivated people
- Records in areas where nothing was known
- Big numbers are good but even a single photo record matters (baselines – who knows the future)
- Plus: good science for society
- (**e.g.,** Assis J, Araujo MB, Serrao EA (2018) Projected climate changes threaten ancient refugia of kelp forests in the North Atlantic.
- Global Change Biology.
-)

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