



## Ocean Acidification – Connecting scientists to transfer knowledge at local, regional, global levels

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Session: 7

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United Nations  
Educational, Scientific and  
Cultural Organization

Organisation  
des Nations Unies  
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науки и культуры

- Intergovernmental  
Oceanographic  
Commission
- Commission  
océanographique  
intergouvernementale
- Comisión  
Oceanográfica  
Intergubernamental
- Межправительственная  
океанографическая  
комиссия

# Ocean Acidification

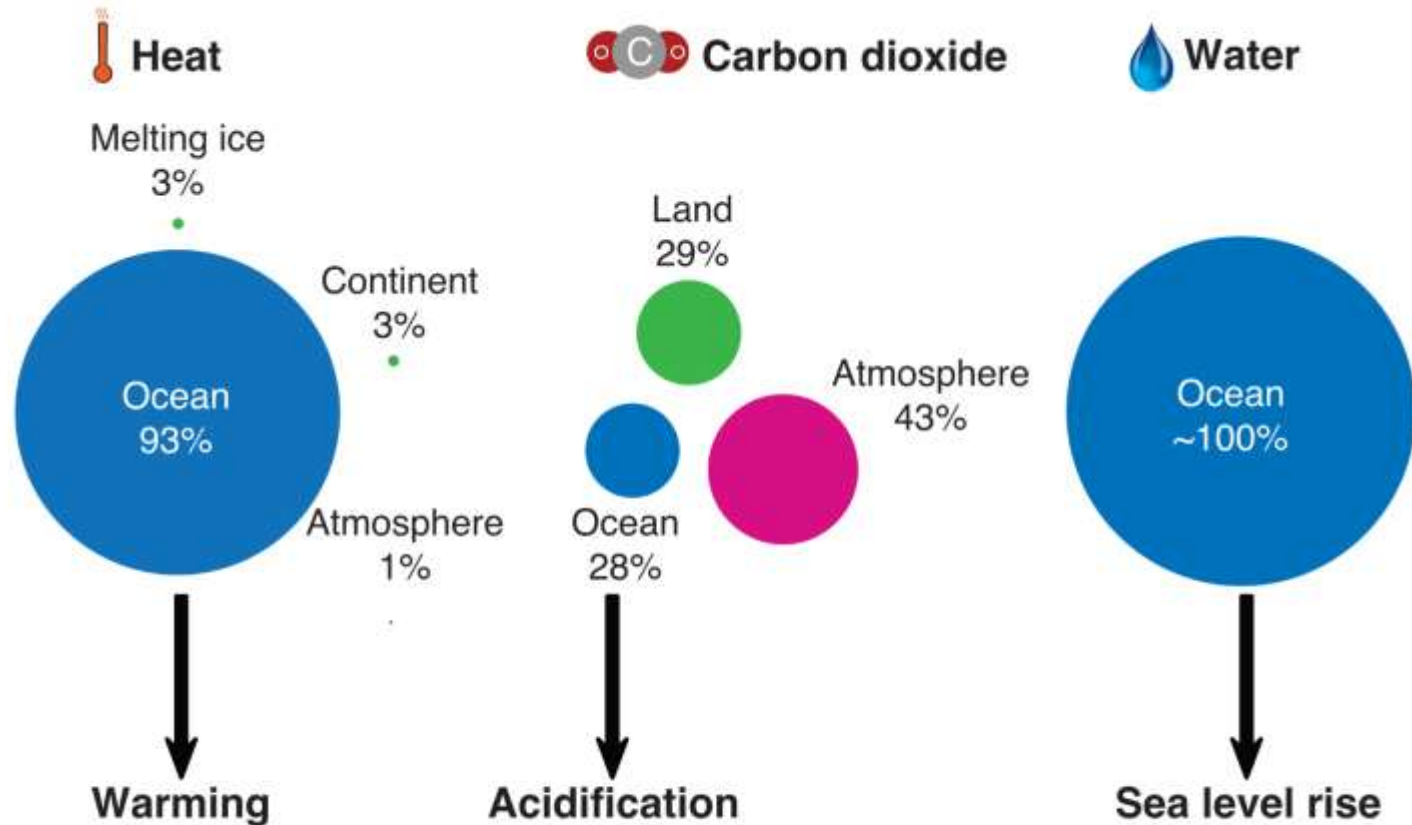
## Connecting scientists to transfer knowledge at local, regional, global levels

