International ocean acidification initiatives and coordination (OA-ICC, GOA-ON, resources, data management)

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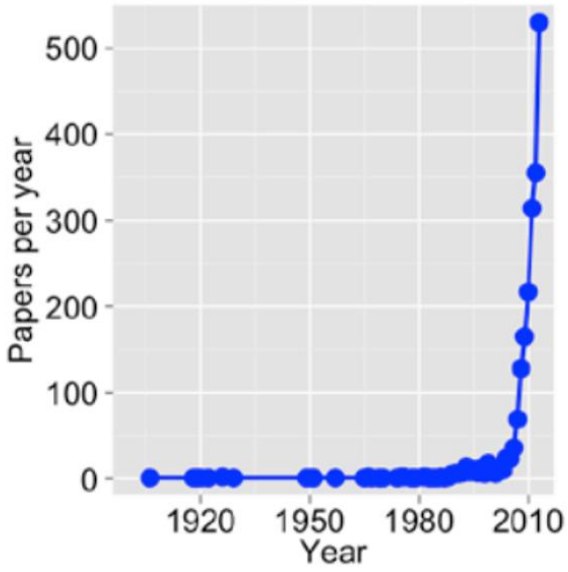
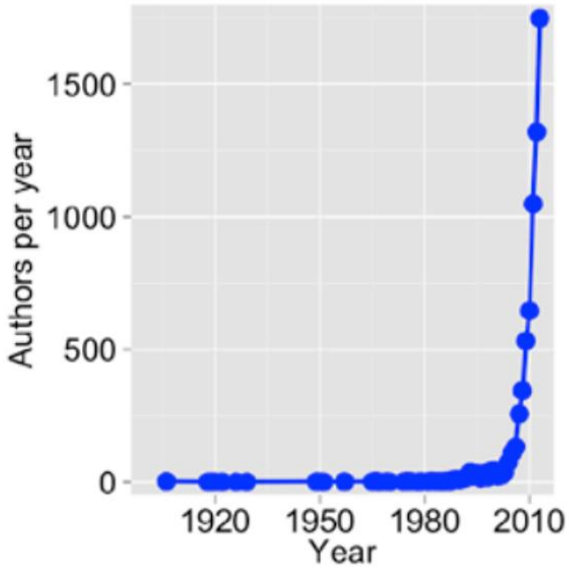
www.iaea.org/ocean-acidification
http://news-oceanacidification-icc.org/

Ocean acidification – a rapidly growing field





	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
papers	24	23	36	69	128	165	217	314	355	530
authors	75	109	133	257	344	532	645	1048	1320	1748

