

April 2021 | Number 7

TAKING ADVANTAGE OF THE DECREASE IN COMMERCIAL ACTIVITY FROM COVID-19

An article was recently published in *Eos: Transactions of the American Geophysical Union* describing IQOE activities related to determining whether the COVID-19 pandemic has had an effect on sound in the ocean. IQOE has identified 231 hydrophones worldwide that could contribute to answering this question (Figure 1). A slightly abbreviated version of the *Eos* article was published in *Maritime Executive* (with 2,036 views and 29 shares as of 31 March 2021)

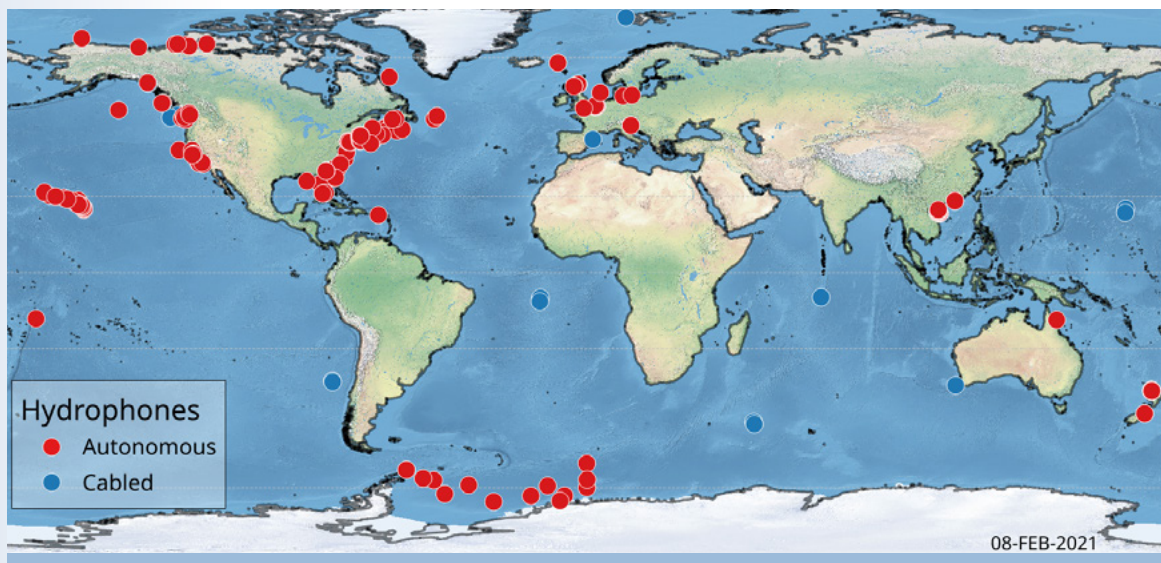


Figure 1. Locations of civilian hydrophones potentially useful to study effects of the COVID-19 pandemic on ocean sound and other acoustic characteristics of the ocean (8 February 2021 map). $n = 231$; some sites overlap and show as a single dot at this scale). Figure produced by Eduardo Klein of the Universidad Simón Bolívar, Caracas, Venezuela.

IQOE LIST OF ACOUSTIC CAPABILITIES OF EXISTING OBSERVING SYSTEMS

Since the beginning of the project, IQOE has maintained a list of ocean acoustic observing assets, first presented as Appendix II of the *IQOE Science Plan*. A section of the IQOE Website was designed to put this information [online](#). Recently, this list has been updated based on hydrophones shown on the map Figure 1, where hydrophone operators approved inclusion of this metadata on the IQOE Website. We will continue to add to this inventory and update it regularly to keep the international community informed of global ocean acoustics observation assets.

OCEAN SOUND ESSENTIAL OCEAN VARIABLE (EOV)

IQOE formed a committee to create an implementation plan for the Ocean Sound EOV (see <https://www.iqoe.org/groups/ocean-sound-eov-implementation-committee>). The committee has held a conference call to discuss its work and has begun to draft its document. The committee will seek community input later in the process and is planning to hold an in-person meeting in late in 2021 to finalize the plan.