***Presented by Kirsten Isensee***

*Intergovernmental Oceanographic Commission  
Ocean Science Section*

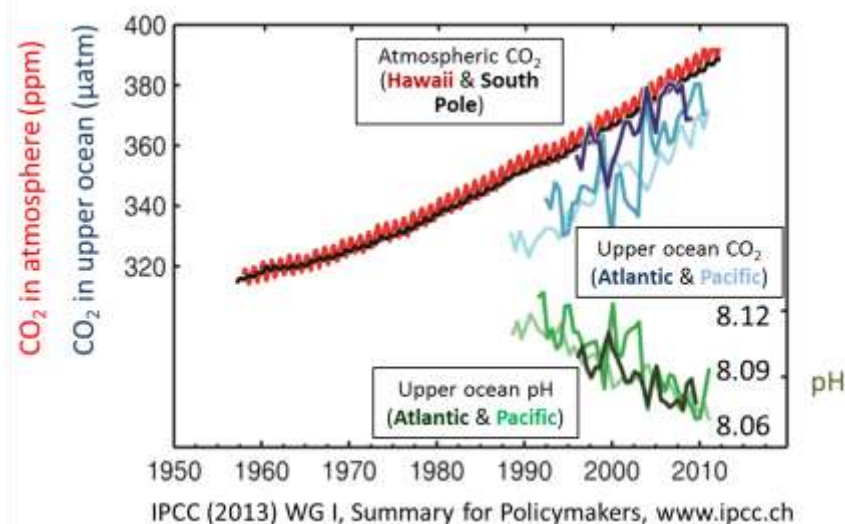
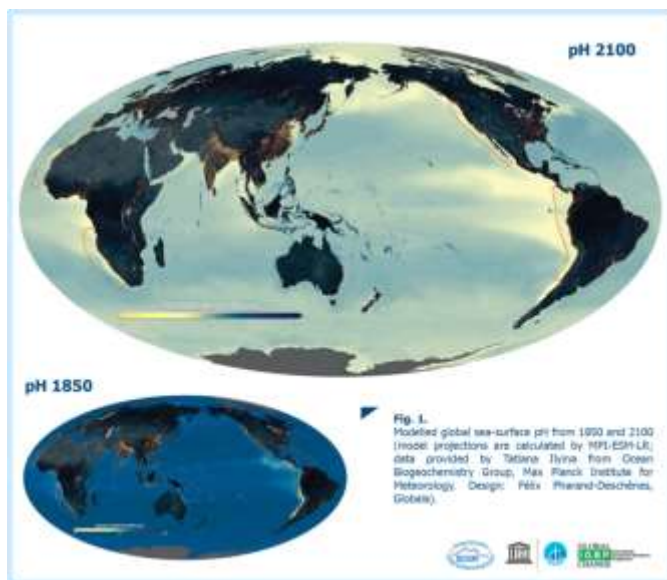
1 October 2015

