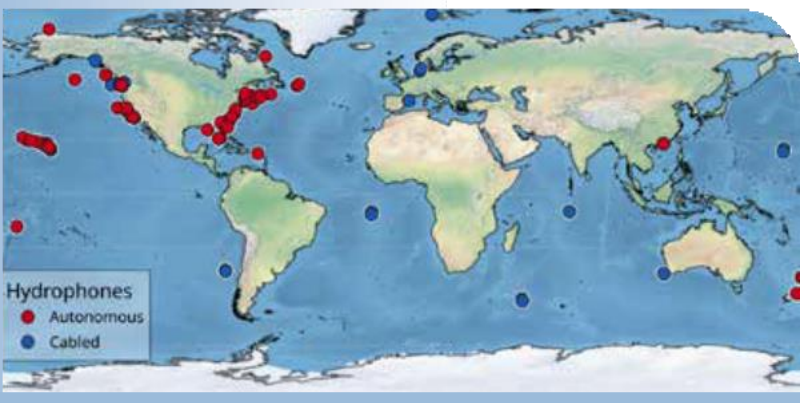
IQOE
International Quiet Ocean Experiment
NEWSLETTER

June 2020 | Number 5

COVID-19 OCEAN

The travel restrictions and reduced commercial activity resulting from the global COVID-19 pandemic have reduced the activity of cruise ships, commercial transport, and commercial air flights. The news media worldwide have reported sightings of marine organisms closer to shore than normally seen and suggestions by bioacousticians that this is a good time to observe noise in the ocean (see page 6). Preliminary results from one study on ocean quieting have recently been published: D.J.M. Thomson and D.R. Barclay. 2020. Real-time observations of the impact of COVID-19 on underwater noise. The Journal of the Acoustical Society of America 147, 3390 (2020); doi: 10.1121/10.0001271. This pandemic presents an opportunity to study how the decrease of ocean noise may affect vocalizations of marine organisms. Hydrophones deployed before the pandemic will be in a good position to track these changes. IQOE is working to coordinate hydrophone operators to compile data to examine what might be learned from these observations. A map of hydrophones currently included in the activity is shown below. Please contact Ed Urban (ed.urban@scor-int.org) if you would like to be involved in this activity.



Hydrophone Map — 25May2020

TWO NEW IQOE ENDORSEMENTS

(Solutions @ Underwater Radiated Noise: SATURN) and another for an existing observing system (the NOAA/ NPS Ocean Noise Reference Station Network: NRS). More information about NRS is given below and has been added to the Endorsed Projects section of the IQOE Website (see https://www.iqoe.org/projects). Information about SATURN will be provided after the proposal is approved.

IQOE DATA OFFICE

The IQOE Data Office at the Alfred Wegener Institute (Germany) has hired a data portal programmer, who is working with Olaf Boebel to develop a prototype portal based on data from the PALAOA project. A data manager also has been hired for the project, but will not arrive until mid-November. The project is being supported by the German MareHUB funding.

PUBLICATIONS

At Ocean Sciences 2020 in San Diego, California, USA in February 2020, oral and poster sessions were held on the topic of "Exploring and Characterizing Deep- and Coastal Ocean Soundscapes". The session was convened by Adrienne Copeland, Robert P. Dziak, Ana Sirovic, and Delwayne R. Bohnenstiehl. Session co-chairs announced that a Research Topic on ocean soundscapes has been accepted for the peer-reviewed journal *Frontiers in Marine Science.* An announcement of the opening of the Research Topic is available at https://www.frontiersin.org/research-topics/13899/innovation-and-discoveries-in-marine-soundscape-research.

The Journal of the Acoustical Society of America (JASA) has issued a call for papers for a special JASA issue on Ocean Acoustics in a Changing Arctic (see https://asa.scitation.org/jas/info/specialissues/cfp_033121). The deadline for manuscripts is 31 March 2021. Papers will be published in regular JASA issues as soon as accepted and will be identified as part of the special issue. Many of the topics listed are relevant to IQOE.

JASA has also issued a call for papers for a special issue on COVID-19 Pandemic Acoustic Effects (see https://asa.scitation.org/jas/info/specialissues/cfp_042220). The submission deadline is currently open-ended.