OA-ICC Bibliographic Database,
modified after Gattuso and Hansson 2010

Ocean acidification – a rapidly growing field

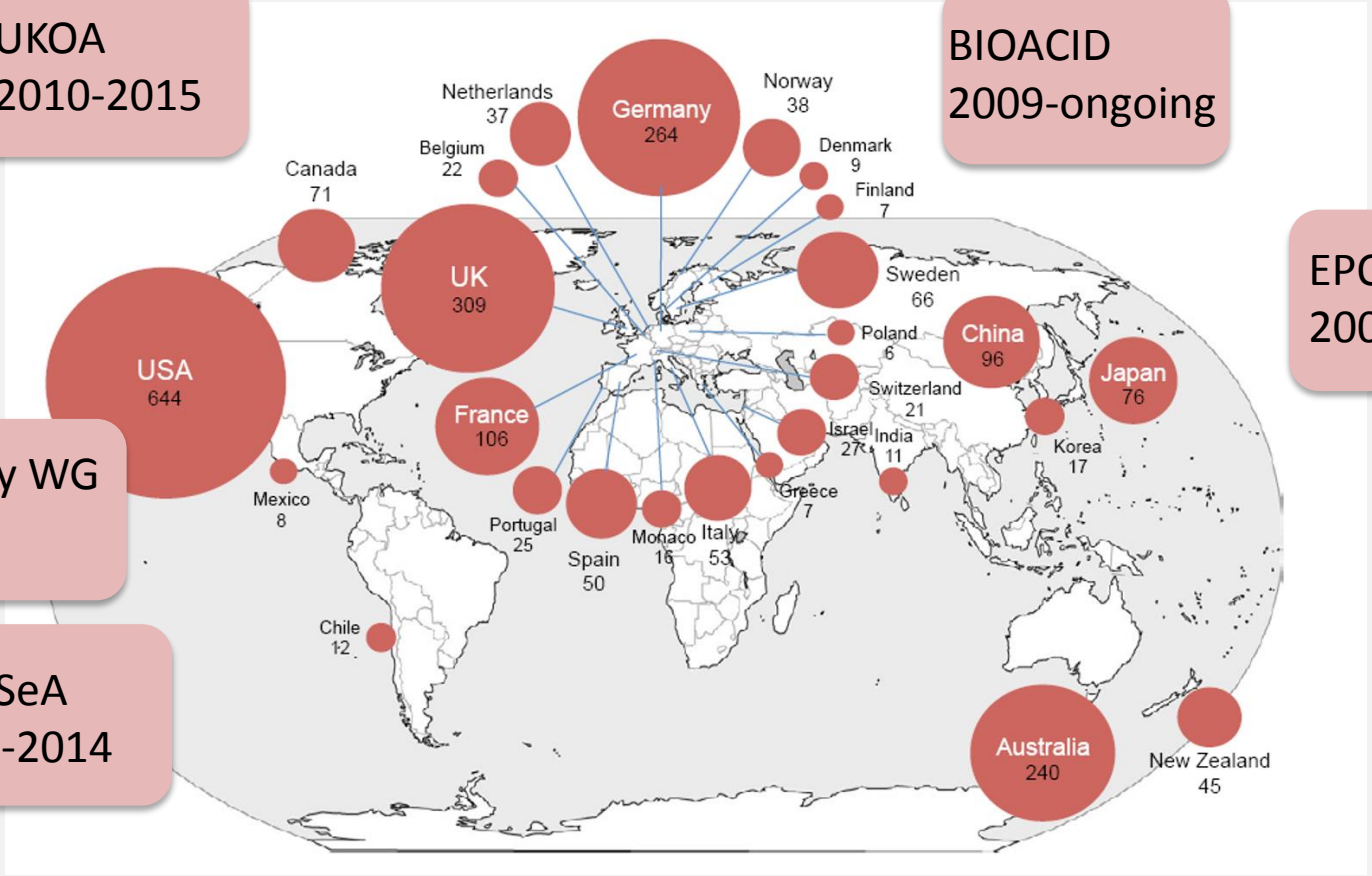
UKOA
2010-2015

BIOACID
2009-ongoing

EPOCA
2008-2012

Inter-Agency WG
NOAA OAP

MedSeA
2011-2014



OA-ICC Bibliographic Database, P. Williamson, CBD 2015

Ocean acidification – a rapidly growing field

→ increasing need for international coordination and collaboration

The IAEA launched the OA-ICC in 2012 upon recommendation of the SOLAS IMBER Ocean Acidification Working Group and increasing concern of its Member states




Why the IAEA?

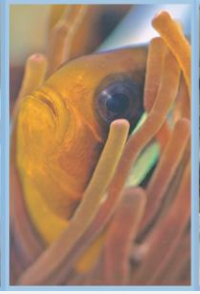
Nuclear applications in ocean acidification research

- The IAEA Environment labs are active in any field where isotopic and nuclear applications are relevant to understand environmental issues.

- Isotopic and nuclear techniques are unique tools e.g. to:

  - Study the Impact on primary production, growth and calcification rate, using e.g. Ca-45, C-14

  - Reconstruct past pH, using the isotopic ratio B-11/B-10 as a proxy

IAEA Environment Laboratories – other projects with OA components

• Coordinated Research Programme: “Ocean Acidification and Economic Impacts on Fisheries”