MANTA SOFTWARE

The Richard Lounsbery Foundation has funded a project to create new software designed to generate standardized ocean sound level data products from passive acoustic recordings, according to [IQOE Guidelines](#). This software is called Ocean Sound Software for Making Ambient Noise Trends Accessible (MANTA). Work on this software has proceeded over the past year and it is expected that the software will be distributed in April 2021. MANTA developers do not anticipate a limit to the file size for inputs. Any duration of recording can be analyzed, as long as the file header and content are documented correctly with the metadata provided. All frequencies will be accepted. MANTA outputs adhere to the latest ISO standards for ocean acoustics.

OPEN PORTAL TO UNDERWATER SOUND (OPUS)

The AWI Ocean Acoustics Group in Bremerhaven, Germany is developing the Open Portal to Underwater Sound (OPUS) to promote the use of acoustic data collected worldwide. To this end, the portal is being designed to allow easy access to MANTA-processed data via a map- and time-based selection tool and shopping basket functionality. Development of the portal is supported by two-related MAREHub project positions funded until early 2022. A test version of the portal is expected to be launched in early 2021. The portal will accept (volume permitting) MANTA-processed data (i.e., spectral sound pressure levels at millidecade/minute resolution) together with related metadata as they become available and make them accessible via OPUS under licenses customized to each data provider, including any requirements for data access. A citable description of each dataset individually and the resulting dataset in the form of a data paper is envisioned. AWI adheres to FAIR data management and stewardship principles. The first deadline for data submission from MANTA outputs will be set at 31 December 2021. The AWI Ocean Acoustics Group will strive to regularly expand the portal with new MANTA-processed data sets as they are submitted. However, AWI will not perform any

independent quality control on the submitted data sets, archive raw audio data, or analyze submitted data as part of the OPUS activity.

SPECIAL JOURNAL ISSUES

Several special issues of journals of potential interest to the IQOE community are now open:

- Research Focus in *Frontiers in Marine Science* on [Before-After Control-Impact \(BACI\) Studies in the Ocean](#). Submission deadline is 12 April 2021.
- Research Focus in *Frontiers in Marine Science* on [Innovation and Discoveries in Marine Soundscape Research](#). Submission deadline is 30 April 2021.
- Special issue of the *Journal of the Acoustical Society of America* on [Ocean Acoustics in a Changing Arctic](#). Submission deadline is 30 June 2021.
- Special issue of the *Journal of the Acoustical Society of America* on [COVID-19 Pandemic Acoustic Effects](#). The submission deadline is currently open-ended.

SPECIAL SESSION ON OCEAN SOUND AT 2021 ANNUAL MEETING OF PARTNERSHIP ON OBSERVATIONS OF THE GLOBAL OCEAN (POGO)

POGO convened a special session on ocean sound at its annual meeting, on 27 January 2021. During the session, an update on IQOE activities was provided, as well as presentations by speakers from ONR Global, JPI Oceans, and the EU Marine Board.

IQOE—IQOE Co-chair Peter Tyack presented an update about IQOE, including the progress of IQOE working groups and IQOE's new committee to create an implementation plan for the Ocean Sound Essential Ocean Variable.

European Marine Board Expert Working Group on Underwater Noise—The Marine Board formed this group to update a position paper published by the Marine Board/European Science Foundation in 2008. Other high-level objectives include raising awareness of the current knowledge and research gaps in underwater sound, broaden the scope of effects on marine organisms from marine mammals to all marine organisms, and highlight the conflicts and solutions that exist relative to underwater noise. The working group is chaired by Frank Thomsen, DHI, Denmark, who made the presentation during the POGO session. The committee is using a four-part risk-based approach: “(1)

What is the problem? (2) How far does the sound spread and how many animals are in range of it? (3) How do they react to the impact? (4) How can we mitigate impacts?" The committee was formed in late 2019 and is planning to complete its final draft for review in April 2021 and to publish the final version of the document in summer/autumn 2021. It is expected that the committee will be disbanded after its report is issued. The committee may approach the IQOE Scientific Steering Committee for consultations during the compilation of the report.