# ***IOC-UNESCO and Ocean Acidification Research? Why?***

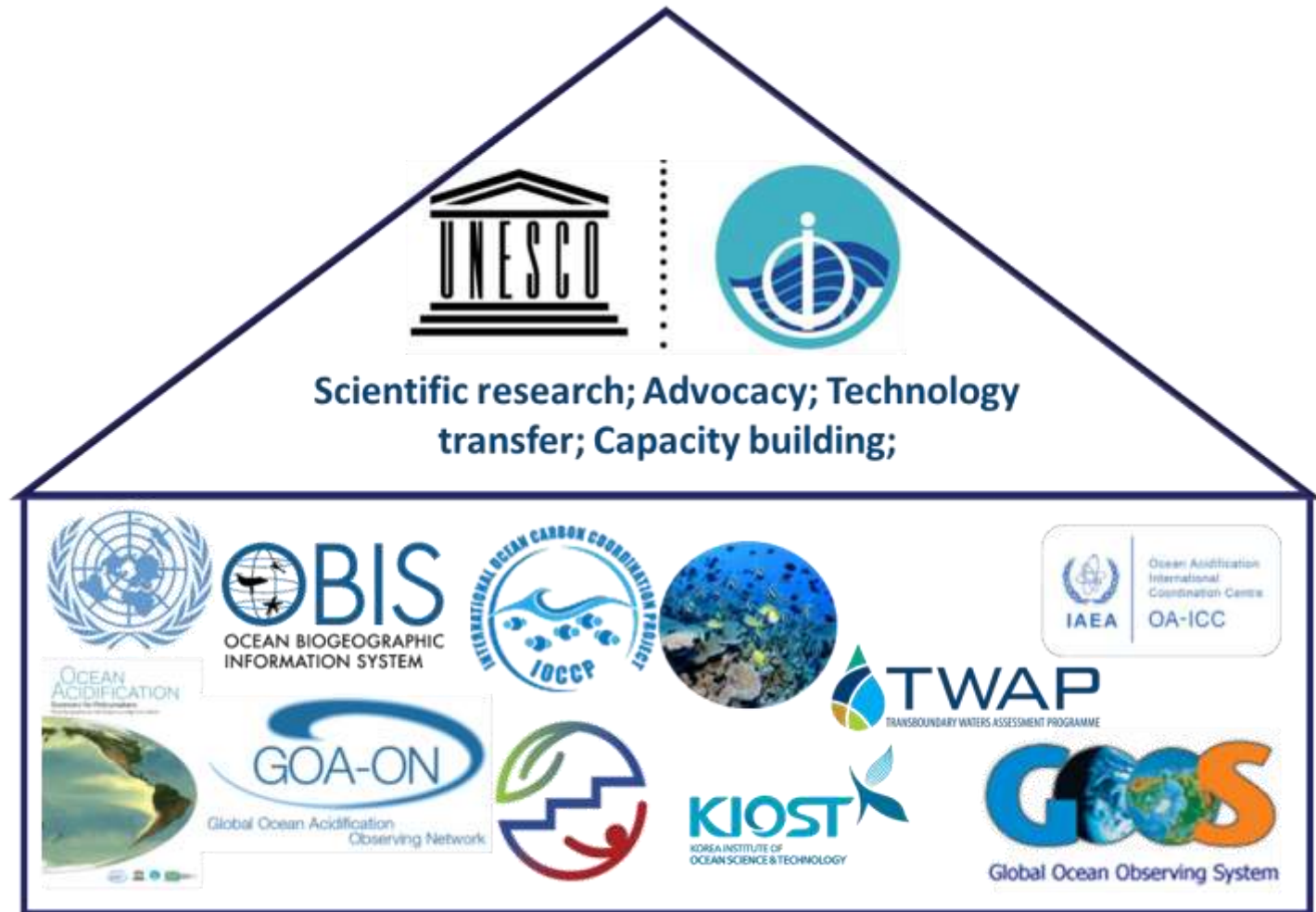


# IOC-UNESCO and Ocean Acidification Research? Why?

- Present level of CO<sub>2</sub> in the atmosphere is higher than it has been for the past 800 000 years
- The ocean has absorbed 1/3 of the fossil carbon released
- Capacity of the ocean to continue to absorb carbon at the same rate is questioned by scientists.
- Absorbed CO<sub>2</sub> results in the formation of more carbonic acid, which increases the acidity of seawater – 26 % since 1900 and about 150% in 2100
- The rate of change may be faster than at any time during the last 300 million years



# ***IOC-UNESCO and Ocean Acidification Research? Why?***



# Call for Global Observation Coordination - OA



**One section** dedicated to **Oceans and Seas**  
Including 20 paragraphs (158 – 177)

One section dedicated to SIDS; 3 paragraphs  
(178 -180)

**Paragraph 166: Ocean Acidification**



## POST 2015 AGENDA – Sustainable Development Goals

SDG 14 Conserve and sustainably use the oceans, seas and marine resources

ONE TARGET: **Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels**

**But many other SDGs can be related to OA research, e.g. SDG 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture; SDG 13 Take urgent action to combat climate change and its impacts;**



# Current State of knowledge

Some examples:



<http://www.cbd.int/doc/publications/cbd-ts-75-en.pdf>



<http://ocean-acidification.net/>

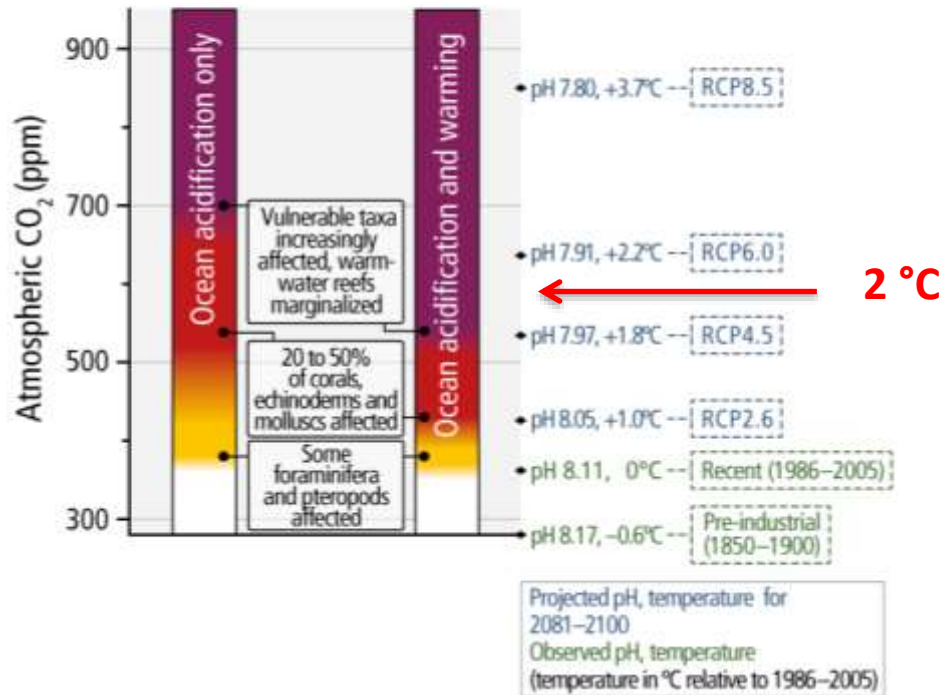


<http://www.ipcc.ch/report/ar5/>

# Estimate Global Level Impacts of OA

Increasing risk from RCP2.6 to RCP8.5

(b) Risk for marine species impacted by ocean acidification only, or additionally by warming extremes