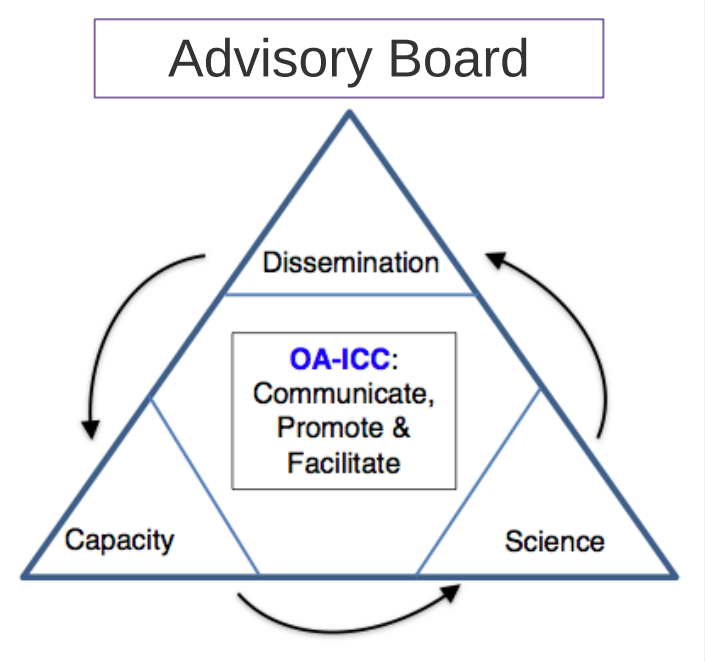
• Current **IAEA Technical Cooperation projects** with OA component:

National project: Kuwait
National project: Indonesia
Regional project: Africa
Regional project: Latin America

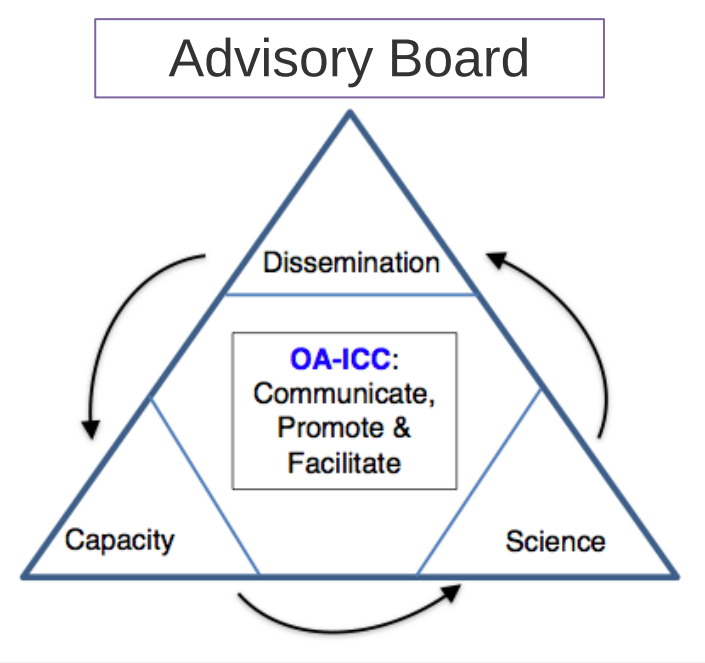
Contacts:
Juan-Carlos Miquel, Yasmine Bottein, Marc Metian

• Proposal:
Inter-regional project (Africa, Asia and South America) on OA monitoring

IAEA Ocean Acidification International Coordination Centre (OA-ICC)



- **Objective**: act as a ***hub*** to communicate, promote and facilitate international activities on ocean acidification
- **End users**: scientific community and science users (e.g., policy makers, media, general public)



- **Functioning**:

Operated by the IAEA Environment Laboratories in Monaco

Announced in June 2012 at Rio+20 for an initial duration of 3 years

Advisory Board: UN agencies, key institutions and leading scientists in the field

Funding and support

Supported by the IAEA ‘Peaceful Uses Initiative’ (PUI) through direct and in-kind contributions from several IAEA Member States and research projects on ocean acidification:
Australia, France, Italy (ENEA), Japan, New Zealand, Norway, Spain, United Kingdom, United States
NOAA OAP, IMBER, SOLAS, BIOACID, MedSeA, UKOA

Total budget: USD 2.4 M (USD 1.4 M cash and USD 1 M in-kind)




SCIENCE

'Promote activities to help advance ocean acidification research'

Global observing network
R. Feely, USA & L. Jewett, USA

Joint platforms & experiments
U. Riebesell, Germany & J. Barry, USA

The human dimension (socio-economics)
J. Bijma, Germany & S. Cooley, USA

Intercomparison exercises
M. Dai, China

Best practices
U. Riebesell, Germany & J.-P. Gattuso, France

Bibliographic database
J.-P. Gattuso, France

Data management
J.-P. Gattuso, France




CAPACITY BUILDING

'Help train tomorrow's experts on ocean acidification'

Regional training courses
L. Robbins, USA

Participation of scientists from eligible countries in international meetings

Regional coordination meetings

COMMUNICATION

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

Exhibits, side events, publications (in cooperation with the Ocean Acidification International Reference User Group; OA-iRUG)