UPCOMING

IQOE is planning an implementation workshop for the Ocean Sound Essential Ocean Variable (EOV) to be held in conjunction with the first meeting of the EU Marine committee on ocean acoustics. This workshop will be funded by the Lounsbery Foundation, the Partnership for Observation of the Global Ocean, and the Office of Naval Research-Global. The purpose of the workshop will be to discuss practical steps to implement the Ocean Sound EOV. Stay tuned for information about the schedule of the workshop after international travel has resumed.

NEWS FROM ENDORSED

- **ADEON** (https://adeon.unh.edu/)—One of the ADEON landers failed to return to the surface during a lander recovery cruise in November. The lander surfaced on 27 November, after the recovery vessel had left the area and signaled to JASCO that it was ready to be recovered. Thanks to the M/V *Alucia* of the OceanX organization (see http://www.oceanx.org/), the lander and its one year of data were recovered.

- **JOMOPANS** (https://northsearegion.eu/jomopans/about/)—JOMOPANS deployed a passive acoustics mooring in a relatively quiet portion of the Scottish sector of the North Sea in October 2019, which they have not been able to retrieve yet. Data from this region should be helpful to validate models. See https://northsearegion.eu/jomopans/news/central-north-sea-mooring/. The Jomopans team held its sixth consortium meeting on 17–18 February 2020 in Copenhagen, Denmark. A major topic of the meeting discussions related to the follow-on to Jomopans, which would be an operational monitoring program for the North Sea. This will require development of an implementation plan for consideration of the Policy Advisory Board that represents the policy advisors of all participating countries.

The project results so far were presented by Niels Kinneging at the Ocean Sciences 2020 meeting in San Diego, California, USA in February 2020.

- **Joint Framework for Ocean Noise in the Atlantic Seas** (JONAS) (https://www.jonasproject.eu/)

JONAS UPDATE FOR IQOE

JONAS (Joint Framework for Ocean Noise in the Atlantic Seas) is a project funded by the INTERREG Atlantic Area program, which addresses the issue of underwater noise and the threats it poses to sensitive species in the northeast Atlantic Ocean. The JONAS project aims to enable decision makers to better mitigate these risks and meet their reporting obligations under MSFD Descriptor 11.

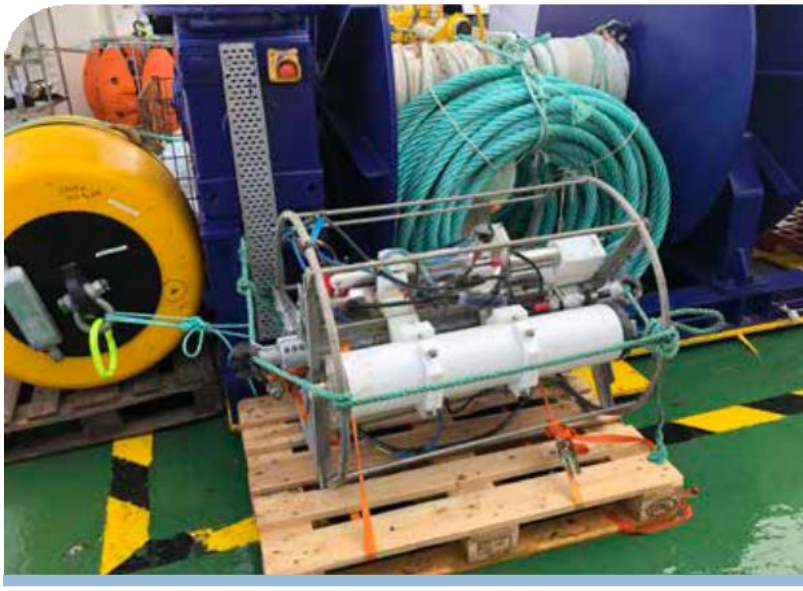


Image above is from the deployment of the EMSO EGIM at ESTOC seafloor site in December 2019, on-board Spanish Research Vessel IEO ***Angeles Alvriño.*** The acoustic data will be used to calibrate models in JONAS.