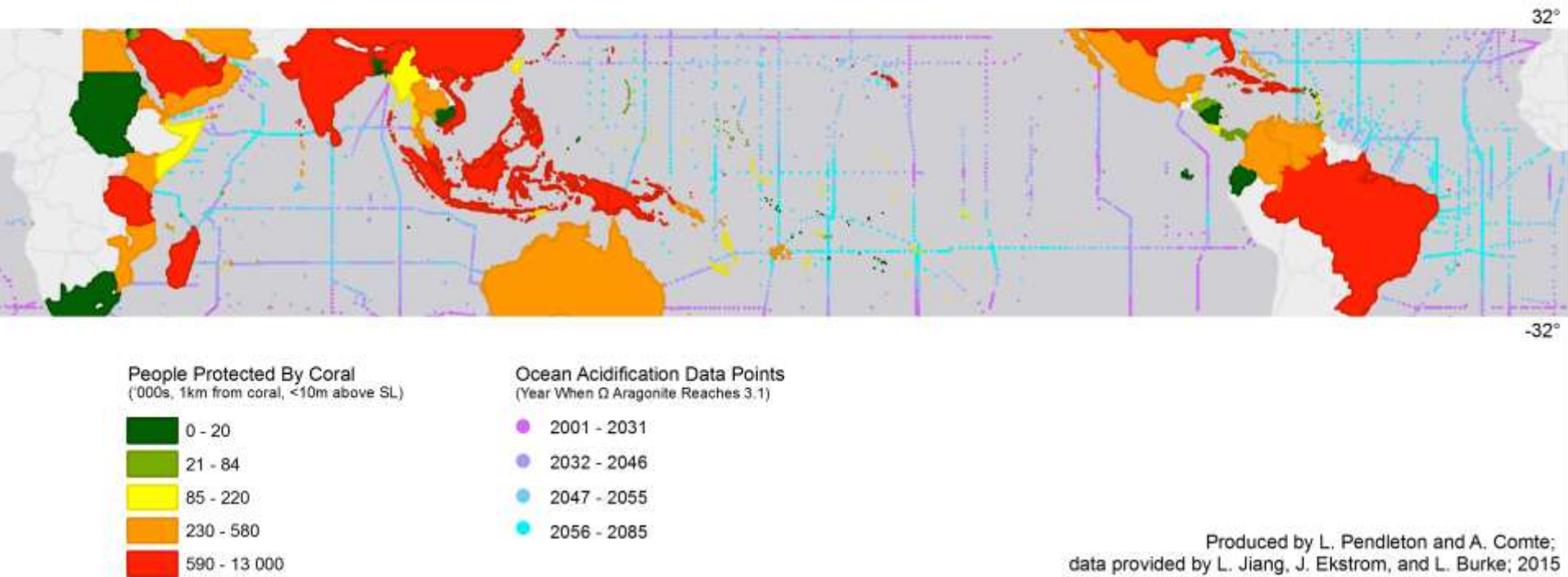


	Data	People
People	Good	Poor: don't understand impacts or responses
Ecosystems and organisms at risk	Poor to Fair: Do not have species level data	Simplistic: mesocosm level science needed
OA and other synergistic environmental hazards	Bad to Fair OA near shore data limited, hurricane projections uncertain	Bad, getting better. Need better data near shore and better data about local stressors.



# ***Large Gaps in Data for Global Models***

## **Population Protected by Coral & Ocean Acidification**



## ***Ocean acidification measurements are needed for policy***

- Early warning
- Cause and effect
- Mitigation

## ***Ocean acidification measurements are needed for science***

- Understanding variability
- Assessing ocean health
- Improved forecasting

## ***Ocean acidification measurements need to be regional/global***

- Regional-Global-scale processes
- Data comparisons
- Food security

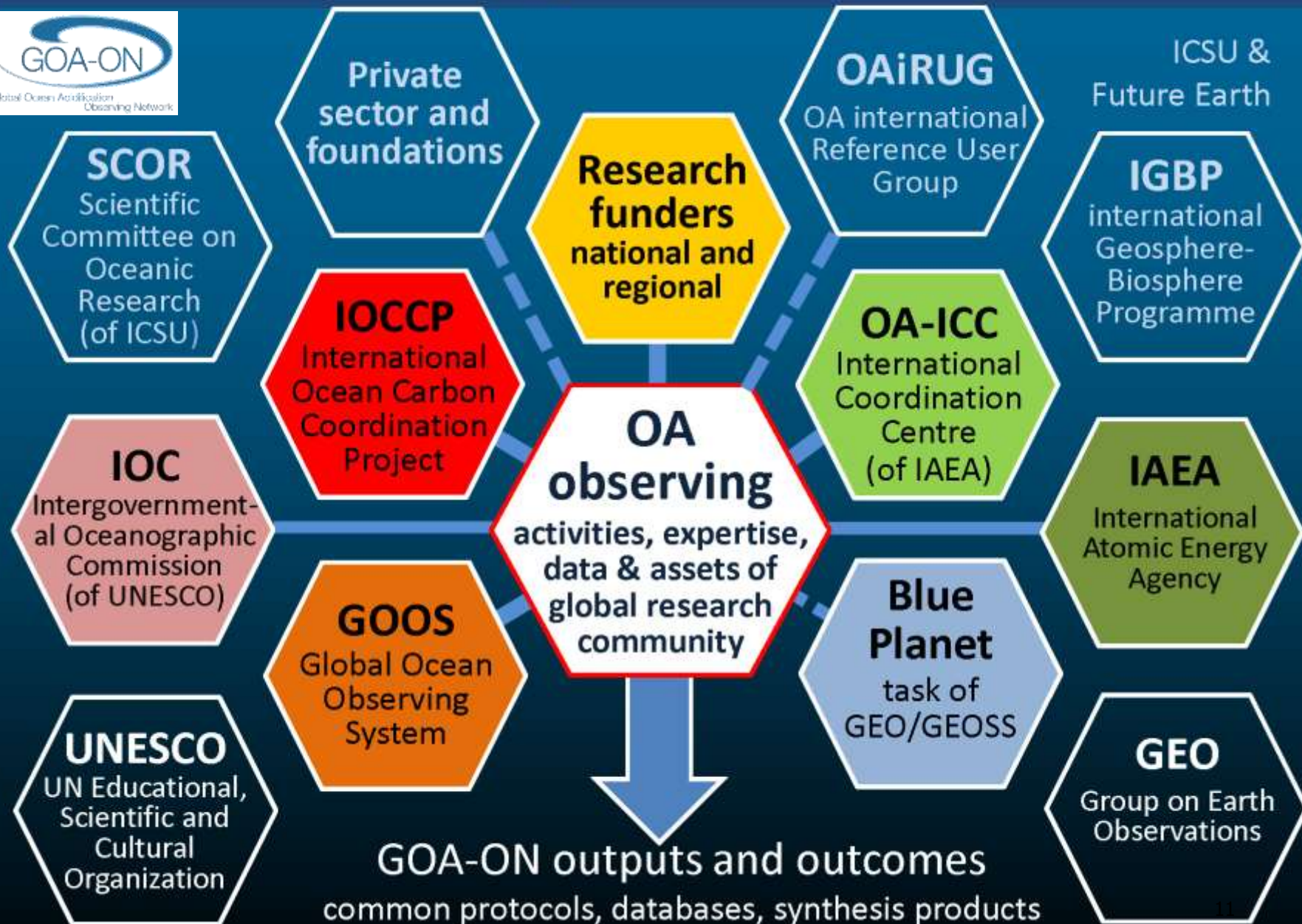
OCEAN ACIDIFICATION (pH)