D. Laffoley, UK & C. Turley, UK

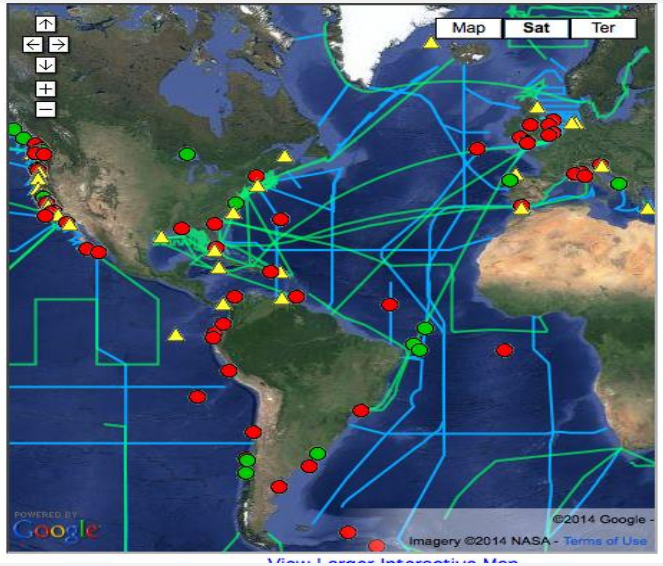
Web site & news stream

Distribution of material

GOA-ON

Global Ocean Acidification Observing Network

- 2 international workshops (Seattle 2012 and St Andrews 2013)
- 155 members from 30 countries
- Co-chairs: L. Jewett (NOAA OAP, USA) and B. Tilbrook (CSIRO, Australia)
- Strategy outlined in GOA-ON Plan (Goals, Levels)
- Friends of GOA-ON



NOAA

IOOS INTEGRATED OCEAN OBSERVING SYSTEM

GOOS Global Ocean Observing System

UNESCO United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

UK Ocean Acidification Research Programme

International Ocean Carbon Coordination Project IOCCP

BLUE PLANET Oceans and Society

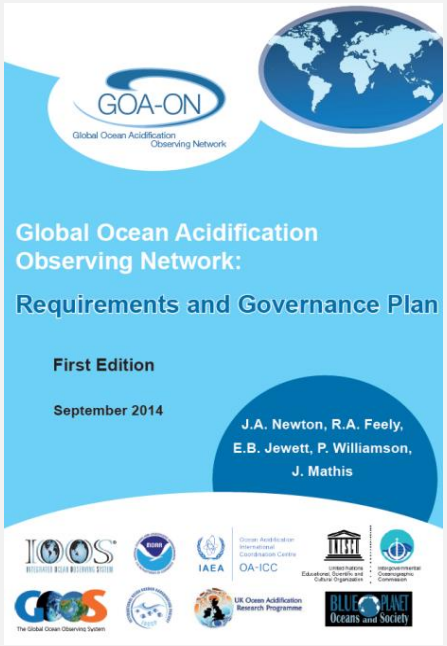
IAEA Ocean Acidification International Coordination Centre OA-ICC

Upcoming

- Expert workshops (data portal and synthesis products)
- Defining EOVs, Biology Working Group, fill gaps (e.g. Africa)
- Training course, Mozambique (S. Dupont)
- 3d scientific meeting Hobart, 8-10 May 2016, following the 4th Ocean in a High CO2 World Symposium (focus on biology)

Get involved

www.goa-on.org
info@goa-on.org
Newsletter
Next workshop: Hobart, May 2016



Joint platforms and experiments

Goal

Promote international collaboration and provide access to “platforms” (lab, ship, experiment, facility…)

Approach

- Travel support – challenging to implement
- Information sharing: OA-ICC web site
    - Links to various facilities
    - Short list of collaboration opportunities

Human dimension – collaboration between natural and social scientists

Goal

Facilitate interactions between natural and social sciences to advance understanding of the impacts of ocean acidification on human society

Approach

International workshops to bridge gap between ocean acidification impacts and socio-economic valuation (CSM & IAEA), recommendations, publications

Intercomparison

Goal

Support intercomparison of key ocean acidification variables and software

Approach

Support international intercomparison exercices:

- software comparison, extended (error propagation and buffer factors)
- calcification (compare methods)