Over the past six months, the consortium has been busy mapping noise in both the Atlantic Area and the Azores archipelago. Acoustic propagation models have been developed to predict the risk of high noise areas using ship positions; the next step will be ground truthing the data using sound measurements at selected spots to calibrate these models. An example is the use of acoustic data collected by the EMSO ERIC Canary Islands Regional Facility, with

the EMSO Generic Instrument Module (EGIM) deployed in December by PLOCAN on the seafloor (3650m) at the European Station for Time series in the Ocean Canary Islands (ESTOC).

While JONAS researchers continue to make progress in noise mapping, risk mapping activities are also getting underway. JONAS has selected twelve focal species to represent a range of depths and acoustic sensitivities including, but not limited to, the European seabass, blue mussel, sperm whale, Norway lobster, common cuttlefish, harbour seal, bluefin tuna, and long-finned pilot whale. Distribution data are being gathered for each species to feed into risk maps, which will be created at the appropriate spatial and temporal resolutions using best available approaches. The methodology will be applied to the Atlantic Area for a period of one year, after which JONAS will deliver a risk-based assessment of underwater noise for the most endangered and affected species. To assess the quality of these results, a sensitivity study of the methodology will be conducted.

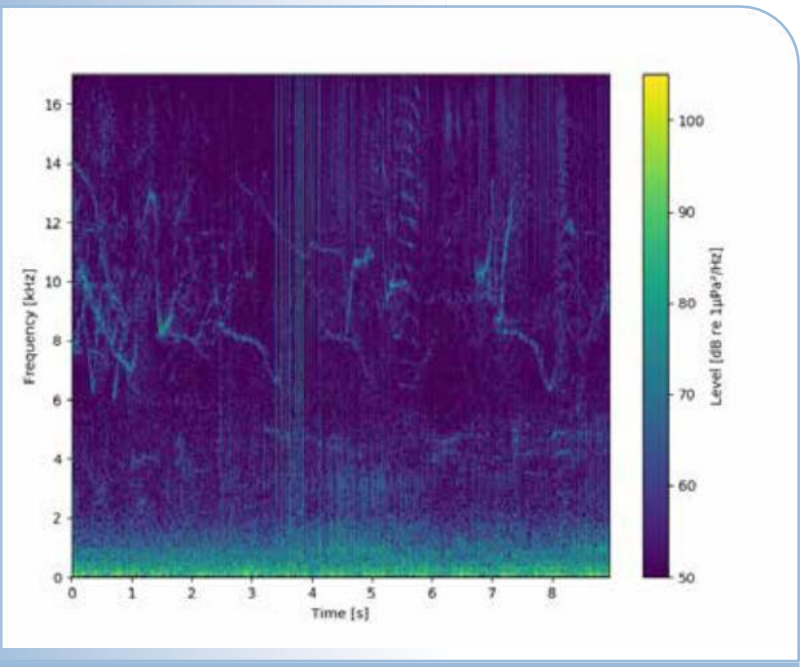


Image above is a spectrogram of whistles and clicks likely made by bottlenose dolphins (*Tursiops truncatus*) from a mooring off Britany inthe Celtic Sea. Recordings like these will contribute to JONAS's analyses. (Benjamin Ollivier)

In November 2019, JONAS collaborated with the IFADO project for the launch of a waveglider acoustic observing mission. The waveglider, which made the 2000km trip from the Azores to Gran Canaria in a 57-day mission, was equipped with a passive acoustic monitoring hydrophone. Acoustic recordings of cetaceans captured by the hydrophone will be analysed and potentially used to inform risk maps being developed.

Looking ahead, JONAS aims to begin work on several cumulative noise management case studies designed to address specific drivers of noise in the Atlantic Area. These case studies will demonstrate how the JONAS risk mapping and indicator methodologies can support decision making in the management of anthropogenic noise. The case studies will focus on ship-quieting scenarios and cost-benefit analyses, seismic survey noise prediction tools, offshore wind-risk mapping, and an assessment of acoustic deterrent device impacts.

