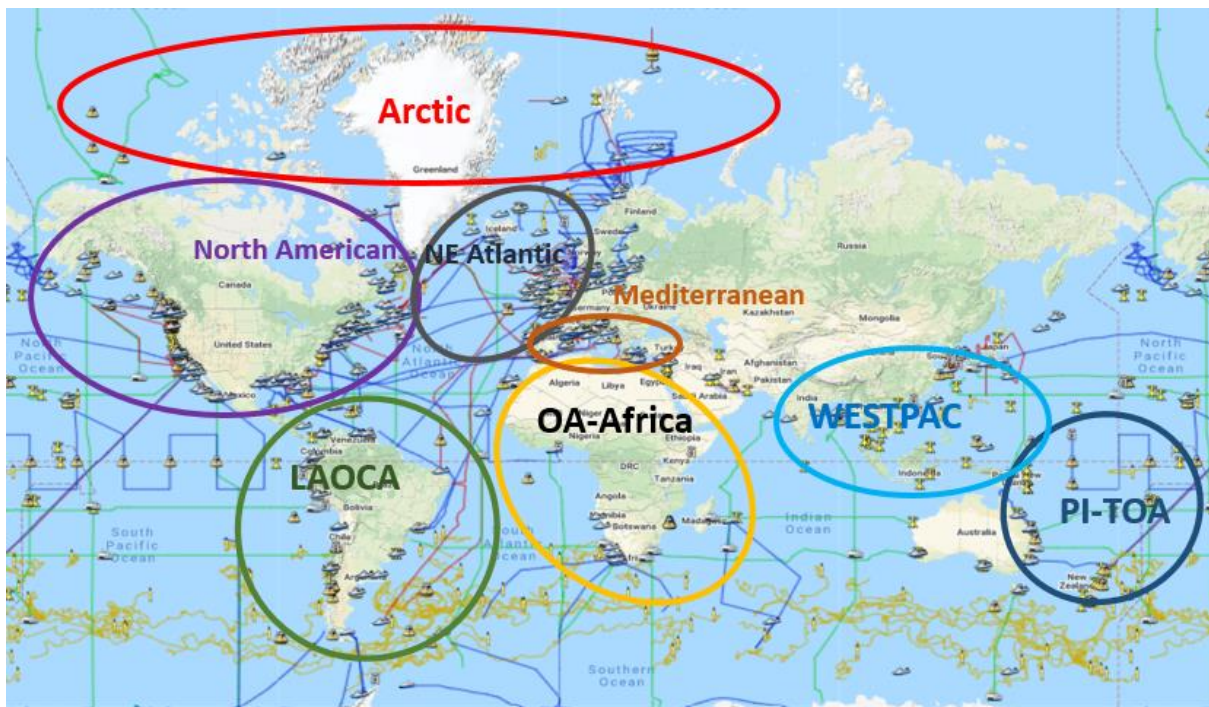




Global Ocean Acidification  
Observing Network

# GOA-ON Hub Reports 2021



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## North American Ocean Acidification Network

Geographic scope (countries involved or region): Canada, United States of America, Mexico

Number of members to date: 141

Do you have a steering committee? Y/N: Y

How are the Co-Chairs chosen for the hub?: Selected by the GOA-ON Executive Council or by the Membership

How are members chosen to join the hub?: Complete the Application Form

Objective 1: Share information about the readiness of the Observing Network

Objective 2: Assist in Data Management

Objective 3: Promote “Best Practices” within the Hub’s domain to be consistent with GOA-ON

Objective 4: Provide integration of the global network through synthesis product development

List of activities in the past 18 Months (add more rows as needed)

Name/short title of event	Location	Number of participants (estimate)	Short Summary
Synthesis of surface chemical data for carbon parameters	North American Coastal Waters	24	Synthesis report on the physical and chemical controls of surface water carbonate data for North American Coastal Waters.  Cai et al. (2020). Nature Commun., 11, 2691, doi:10.1038/s41467-020-16530-z,
Synthesis of Time Series Data	North American Coastal Waters	32	Workshop report on the analysis of time series data and the determination of anthropogenic trends.  Sutton et al (2019): <a href="#">Autonomous seawater pCO<sub>2</sub> and pH time series from 40 surface buoys and the emergence of anthropogenic trends</a> . Earth Syst. Sci. Data, 11, 421–439, doi:10.5194/essd-11-421-2019
Developed synthesized Quality controlled data product on coastal cruise data	North American Coastal Waters	30	Coastal Ocean Data Analysis Product in North America (CODAP-NA): An internally consistent data product for discrete inorganic carbon, oxygen, and nutrients on the North American ocean margins. (Jiang et al., in press).
Developed new technologies for observing carbon chemistry with autonomous vehicles	North American Coastal Waters	13	Report on the development and evaluation of new technologies for carbon dioxide measurements on surface ocean autonomous vehicles.  Sabine et al (2020): <a href="#">Evaluation of a new carbon dioxide system for autonomous surface vehicles</a> . J. Atmos. Oceanic Tech., 37(8), 1305–1317, doi:10.1175/JTECH-D-20-0010.1
The second in person meeting of the GOA-ON North American Ocean Acidification Hub was held 16-18 December 2019	North American Coastal Waters: Universidad del Mar, Huatulco, México,	26	The North American Hub Meeting 16-18 December 2019 included updates on current ocean acidification research efforts in the region, future capacity building opportunities, and reassessing the near and long-term priorities of the regional hub.

Other Achievements:

- *Completed and published workshop report on the determination of acidification trends in coastal waters (Sutton, A.J., and J.A. Newton (2020): Reaching consensus on assessments of ocean acidification trends. EOS, 101, doi: 10.1029/2020EO150944).*
- *Completed model evaluation for projecting acidification in coastal waters (Siedlecki, S.A., D. Pilcher, E.M. Howard, C. Deutsch, P. MacCready, E.L. Norton, H. Frenzel, J. Newton, R.A. Feely, S.R. Alin, and T. Klöngler (2021): Coastal processes modify projections of some climate-driven stressors in the California Current System. Biogeosciences, 18(9), 2871–2890, doi: 10.5194/bg-18-2871-2021.*
- *Pre-cruise coordination meetings since last year for the WCOA21 cruise from Canada to Mexico.*
- *DFO/NOAA OA Working Groups collaborative projects (ongoing)*
- *Publication: Niemi, A., Bednaršek, N., Michel, C., Feely, R.A., Williams, W., Azetsu-Scott, K., Walkusz, W., Reist, J.D., 2021. Biological Impact of Ocean Acidification in the Canadian Arctic: Widespread Severe Pteropod Shell Dissolution in Amundsen Gulf. Front. Mar. Sci. 8, 1–16. <https://doi.org/10.3389/fmars.2021.600184>*
- *Ocean Networks Canada workshop on in situ sensors for ocean acidification research with publication: Sastri, A.R., Christian, J.R., Achterberg, E.P., Atamanchuk, D., Buck, J.J.H., Bresnahan, P., Duke, P.J., Evans, W., Gonski, S.F., Johnson, B., Juniper, S.K., Mihaly, S., Miller, L.A., Morley, M., Murphy, D., Nakaoka, S., Ono, T., Parker, G., Simpson, K., Tsumoda, T., 2019. Perspectives on in situ sensors for ocean acidification research. Front. Mar. Sci. <https://doi.org/10.3389/fmars.2019.00653>*
- *PICES North Pacific Ocean acidification synthesis report: Christian, J.R., Ono, T., 2019. Ocean Acidification and Deoxygenation in the North Pacific Ocean. PICES Spec. Publ. 5, 116.*