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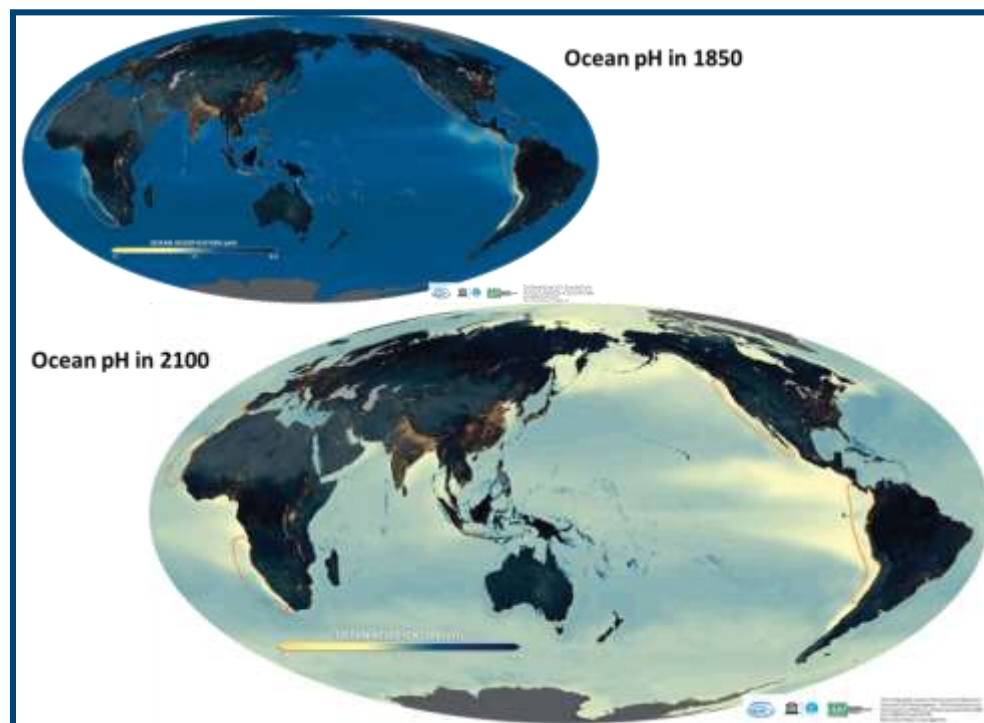


# Global OA Observing Network *wider connections*



## ***The Global Ocean Acidification Observing Network***

- Goal 1** Understanding of global OA conditions
- Goal 2** Understanding of ecosystem response to OA
- Goal 3** Data to optimize OA modeling



# ***Biological Working Group***

## **Task #1 - Inform the chemical monitoring program about the biological needs** [Short term]

### CHALLENGE

Marine chemical monitoring is critical to understand/predict responses of marine life. However, there is a need for a better communication between the two communities.