[EU Joint Programming Initiative \(JPI\) Oceans action on Underwater Noise in the Marine Environment](#)—This JPI Oceans action was adopted in May 2020 after two scoping workshops held in 2019 and 2020. The lead countries are Italy and Germany, represented by Angelo Camerlenghi and Benjamin Kürten, respectively. This action specifically relates to a JPI Oceans initiative on Healthy and Productive Seas and Oceans, considering sound as a form of marine pollution. This action also contributes to implementation of the European Marine Strategy Framework Directive (MSFD), with synergy with the MSFD Technical Group on Noise and Horizon Europe "[Mission Starfish 2030: Restore our Ocean and Waters](#)". The latter activity has an objective to regulate and reduce ocean noise. Specific goals of this action include "to decrease the existing high level of uncertainty, to promote specific lines of scientific research that will contribute to the implementation of the MSFD at regional sub-basin scale and to contribute to reach the Good Environmental Status (GES) of European seas and oceans." The action will use three approaches: (1) creation of a knowledge hub, (2) sharing of existing infrastructures, and (3) implementation through joint calls. Joint calls will include the topics of "Effects of anthropogenic noise pollution on marine ecosystems" and "Innovative seismic sources for quieter and effective alternatives to conventional geophysical exploration." The next step is to increase the number of countries that will participate formally in the joint action, beyond Germany and Italy. It is hoped to gather in-kind and financial commitments from participating nations by autumn 2021 and to fund projects starting in 2022. For more information, please contact Angelo Camerlenghi (acamerlenghi@inogs.it) or Benjamin Kürten (b.kuerten@fz-juelich.de).

Office of Naval Research Global (ONR Global)—Dr. Elena McCarthy, a Science Director from ONR Global made a presentation about current activities and funding opportunities available to scientists conducting fundamental research. ONR Global Science Directors conduct their work through 7 offices worldwide. Funded activities include Liaison Visits (ONR Global Science Directors participate in meetings and visit research institutions), a Visiting Scientist Program (supports travel of non-U.S. scientists to meet with U.S. scientists), a Collaborative Science Program (supports international conferences and workshops of interest to the U.S. Navy), and research grants (supports innovative fundamental research of interest to the U.S. Navy for one

to three years, helping to connect non-U.S. research with U.S. partners). All the work supported is unclassified and the resulting research is peer-reviewed and published in major journals. McCarthy noted the research projects and conferences being supported by ONR Global, including an IQOE conference related to the Ocean Sound EO. She commented that the COVID-19 pandemic provides a unique opportunity for scientists studying ambient noise in the ocean by providing a controlled global experiment and emphasized that studies of ocean noise should be holistic, international, cross-disciplinary, and consider sources of both human-generated and naturally occurring sound.

NEWS FROM ENDORSED PROJECTS

ADEON (<https://adeon.unh.edu/>)—The final recovery of ADEON landers was accomplished in November 2020 (see Figure 2) and program results are being synthesized.

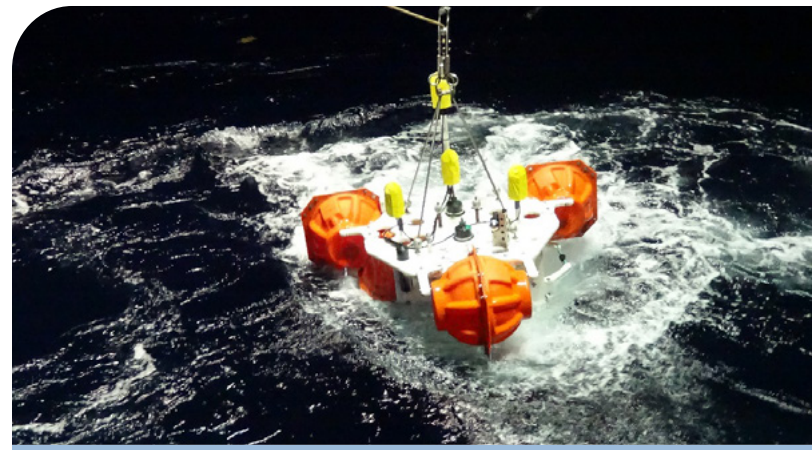


Figure 2. Recovery of an ADEON Lander in November 2020.

