



International Ocean Acidification Initiatives and Resources



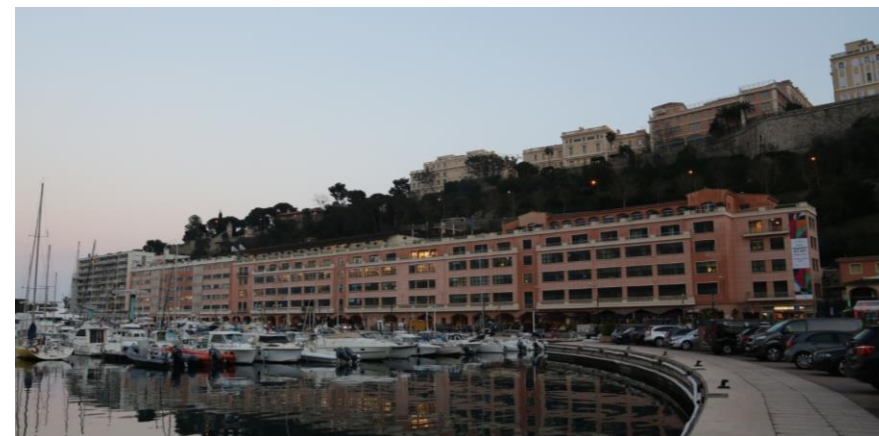
IAEA

Ocean Acidification
International
Coordination Centre

OA-ICC

Lina Hansson
OA-ICC Associate Project Officer

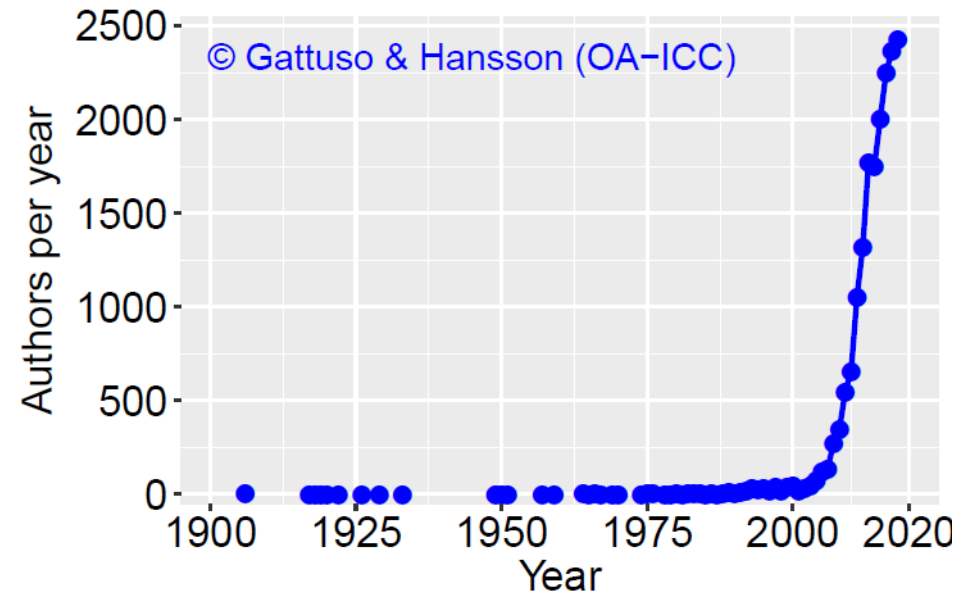
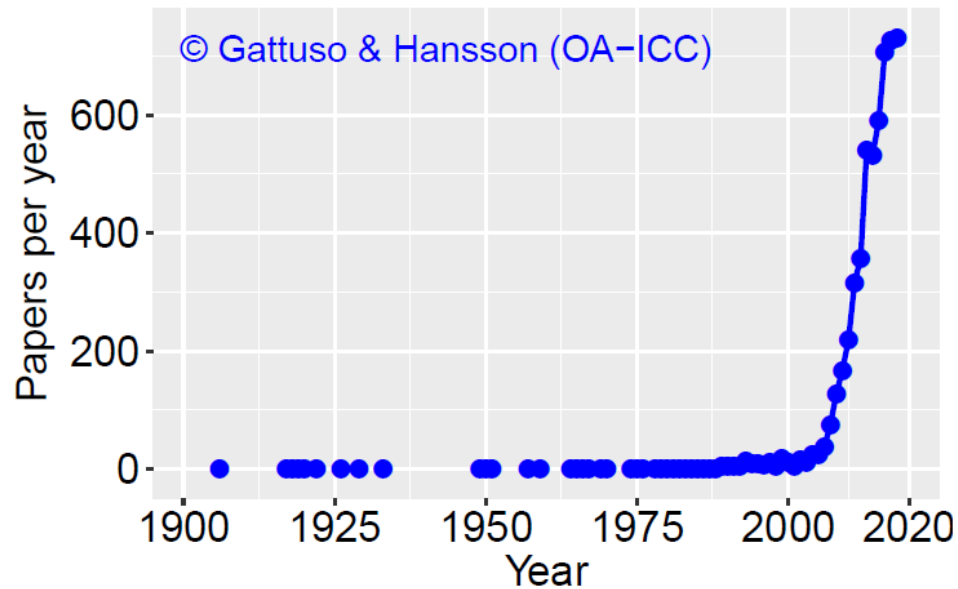
IAEA Environment labs in Monaco - the only marine laboratory in the UN system