To strengthen noise monitoring activities and ensure coherence in the northeast Atlantic, JONAS has linked with other projects (JOMOPANS, RAGES, IFADO) and agreed upon the acoustic data standards to be used to ensure maximum data compatibility. JONAS recently completed an inventory of the noise monitoring capacity of the northeast Atlantic (including PAM moorings, moored hydrophones, autonomous recorders, and observatories), which highlights available monitoring recordings, and will help support the JONAS objective of creating a data-sharing platform for the region. Various raw data formats will be transformed into a standard format to facilitate data exchange among projects and countries. Unfortunately, due to COVID-19, JONAS has had to defer its first stakeholder workshop on the topic of the JONAS noise visualisation platform in development, but is hoping to reschedule the workshop for later in the year.

To learn more about JONAS, take a look at our most recent newsletter, or visit www.jonasproject.eu. Join JONAS on Twitter for frequent updates @jonas_project. – From Amy Dozier, JONAS

- **NOAA/NPS Ocean Noise Reference Station Network (NRS):** https://www.pmel.noaa.gov/acoustics/noaanps-ocean-noise-reference-station-network

The NOAA/NPS Ocean Noise Reference Station Network (NRS) was created in 2014. An example publication from the project can be found at https://www.frontiersin.org/articles/10.3389/fmars.2019.00500/full. The NRS was established in partnership with the U.S. National Park Service (NPS) to document baseline levels and multi-year trends in ocean ambient sound at 12 locations scattered throughout the U.S. Exclusive Economic Zone (EEZ). Using time-series data collected within four National Marine Sanctuaries (NMS), two National Parks, and six other habitats throughout the U.S. EEZ, the NRS network provides data to compare long-term changes and trends in the low-frequency underwater ambient sound field. Monitoring these biological areas of interest is of high importance; these environments are home to a variety of endangered marine animals but, at the same time, are exposed to increased human use from recreational/commercial shipping and fishing, as well as renewable energy activities. Establishment and continuation of the NRS has been funded by the National Marine Fisheries Service Ocean Acoustics Program, Pacific Marine Environmental Laboratory

(OAR), the Office of National Marine Sanctuaries (NOS), all NMFS Science Centers, and the National Park Service. – From endorsement application

- **Ports, Humpbacks, Y Soundscapes In Colombia (PHySIC)**

PHySIC will resume another field season near the end of June, with three students working on their theses using the PHySIC data and expanding the project by collecting their own data:

1. Daniel Noreña is compiling a whistle repertoire for the resident dolphin populations. He is slated to submit his thesis at the end of the quarter, but universities in Bogota have shut down, so we will see how the graduating students are affected.
2. L. Valentina Huertas-Amaya is mapping projected shipping routes that could result from the port and learning parabolic equation propagation modeling to map her projected routes as noise maps, with help from our company's GIS expert. One of her maps was circulated by a WhatsApp group that is fighting against the port and then was picked up by two congressional members and posted on Twitter.
3. Maria Paula Rey-Baquero is starting to process 2019 data for her thesis, increasing her temporal and spatial coverage for diel cycle analysis.

Additionally, Dr. Natalia Botero-Acosta received a Fulbright Scholarship to work with Ari Freidleander's laboratory at Oregon State University (USA) to process her biopsy samples for stress hormones, which PHySIC is using as a response variable to the noise levels that PHySIC (mainly Maria Paula Rey-Baquero) has been processing. An abstract on the topic of the effects of whale-watching in the South American eco-tourism fleet was submitted for a special *Frontiers in Marine Science* issue. The abstract was accepted and the paper is due by 30 June 2020. At the Society for Marine Mammalogy meeting in December 2019, Kerri Seger met with representatives of the International Union for the Conservation of Nature (IUCN) who are working to get a group of scientists together to assess the "state-of-knowledge" about ecosystems along the west coast of South America. PHySIC noise levels and other data would be used in that report, if it materializes. PHySIC is involved in a variety of public outreach activities that may be fruitful this year, and will continue its work as long as it can continue to obtain funding from a variety of sources. – From Kerri Seger, PHySIC

- **QUIETMED2** (http://quietmed2.eu)

QUIETMED2 organized a "Training Session to Better Manage Underwater Noise Pollution in the Mediterranean Region" in conjunction with the World Marine Mammal Conference on 7 December 2019 in Barcelona. The aim of this training was to support the assessment of Good Environmental Status (GES) with regard to underwater noise pollution (Descriptor 11 of the EU Marine Strategy Framework Directive) in the Mediterranean Region. See http://quietmed2.eu/quietmed2-participates-in-the-wmm/.