What activities are planned for the next 12 months

- *Continue to develop and publish synthesis papers on acidification in North American Coastal Waters provided postdoc support is provided by GOA-ON.*
- *Continue to develop a detailed publication of “Best Practices” on the determination of acidification trends in coastal waters.*
- *Completed the synthesis for the paper review on the Gulf of Mexico between researchers from EUA and Mexico from different institutions. The preliminary title is: Ocean Acidification in the Gulf of Mexico: Drivers, Impacts, and Unknowns*
- *Complete the science paper title: Temporal variability of the aragonite saturation horizon in the Pacific region of the Baja California peninsula, Mexico*
- *Complete the science paper title: Reclassification of Upper Waters Mass of the Gulf of Mexico by Linking Physical and Biogeochemical Features*
- *WCOA cruise Canada to Mexico June 2021*
- *GOMECC cruise Gulf of Mexico September 2021*
- *MBARI cruise EUA-Mexico May 2022*
- *Next Ocean Science “Hawaii”: Hub meeting (Face-to-Face or virtual)*
- *Canadian cruises (9 total): Atlantic – DFO cruises in Labrador Sea and Scotian shelf, starting June, 2021 (AZOMP, AZMP, AZMP Bedford Basin, Eastern Shore Islands); Arctic – Davis Strait (Aug. 2021), Amundsen Science (Aug – Nov, 2021); Pacific – Queen Charlotte Sound cruises (DFO La Perouse cruise, May, 2021 and mooring cruise, June, 2021, and WCOA cruise)*
- *Underway system on M/V Seaspans Royal – British Columbia: beginning Aug. 2021, collaboration with Hakai Institute*
- *C-PROOF Glider in Queen Charlotte Sound (collaboration between UVic, UBC, Hakai Institute, C-PROOF, DFO)*
- *Canadian white paper on the state of Canada’s OA knowledge (in progress)*

What support is desired from GOA-ON to help the hub grow and achieve its objectives

- *Postdoc support for preparing the North American Acidification Synthesis Report.*
- *Support for enhancing the usefulness of the North American Hub Webpage and interoperability with the O.A.I.E.*
- *We are excited to participate in GOA-ON’s OA Week, as it becomes scheduled.*
- *Seed funding would support collaborative opportunities, facilitating knowledge exchange and data sharing*

## OA Med-Hub

Geographic scope (countries involved or region): 10 countries from the Mediterranean basin

Number of members to date: 57 members

Do you have a steering committee? Y/N: Y

How are the Co-Chairs chosen for the hub?: The chair was the founder and the SC members were elected by their country's members.

How are members chosen to join the hub?: At the first stage, members were invited by the chair based on expertise in Mediterranean OA. After having a considerable number, membership became open to scientists (researchers, postdocs, and PhD students only) who express their interest to join, also based on their OA research/plan.

Objective 1: Improve the communication between the Mediterranean OA members to better study and understand the ocean acidification and its consequences in the Mediterranean through collaborations and projects

Objective 2: Promote community "best practices" consistent with GOA-ON

Objective 3: Support the Mediterranean OA community via capacity building and trainings

Objective 4: Work together as a community to provide OA related messages (social, biological, and physical impacts and implications of ocean acidification) for policy-makers and the public

List of activities in the past 18 Months (add more rows as needed)

Name/short title of event	Location	Number of participants (estimate)	Short Summary
Election of a steering committee	Virtual	42	<p>10/05/2019. The steering committee members were elected by their colleagues from the same country to represent their country in the committee. They are:</p> <ul style="list-style-type: none"> <li>• Steve COMEAU, Laboratoire d'Océanographie de Villefranche, CNRS and Sorbonne Université, France</li> <li>• Michele GIANI, Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Italy</li> <li>• Abed El Rahman HASSOUN, CNRS-L, National Center for Marine Sciences, Lebanon</li> <li>• Iris HENDRIKS, Istituto</li> </ul>

			<p>Mediterráneo de Estudios Avanzados (IMEDEA - CSIC-UIB), Spain</p> <ul style="list-style-type: none"> <li>• Valeria IBELLO, Middle East Technical University, Institute of Marine Sciences, Turkey</li> <li>• Mohammed IDRISSE, Institut National de Recherche Halieutique (INRH), Morocco</li> <li>• Evangelia KRASAKOPOULOU, Department of Marine Sciences, University of the Aegean, Greece</li> </ul> <p>Nayrah SHALTOUT, National Institute of Oceanography and Fisheries, Egypt.</p>
<p>OA Med-Hub 1<sup>st</sup> virtual meeting (kick-off)</p>	<p>Virtual</p>	<p>16</p>	<p>Held in 1 July 2019. This was an introductory meeting to the hub and its goals. The main conclusions were:</p> <ul style="list-style-type: none"> <li>• Outline concrete actions, keeping it flexible and staying open</li> <li>• To do a survey in order to identify what methods are being used, what monitoring efforts are underway, major projects people are working on, etc. in the Med.</li> <li>• Work on communication products (website, flyer, poster)</li> <li>• Identify conferences/meetings where the</li> </ul>

			<p>network could meet in person in the next year.</p> <ul style="list-style-type: none"> <li>• To meet quarterly or bi-annually to hear updates and identify new plans, ways to collaborate, etc.</li> <li>• To meet in-person for the first time in Monaco (March 2020): first SC in-person meeting</li> <li>• To discuss a white paper in-person in Peru/Chile and organize side-meetings during the High CO<sub>2</sub> symposium.</li> </ul>
SC meeting [2 <sup>nd</sup> virtual meeting]	Virtual	8	<p>Held in 16 July 2020. The main conclusions were:</p> <ul style="list-style-type: none"> <li>• As the High CO<sub>2</sub> symposium was cancelled, the OA Med-Hub will participate efficiently in the OA week; members will decide on which presentations will be included in our session by voting.</li> <li>• The steering group will continue working on a project proposal: the COST call</li> <li>• Social media channels will be developed and used to increase the visibility of the OA Med-Hub.</li> </ul>
SC meeting [3 <sup>rd</sup> virtual meeting]	Virtual	8	<p>Held in 29 September 2020. The main conclusions were:</p> <ul style="list-style-type: none"> <li>• We agreed on having an open webinar-series to advertise for the OA Med-Hub in</li> </ul>