Ocean acidification - a rapidly growing research topic

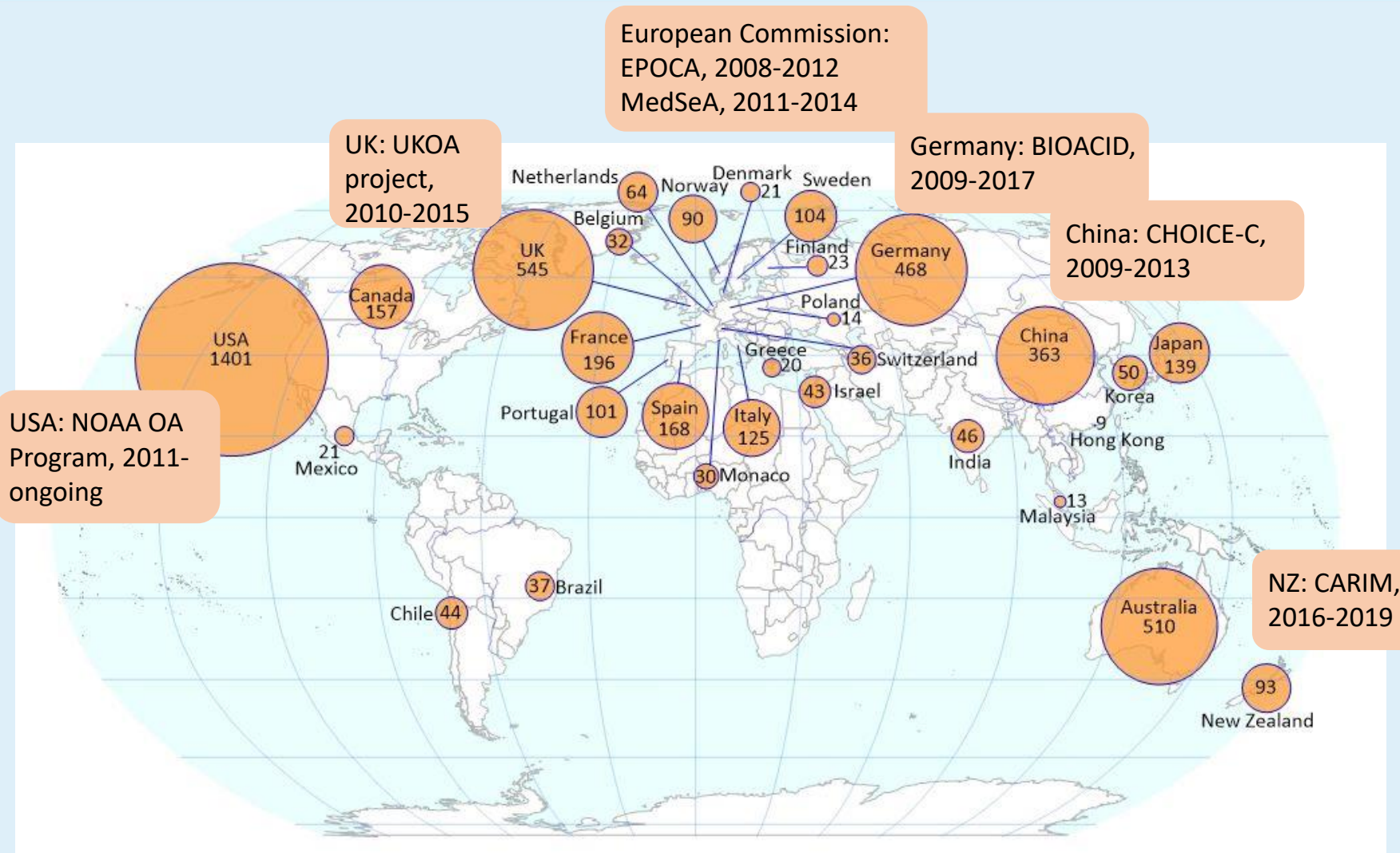


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	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
<i>papers</i>	25	25	38	76	129	168	220	317	357	541	533	591	707	727	731
<i>authors</i>	75	122	138	274	348	549	653	1053	1319	1773	1749	2007	2249	2371	2433

Ocean acidification - a rapidly growing research topic



OA papers per country (2006-2018), based on first author affiliation. Data for countries with 9 papers or more are shown. Data from the OA-ICC bibliographic database. Figure produced by Dana Greeley, NOAA PMEL.

Increasing need for international coordination and collaboration

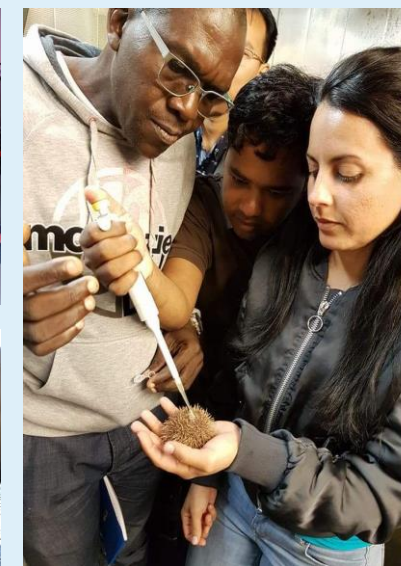
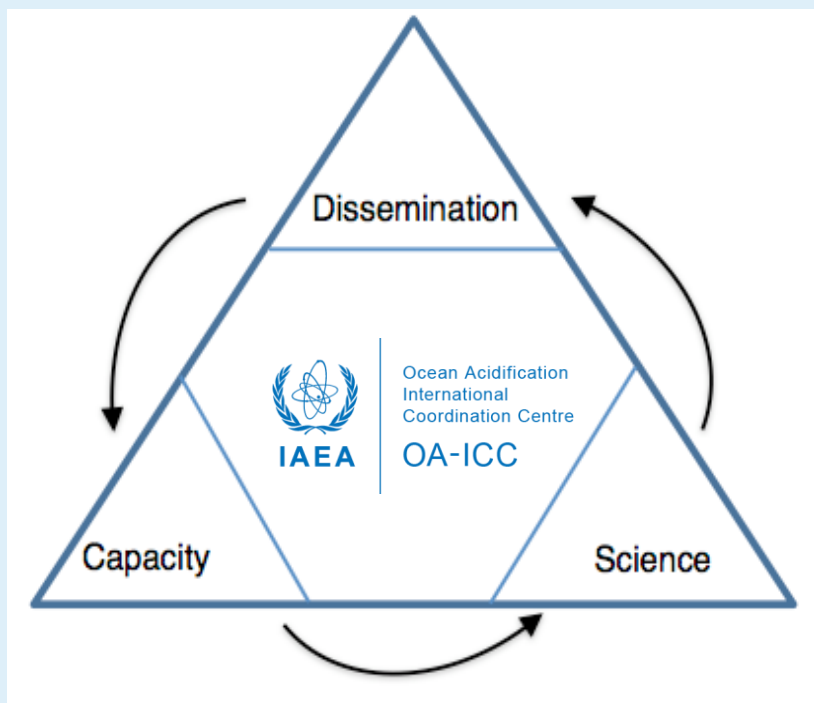


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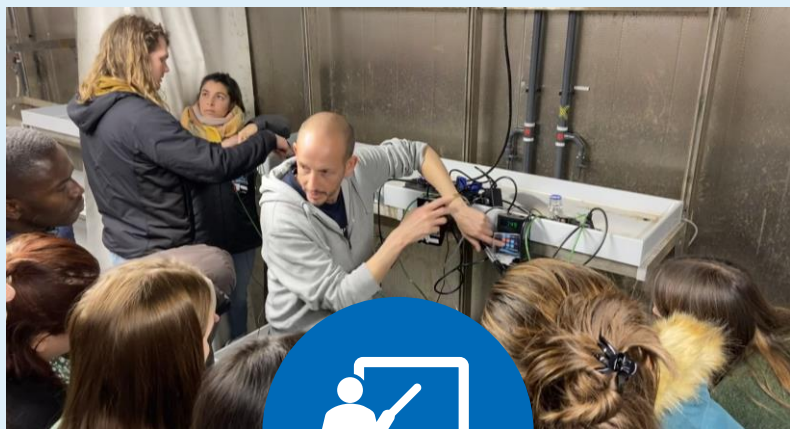
2009: SOLAS-IMBER Working Group on Ocean Acidification



2012: IAEA Ocean Acidification International Coordination

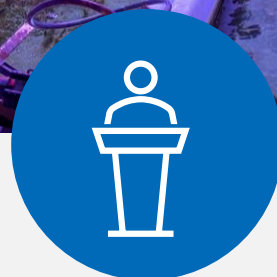
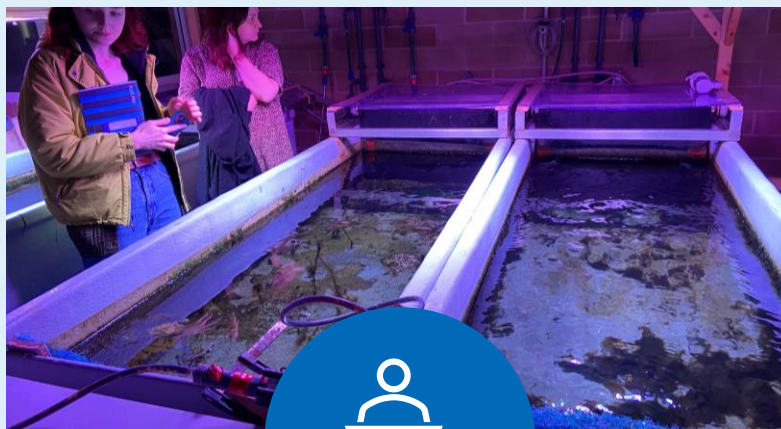


OA-ICC's 3 Pillars



Capacity building

*Train tomorrow's experts on
ocean acidification and
multiple stressors*



Science

*Advance ocean acidification
research*



Communication

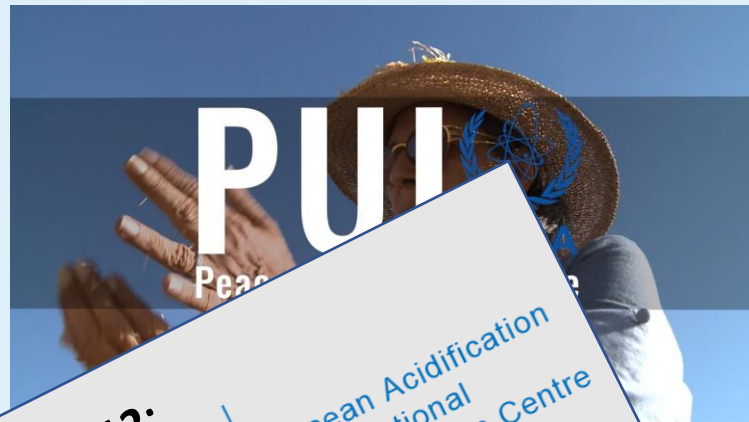
*Serve as a hub of information for
different audiences (scientists,
policy makers, media)*