The QUIETMED2 Advisory Board met on 30 January 2020 to assess progress of the project at its mid-term point. The Advisory Board confirmed that QUIETMED2 should continue its work with partner organizations in the Mediterranean region on a methodology to establish noise thresholds, an impulsive noise "risk of impact" indicator, and the Impulsive Noise Register in the Mediterranean Region (INR-MED).

- **SanctSound** (https://sanctuaries.noaa.gov/science/monitoring/sound/)

SanctSound is a multi-year effort, co-managed by the U.S. National Oceanic and Atmospheric Administration (NOAA) and the U.S. Navy, to monitor underwater sound within the U.S. National Marine Sanctuary System. In late 2018 to early 2019, recorders were placed at 28 of the project's 30 monitoring locations within seven national marine sanctuaries and one marine national monument. The remaining two sensors were deployed in summer 2019. Twenty-six of these locations are serviced ~3 times/year, while 4 in the Papahānaumokuākea Marine National Monument are serviced annually. Additional data collection efforts took place in fall-spring 2019–2020, including observations by gliders equipped with hydrophones in Gray's Reef and Stellwagen Bank National Marine Sanctuaries off the U.S. East Coast, and in Papahānaumokuākea Marine National Monument in the Pacific. Several sites have integrated recording efforts with telemetry infrastructure, and supplementary tagging of soniferous species as well as receiver maintenance is ongoing. The first year of raw data from the project was sent to NOAA's National Centers for Environmental Information (NCEI) for archiving. Data from the first year of the project will be publicly available in late 2020. Standardized analysis products derived from year 1 data were also sent to NCEI to support development of a Web-accessible database and portal for the project. The project's Web portal is scheduled to go live in spring 2022. SanctSound held its annual progress meeting in April 2020 remotely, due to the COVID pandemic. Scheduled presentations of initial results in 2020 and 2021 are now under review as conference venues re-consider their schedules. Project leads and analysts continue to participate in discussions of which project data might be of value for assessing the pandemic's effect on underwater soundscapes. SanctSound locations were chosen to generate standardized measures of variance in relatively near-shore recreational and commercial activities, as well as biological uses; thus, many are well-positioned for analysis of more local changes in soundscapes associated with reduced human presence offshore. —From Leila Hatch, SanctSound.

Get your project endorsed

IQOE would like to endorse any research project 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 of endorsed projects, which are usually national or regional, and the potential for joint activities with other endorsed projects and with other IQOE-involved scientists

IQOE WG

Acoustic Measurement of Ocean Biodiversity Hotspots— The WG has an article in review entitled "A research framework for assessing marine biodiversity using acoustic methods".

Arctic Acoustic Environment—The WG is working to establish relations with the International Arctic Science Committee (IASC) and its Sustaining Arctic Observing Networks (SAON) activity, as well as with the Arctic Council and its working group on Protection of the Arctic Marine Environment (PAME). WG members participated in a recent virtual conference on Arctic Observing Systems. The WG is considering holding a virtual conference on Arctic Acoustic Observations in September.

Marine Bioacoustical Standardization and Standardization—IQOE has two working groups focused on observation, processing, and reporting standards, one for biological variables and the other for physical variables. A major achievement of the groups was the completion last year of the *Guidelines for Observation of Ocean Sound.* Since the publication of this document, the two WGs have been seeking ways to promote use of the guidelines.

In another activity, the chairs of the standards WGs prepared a letter to be sent by IQOE to the chairs of the International Standards Organization (ISO) Technical Committees (TCs) 12 (Quantities and Units) and 43 (Acoustics) supporting changes to ISO 80000-8 to replace the version of ISO 80000-8 published in 2007. Standards like ISO 80000-8 are of vital importance because they meet the need to facilitate effective communication in the field of acoustics generally, and underwater acoustics in particular. Two main reasons were expressed for preferring the revised standard.