JOMOPANS (<https://northsearegion.eu/jomopans/about/>)—JOMOPANS released its most recent newsletter in [November 2020](#). This issue of the newsletter presents a soundscape map for the North Sea, the first representation of ambient noise in this area. The coming months will involve implementation of project results to make operational noise measurements and conduct of a final project event in spring 2021. The development of the JOMOPANS Good Environmental Status (GES) tool is in its final stages. This tool will make it possible to combine noise levels with habitat maps of select marine mammals and fish to evaluate risks of anthropogenic noise to marine organisms.

Joint Framework for Ocean Noise in the Atlantic Seas (JONAS) (<https://www.jonasproject.eu/>)—The [most recent JONAS newsletter](#) was issued in January 2021. JONAS is developing tools to study how noise impacts marine organisms, including modelling of soundscapes, direct measurements of sound to validate models, and creation of habitat maps of representative species to estimate the risk

of sound exposure to which each would be exposed. The JONAS study region is the northeast Atlantic Ocean and Azore islands. The ultimate goal of JONAS is to create tools that can be implemented in this region to reduce the impacts of sounds on marine organisms. JONAS was awarded a Special Commendation for Creativity and Imagination in the 2020 .eu Web awards on 16 December 2020.

NOAA/NPS Ocean Noise Reference Station Network (NRS) (<https://www.pmel.noaa.gov/acoustics/noaanps-ocean-noise-reference-station-network>)—NOAA is discussing how its Ocean Noise Reference Station Network could be used to study the effects of the COVID-19 pandemic on ocean noise. NRS recovered two of its stations (NRS-02 at Ocean Station Papa in the Gulf of Alaska and NRS-03 off the Washington State coast) ahead of schedule, in September 2020, to investigate for sound level reductions during early 2020. Observations from these stations will be combined with data from several hydrophone assets in the eastern north Pacific and Puget Sound area to quantify sound level changes during the last year.

Ports, Humpbacks, Y Soundscapes In Colombia (PHYSIC)—An Ecological Acoustic Recorder (EAR) was recovered in early February after a long bad-weather delay. The data will be recovered and it will be possible to determine if there is any detectable “Covid signature”. Two students, Maria Paula Rey-Baquero and Valentina Huertas-Amaya, gave presentations at African Bioacoustics Community and Acoustical Society of America conferences about the diel cycles and predicted shipping lane configuration noise simulations for the Gulf of Tribugá. These students are finishing the review process for a manuscript for a Research Focus in *Frontiers in Marine Science*, analyzing communication space reduction of humpback whale song in the Gulf of Tribugá from the boats used in whale-watching paired with an analysis of song temporal changes during boat passes at the Morro Mico site. Natalia Botero-Acosta has officially started her Fulbright fellowship in Ari Friedlaender’s lab, working through the biopsy samples to analyze stress hormone levels that will be compared with coincident sound levels.

QUIETMED2 (<http://quietmed2.eu>)—The QUIETMED2 project presented its achievements to the European Commission on 28 January 2021. Promotion of the [ACCOBAMS noise register](#) developed by QUIETMED was a major achievement of the program. QUIETMED2 also proposed a method to establish thresholds for impulsive noise in the Mediterranean Sea Region and recommendations about how to implement the thresholds. In the course of its work, QUIETMED2 increased regional coordination among EU and non-EU countries in relation to the Marine Strategy Framework Directive Descriptor 11 on underwater noise. More detail about the outcomes of the project will be available at <https://quietmed2.eu/outputs/>.