Portfolio of IAEA projects to best address OA



Starting 2007:
Laboratory research
and new methods (NIT)

2019-2023:
Coordinated Research
Project – ‘Evaluating
the impact of OA on
seafood – a global
approach’



2012:



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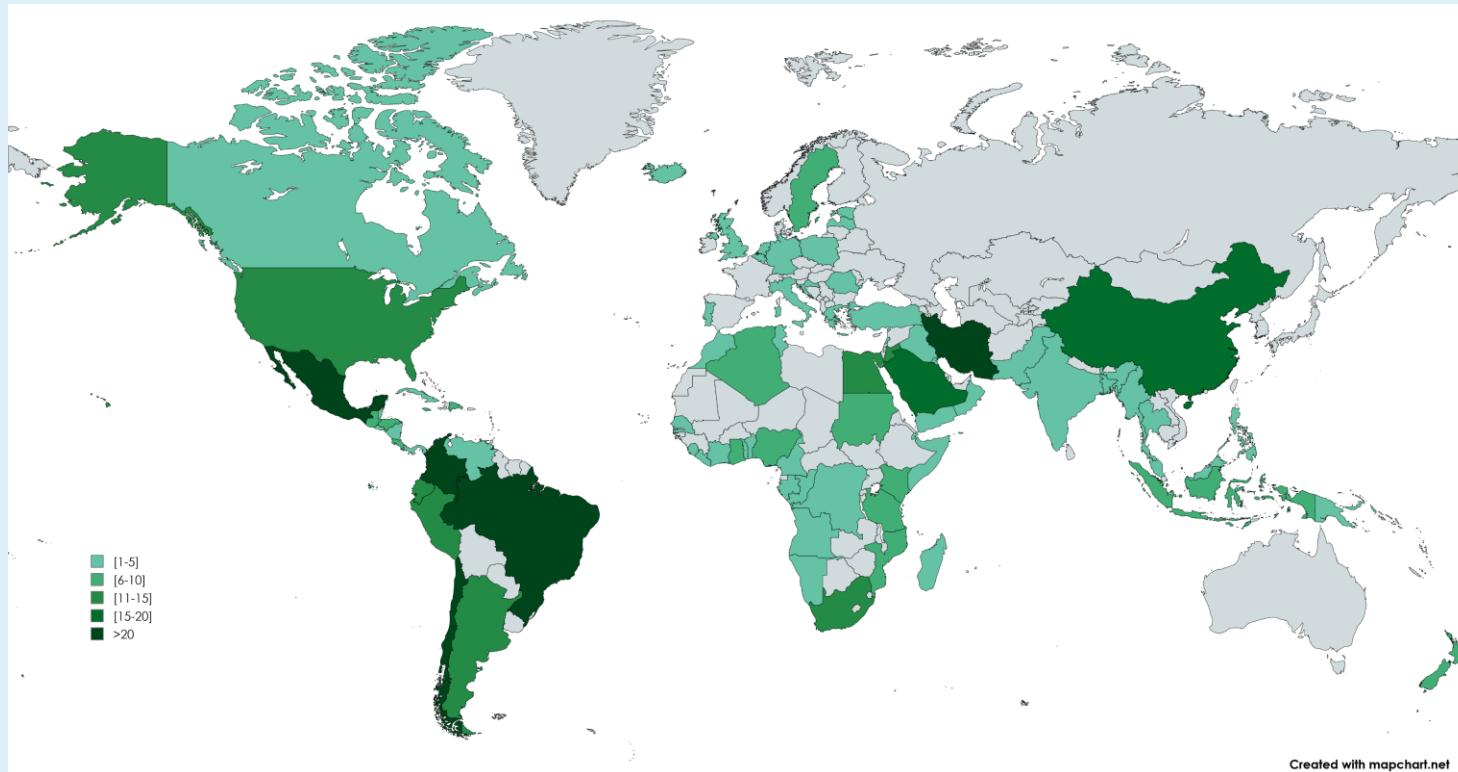


2016-2019: Inter-regional project (INT7019) –
‘Supporting a Global OA Observing Network towards
increased involvement of developing states’

2024-2027: INT7022 Ocean health
+ regional & national TC projects in Africa, Latin
America, Belize, Palau



Capacity building – 12 years in numbers



More than 800 people trained
(52 in multiple trainings)

108 countries

91% Global South

Capacity building – strategy

Questionnaire (INT7019; 2016-2019)

- Expertise & motivation
- Infrastructure, equipment & human resources
- Regional capacity
- Challenges & barriers
- Other resources & contacts

Evaluating Capacity Questionnaire

Tell us about your chemistry laboratory.

Do you have access to a fully equipped chemical laboratory?

☐ Yes

☐ No

☐ Other: _____

Do you have access to:

☐ Laboratory balance (± 1 mg)

☐ Assorted laboratory glassware

☐ Purified water source

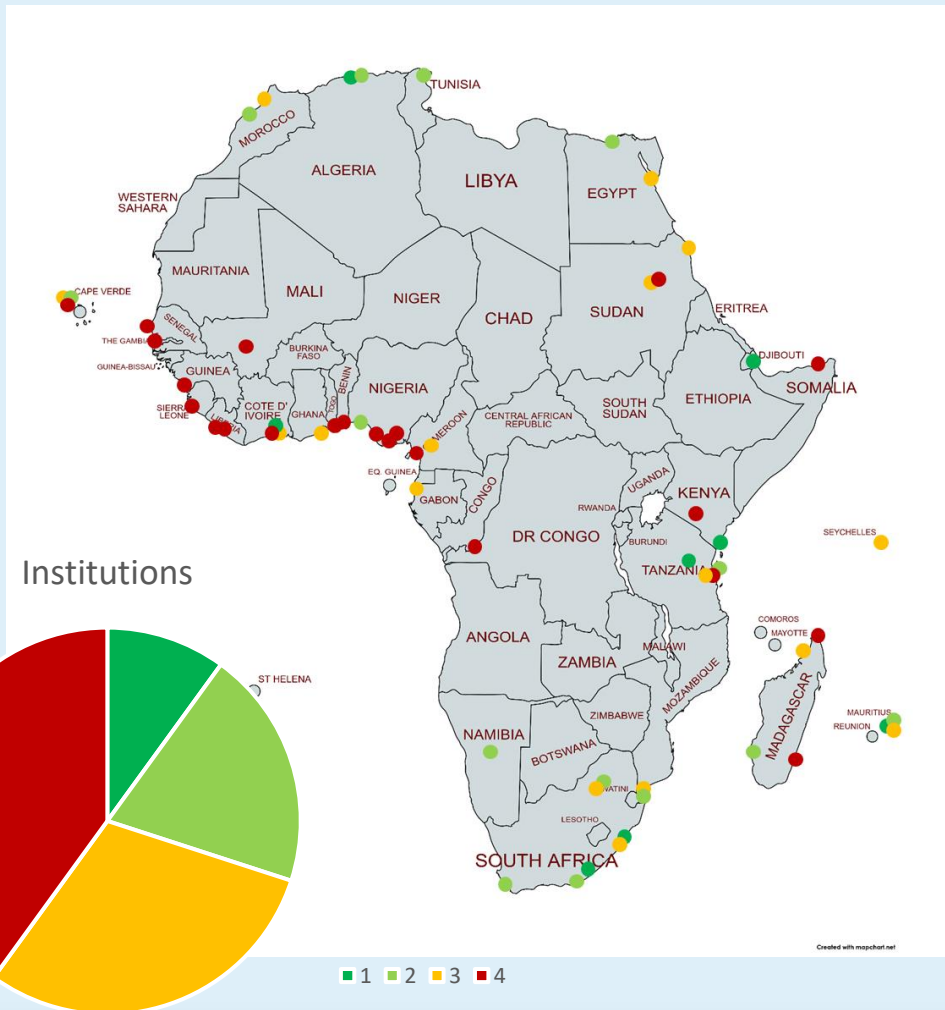
☐ Temperature bath or temperature controlled lab ($\pm 1^\circ\text{C}$)