			<p>line with the GOA-ON series of webinars.</p> <ul style="list-style-type: none"> <li>• Each presentation can last between 20 to 30 minutes maximum to keep the attention and focus of the audience.</li> <li>• The time-lapse between each presentation (each month, two months, etc.) will be determined based on the number of colleagues interested to give a talk.</li> <li>• Proposals: Many countries and colleagues from the hub were invited to participate in the COST proposal.</li> <li>• OA Med-Hub newsletter: to share add news, articles, conferences, or any other info. that can help our community here. This will be distributed every 1-2 months within the OA Med-Hub members.</li> </ul>
<p>OA Med-Hub UN voluntary commitment: <a href="https://oceanconference.un.org/commitments/?id=34011">https://oceanconference.un.org/commitments/?id=34011</a></p>	<p>Virtual</p>	<p>57</p>	<p>Registered: 26 September 2019 Deliverables:</p> <ul style="list-style-type: none"> <li>• Expanding the network members</li> <li>• Preparing an overview paper to report the OA trends in the Mediterranean and its effects on marine life</li> <li>• Doing a survey to gather information</li> </ul>



			<p>about the Mediterranean OA scientific community</p> <ul style="list-style-type: none"> <li>Organizing and coordinating meetings to guarantee a good collaboration and ultimately submit a common proposal for a Mediterranean collaboration related to OA</li> </ul>
OA Med-Hub survey	Virtual	26	A survey to know “Who’s doing what?” in the Mediterranean was launched in September 2019 to gather information about the Mediterranean OA scientific community. This is the 1 <sup>st</sup> deliverable of the OA Med-Hub UN-VC.
Submission of a common proposal to COST: Mediterranean Collaboration on Ocean Acidification.	Virtual	22	13/11/2020. 22 members from 11 Mediterranean countries have teamed up together to submit a proposal that could improve the research and capacity building coordination between them.
High Level Political Forum 2020 side-event "Developing capacity to address ocean acidification for a sustainable ocean future" <a href="https://sustainabledevelopment.un.org/hlpf/2020">https://sustainabledevelopment.un.org/hlpf/2020</a>	Virtual	>200	Abed represented the OA Med-Hub during a talk entitled "Regional perspective of Ocean Acidification science and observation" during the HLPF side-event "Developing capacity to address ocean acidification for a sustainable ocean future" on the 8th of July 8-9 am (New York Time) as a part of the Communities of Ocean Action within the High Level Political Forum 2020:
Ocean Acidification Week (#OAWeek2020): <a href="https://www.youtube.com/watch?v=9wH7JLIURS0">https://www.youtube.com/watch?v=9wH7JLIURS0</a>	Virtual	>200	OA week took place between 8 and 10 September 2020, the Mediterranean session was featured on 8/09/2020.

			During the event, a couple of the OA Med-Hub members presented their latest OA research. It was very successful.
Center for Mediterranean Integration ‘climate change effects in the Mediterranean basin’	Virtual	>150	Featured the OA Med-Hub in an international event entitled: "Assessing Climate and Environmental Stresses in the Arab and Mediterranean Regions: Scientific Evidences and Socio-economic Impact", 27 October 2020, organized by the Center for Mediterranean Integration.
First national meeting on MSP and Blue Economy in Lebanon	Virtual	~ 100	Featured the OA Med-Hub in a talk entitled “Seawater monitoring systems and parameters in the context of climate change” during the First national meeting on MSP and Blue Economy in Lebanon held on 6 and 13 November 2020, and organized by IOC-UNESCO.
Monaco Ocean Week 2021: “Future Priorities for Addressing Ocean Acidification in the Mediterranean: from research to policy”. <a href="https://www.youtube.com/watch?v=YiQ5tBguD3c">https://www.youtube.com/watch?v=YiQ5tBguD3c</a>	Virtual	~ 80	Organization and participation as a moderator in a webinar on Ocean Acidification in the Mediterranean organized in the framework of the Monaco Ocean Week 2021 and entitled “Future Priorities for Addressing Ocean Acidification in the Mediterranean: from research to policy”. The session was held on March 24 <sup>th</sup> 2021 and organized by the IUCN and OA Med-Hub with the collaboration of the Fondation Prince Albert II de Monaco. During this session, GOA-ON and OA Med-Hub were featured, and many OA Med-Hub members presented their work. It was the 1 <sup>st</sup> OA science/policy event in the area.

Ocean Acidification: SDG indicator 14.3.1 methodology – revisited	Virtual	~ 25	Participation in a workshop entitled "Ocean Acidification: SDG indicator 14.3.1 methodology – revisited" that was held in 12-13 April 2021 and organized by the IOC-UNESCO to improve the SDG 14.3.1. requirements.
ASLO 2021	Virtual	Estimation > 100	The OA Med-Hub has submitted a session to ASLO 2021, and it was accepted. The session is SS84 - Ocean acidification: trends and effects from local to regional scales 2 session at the ASLO 2021 Virtual Aquatic Sciences Meeting.

Other Achievements:

- 4 Newsletters have been published and distributed so far, featuring GOA-ON and OA Med-Hub events, OA articles in the Mediterranean and elsewhere, conferences, opportunities (PhDs, Postdocs, etc.)
- OA Med-Hub is now present in social media platforms:  
on Facebook: <https://www.facebook.com/OAMedHub/>  
on Instagram: [https://www.instagram.com/oa\\_medhub/](https://www.instagram.com/oa_medhub/)  
on Twitter: [https://twitter.com/oa\\_medhub](https://twitter.com/oa_medhub)

What activities are planned for the next 12 months

- The 4<sup>th</sup> SC meeting will be held next June 2021 to discuss progress, problems of CRMs (obstacles, solutions?), COST proposal and other projects, OA week 2021, and OA Med-Hub series of webinars.
- World Ocean Day event organized by OA-Alliance and TOF 8 June 2021: “Protecting Communities and Livelihoods from the Threat of a Changing Ocean,” to give an overview of OA Med-Hub, with an emphasis on the blue economy/ aquaculture / fisheries sectors in the region.
- OA week 2021 but we are looking to do in-person workshops.
- AAAS annual meeting 2022 “Examples of science diplomacy in the OA Med-Hub”.
- OA Med-Hub was planning to conduct the inter-calibration exercises. We are searching for funds.
- Biblio. Reviews: OA in the Med. + Effects of OA on marine organisms in the Med.

What support is desired from GOA-ON to help the hub grow and achieve its objectives

- Secretariat help (meetings, newsletter, etc.)
- Inter-calibration essays between Med. institutions.
- Trainings in the South Mediterranean countries about OA best practices, importance of studying OA, etc..
- Small funds for labs./institutions that are willing to start/sustain OA research.

## Red Latinoamericana de Acidificación del Océano- Latin American Ocean Acidification Network (LAOCA)

**Geographic scope (countries involved or region):** Several Latin American, Central America and Caribbean countries including Argentina, Brazil, Chile, Cuba, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Panama and Peru. (October 2020).