### ACTION

Publish a document/manuscript targeting the chemical monitoring community.



# ***Biological Working Group***

## **Task #1 - Inform the chemical monitoring program about the biological needs** [Short term]

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## **Task #2 – Evaluate the needs and requirement of a Biological Monitoring Program** [Medium term]

### CHALLENGE:

Developing an OA-specific biological monitoring program may not be realistic. What are the alternatives?

### SUGGESTED ACTIONS:

**Compile existing biological monitoring**; Identify key questions; **Case studies projects**.

# Biological Working Group

## Task #1 - Inform the chemical monitoring program about the biological needs [Short term]

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### SUGGESTED ACTIONS:

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## Task #3 – Develop a theoretical framework linking chemical changes to biological response [Medium/Long term]

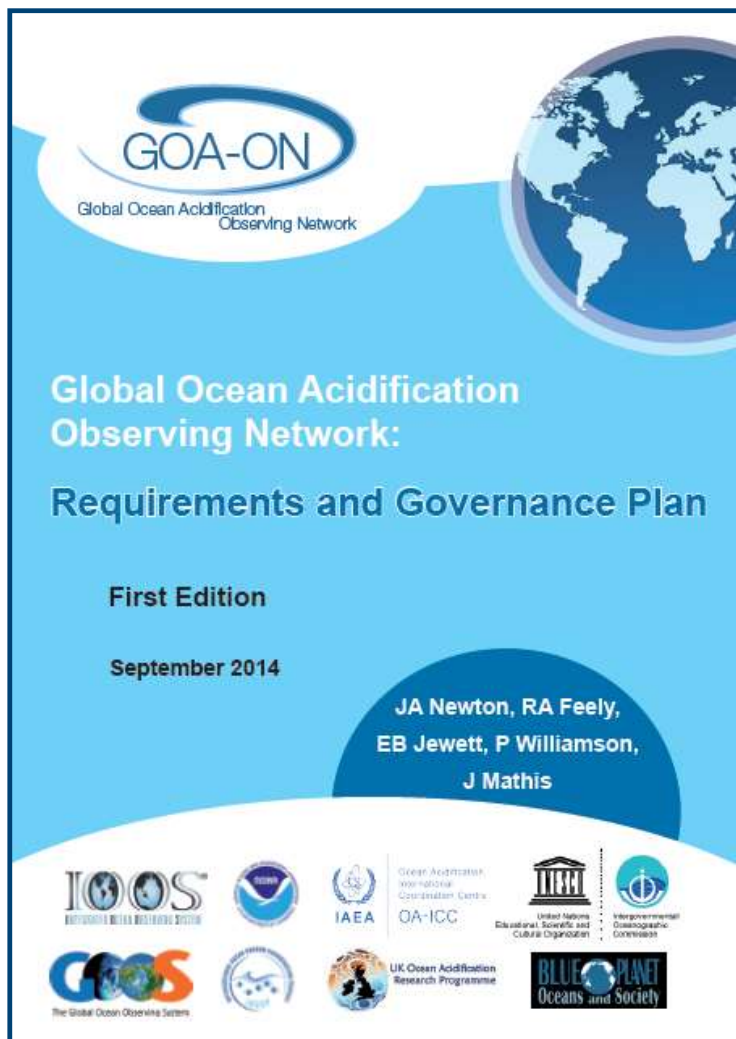
### CHALLENGE

The goal is to deliver a realistic alternative that connecting the monitored chemical data to biological and socio-economic impacts and the **production of risk maps required for policy and management?**

### SUGGESTED ACTIONS:

Develop a strategy for a re-evaluation of existing information . **Identify knowledge gaps** and inform the research community, and possibly suggest actions.