☐ Pipettes

☐ Magnetic stirrer

☐ Other: _____

Capacity building – strategy



Category	Have	Need
#1	Everything	Collaboration, Communication
#2	Infrastructure, most equipment	Some equipment (e.g. kit), Advanced training
#3	Infrastructure, little/no equipment	Most equipment (e.g. balance), Basic training
#4	No Infrastructure, little/no equipment	Everything Basic training

**2021 assessment:
Clear needs for basic level training in West Africa**

Capacity building – strategy


Trainings adapted to the need

- Level 1 – basic trainings (theory, co-design, strategic plan)
- Level 2 – Advanced training (practical, e.g. chemistry, biology, monitoring, multiple stressors)
- Level 3 – Advanced training (practicals, e.g. communication, experimental design, meta-analysis, data reporting)
- Level 4 – Coordinated and collaborative research

OA-ICC Resources - News stream



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Ocean Acidification
a news stream provided by the Ocean Acidification International Coordination Center (OA-ICC)

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**Vacancy: Research Scientist - biogeochemistry.
Radioecology Laboratory, IAEA Marine
Environment Laboratories**

Published 14 March 2024 Jobs Leave a Comment

- **Primary Location:** IAEA Marine Environment Laboratories in Monaco
- **Closing Date:** 2024-04-09, 11:59:00 PM
- **Duration in Months:** 36


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OA-ICC Resources – Bibliographic database

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Group Libraries
OA-ICC

Title	Creator	Date
#OHCO2 What? New directions a...	Cooley	2012
∂11B, Sr, Mg and B in a modern P...	Allison et al.	2010
A whole organism approach to ...	Wood et al.	2008
Kiel CO2 manipulation experim...	Bleich et al.	2008
Predicting the impact of ocean ...	Widdicombe and Spicer	2008
<i>Alvania acida</i> sp. nov., a new late ...	Garilli et al.	2023
<i>De novo</i> transcriptome assembly ...	Tripp-Valdez et al.	2019
<i>Emiliana huxleyi</i> coccolith calcite...	D'Amario et al.	2018
<i>Emiliana huxleyi</i> shows identical ...	Hoppe et al.	2011
<i>Emiliana huxleyi</i> biometry and ca...	Patil et al.	2021
<i>Enhalus acoroides</i> efficiently allevi...	Luan et al.	2023
<i>Ervilia castanea</i> (mollusca, bivalvi...	Martins et al.	2020
<i>Homarus gammarus</i> (Crustacea: ...	Rato et al.	2017
<i>In situ</i> perturbation experiments: ...	Barry et al.	2010
<i>In situ</i> survey of life cycle phases ...	Frada et al.	2012
<i>In situ</i> developmental responses ...	Lamare et al.	2016
<i>In situ</i> ecosystem-based carbon d...	Kim et al.	2008
<i>In situ</i> measurements of oxygen i...	Rollion-Bard et al.	2010
<i>Limacina helicina</i> shell dissolutio...	Bednarsek et al.	2014

11019 items in this view

10.1038/s41598-019-53930-8
10.1098/rspb.2019.0785
10.1594/PANGAEA.716818
10.1594/PANGAEA.716837
10.1594/PANGAEA.716843
10.1594/PANGAEA.717469

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>11000 references

Updated weekly

Assigned keywords to
facilitate searches

OA-ICC Resources - Databases



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Ocean Acidification International Coordination Centre (OA-ICC)

The IAEA Ocean Acidification International Coordination Centre (OA-ICC) promotes international collaboration on [ocean acidification](#). The OA-ICC organizes training courses in Member States and provides access to data and resources to advance ocean acidification research. The Centre promotes the development of data portals, standardized methodology and best practices. The OA-ICC works to raise awareness of the issue among various stakeholders and inform about the role that nuclear and isotopic techniques can play in assessing its impacts. To achieve these objectives, the OA-ICC works with many international partners and

Related Stories

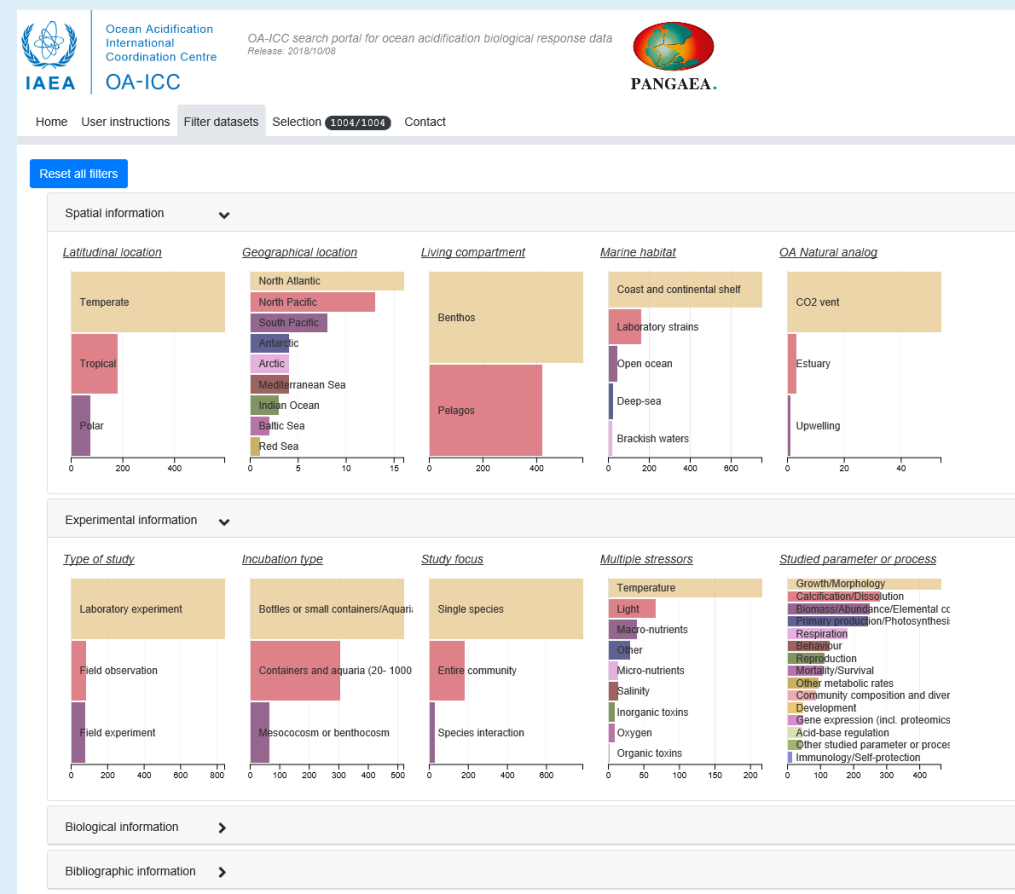
IAEA Supports New Research on the Impacts of Ocean Acidification on Seafood

Scientists Chart out Future of Ocean Acidification Research in Africa at High-Level Conference in Liberia

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- [Capacity building](#)

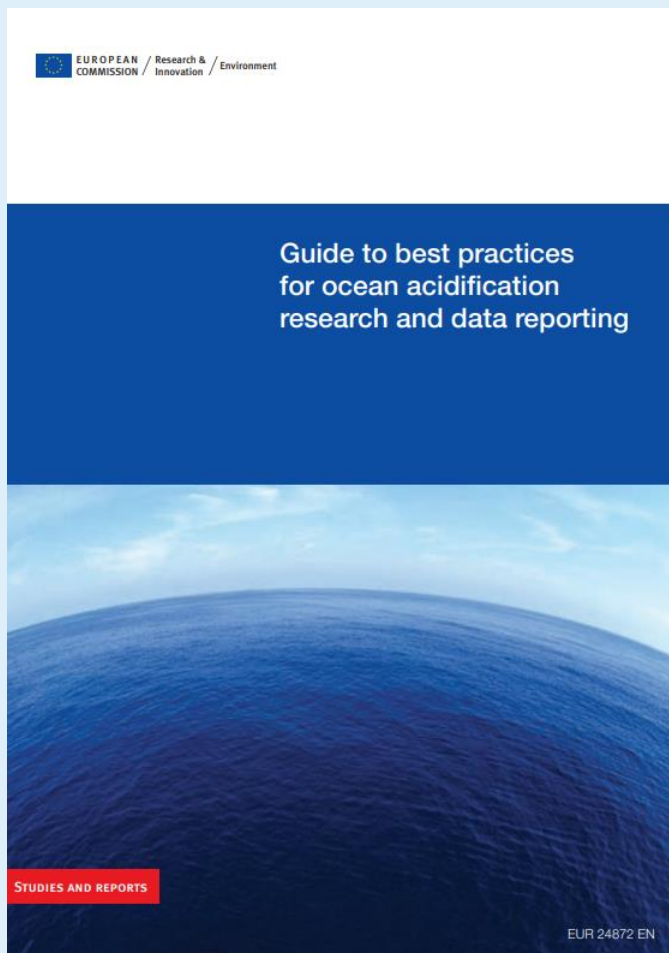
<https://www.iaea.org/services/oa-icc>




Resources – Best Practices




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How to measure pHT in biological experiments

A simple video tutorial and manual for TRIS buffer preparation, pH probe calibration, sampling and calculations.