**Number of members to date:** an approximate of 70 members

### Do you have a steering committee?

Carla F. Berghoff (Argentina) / Cristian Vargas (Chile) - Co-Chairs  
Celeste Sánchez Noguera (Costa Rica)  
Cecilia Chapa Balcorta (México)  
Mario Hurtado Domínguez (Perú y Ecuador)  
Paulo A. Horta Jr. (Brasil)  
Rocío del Pilar García-Urueña (Colombia)  
Martín Hernández Ayón (México) - Link with GOA-ON  
Nelson Lagos (Chile)- Link with OA-ICC

### How are the Co-Chairs chosen for the hub?:

LAOCA Network has a well-established Governance Structure based on an Executive Committee (CE-LAOCA) (as stated in item 7 LAOCA Network Governance Plan) which incorporates:

- a. Two (Co-Chairs), with 50:50 gender equality, elected by vote by the members of CE-LAOCA.
- b. A maximum number of up to 5 members of CE-LAOCA\* prioritizing representative regions (e.g. Caribbean, Humboldt, Pacific, Atlantic), and / or countries with high membership. It is also considered to have good representation of researchers with different capacities (e.g. chemistry / observation, experimentation, modeling, etc.), as well as gender equity.
- c. A member with the function of articulating CE-LAOCA with the Global Ocean Acidification Observing Network (GOA-ON) \*, and
- d. A member with the function of articulating CE-LAOCA, with the Ocean Acidification International Coordination Center (OA-ICC) \*.

\* The EC committee nomination is open based on the candidate's potential for networking both within the region but also with other international programs.

\* Only in the event that there is a representative of a LAOCA member country, as part of the Executive or Scientific Committee of any of these international programs.

### How are members chosen to join the hub?:

The requirements for the incorporation of new LAOCA Network members are stated in item "6.1: Requirements for the incorporation of new LAOCA Network members" of the LAOCA Network Governance Plan. Those are the following:

The LAOCA Network is open to any advanced student (Doctorate / PhD) or researcher (professional / academic) who actively works in one of LAOCA's lines of action (endorsed through publications, projects and training of students working in any of the lines of action),

b. To become a member of the Network, applicants must fill out a registration form requested through the official email of the LAOCA Network (redlaoca@gmail.com), committing to provide reliable information for their respective registration.

c. Demonstrate interest in developing and improving the quality of research on Ocean Acidification at the regional level, beyond individual interests.

d. Commit to establishing a cooperative work format and assistance to those regions with significant gaps in knowledge and research.

- e. New members must be willing to share and make available "protocols" and "data", including all information on the carbonate system and experimentation, no later than two years after data collection, or after being published in some research journal.
- f. Each of the members of the network must share their Database (Data Report) available through international repositories, such as PANGEA, GLODAP, SOCAT, GOA-ON or other informed repositories, which allow the data to be visible between the members of LAOCA. The buoy and sensor data will be available for free use, from the respective websites of the observation programs or projects.
- g. Each of the members should acknowledge in scientific publications or technical reports, the contribution of LAOCA in aspects related to training, education or training, if any of them were the case. Otherwise, it would be appreciated to mention that the respective document is "a scientific contribution to the Latin American Ocean Acidification Network (LAOCA)". The foregoing will also allow a record of scientific productivity in this area at the regional level.
- h. LAOCA members commit to the proper use of the logo or other distinctive graphic element of the network, which may be included in the acknowledgments section (when appropriate) in presentations, announcements, documents, among others. The logo should not be used as an indicator of affiliation, unless its use in official representation of the network has been previously agreed with CE-LAOCA.
- i. The members of the LAOCA Network cannot express any forms of violence, discrimination, harassment and abuse of power against any member of our network. The forms of violence include: verbal, written, physical, psychological and sexual, among others; Forms of discrimination include: ethnicity or original ancestry (equivalent to what is erroneously used as "racial"), age, physical disabilities and different capacities (disability), sex, gender, sexual orientation, gender identity or expression, religion, political affiliation and, in general, any other reason of arbitrary discrimination.

**Objectives:**

The objectives of the LAOCA Network were defined in December 2015 and are stated in item 4 "Specific Objectives" of the LAOCA Network Governance Plan. Those are the following:

1. Synthesize and review the state of the art of the existing information in Ocean Acidification studies in Latin America.
2. Promote the implementation, maintenance, and calibration of long-term data series for the parameters of the carbonate system in Latin America.
3. Train LAOCA members in the different lines of action (e.g. observation, experimentation, and modeling).
4. Standardize the measurement methods of the carbonate system and experimental protocols, in order to generate high-quality databases (at least "weather").
5. Consolidate the use of a "good practices" protocol for observation and experimentation on the subject of Ocean Acidification.
6. Constitute a node of articulation and communication between global (e.g. GOA-ON, IOCCP, OAICC), regional and local acidification programs.
7. Determine, and evaluate local and regional Ocean Acidification scenarios for the different types of marine ecosystems (e.g. estuaries, coastal zone, open ocean, OMZ, etc).
8. Facilitate access to infrastructure and equipment among LAOCA member countries and institutions.
9. Facilitate the exchange of undergraduate and graduate students from institutions that are part of LAOCA.
10. Develop a scientific dissemination program to sensitize the general public regarding the problem of Ocean Acidification.
11. Coordinate efforts to promote collaborative projects among LAOCA member countries.
12. Promote the insertion of the Ocean Acidification problem in the political agenda of LAOCA member countries, and even through collaboration agreements among member countries.

List of activities in the past 18 Months

Name/short title of event	Location	Number of participants (estimate)	Short Summary

Participation in CONVERSATORIO REGIONAL “Investigación sobre Acidificación Oceánica en Latinoamérica: Avances y Desafíos”	25 June 2020; virtual (Facebook: Highco Lima).	>250	This successful event, co-organized by Pedro Ruiz Gallo National University in Peru, The Latin American Network on Ocean Acidification (LAOCA), and REMARCO was a short ‘teaser’ to maintain an active Latinoamerican community before the 5TH INTERNATIONAL SYMPOSIUM ON THE OCEAN IN A HIGH CO2 WORLD. The event featured Eight outstanding researchers from Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico and Peru that presented the progress of the different OA research lines that are starting and underway in Latin America and Caribe. The video of the event ( <a href="https://www.facebook.com/100037553752238/videos/270531144208675">https://www.facebook.com/100037553752238/videos/270531144208675</a> ) has >3500 reproductions!
Participation in the Ocean Acidification Week A virtual multi-day forum to highlight ocean acidification research and initiatives Session 6 — LAOCA (Latin American & Caribbean) Hub	9 September 2020; virtual.	>200	Session 6 featured the role of LAOCA in coordinating and supporting ocean acidification research in Latin America, and how LAOCA is inserted in the context of international cooperation programs. The state of the art of ocean acidification research in Latin America was presented, with a focus on local-regional advances, and successful experiences in the region. In addition, an overview of the different realities, opportunities and challenges facing the region was included. <a href="https://www.youtube.com/watch?v=ptHOTTHIqhs&amp;t=667s">https://www.youtube.com/watch?v=ptHOTTHIqhs&amp;t=667s</a>
Participation in the 2020 workshop COCAS & COAST-HF "From buoy to data" International Coastal Buoys Network Workshop	24 November 2020; virtual.	>150	As part of the second day of the workshop LAOCA participated in the section “ International programs and networks” to present the role of LAOCA in coordinating and supporting ocean acidification research in Latin America, and how LAOCA is inserted in the context of international cooperation programs.