## ***Vision and Plan***



<http://www.goa-on.org/>

## ***Expected Products***

The outcomes from GOA-ON are globally distributed quality-assured data, near-real-time data, and data synthesis products that:

- Facilitate research (new knowledge) on OA and its drivers
- Communicate status of OA and biological response
- Enable forecasting/prediction of OA conditions
- Data portal WS in November
- EC council meeting 19-20 November discussing Data synthesis products
- OA-ICC: OA training courses (next China October, December South Africa)

# ***Ocean Acidification – Scientific Coordination***

## ***Local***

National Research Programmes, e.g. BROA (Brazil), UKOA (United Kingdom), Ocean Acidification Monitoring Program in Thailand

## ***Regional***

### **Latin American Ocean Acidification Network**



First meeting in December 2015 – official start

GOAL: Identification of existing human and technical resources/research, which is already conducted

Gaps: Projects for possible collaboration and what could be the add on; Experimental work and observation; Identification of highly vulnerable areas – IOC supports this initiative

### **Monitoring of the Ecological Impacts of Ocean Acidification on Coral Reef Ecosystems – West Pacific Ocean**

IOC- WESTPAC - Establishment of research and monitoring to detect ecological impacts of ocean acidification on coral reef ecosystems

### **LME initiatives**

Several scientific programmes in LMEs include OA research, e.g. Coral Reef monitoring the Pacific; Bay of Bengal

## ***Global***

New mechanism for coordinated collection and collation of OA field data

### **The Global Ocean Acidification Observing Network**

IOC is part of the Executive Council and co-chairing and coordinating the Biological Working Group



# ***Ocean Acidification – Scientific Coordination - LME***

## ***Mitigation***

Marine Protected Areas – conservation and reforestation of Coastal Blue Carbon Ecosystem will reduce an additional source of greenhouse gases



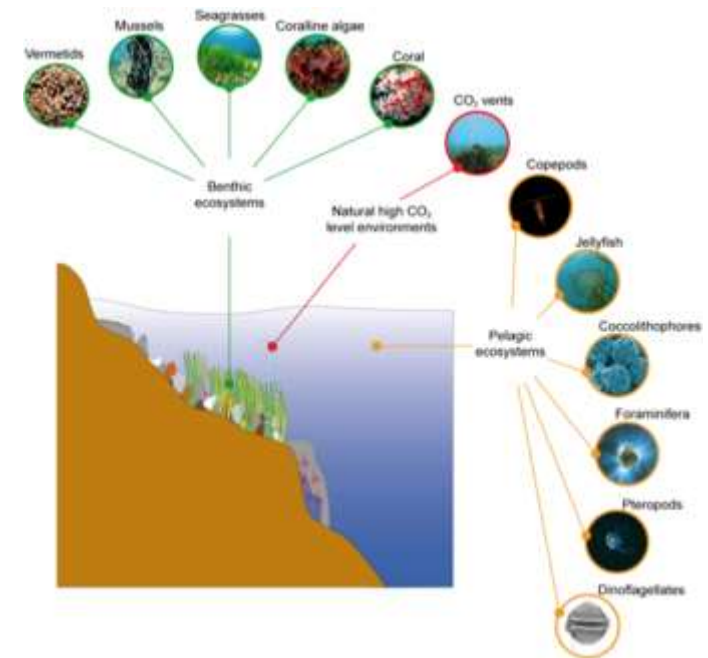
## ***Adaptation***

Sustainable use of the ocean resources, e.g. reduce fisheries, culture shell fish species which are more resilient to high CO<sub>2</sub> concentrations

## ***Resilience***

Decrease other stressors, e.g. Reduce extensive fisheries and bottom trawling, as well as the input of nutrients due to inefficient fertilizer use

Protect the coastal ecosystems to ensure undisturbed recruitment - MPA





# TAKE HOME

## 1. Management requires Measurements:

assessment of the biogeochemical, ecological and societal importance of ocean acidification needs field data (chemical and biological variables) at local, regional and global levels, with associated capacity-building.

## 2. Sustainable Development Goal

The Ocean and ocean acidification can no longer remain on the periphery of international debates on climate or the environment. - Coral coverage is one indicator for OA

**The UN is encouraging Member States to take necessary actions to monitor the Ocean and to reduce CO<sub>2</sub> and other human stressors that concur with ocean warming and acidification.**



# Thank you!

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