Sanja Grđan, University of Dubrovnik & Sam Dupont, University of Gothenburg

Translation by Celeste Sánchez Noguera (Spanish) and Sam Dupont (French)

Measuring pH in seawater using a glass electrode is not trivial and requires TRIS buffer. TRIS buffers are commercially available from Dr. Andrew Dickson's laboratory at the Scripps Institution of Oceanography, California. However, access to this buffer can be difficult due to a continuously increasing demand as well as costs including shipping, customs fees, and taxes, making them less available for countries and laboratory with limited funds.

A simplified buffer preparation method is described in Paulsen & Dickson (2020) making the use of TRIS buffers available to a wider range of researchers.

The aim of this document and associated material (xls sheets and videos) is to help experimentalists entering the field of ocean acidification to make their own TRIS buffer, calibrate their glass electrodes for pH measurement on the total scale, take water samples and calculate pH on the total scale (pHT).

Click on the following links to download packages including the manual and videos (available in English, French and Spanish).

English

- Video: [How to measure pHT in biological experiments: TRIS buffer preparation](#)
- Video: [How to measure pHT in biological experiments: pH probe calibration, sampling and calculations](#)
- Excel: [Chemical preparation_TRIS buffer](#)
- Excel: [Preparing TRIS buffer](#)
- Excel: [TRIS calibration and pHT calculation](#)
- [Manual](#)

French

- Video: [Comment mesurer le pHT dans les expérimentations biologiques : Préparation de la solution tampon TRIS](#)

Resources – Best Practices

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Practical Best Practices for Ocean Acidification Monitoring

Practical methodologies and operating procedures for ocean acidification researchers, especially users of the GOA-ON in a Box ocean acidification monitoring kit.

[HOME](#)

Resources – Best Practices



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M

MEDDLE

A GUIDE TO RUNNING BEST PRACTICE
EXPERIMENTS IN OCEAN RESEARCH

JUMP TO

- 1. DESIGN YOUR EXPERIMENT
- 2. MEDDLE SIMULATOR
- 3. ADDITIONAL RESOURCES

The logo for the Scientific Committee on Oceanic Research (SCOR), featuring a stylized mountain range and the acronym SCOR.

STATE OF THE
PLANET

Copernicus Publications
The European Open Access Publisher

Guide to Best Practices in Ocean Alkalinity Enhancement Research

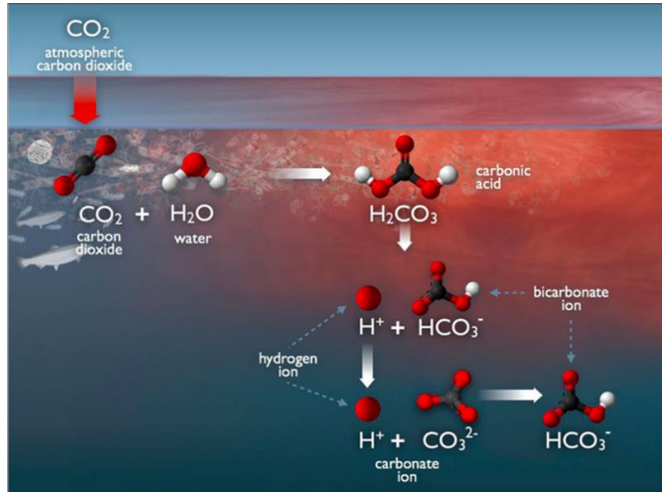
climateworks
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OACIS

OA-ICC – A partnership





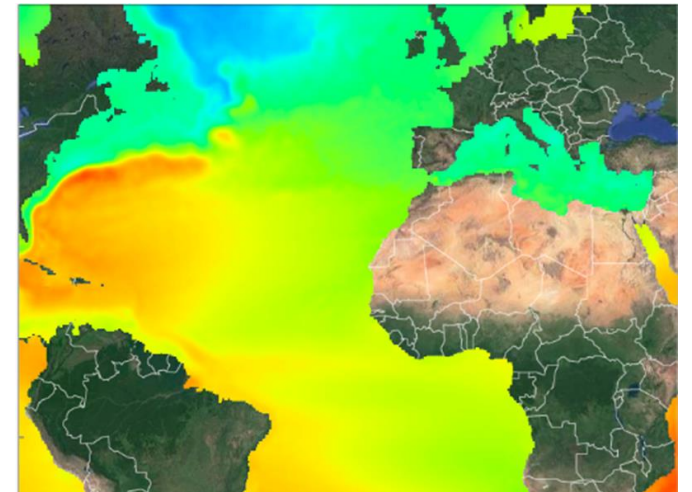
Goal 1

Improve our understanding
of global OA conditions.



Goal 2

Improve our understanding
of ecosystem response to
OA.



Goal 3

Acquire and exchange data
and knowledge necessary to
optimize modelling for OA
and its impacts.

GOA-ON in 2023



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Network of 900+
scientists from
114 countries and
territories

> 140 members from 24 Small Island Developing
States (SIDS) (12% of the membership)

Data from www.goa-on.org current members list

GOA-ON Regional Hubs, 2023

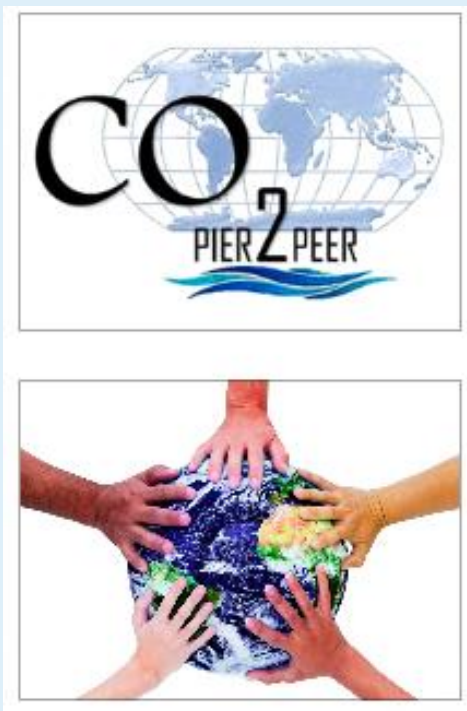


secretariat@goa-on.org | [@goa_on](https://twitter.com/goa_on)