Biogeosciences Open Access
Biogeosciences, 12, 1483–1510, 2015
www.biogeosciences.net/12/1483/2015/
doi:10.5194/bg-12-1483-2015

Comparison of ten packages that compute ocean carbonate chemistry

J. C. Orr[1], J.-M. Epitalon[2], and J.-P. Gattuso[3,4]

[1]LSCE/IPSL, Laboratoire des Sciences du Climat et de l'Environnement, CEA
[2]Geoscientific Programming Services, Fanjeaux, France
[3]CNRS-INSU, Laboratoire d'Océanographie de Villefrance, Villefranche-sur-
[4]Sorbonne Universités, UPMC Univ. Paris 06, Observatoire Océanologique, V

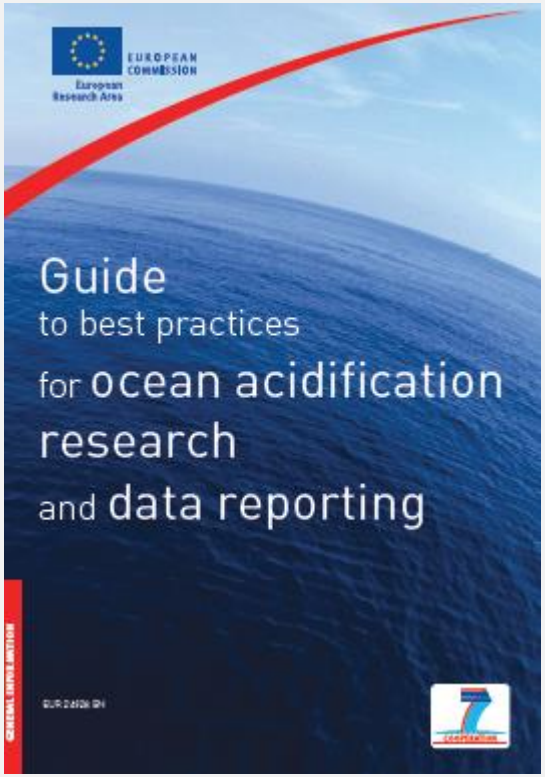
Best Practices

Goal

Provide access to internationally standardized protocols for observational and experimental approaches and data reporting, to promote quality and comparability of results

Approach

- Addendum, update not foreseen
- Share information (guide distribution, web site and news centre)



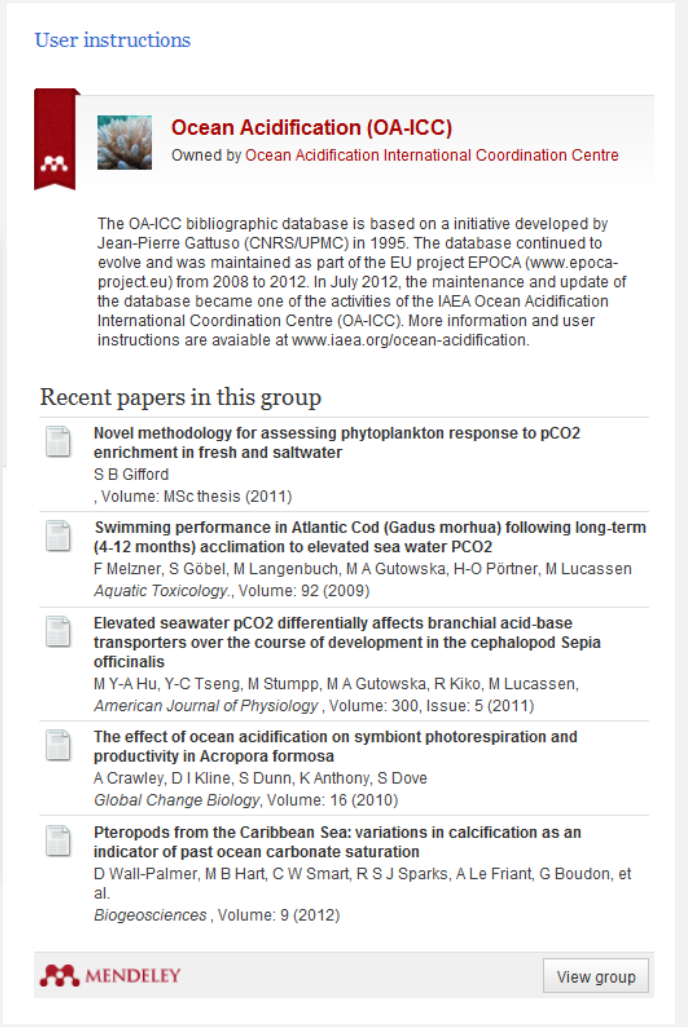
OA-ICC bibliographic database

Goal

Provide access to a comprehensive list of bibliographic references on ocean acidification