During the last 5 years we have fulfilled several achievements including: 1) the articulation with other national regional and international programs; 2) the training of a large number of young researchers; 3) facilitated the student exchange among the member’s countries; 4) organization of different courses for graduate students and 5) a significant component of outreach through TV channels, radio, seminars, webinars, and also regular communications through social networks including Facebook. Another very important component of LAOCA is that members and research groups in the region have produced a significant number of research papers and some of those have transferred key scientific messages not only to the regional community but also to the international community.

**Other Achievements:**

- *Finished the LAOCA Governance Plan and distributed to all LAOCA members (Red Latinoamericana de Acidificación del Océano: Plan de Gobernanza. Documento Técnico. Primera Edición, 32 pp. October 2020 DOI:10.13140/RG.2.2.35544.52486).*

- *LAOCA quarterly newsletter, that is distributed to all the LAOCA community through e-mail and by the LAOCA facebook group.*
- *Update of the LAOCA Facebook group (<https://www.facebook.com/groups/1012625915429653>).*
- *Creation of LAOCA YouTube Channel (<https://www.youtube.com/channel/UCOi5g0d1HrBoYYaGGdj6Tig/featured>).*

#### **What activities are planned for the next 12 months**

- *Hosts LAOCA webinar series on three topics (of greatest interest to the LAOCA community according to a SurveyMonkey survey results): 1) Variability of the carbonate system in the coastal and oceanic region 2) Impact of ocean acidification on marine organisms 3) Ocean acidification, a view from evolutionary ecology. The first to be held through the LAOCA YouTube Channel by Martin Ayon in June 2021.*
- *Co-Sponsor Latinamerican courses in OA-related topics; one of them to be held in October 2021.*
- *Expand the LAOCA Newsletter language to bilingual (Spanish-Portuguese).*
- *Relaunch and update LAOCA website.*
- *Participation in the UN World Ocean Day side event co-organized by OA-Alliance and TOF : “Protecting Communities and Livelihoods from the Threat of a Changing Ocean,” to give an overview of LAOCA network with an emphasis on the updated LAOCA Action Plan as a unifying framework for identifying regional priorities (8 June 2021).*
- *Participation in a round table as part of the “XII Simposio Internacional del Carbono en México- Soluciones Climáticas Naturales y Mercados de Carbono: hacia la neutralidad efectiva de emisiones” to be virtually held in en Monterrey, Nuevo León (13- 15 October 2021).*

#### **What support is desired from GOA-ON to help the hub grow and achieve its objectives**

- *Secretariat help with promoting LAOCA events (i.e webinar series, future courses, etc).*
- *Secretariat help with translating GOA-ON newsletter to Spanish/Portuguese and in adding Spanish/Portuguese subtitles to webinars and protocols videos of the GOA-ON YouTube Channel. This would expand the scope of GOA-ON videos that are in English, and would be a good complement to what LAOCA is going to generate.*
- *Co-Sponsor LAOCA courses in OA-related topics.*
- *Help to improve participation of Latin-American countries in OA courses and in the Peer to Pier 2 program.*

## OA-Africa Hub

Geographic scope (countries involved or region): Africa Continent (28 countries located in north Africa on Mediterranean Sea, East Africa coast, West Africa coast on Atlantic Ocean, and South Africa coast)

North Africa: Morocco, Algeria, Tunisia, Libya, Egypt, Djibouti

East Africa: Mauritius, Tanzania, Kenya, Somalia, Seychelles

West Africa: Senegal, Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Nigeria

South Africa: South Africa, Namibia, Angola, Mozambique, Madagascar

Number of members to date: around 208 members from Member States in the region

Do you have a steering committee? Yes

How are the Co-Chairs chosen for the hub?: one of the co-chairs was chosen by IAEA and the other two co-chairs were chosen due to their relation to OA research and their activities. The steering committee members were elected to be presenting two from each geographic region of Africa (North, East, West and South).

How are members chosen to join the hub?: In principle, members were nominated by their countries as a national contact points to IAEA to participate in capacity building program. This was followed by distribution of announcement to join the hub and selection of members based on their activities and interest on OA.

Objective 1: Ensure Africa is resilient and knowledgeable of potential threats and mitigation/adaptation strategies available to combat ocean acidification.

Objective 2: Develop a network of scientists working together to provide (1) information to stakeholders and policymakers, (2) provide guidance and direction (3) coordinate activities related to OA research and monitoring (4) identify broad support for increase OA research and monitoring (5) promote the advancement of science.

Objective 3: Facilitate collaboration between scientists, stakeholders, and policymakers to build understanding of social, biological, and physical impacts and implications of ocean acidification

(Add extra objectives as needed)

List of activities in the past 18 Months (add more rows as needed)

Name/short title of event	Location	Number of participants (estimate)	Short Summary
Steering committee meeting 26/11/2020	Virtual	6 persons	1-Schedule next OA Africa hub meeting for 2 weeks from now 2-Contact Future Earth Coasts on behalf of Hub to discuss how to update the website 3-Draft a GOA-ON Africa Hub survey for OA Researchers in Africa 4-Set plan for completing specific white papers 5-Create teleo-pipline accounts
Steering committee meeting 09/12/2020	Virtual	7 persons	1-OA Day of Action Monrovia support and press release 2- Begin condensing white papers, gathering any needed information 3- Develop a OA Africa 2021 survey
Steering committee meeting 26/02/2021	Virtual	9 persons	1-A candidate list will be made and prospective candidates notified of their consideration for new seats on the committee to represent South Africa



