



## Workshop overview

The Global Ocean Acidification Observing Network (GOA-ON) is an international effort to observe ocean acidification (OA), to identify the drivers and impacts of OA on marine ecosystems, and to provide biogeochemical data to optimize OA modeling and predictions. Since its inception in 2012, GOA-ON has grown to over 630 members from 96 countries, and has continued to build a community through workshops and regional trainings aimed at advancing ocean acidification science. The 4<sup>th</sup> GOA-ON International Workshop was hosted by the State Key Laboratory of Satellite Ocean Environment Dynamics and the Second Institute of Oceanography, and was attended by 270 participants from 62 countries. This workshop included plenary presentations and discussions, parallel sessions reflecting the themes of the workshop, poster sessions, and two special events.



### International Scientific Committee

- Dr. Fei Chai**, (Workshop Co-Chair), SOED, Second Institute of Oceanography, SOA, China & University of Maine, USA
- Dr. Minhan Dai** (Workshop Co-Chair), Xiamen University, China
- Dr. Jan Newton**, (Workshop Co-Chair), University of Washington, USA
- Dr. Wei-Jun Cai**, University of Delaware, USA
- Dr. Arthur Chen**, National Sun Yat-sen University, Taiwan
- Dr. Sam Dupont**, University of Gothenburg, Sweden
- Dr. Richard Feely**, PMEL/NOAA, USA
- Dr. Helen Findlay**, Plymouth Marine Laboratory, UK
- Ms. Lina Hansson**, International Atomic Energy Agency (IAEA)
- Dr. Naomi Harada**, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan
- Dr. Kirsten Isensee**, Intergovernmental Oceanographic Commission (IOC), UNESCO
- Dr. Libby Jewett**, NOAA Ocean Acidification Program, USA
- Dr. Somkiat Khokiattiwong**, Phuket Marine Biological Center, Thailand
- Dr. Kitack Lee**, Pohang University of Science and Technology, Republic of Korea
- Dr. Nayrah Shaltout**, National Institute of Oceanography and Fisheries (NIOF), Egypt
- Dr. Maciej Telszewski**, International Ocean Carbon Coordination Project (IOCCP)
- Dr. Bronte Tilbrook**, CSIRO, Australia
- Dr. Cristian Vargas**, Universidad de Concepcion, Chile

### Workshop Goals

- Advance understanding of ocean and coastal acidification in a multi-stressor environment
- Identify impacts of ocean and coastal acidification on organisms and ecosystems
- Improve regional and global modelling of physical-biogeochemical processes related to ocean acidification and the associated ecosystem responses
- Identify ways for GOA-ON to better meet the information needs of stakeholders
- Discuss advances in technologies, data management practices and new products

### Organizers/sponsors



### Co-sponsors



## Parallel session recommendations

### Ocean and coastal acidification in a multi-stressor environment

- Develop recommendations for a best set of carbonate chemistry parameters and constants for measuring OA and related stressors in the coastal zone.
- More affordable sensors that can function in complex coastal zones experiencing multiple stressors need to be a priority for future observing needs.
- Open ocean and coastal observations have tended to focus on the surface; the observing systems need to also cover the subsurface.



### Observing ocean and coastal acidification and the impacts on organisms and ecosystems

- GOA-ON should continue to interact and build strong links with other observing networks to ensure chemistry and biology observations are coordinated and to maximize the use of observing infrastructure.
- Increased collaboration of biogeochemists and modellers with biologists is needed to better understand the systems and responses being studied.
- Biogeochemical modelling in a multi-stressor context can help determine keystone species and the identification of regional vulnerabilities and the risk of ocean acidification for different locations.

### Regional and global modelling on physical-biogeochemical coupling processes related to ocean acidification and associated ecosystem responses

- Long-term and accessible field observations are critical for modelling and need to be maintained. In parallel, increased emphasis on high-resolution models at local scales is needed for regional downscaling.
- Future GOA-ON meetings should include more emphasis on social and economic models.
- Future capacity building activities should consider including modelling products and evaluations in workshops.



### Shaping GOA-ON to better meet the information needs of global-to-local decision makers

- Encourage science-based decision making and policy by reinforcing the link between the environment and the economy.
- Promote co-production of research by actively involving different sectors of society, including industry.
- Invite policy makers to the next GOA-ON workshop, and host events focused on policy and social science aspects of ocean acidification.
- While adaption and conservation are important, reducing CO<sub>2</sub> emissions globally should remain the priority to address ocean acidification.





## Special events and workshop outcomes

### Special event 1: Improving industry-science response to multi-stressor impacts on aquaculture

This event brought together over 70 scientists and aquaculture stakeholders to bridge the gap between the scientific community and the aquaculture industry. Key industry representatives emphasized the importance of ocean acidification research, while also acknowledging the reality of facing multiple stressors, particularly in coastal zones. Together, scientists and aquaculture stakeholders can mutually benefit from one another through co-producing research relevant for both parties.



### Special event 2: Special Event on Ocean Carbon from Space (SatCO2)

During this workshop, 48 scientists were trained on the Marine Satellite Data Online Analysis Platform "SatCO2". This software provides access to marine satellite remote sensing data, algorithms and interactive analyses, 3D sphere visualization, among other applications.



### Launch of GOA-ON Implementation Strategy

The GOA-ON Implementation Strategy was officially launched at the workshop. This document outlines how to implement the GOA-ON Requirements and Governance Plan, including expanding ocean acidification observations, closing human and technology gaps, and informing about the impacts of ocean acidification. The Implementation Strategy also offers practical information prompting members to approach GOA-ON's goals.



For more information about GOA-ON, or to become a member, visit [www.goa-on.org](http://www.goa-on.org). If you have any questions, please email the GOA-ON Secretariat: [secretariat@goa-on.org](mailto:secretariat@goa-on.org)  
Alicia Cheripka (NOAA OAP)  
Marine Lebec (IAEA OA-ICC)  
Katherina Schoo (IOC-UNESCO)

The countries shaded in black represent those with GOA-ON membership. GOA-ON membership has grown from 150 members in 2013, to over 630 members from 96 countries in 2019. Within the last year, GOA-ON has seen the formation of several new regional hubs, including in North America, Northeast Atlantic, the Mediterranean Sea and Pacific Islands.