SanctSound (<https://sanctuaries.noaa.gov/science/monitoring/sound/>)—From Leila Hatch: “SanctSound continues to push through this tricky year with regular deployment maintenance in sanctuaries from the Northwestern Hawaiian Islands to the Florida Keys. Data management and analysis are keeping everyone busy as we come into the last year of recording effort, and begin to present results. As a project very much geared towards growing public and managerial understanding of soundscapes, this year will emphasize communications. The Office of National Marine Sanctuaries initiated a series of Web stories that will continue to showcase both sanctuary-specific and national scale results. Several papers are in progress for submission this spring. Web portal development has entered its version 2 phase and will go live in spring 2022. It has been a difficult time to do marine science, but many, many people across the US, from field staff to lead analysts and the students they are training, to communications specialists to administrative specialists, have kept the project on track. Because of their efforts, we are able to look at what the pandemic has sounded like around the country, and support further studies asking whether changes in human presence have changed animal behaviors and stress levels.”

Solutions @ Underwater Radiated Noise (SATURN) (<https://www.mare.i.e/project/saturn-solutions-at-underwater-radiated-noise/>)—The SATURN project held its kick-off meeting on 16–18 February 2021 and will run until 2025. Gerry Sutton of the SFI Research Centre for Energy, Climate and Marine (MaREI) at University College Cork, Ireland, is the Project Coordinator. SATURN will advance knowledge of acute and cumulative effects of ship noise on water species (fishes, invertebrates and aquatic mammals); develop standards for terminology, metrics and signals; establish a stakeholder group from across the range of relevant disciplines; identify, quantify and validate any negative impacts from shipping and boats; and assess suitable mitigation measures for reducing environmental impact from underwater noise from a policy and commercial perspective. The science plan includes dose-response studies on fishes and invertebrates, in-situ behavioral studies on aquatic mammals, development of on-board quiet ship technology, standardization, a case study of major ship re-routing in the Kattegat, and a quiet ship stakeholder board.

Get Your Project Endorsed

IQOE would like to endorse any research project (national or regional) or observation activities that are relevant to IQOE. Information about the endorsement process and endorsed projects can be found at <http://www.iqoe.org/projects>. The benefits of endorsement include increased international visibility and the potential for joint activities with other endorsed projects and with other IQOE-involved scientists.

WG PROGRESS

Acoustic Measurement of Ocean Biodiversity Hotspots—

The working group is organizing subgroups to undertake activities related to its terms of reference, following publication of its [review article](#). The subgroups will work on ideas such as developing a global biological sounds library to be used for automated classification of marine animal sounds, designing a multiple-site global experiment, developing a paper on COVID quieting and acoustic diversity, and advancement of metrics and techniques for characterizing acoustic diversity.

Arctic Acoustic Environment—The WG convened a virtual conference on Sound in the Arctic Ocean on 11–12 November 2020. Twenty-two papers were presented over two half-days and 94 individuals from 18 countries registered for the conference. A significant majority of participants thought the conference was useful and should be repeated in 1–2 years. The conference agenda is available on the group’s Webpage <https://www.iqoe.org/groups/arctic> and a summary of the conference will be made available when completed.

Marine Bioacoustical Standardization—This working group recently updated its Terms of Reference (<https://iqoe.org/groups/marine-bioacoustical-standardization>). It met virtually on 25–26 Jan. and 11 Feb. 2021 to discuss progress on its first task, which is the development of an inventory of bioacoustical standards. The group plans to have a draft inventory ready for review around May 2021.