			<p>2-OA resolution for the Abidjan convention</p> <p>3-OA trainings in West Africa</p> <p>New Terms of Reference for the committee</p> <p>4-Schedule next meeting, webex and reminders</p> <p>5-Draft COA OA new commitment for the OA Africa Network</p>
<p>Steering committee meeting</p> <p>30/04/2021</p>	Virtual	8 persons	<p>Action items:</p> <ul style="list-style-type: none"> <li>• Committee members provide feedback on TOR</li> <li>• Invite two new members</li> <li>• Trevor compile member list and send out minutes</li> <li>• Someone to make short survey of interest in joining the OA Africa Network</li> <li>• Finish white papers and policy doc</li> </ul> <p>Policy document resources from Future Earth Coasts</p> <ul style="list-style-type: none"> <li>• Guide on how to write a policy brief is found <a href="#">here</a>.</li> <li>• Good examples of policy briefs are the ones on <a href="#">Marine Biodiversity data</a> in the WIO region, on <a href="#">coastal systems of Hainan</a>, and on <a href="#">coastal management in Brazil</a>.</li> <li>• The head of the OKE, Rebecca Lahl, is offering a <a href="#">training on policy briefs</a> for African stakeholders in May, which may be of interest to the OA Africa team as well (she already has a high number of registrants, but if 2 or 3 more people register that should not be a problem).</li> <li>• Rebecca also agreed to provide a short presentation on policy briefs in the workshop we were discussing.</li> </ul>
OA day of Action, Monrovia	Virtually and in person	30 person	January 2021
OA week (OA Africa)	Virtual meeting	25 persons	Four researchers from OA Africa participated in OA week Took place virtually on 9/September 2020.
OA Awareness day 5 <sup>th</sup> February	virtual	34 person	<p>1-What are the capacity building activities and effort done in Africa under the Umbrella of GOA –ON and OA-ICC what is pier 2pier program and GOA-ON Kit</p> <p>2- idea about the National and Social science interaction</p> <p>3- states of OA capacity in Africa</p> <p>4- overview of future earth effort to address OA in Africa</p>
Nairobi Convention- The 2021 Western	Virtual	6 persons	Presentation of OA White Paper for East Africa

Indian Ocean (WIO) Regional Science to Policy Dialogue from 23 – 25 March			
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Other Achievements:

- Evaluation of Ocean acidification Capacity in Africa (online survey)
- Submission of OA resolution for the Abidjan convention
- Updating and distribution of OA Africa Hub TOR
- Finish White Paper for East Africa
- Finish White Paper of West Africa
- Working for draft of North Africa White Paper
- Drafting of OA Africa Policy document
- Submission of OA resolution to COP26
- Submission of UN voluntary commitment

What activities are planned for the next 12 months

- Publication of White Paper under IAEA-OA-ICC
- Training for West Africa Country
- Updating the Web Site
- Participation in ASLO 2021

What support is desired from GOA-ON to help the hub grow and achieve its objectives

- More fund for capacity building in west Africa
- Facilitate acidification measurements through providing more kits to all Africa Countries so each country could run the experiments and measure OA.
- Mentoring for OA data Analysis in Africa coastal area
- Help in construction of three centers of excellence on regional bases to help in OA research and monitoring
- Help in engaging more researchers in OA biological experiments by providing funds and more equipment's that help to run these experiments
- Needs more inclusion and young researcher exchange program

## GOA-ON Arctic Hub

Geographic scope (countries involved or region): Arctic Ocean, adjacent shelf seas and gateways

Number of members to date: new hub, kick-off in September 2020

Do you have a steering committee? Y/N: Y

How are the Co-Chairs chosen for the hub?: Invitations from NOAA

How are members chosen to join the hub?: Initiatives from Arctic hub chairs and scientists

Objective 1: Fill data gaps in the Arctic Ocean. Establish time series on seasonal and interannual variability, trends and processes for a pan-Arctic, and assess the influence to and from the connected oceans

Objective 2: Involvement of Arctic communities using GOA-ON in a box, developed to Arctic conditions, and awareness of ocean acidification

(Add extra objectives as needed)

List of activities in the past 18 Months (add more rows as needed)

Name/short title of event	Location	Number of participants (estimate)	Short Summary
Kick-off Arctic hub and GOA-ON Science Week Arctic hub session	Virtual, GOA-ON Science Week, September 2021		Arctic hub session at the GOA-ON Science week, 5 oral presenters (from Canada, China, Norway, Australia cancelled)
Arctic Science Summit Week (ASSW) 2021/Session: Ocean Biogeochemistry in the Rapidly Changing Arctic: Research and Impacts (co-chair by hub chair)	Virtual/Lisboa, ASSW, March 2021		12 oral and 4 poster presentations by hub chairs, members and future members
Arctic hub chairs/ NOAA meeting	Virtual, May 2021		Information on activities and discussions of proceeding of the hub. Arctic hub chairs: -Agneta Fransson (Norwegian Polar Institute, Norway) -Melissa Chierici (Institute of Marine Research, Norway) -Kumiko Azetsu-Scott (Dept. Fisheries and Oceans and Bedford Institute of Oceanography, Canada) -Jessica Cross (NOAA, USA)
MOSAic Arctic ice-drifting cruise on RV Polarstern	Arctic Ocean, 2019-2020		Seasonal/full annual cycle, interdisciplinary, international Arctic project, led by Germany. Contributions from Arctic hub chairs/members
Synoptic Arctic Survey (SAS), pan-Arctic	Arctic Ocean, 2020-2021		Countries and cruises involved: Canada, China, Denmark, Japan, Korea,

international Arctic Ocean cruises, 2020-2021			Norway, Russia, United Kingdom, USA to contribute to a comprehensive pan-Arctic data set
Regional programs (coastal-shelf, land-ocean)	Example: Fram Strait (Norway), Davies Strait (Canada), Barents Sea and Svalbard fjords (Norway)		Annual cruises

Other Achievements:

- Arctic hub web site

What activities are planned for the next 12 months

- Host an Arctic hub webinar in July 2021
- GOA-ON Science week, Arctic hub session, September 2021
- ASSW 2022 in Tromsø, Norway, Steering committee meeting
- Nuuk 2022 training meeting/workshop
- Involvement of Arctic communities using GOA-ON in a box, developed for Arctic conditions, low-cost CO<sub>2</sub> sensors, awareness of ocean acidification to the public
- Pan-Arctic “Shell day”, modified US program by NECAN, <http://www.necan.org/shellday> (NECAN is a North East Coastal Acidification Network, community/local collect OA samples, awareness of OA in the general public, could be developed as a pan-Arctic “shell day”

What support is desired from GOA-ON to help the hub grow and achieve its objectives

- Help with promoting and organizing events and webinars and meetings
- Training and support on GOA-ON in a box, development for Arctic conditions

## North East Atlantic OA (NEA-OA) Hub

Geographic scope (countries involved or region): European countries around NE Atlantic (Belgium, Denmark, Faroe Islands, France, Germany, Iceland, Ireland, Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, UK)

Number of members to date: 108 members, 15 countries

Do you have a steering committee? Yes

How are the Co-Chairs chosen for the hub?: At the moment they are still the initial founders. Eventually they will be chosen by vote within the Exec Group.

How are members chosen to join the hub?: Anyone interested gets in touch.

