

This is the final IQOE Newsletter, as the project ended on 31 December 2025. Thank you to everyone who devoted their creative efforts toward creating and sustaining the project since the first exploratory meeting in 2010! Thanks especially to IQOE Science Committee (SC) members who guided the project: Olaf Boebel (Germany), Ian Boyd (SC Co-chair, UK), Bishwajit Chakraborty (India), Chris de Jong (Netherlands), George Frisk (SC Co-chair, USA), Tess Gridley (South Africa), Tony Hawkins (UK), Bruce Martin (Canada), Rob McCauley (Australia), Jennifer Miksis-Olds (USA), Miles Parsons (Australia), Hanne Sagen (Norway), Filipa Samarra (Iceland), Steve Simpson (SC Co-chair, UK), Lise Doksaeter Sivle (Norway), Karolin Thomisch (Germany), Jakob Tougaard (Denmark), Peter Tyack (SC Co-chair, USA), Alexander Vedenev (Russia), and Carrie Wall Bell (USA). We also thank Jesse Ausubel for posing the foundational question: **what could be learned by decreasing sound in the ocean?** Ausubel consistently provided wise counsel and served as a steadfast champion of IQOE.

The IQOE SC met for the final time on 23–25 September 2025 in Roskilde, Denmark. The meeting discussed the progress across all ongoing IQOE activities and led to the decision to convene an open workshop to discuss activities that will follow IQOE (see section below).

The meeting began with a reflection on IQOE's impact over the past decade. It was noted that IQOE set up topical and regional working groups with global participation, fostering collaboration and strengthening international networks. IQOE activities related to standardization were important early in the project and later taken up by international standards organizations. The 2011 IQOE Open Science Meeting and subsequent activities have entrained early-career scientists into the global research community. Open meetings have engaged scientists at all career stages to collaboratively plan new work and develop open networks. IQOE endorsements of national and regional projects have demonstrated the importance of these projects for global understanding of ocean sound and endorsed projects have conducted research important to meet IQOE objectives. IQOE also promoted open-access publications (e.g., [Erbe and Thomas](#)), open access to

acoustic metadata, freely available software to standardize processing of acoustic data ([MANTA](#)), the [OPUS](#) portal to acoustic data, and open-source acoustic observing systems. The creation of the Ocean Sound Essential Ocean Variable (EOV) identified ocean sound as an important parameter to be measured worldwide by the Global Ocean Observing System. [See self-evaluation document](#) for additional details.

A final report, summarizing IQOE's achievements and lessons learned, is being prepared for SCOR and POGO and will inform an article to be submitted for publication.

NEW FUNDING FOR IQOE SYNTHESIS AND DISSEMINATION

New funding from the Richard Lounsbery Foundation will support publication of IQOE results and a post-doctoral fellowship aimed at advancing ongoing work and engaging new communities that could contribute to a future Global Ocean PAM Network. The fellowship was awarded to Ella Bea Kim, who is completing her Ph.D. at the Scripps Institution of Oceanography. Aran Mooney at the Woods Hole Oceanographic Institution will serve as her post-doc supervisor.

OPEN WORKSHOP ON OCEAN SOUND OBSERVATIONS

A workshop will be held at the InnovOcean Campus of the Flanders Marine Institute (Figure 1) on 22–24 September 2026. It will focus on continuing IQOE-initiated activities and identifying new efforts needed to implement the Ocean Sound EOV. The planning committee is cochaired by Peter Tyack (USA) and Karolin Thomisch (Germany). A “save the date” [announcement](#) has been distributed through the IQOE email list and other networks to gauge interest in workshop participation. Registration will open by 1 June 2026 and registrants will be invited to help shape break-out sessions



Figure 1 – VLIZ InnovOcean Campus, Oostend, Belgium

and propose new topics. A key goal of the workshop is to engage early-career scientists, both in person and remotely, and to “pass the torch” to the next generation of ocean sound researchers.

Although IQOE has concluded, several activities are ongoing and important gaps remain in advancing passive acoustic monitoring of the ocean. The workshop will address how to continue existing efforts and launch new ones. Topics for discussion include

- How can observations by particle motion detectors be increased? Many marine organisms sense particle motion more than sensing acoustic pressure changes. Yet, particle motion detectors are much less frequently deployed than hydrophones.
- How can the communities using PAM on gliders and hydrophones on ocean bottom seismometers be better integrated in the global PAM observation effort?
- How can standardized PAM systems be designed for deployment on a variety of GOOS platforms?
- How can calibration processes be improved to make calibration easier and less expensive?

Additional workshop information will be posted on the [Website](#) as it becomes available.

LOW-COST OCEAN SOUND RECORDING SYSTEM

In 2023, IQOE set up a task team chaired by Lucille Chapuis of La Trobe University (Australia) to design a low-cost ocean sound recording system that could be deployed for research, education and citizen science. The project was accepted

as a [Decade Action](#) by the UN Decade of Ocean Science for Sustainable Development until the end of 2026.

The task team solicited expressions of interest from companies producing ocean sound recording systems, as well as input from the scientific community regarding how a low-cost system might be used. A survey of end-users was answered by 138 respondents, yielding some expected results, but also some unexpected findings (see [infographic](#)). Ninety percent of respondents believe that such a low-cost autonomous device is needed, including a significant portion of respondents who are senior researchers.



Figure 2 – Low-cost recording system developed for beta testing

Twenty-five systems are being produced at Sensor Technology Ltd. (Canada) for beta testing (Figure 2). According to Chapuis, “the beta testers will be selected to represent the world globally, different sound sources and environments (marine mammals, fish, soundscape, freshwater etc.) and also the different pools of end users (senior researchers, early-career researchers, students, citizen scientists, educators, artists, etc.)” It is planned to distribute an additional 25 units if enough financial support can be arranged. Feedback from beta testing will be used to improve the design, which will be distributed with educational materials to make it possible for the system to be built by anyone interested in deploying a low-cost system. A graphical user interface will be developed to make it easier to program the units.