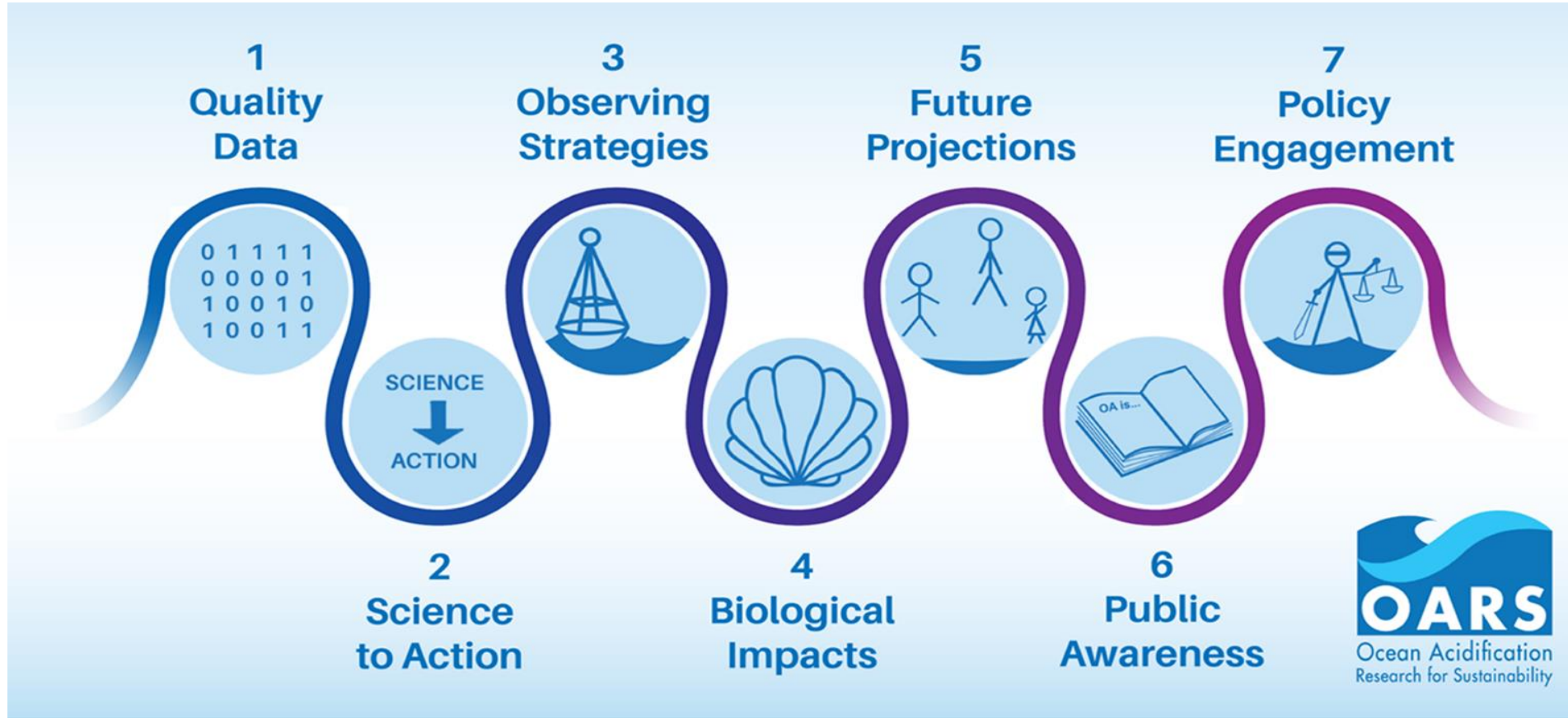
GOA-ON Pier2Peer program



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A ROADMAP TO ACHIEVE THE TARGETED OUTCOMES



2021
2030 United Nations Decade
of Ocean Science
for Sustainable Development

**OARS White
Papers:**



secretariat@oars-commitments.org | [@OARSOceanDecade](https://twitter.com/OARSOceanDecade)

SDG 14.3 Ocean acidification

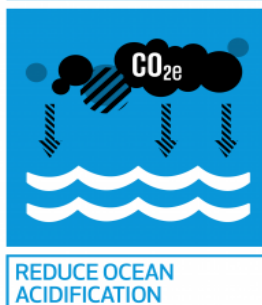


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**Need for international
coordination and
collaboration**

TARGET 14-3



Target 14.3

“Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels”

SDG Indicator 14.3.1

The global call to collect ocean acidification data



Global Ocean Acidification
Observing Network



unesco

Intergovernmental
Oceanographic
Commission

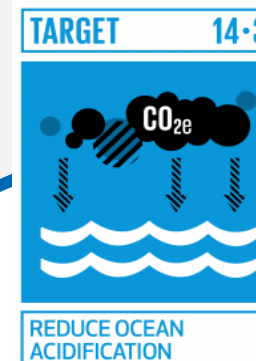


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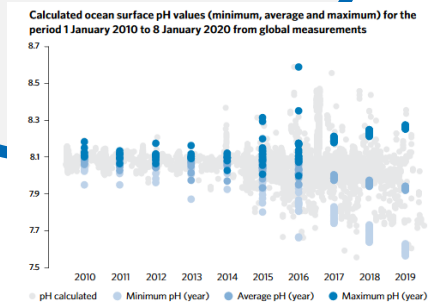
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.



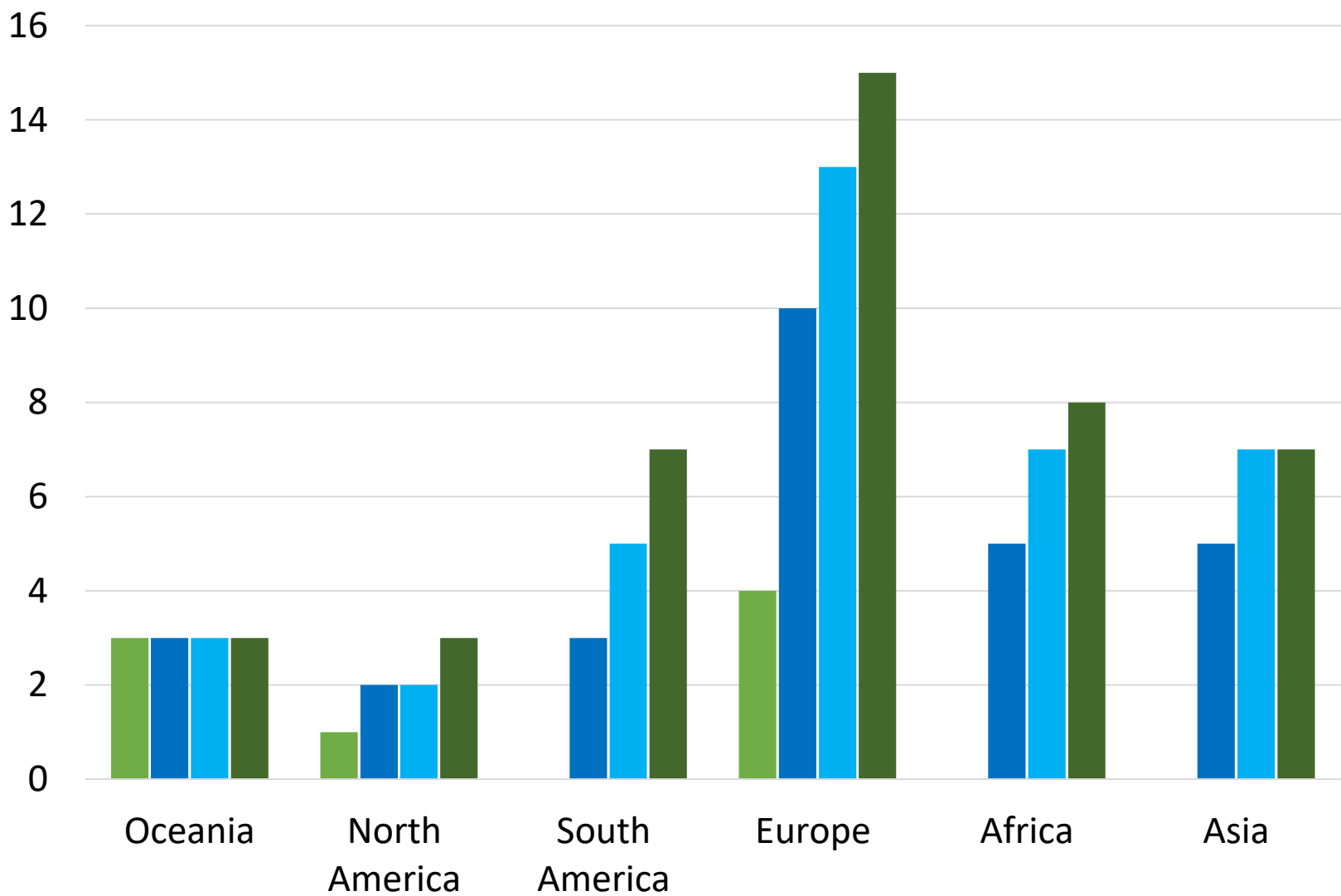
Target 14.3 Minimize and address the impacts of ocean acidification, incl. through enhanced scientific cooperation at all levels.