Objective 1: Share information on OA monitoring (and experimental and modelling) activities

Objective 2: Facilitate data submission to the GOA-ON data portal

Objective 3: Promote community “best practices” consistent with GOA-ON

Objective 4: Facilitate capacity building & training activities

Objective 5: Provide integration across the region

List of activities in the past 18 Months (add more rows as needed)

Name/short title of event	Location	Number of participants (estimate)	Short Summary
UNFCCC COP25 (Dec. 2019)	Madrid, Spain	100+	Dr Tarquin Dorrington (Defra, UK) “From Knowledge to OA action: Mobilizing Global Leadership to Protect Coastal Communities and Livelihoods from a Changing Ocean - Perspectives from the NE Atlantic” at the French Pavilion Dr Helen Findlay (PML, UK), Dr Carol Turley (PML, UK) also presenting.
Virtual Ocean Dialogues, hosted by the World Economic Forum (Jun. 2020)	Online	100+	'Deep Dive' focused on Ocean Acidification and Climate-Ocean Impacts. Co-hosted by NEA-OA, OA Alliance, PML.
OA week (Sep. 2020)	Online	100+ (?)	NEA-OA hub hosted two sessions, one on carbonate chemistry monitoring aspects, one on biological impacts.
SDG workshop (Oct. 2020)	Online	50	IOC & NEA-OA hub co-organised a workshop for scientists and data managers on the SDG 14.3.1. Indicator and submission process.
“Regional Knowledge to Local Action” workshop (Apr. 2021)	Online	70	OA Alliance & NEA-OA hub workshop for scientists, policy makers and marine management stakeholders
Webinar with British-Irish Council (May 2021)	Online	15	NEA-OA webinar and discussion around communication of OA, Action, and network

### Other Achievements:

- Established Data Working Group – looking into data flow, facilitate data sharing discussions, questionnaire on data management and data types to hub members.
- Working with OSPAR ICG-OA on the QSR report. Hub members involved in all sub-groups (OA physicochemical, biological impacts and modelling)

What activities are planned for the next 12 months

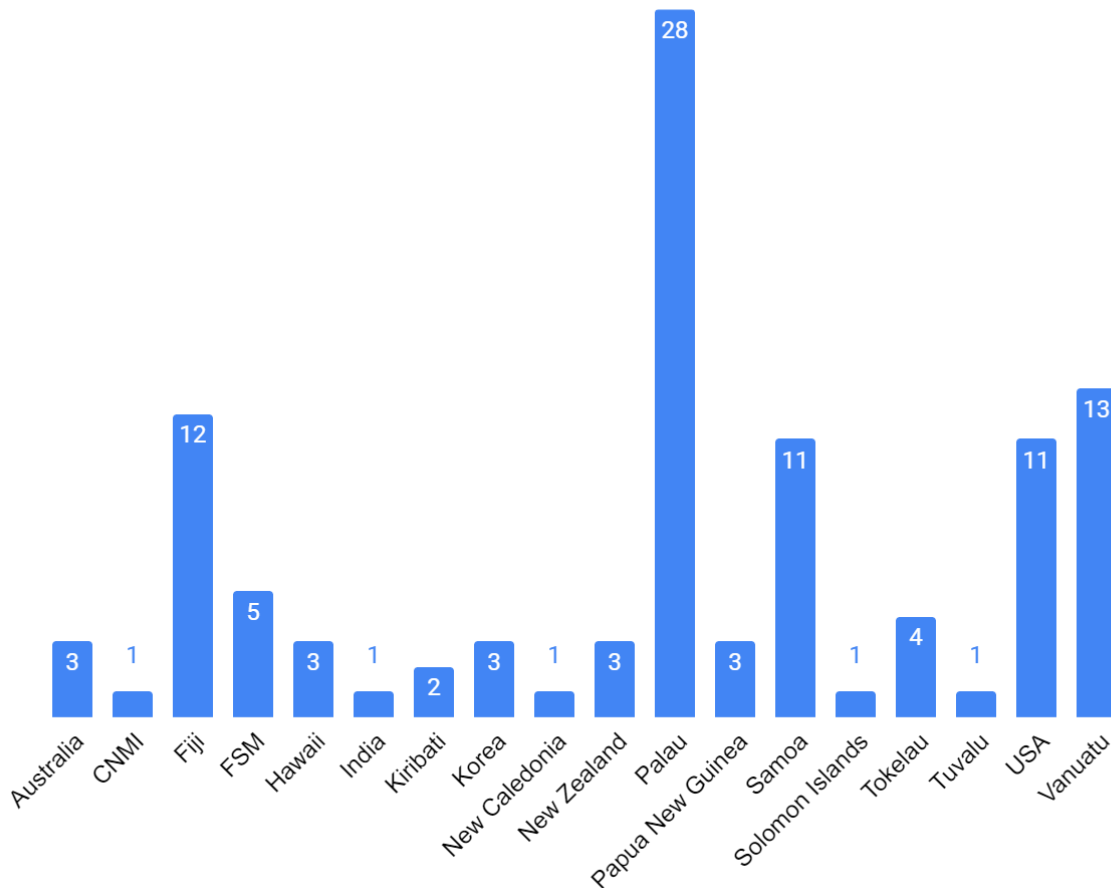
- Submit a Voluntary commitment
- Data WG report
- Participate in OA week
- Participate in UNFCCC COP26
- Hold hub-wide workshop (date TBD)
- Continue OSPAR ICG-OA QSR support
- Training working

What support is desired from GOA-ON to help the hub grow and achieve its objectives

GOA-ON promotion of events is always useful. Our biggest issues, like all, are finding financial support for training/events/working groups. So anything that GOA-ON can do to facilitate that would be useful. As a hub, I believe we are quite well connected to the EG and activities, which helps with training/awareness/communication.

## PI-TOA

Geographic scope (countries involved or region): Pacific Island Countries and Territories



Number of members to date: 106

Do you have a steering committee? Y

How are the Co-Chairs chosen for the hub?: Elected

How are members chosen to join the hub?: Networking, all welcome, recently added all participants from regional Pacific Islands OA Monitoring Dialogue

Objective 1: Better coordinate regional OA monitoring efforts

Objective 2: Share lessons learned and assist one another

(Add extra objectives as needed)

List of activities in the past 18 Months (add more rows as needed)

### Pacific Islands Ocean Acidification Monitoring Dialogue

6-7 May 2021

#### Purpose and Objectives

<b>Purpose:</b> To provide an opportunity for PICTs to share lessons learned from OA monitoring and learn from one another and from other OA monitoring experts.	
<b>Objectives</b>	<b>Expected Outcomes</b>

1. Enable participants from different agencies/ministries/organisations within participating countries to convene in-country and coordinate their national OA monitoring activities.	Participating countries have better coordination of national OA monitoring activities.
2. Enable participants to share lessons learned from their diverse experiences monitoring OA.	Participants learn from one another what challenges to expect when monitoring OA and how these challenges may be addressed.
3. Provide an opportunity for participants to ask questions of and seek advice from one another and from international OA monitoring experts.	Participants receive advice and information that is applicable to their work of monitoring and responding to OA.
4. Provide an opportunity for participants to learn more about OA.	Participants come away with a deeper understanding of what OA is, and why it is important to monitor OA.

Over 84 participants from 14 countries participated in this dialogue.