1. The revised standard would correct several major errors in the 2007 standard, including

    a. A definition of sound power level (SWL) that leads to a highly oscillatory, and sometimes imaginary value of SWL for a sinusoidal signal of constant amplitude. (In normal use, SWL is neither oscillatory nor imaginary, so this 2007 definition has little value).

    b. A definition of sound pressure level (SPL) that leads to a highly oscillatory value of SPL for a sinusoidal signal of constant amplitude. (In normal use, SPL is not an oscillatory quantity, so this 2007 definition has little value).

2. The revised standard recognizes the reference sound pressure of 1 μPa, for use in underwater acoustics, alongside the value of 20 μPa traditionally used in air acoustics. This is of particular importance to IQOE because we do not use 20 μPa in underwater acoustics, making the 2007 standard inadequate for our purpose.

National standards committees vote on new and revised standards. This vote was concluded in February 2020 on the revised ISO 80000-8, resulting in adoption of the revised standard (https://www.iso.org/standard/64978.html), incorporating the changes supported by IQOE.

NATIONAL/REGIONAL ACTIVITIES

Several national efforts beyond endorsed activities are directly relevant to IQOE. If you have news of national

Canada

Marine Environmental Research Infrastructure for Data Integration and Application Network (MERIDIAN)—MERIDIAN is working in 2020 to complete its prototype products and transition them to fully operational systems, as well as to seek funding for continuation of MERIDIAN beyond this year. On 1 April 2020, Meridian released its Data Discovery Portal (see http://soundscape-atlas.uqar.ca/).

USA

First data from Stones Mooring: At Ocean Sciences 2020, Cynthia Pyć of JASCO Applied Sciences described results from the hydrophones deployed near the Shell Oil Stones Mooring in the Gulf of Mexico. Her presentation, co-authored by several JASCO colleagues, was entitled "Gulf of Mexico Stones deep water ocean soundscape project: the first passive acoustic deployment of the Gulf Research Program of the National Academies of Sciences, Engineering and Medicine". The presentation described the results from a 295-day deployment, which was dominated by sounds from human activities, but also included daily vocalizations of sperm whales and frequent calls of other marine mammal species, including beaked whales and several species of dolphins. The presentation included information from both ~6-month deployments, an update from the initial conference abstract (see https://agu.confex.com/agu/osm20/meetingapp.cgi/Paper/639850). The full dataset from the Stones Mooring is now available on the GCOOS Website (see https://stonesdata.tamucc.edu/browse_aco.php).

Wildlife Conservation Society (WCS) Ocean Giants Program— This program monitors whales acoustically with

six autonomous hydrophones near the ocean floor between New Jersey and Coney Island, New York and up into New York Harbor. WCS (with the Woods Hole Oceanographic Institution) has also deployed a hydrophone 22 miles off Fire Island. This site monitors fin, humpback, sei, and North Atlantic right whales.

IQOE EMAIL

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UPCOMING

New meetings have been added to the calendar of IQOE-relevant events.

NEWS

The following are news reports of unusual activity of marine organisms since pandemic started:

- DW English (April 16): Coronavirus lockdown gives animals rare break from noise pollution
- The Narwhal (Apr 19): 'An important time to listen': ocean scientists race to hear the effects of coronavirus under water
- National Post (April 19): Amid COVID-19 lockdowns, Canadians are reporting more wildlife sightings
- KCET (April 22): Scientists Who Study Earthquakes and Marine Life Gain Chance to Look Into Our Quieter World
- The Guardian (April 27): Silence is golden for whales as lockdown reduces ocean noise
- Daily Mail (April 27): Underwater noise pollution from ships plummets during the coronavirus lockdown
- ZME Science (April 28): Whales enjoying the sound of silence as COVID-19 pandemic reduces ship traffic
- New Zealand Herald (April 28): Covid 19 coronavirus: Humpback whale seen at Wellington's ferry dock, dolphins play off Auckland's North Shore
- Lonely Planet Travel News (April 30): Whales are thriving without cruise ship traffic - Lonely Planet
- WPEC (April 30): The New Us: Cleaner air and water. Is shutdown a silver lining?

Endorsed projects (8): ADEON, JOMOPANS, JONAS, NRS, PHYSIC, QUIETMED2, SanctSound, TANGO

Publications in Aquatic Acoustic Archive: 6,498

IQOE Email List: 271