Indicator 14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations.



SDG 14.3.1 Reporting – good progress



2020 – 8 countries submitted data and information

2021 – 28 countries submitted data and information

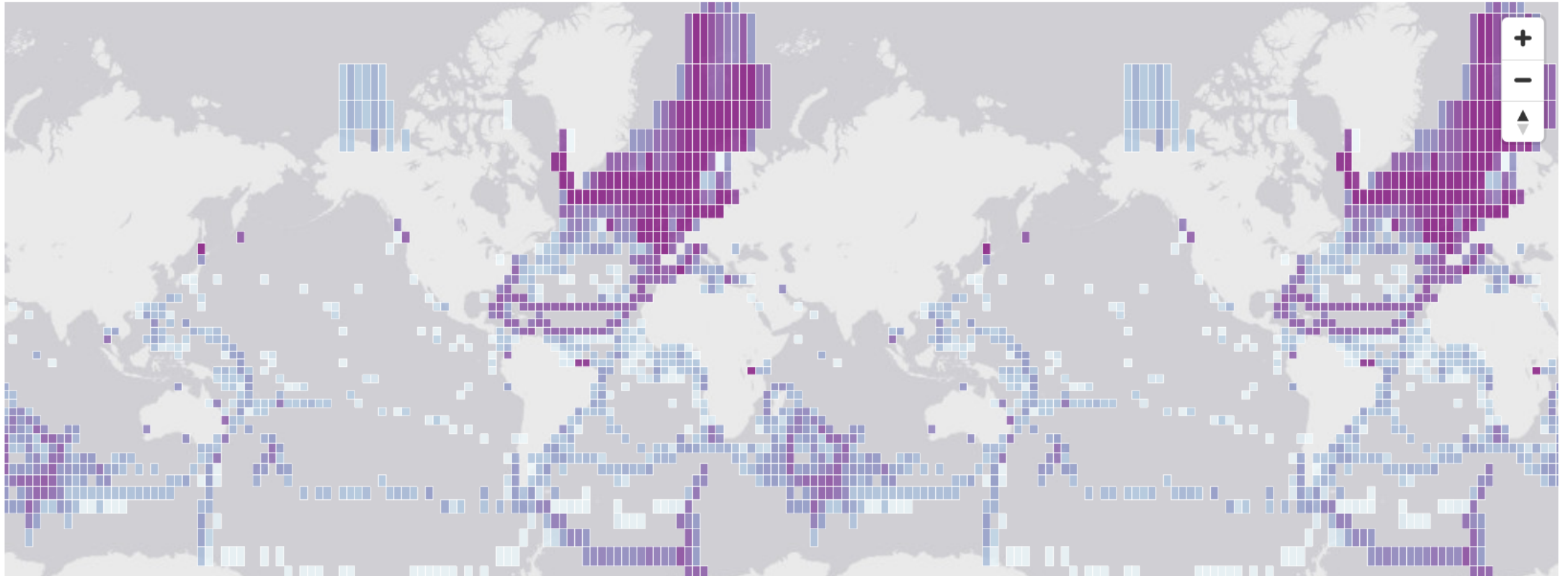
2022 – 37 countries submitted data and information

2023 – 41 countries submitted data and information

2024 – 42 Countries

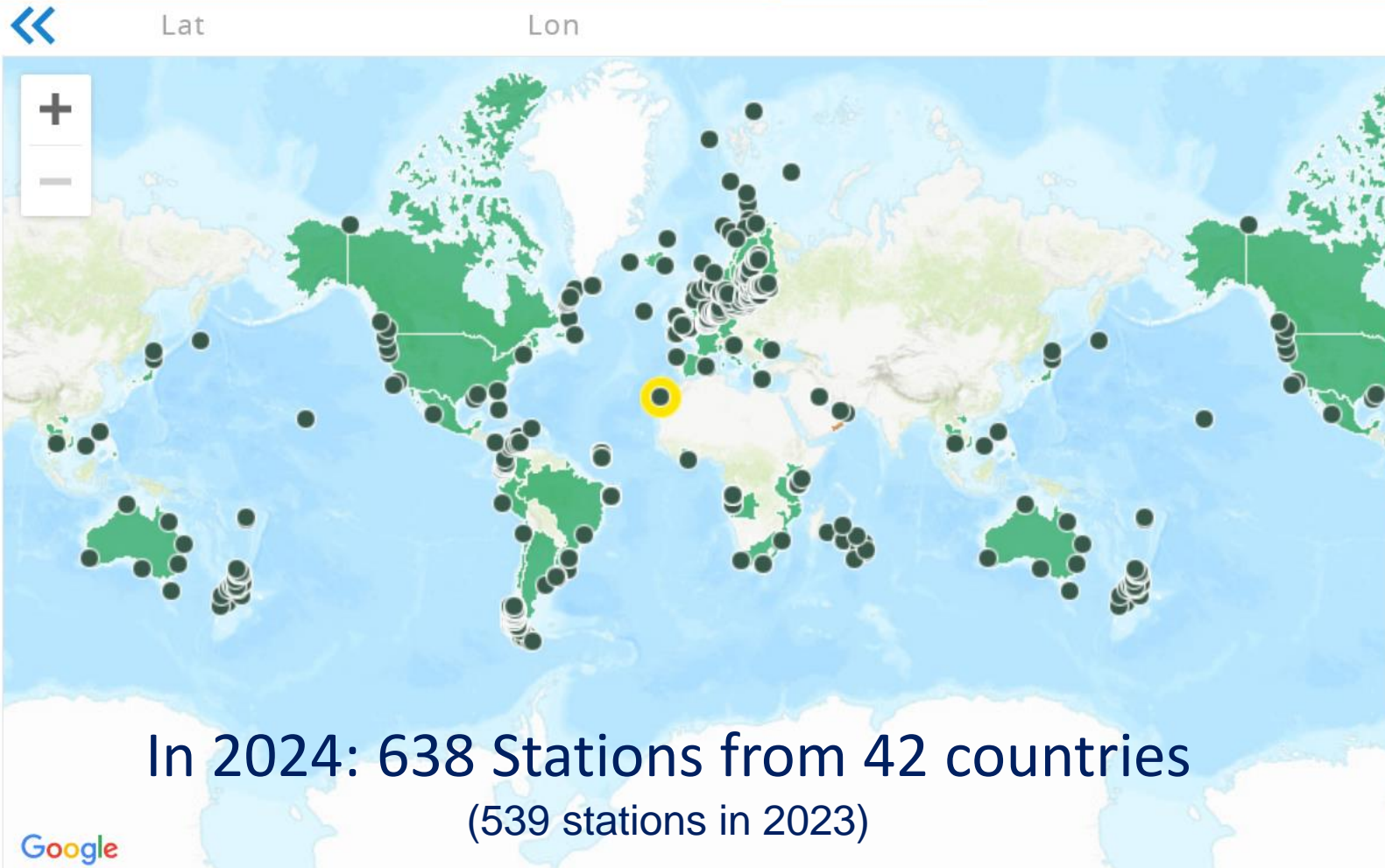


Welcome to the SDG 14.3.1 data portal



This SDG 14.3.1 Data Portal is a tool for the submission, collection, validation, storage and sharing of ocean acidification data and metadata submitted towards the Sustainable Development Goal 14.3.1 Indicator: Average marine acidity (pH) measured at agreed suite of representative sampling stations.