Feedback from participants:

*VFD would like to express their gratitude to SPREP & KIOST for the wonderful opportunity to be part of this first ever OA dialogue, learning from OA work already being implemented on OA across the region is very enlightening and motivating I must admit.*

*I am very excited to see what the future is for OA monitoring work in Vanuatu, at least starting from somewhere and initially engaging our local communities as per OA awareness materials, etc.*

- *Head of Vanuatu Fisheries Research*

*It was a great two days of learning experience from our regional friends in the Pacific Ocean on Ocean Acidification Monitoring. I believe our discussions this morning has really set out a clear path for us to ensuring that Vanuatu has incentives in place that will drive OA monitoring in a sustainable manner, for now and future to come.*

- *Van-KIRAP Project Manager*

- A recording of both days is now available at the following links:

- Day 1: [https://sprep.zoom.us/rec/share/LXk\\_3f792AQUPRDRKM\\_aVRZMimdmf5EbU-pEVTLXLijz\\_5Sk0-6CGAStgEFtOg1.WjI8fv-t1FVV11p](https://sprep.zoom.us/rec/share/LXk_3f792AQUPRDRKM_aVRZMimdmf5EbU-pEVTLXLijz_5Sk0-6CGAStgEFtOg1.WjI8fv-t1FVV11p) Passcode: HrCD2+U7

- Day 2: [https://sprep.zoom.us/rec/share/BmsGK\\_g6CmP0C92JYhrpfsJe4VDDhhnOPOIT6ia95\\_As-320i\\_utO91gm0TjewvwF.-eHxG6oJtLvigZ\\_o](https://sprep.zoom.us/rec/share/BmsGK_g6CmP0C92JYhrpfsJe4VDDhhnOPOIT6ia95_As-320i_utO91gm0TjewvwF.-eHxG6oJtLvigZ_o) Passcode: 4&!Bt^Q\$

- And a shared folder with all associated files and presentations is available here:
- [https://sprep-my.sharepoint.com/:f:/g/personal/robertmc\\_sprep\\_org/EvU3V913K85IqJc6gsOBvT8BHy\\_mnKzU-SI0xo9d9hW0MOQ?e=gRJRSA](https://sprep-my.sharepoint.com/:f:/g/personal/robertmc_sprep_org/EvU3V913K85IqJc6gsOBvT8BHy_mnKzU-SI0xo9d9hW0MOQ?e=gRJRSA)



## WESTPAC

Geographic scope (countries involved or region): Western Pacific and Adjacent Areas

Number of members to date: around 20-40 members from Member States in the region

Do you have a steering committee? Yes

How are the Co-Chairs chosen for the hub?: Designated by the IOC Sub-Commission for the Western Pacific (WESTPAC).

How are members chosen to join the hub?: In principle, members were nominated by the WESTPAC National Focal Points. But membership is also open to those from the WESTPAC member states, who expressed their interest in and commitment to the WESTPAC OA programme.

Objective 1: Strengthening regional ocean acidification observation and research activities, to get strongly support and participation of member state in the WESTPAC region and to ensure its sustainability.

Objective 2: Building up capacity and technical support, as foundation tool, for ocean acidification observation and research activities through South-South and North-South cooperation.

Objective 3: Enhancing OA knowledge and to better understand the linkage of OA and marine ecosystem impacts particular in the coastal waters, which has high dynamic of bio-geochemical processes and enrichment of marine resources and biodiversity.

Objective 4: Encouraging establishment close communication between OA research community and ocean policy maker/management to support the role of countries to achieve their SDG-14.3 commitment.

(Add extra objectives as needed)

List of activities in the past 18 Months (add more rows as needed)

Name/short title of event	Location	Number of participants (estimate)	Short Summary
Conducted regular consultative meeting of WESTPAC-OA committee	Virtual	10 persons	Reviewed the workplan for OA activities, due to the pandemic situation, in the region and follow up activities of members of the network including disseminate information of SDG 14.3.1
Assessed the progresses of WESTPAC OA monitoring of the proposed pilot sites	Virtual meeting and questionnaire	6 countries	During last 2 years, the participated institutes in the OA monitoring have been expending their monitoring OA sites from initiative proposed 20 pilot sites to be 150 sites last years.
Experts and technical support organizing national workshop on OA monitoring, assessment of coral reef biodiversity impacts in Vietnam and Thailand	Oceanographic Institutes, Nha-Trang, Vietnam, and Phuket Marine Biological Center, Thailand	20 persons in each country	<b>Vietnam:</b> organize training workshop on pH and TA analysis and monitoring biodiversity for the researcher from research institutes and Universities. <b>Thailand:</b> follow up OA monitoring and research including gathering data and information to make the report to the Government for the SDG 14.3.
Provided technical support on pH and TA analysis to member state, upon request.	Provided technical support through e-mail communication.	1 country	Assisted making an accessory for spectrophotometer, pH measurement, from the OA network, including secondary referent material for pH measurement to support Malaysia up on it request.
Organized WESTPAC-OA	Virtual	Around 50 participants	The webinar series focused on OA research and activities in the region, as

<p>webinar series (4 webinars), once a week in May 2021</p>		<p>of each week.</p>	<p>platform for exchange and learn about ongoing OA research among the researcher including discussion on the way forward for OA activities particular on of multi-stressors impacts, which are co-occurrence or consequence of OA phenomena in the coastal waters which enrich of marine biodiversity and resources.</p>
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Other Achievements:

- Example 1: *Finished white papers on...*
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What activities are planned for the next 12 months

- WESTPACT-OA has been planning to conduct the inter-calibration exercise on pH and TA analysis since early of this year (2021). But it has to be postponed, due to unavailable the Reference Materials (RMs) form Andrew Dickson Laboratory. We reschedule the plan for the intercalibration exercise to be in late of this year, when RMs are available.
- Workshop, but depend on the Covid-19 situation.

What support is desired from GOA-ON to help the hub grow and achieve its objectives

- Since WESTPAC has already built up the OA monitoring foundation, particular on development of SOP for pH and TA analysis and monitoring coral reef biodiversity (using Reef Autonomous Monitoring Structure, ARMS, that was technology transferred from NOAA) and established monitoring sites in several member states. Since most of OA monitoring sites in the region are located in the coastal waters that are importance area to socio-economic, livelihood, fisheries, and etc., while there are diverse and high dynamic of biogeochemical processes that could influence or link to OA occurrent processes. As well as changing acidity of natural seawater (pH) will take longtime to be clearly visualize its change and impacts. Therefore, we need long term support for monitoring and research. The question is how we can make OA monitoring and research to be sustainable and could generate applicable data and information to support the national policy development for sustainability use of the coast and ocean. So far, we feel that the OA activities alone is hard to convince to get long term support from the funder or most governments. We would like to inquire support from the GOA-ON on develop scientific knowledge, analysis of coherence of OA and other multi-stressors, and technology transfer to clearly address OA impacts on coastal marine resources, that will be more visible and to bring more concern to the funder/government.