RECENT PUBLICATIONS

- Chou et al. 2021. International policy, recommendations, actions and mitigation efforts of anthropogenic underwater noise. *Ocean & Coastal Management* 202:105427, <https://doi.org/10.1016/j.ocecoaman.2020.105427>
- Duarte, C.M., L. Chapuis, S.P. Collin, D.P. Costa, R.P. Devassy, V.M. Eguiluz, C. Erbe, T.A.C. Gordon, B.S. Halpern, H.R. Harding, M.N. Havlik, M. Meekan, N.D. Merchant, J.L. Miksis-Olds, M. Parsons, M. Predragovic, A.N. Radford, C.A. Radford, S.D. Simpson, H. Slabbekoorn, E. Staaterman, I.C. Van Opzeeland, J. Winderen, X. Zhang, F. Juanes. 2021. The soundscape of the Anthropocene ocean. *Science* 371(6529): eaba4658, [DOI: 10.1126/science.aba4658](https://doi.org/10.1126/science.aba4658)
- Scientific Committee on Antarctic Research. 2021. Anthropogenic Noise in the Southern Ocean: An Update. *SCAR Bulletin No. 204*
- Tyack, P. L., J. Miksis-Olds, J. Ausubel, and E. R. Urban Jr. (2021), Measuring ambient ocean sound during the COVID-19 pandemic, *Eos*, 102, <https://doi.org/10.1029/2021EO155447>. Published on 04 March 2021.

An upcoming landmark book on Animal Bioacoustics will be an official contribution to the IQOE. Started by the late Prof. Jeanette Thomas, the book is being co-edited by marine acoustics expert Prof. Christine Erbe. Fifty-nine authors are contributing to the book, several of whom are active members of the IQOE community. Volume 1 presents an introduction to in-air and under-water acoustics, sound propagation in air and under water, signal processing, and acoustic ecological modeling. Readers will find guidance on choosing recording equipment. Volume 1 further gives an overview of audiometric methods, terrestrial and aquatic soundscapes, animal communication, echo-location, and effects of noise. Volume 2 will present animal bioacoustic studies by taxon. The book straddles the aquatic and terrestrial aquatic worlds, often in a directly comparative way. Volume 1 is expected to be published by Springer Verlag in the third quarter of 2021. The Richard Lounsbery Foundation is helping make the book open-access.

NATIONAL/REGIONAL ACTIVITIES

Several national efforts beyond endorsed activities are directly relevant to IQOE. If you have news of national scientific projects or meetings related to IQOE, please email them to [Ed Urban](#).

Canada

The MERIDIAN project highlights its [online soundscape atlas](#) in YouTube videos in [English](#) and [French](#). MERIDIAN is convening a series of winter Webinars; the presentation archive is at <https://meridian.cs.dal.ca/2018/01/02/presentation-archive/>. Topics have included acoustic telemetry detection range modeling; management of underwater acoustic data; Edge computing for hydrophones; acoustic detection and classification in the modern era of big data, deep learning, and open science principles; visualizations for preference inspection in group decision making; “What Do We Know About Fish Sounds?”; and underwater soundscapes.

Norway

In June, ten graduate students from the University of Bergen and the Western Norway University of Applied Science participated in a research school cruise on the coast guard vessel *KV Svalbard*. The cruise was conducted near Svalbard, led by the Nansen Environmental and Remote Sensing Center. The goal of the cruise was to provide “hands-on” experience during a scientific cruise in the Arctic Ocean, including related to acoustic methods. For more information, see <https://www.nersc.no/news/2020-summer-research-school-cruise-useful-arctic-knowledge>.

USA

The U.S. Bureau of Ocean Energy Management (BOEM) announced the development of a [Center for Marine Acoustics](#) (CMA) in December 2020. The CMA is the culmination of

the efforts of BOEM and its predecessor agencies since at least 1998 to study the production of sound by industrial activities in U.S. coastal areas and the effects of such sound on marine organisms.

IQOE EMAIL LIST

IQOE maintains an email list containing your first name, surname, and email address. We do not collect or store any additional information or share our email list with other organizations. If you wish to unsubscribe from the IQOE email list at any time, please click the “Unsubscribe” link at the bottom of any email from IQOE.

SPONSORED BY



WITH ADDITIONAL SUPPORT FROM

RICHARD LOUNSBERY FOUNDATION
EST. 1959

Endorsed projects (9): ADEON, JOMOPANS, JONAS, NRS, PHYSIC, QUIETMED2, SanctSound, SATURN, TANGO

Publications in Aquatic Acoustic Archive: 6,831

IQOE Email List: 358