<https://oa.iode.org/>



In 2024: 638 Stations from 42 countries
(539 stations in 2023)

ESTOC, Spain

Observations

Details

Name: ESTOC

Country: Spain

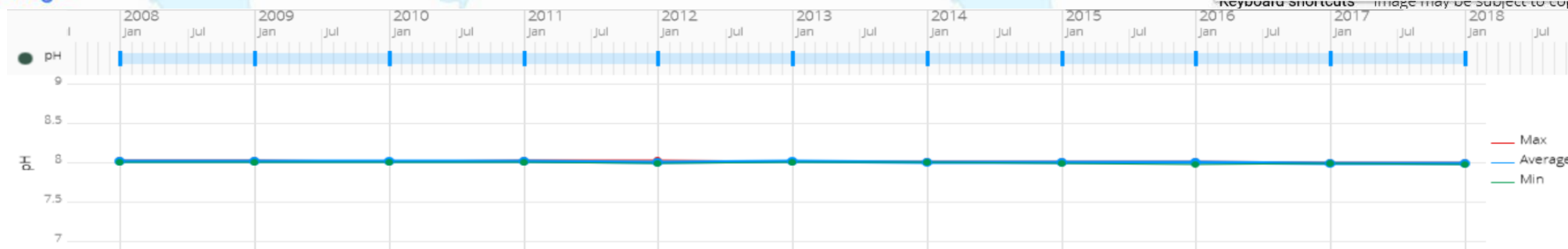
Latitude: 29.1660

Longitude: -15.5000

[Click to Access External Data](#)

pH Measurements

Year	pH (Avg)	Min	Max	Std Dev
2018	7.987	7.976	7.997	0.01
2017	7.991	7.98	8.001	0.015
2016	7.996	7.979	8.012	0.016
2015	7.999	7.985	8.017	0.016
2014	8.006	7.994	8.016	0.009



OceanTeacher Global Academy



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OceanTeacher Global Academy

sdg 14.3 Ocean Acidification

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IOC Programme

Related tags: ioc_programme msp ioc_programme hab ioc_programme tsunami ioc_programme obis language english subject biodiversity subject gis subject data_management subject marine_meteorology affiliate pogo more...



ONLINE

OA2024-BIOTTA

Ocean Acidification

14.3 Ocean Acidification

[No Title]

Ghana
Training Center

English



BLENDED

Carbonatos2024ES

Curso regional de capacitación y entrenamiento sobre medición del sistema de carbonatos para la evaluación del indicador de acidez media del mar (ODS 14.3.1) 2024

14.3 Ocean Acidification

Colombia
Training Center

Spanish



ONLINE

Carbonatos2022ES

Curso regional de capacitación y entrenamiento sobre medición del sistema de carbonatos para la evaluación del indicador de acidez media del mar (ODS 14.3.1) 2022

14.3 Ocean Acidification

Colombia
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SP_OA2022

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Belgium
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English

Accessibility settings

OA Information Exchange

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Catalyzing response to ocean & coastal acidification through the power of collaboration

The Ocean Acidification Information Exchange is an online community for professionals involved with or interested in the topics of ocean and coastal acidification (OCA). Our mission is to respond and adapt to OCA by fostering an online environment built on trust, where our members feel empowered to ask, answer, and learn from one another.

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OA Information Exchange



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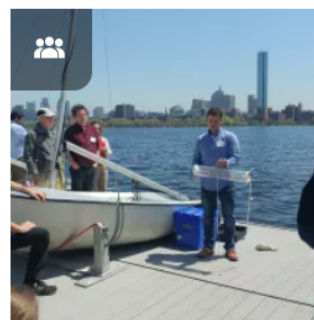
Topic-based teams



Carbon Dioxide Removal

74 members

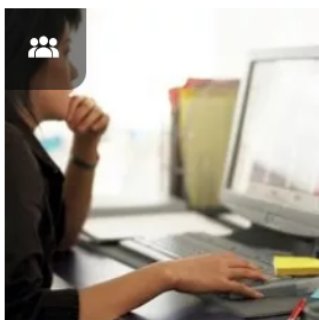
A space to discuss emerging human-driven methods to remove and sequester carbon dioxide from the environment.



Community Science Efforts

70 members

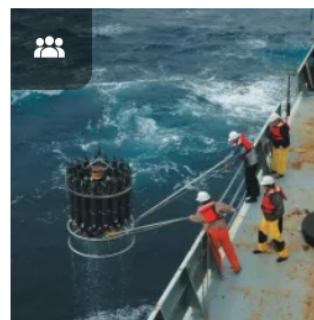
Welcomes dialogue about broadening our collective capacity for research, lessons learned from other community science programs, ideas for projects, and questions related to any of the above.



Data Management

70 members

Focuses on matters related to the preparation, management, archiving, and serving of ocean acidification data and metadata.



Equipment & Troubleshooting

129 members

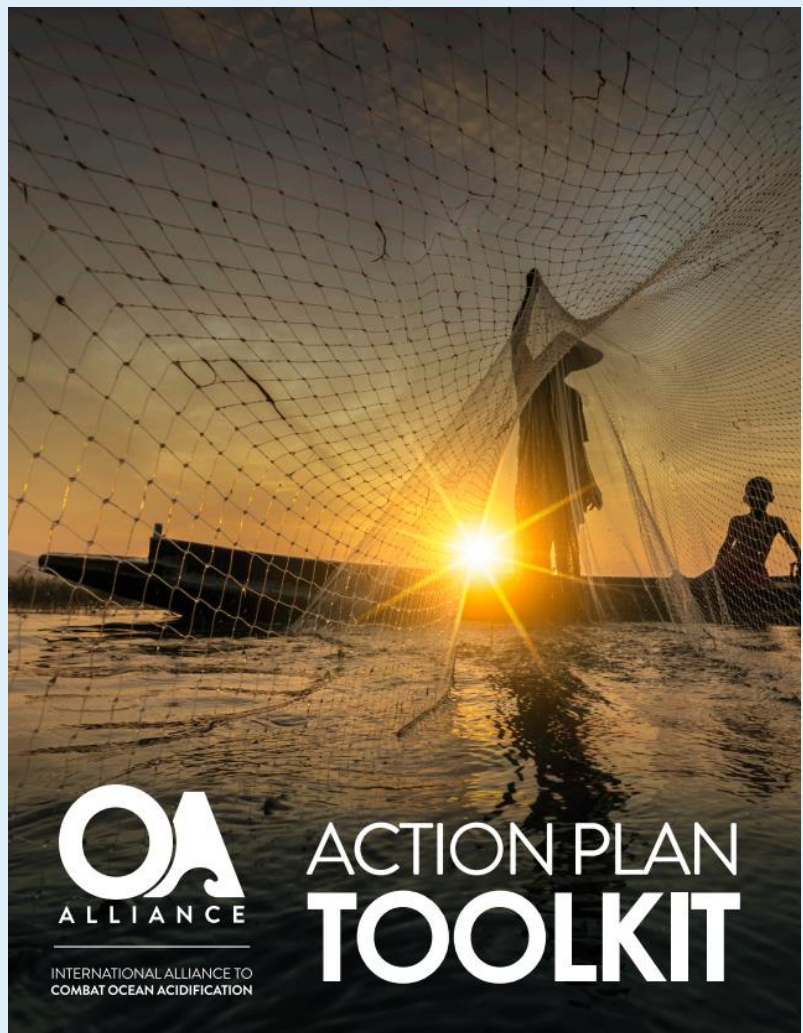
A forum for discussing the equipment and procedures used for monitoring and lab work, in addition to common issues and troubleshooting tips.



INTERNATIONAL ALLIANCE TO
COMBAT OCEAN ACIDIFICATION



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Upcoming activities and opportunities

- **OA week (Virtual)** - 18-22 November 2024
- **Winter School on Ocean Acidification and Multiple Stressors – 2nd Edition**
18-29 November, IAEA Marine Environment Laboratories, Monaco (IAEA/Prince Albert II of Monaco Foundation)
- Next **Pier2Peer** calls for proposals funded by The Ocean Foundation, stay tuned as these come up regularly
- Upcoming **OTGA** courses
- IAEA TC program **INT7022 – Ocean Health**

Take home messages

Make use of existing resources and participate in community efforts:

- OA-ICC:
 - Follow the OA-ICC news stream and check out biblio base and data portal
- GOA-ON:
 - Sign up for the GOA-ON Pier2Peer mentoring program
 - Join regional hubs
 - Make sure your assets are reflected/updated on the GOA-ON portal
- Contribute your data to the SDG 14.3.1 reporting process and consider registering a Voluntary Commitment for SDG14.3
- Join an OARS Working Group and register an OARS commitment
- Other resources: NOAA OA Information Exchange – ask questions and take part in the discussions!
- Let us know how we can best support the community and help advance OA research!



Thank you!

Lina Hansson & Carolina Galdino
OA-ICC Project Office

Contact: oaicc@iaea.org
www.iaea.org/ocean-acidification
<http://news-oceanacidification-icc.org/>