Approach

On-line open access searchable bibliographic database on Mendeley (currently more than 2700 references)



Data management

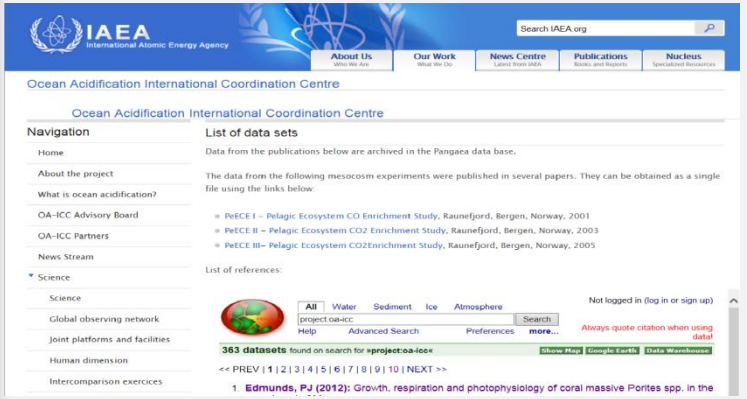
Goal

- Facilitate coordination of OA data archiving efforts and promote data sharing (experimental and GOA-ON).
- Compile published data on the biological impacts of ocean acidification and make openly accessible.

Approach

• OA-ICC Data compilation

• Expert workshops on international management of ocean acidification data (common metadata templates, vocabularies, ultimately joint data portals)



OA-ICC Data Compilation

http://tinyurl.com/oaicc-data

Background:

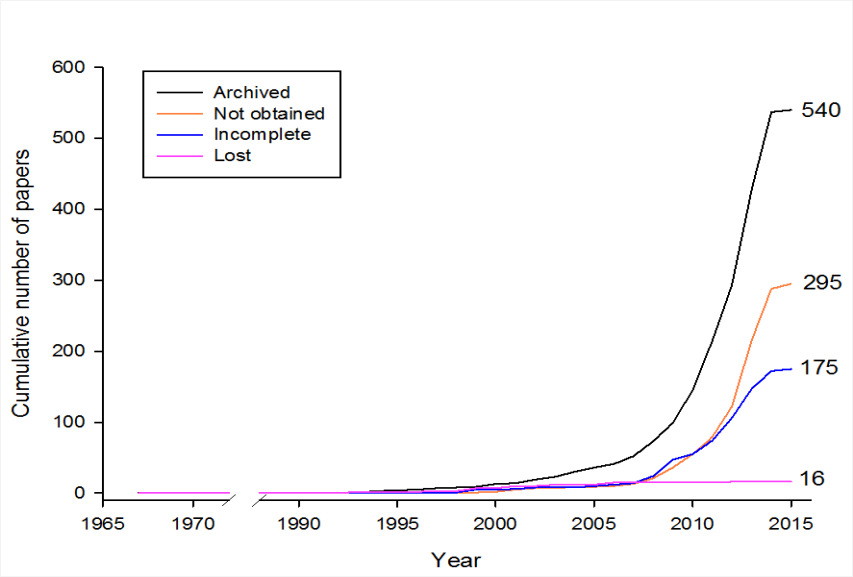
Numerous problems for data comparison (pH reported in different scales, carbonate chemistry calculated using different dissolution constants)

EPOCA/EUR-OCEANS (2007), OA-ICC since 2012, in coop. with Xiamen Univ. and Pangaea

Data from 540 papers to date

Challenges:

Slow feedback from authors (50% success rate)
Different names for the same variable (e.g. primary production/carbon fixation/POC production)



Not obtained: papers for which data could not be obtained
Incomplete: papers which reported less than two carbonate system parameters
Lost: data lost by authors

Recommendations/guidelines (Gattuso et al.)

At least two of the carbonate system parameters, + S, t, hydrostatic pressure :

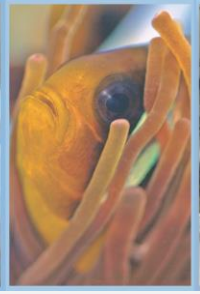
- Dissolved inorganic carbon (CT; µmol kg-1)
- Total alkalinity (AT; µmol kg-1)
- pH (it is critical to mention its scale; see below)
- Partial pressure of carbon dioxide (pCO2; µatm)
- Fugacity of carbon dioxide (fCO2; µatm)
- Carbonate ion concentration (CO32-; µmol kg-1)

Concentrations of total dissolved inorganic phosphorus and total dissolved inorganic silicon (in µmol kg-1) whenever possible

How the parameters were measured and protocol followed.

Certified Reference Materials, source, and batch numbers

pH scale (NBS, free, total, or seawater)

Recommendations/guidelines (Gattuso et al.)

Temperature at the time of sampling and at the time of measurement, if different.
Formulations used to calculate:

- Concentrations of total boron
- CO2 solubility (K0)
- Dissociation constants of carbonic acid (K1 and K2), boric acid (Kb), water (Kw), phosphoric acid (Kp1, Kp2, Kp3), silicic acid (Ksi), hydrogen fluoride (Kf), and bisulfate (Ks)
- Solubility products of calcite (Kspc) and aragonite (Kspa)

Software package used to calculate the carbonate chemistry, version number, and any associated options.

Average reproducibility of the performed measurements (with number of measurements)

Strongly recommended that the chemistry and biological data are either archived in an on-line database (preferred) or provided along with the paper as supplementary information.

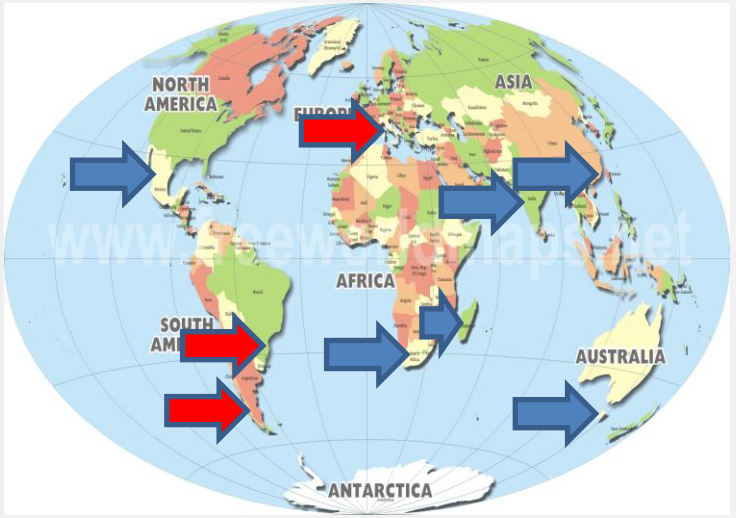
Capacity building

Goal

Provide scientists entering the field access to training to be able to set up pertinent experiments, avoid typical pitfalls and ensure comparability with other studies.

Approach

- Training courses (Latin America, Asia, Africa)
- Information sharing and networking (web site and news centre)
- Regional coordination meetings
- Support to present results at conferences



Communication and knowledge exchange

Goal

To ensure that information on ocean acidification is communicated to key end users in an effective way.

Approach

- Web site and news stream
- Brochures (close collaboration with OA-iRUG)
- Side events, exhibit stands (e.g. at UNFCCC COPs), in coop. with many partners (UKOA, IOC…)

OA-ICC key online resources

OA-ICC web site
iaea.org/ocean-acidification

OA-ICC news stream
news-oceanacidification-icc.org

OA-ICC data compilation
http://tinyurl.com/oaicc-data

OA-ICC bibliographic database
http://tinyurl.com/oaicc-biblio




More great OA resources!

BIOACID web site and Facebook page

NOAA OAP web site and Twitter

UK Ocean Acidification Research Programme web site

www.ocean-acidification.net (IGBP/IOC/SCOR)

MedSeA, EPOCA legacy

OCB Ocean Acidification page




Don’t be strangers! ☺

- Let us know about your projects/progress
- Participate in community efforts
- Make use of resources and provide feedback
- Look out for opportunities

Thank you!

Web site
iaea.org/ocean-acidification

News stream
news-oceanacidification-icc.org

Data compilation
http://tinyurl.com/oaicc-data

Bibliographic database
http://tinyurl.com/oaicc-biblio