At the September 2026 workshop, the results of the beta testing will be presented and a session will be held to discuss the next steps of the development.

QUALITATIVE ANALYSIS OF THE EFFECTS OF THE COVID-19 PANDEMIC ON OCEAN SOUND

IQOE designated 2020 as the Year of the Quiet Ocean to take advantage of the changes in the human use of the ocean that resulted from the COVID-19 pandemic. The IQOE SC decided that there should be a qualitative summary of papers published regarding the effects of the pandemic (see <https://iqoe.org/covid-pause-papers>), followed by a quantitative meta-analysis of the effects of the pandemic.

To conduct the qualitative analysis, the IQOE SC requested a group of early-career scientists to (1) determine whether such an analysis would be useful and, if so, (2) to synthesize the results presented in published papers. Maria Paula Rey Baquero (Colombia), Lucille Chapuis (Australia), Sophie Nedelec (UK), Divya Panicker (India), Kerri Seger (USA), and Fannie Shabangu (South Africa) have worked mostly remotely to conduct the analysis. The publication is expected to be submitted for publication later this year. It will provide the first synthesis of published papers about the effects of the pandemic on ocean sound and will serve as a foundation for a quantitative analysis later.

WORLD PASSIVE ACOUSTIC MONITORING (WOPAM) DAYS



World Passive Acoustic Monitoring Days have been held on June 8 of 2023, 2024, and 2025. The purpose of these days is to observe ocean (and freshwater) sound on the same day around the world. The Lounsbery Foundation supported a post-doctoral fellow (Isla Keesje Davidson) to help gather and analyze WOPAM Day data.

Davidson presented an update at the IQOE SC meeting about the project. WOPAM has held two participant workshops so far. Some themes have emerged regarding the purposes of observations during WOPAM, including anthropogenic impacts of sound, species' presence/absence, and measuring ecosystem condition. Sixty-four percent of workshop participants did not feel comfortable using MANTA software to process their observations and 22% of participants stated that they wanted to learn how to use MANTA. Therefore, WOPAM organized a follow-up workshop given by Jen Miksis-Olds and 40 people attended (more than 60% were early-career scientists) to learn more about MANTA. Many WOPAM participants are willing to provide short segments of their observations and annotate them in some way as to the organisms recorded. Most participants are interested in working with a machine learning and AI team to help classify the sounds in their recordings. WOPAM is dealing with the important issues of agreements for data sharing and ownership. WOPAM worked with "The Deep" Aquarium in Hull in the U.K. to create an interactive engagement exhibition about ocean sound and sponsored a panel session at the UN Oceans Conference in June 2025 called "Ocean Voices" to highlight the work and potential of WOPAM.

IQOE PAM METADATABASE

A draft publication was reviewed at the IQOE SC meeting and suggestions were made for several improvements to the

paper, including revising some of the figures to make them more informative. It was also recommended that the ongoing work by the Acoustical Society of America on [standardized metadata](#) be acknowledged in the paper, although it would be difficult to gather additional metadata to make it compliant with the draft ASA standards. It is hoped that the paper will be submitted to a peer-reviewed journal by the end of 2026. The data represented by the metadata collected could contribute to knowledge of trends of ocean sound at frequencies higher than observed by the Comprehensive Test Ban Treaty Organization (see [Ainslie et al., 2025](#)).

GLOBAL LIBRARY OF UNDERWATER BIOLOGICAL SOUNDS (GLUBS)

GLUBS is seeking funding to build out the project, through approaches to foundations and national funding agencies. Products under development include an AI perspectives paper ("Moving toward a universal AI for underwater biological sounds") led by Louisa van Zeeland and Tzu-Hao Harry Lin, a paper on the standardization of sound annotating and recommendations for use, and an update to the soniferous species list, originally published in [Looby et al. \(2022\)](#). GLUBS worked with the World Register of Marine Species (WoRMS) to include metadata on sonifery with species' listings. The SCOR Working Group on GLUBS (SCOR WG 169) is comprised of a subset of members of the GLUBS community, focused on a portion of overall GLUBS tasks. WG 169 met in Denmark in September 2025.



GLUBS led a Research Focus in the journal *Frontiers in Remote Sensing* called "[Detection and Characterization of Unidentified Underwater Biological Sounds, Their Spatiotemporal Patterns and Possible Sources](#)". Eleven papers were accepted for this Research Focus, which is now closed.

GLUBS is recognized as a [Decade Action](#) of the UN Decade of Ocean Science for Sustainable Development.

MANTA

MANTA developed through a grant from the Richard Lounsbery Foundation "to enhance the value of individual datasets by providing a mechanism to create comparable

data over time and space to ultimately assess ocean sound at a global level” (see <https://bitbucket.org/CLO-BRP/manta-wiki/wiki/Home>). A goal of IQOE was that MANTA would be widely adopted, making it possible to create databases of comparable data available to assess changes of ocean sound over time and space. Until now, the uptake of MANTA has been limited and there is a need for both training in its use and maintenance and improvement of the system. Training was provided by Jen Miksis-Olds to WOPAM participants (see above) and in conjunction with the 4th African Bioacoustics Community Conference in 2024.



THE OPEN PORTAL TO UNDERWATER SOUNDSCAPES (OPUS)

The Open Portal to Underwater Soundscapes OPUS (<https://opus.aq/>), developed by the Ocean Acoustics Group of the Alfred Wegener Institute for Polar and Marine Research (AWI), currently features 59 long-term acoustic datasets publicly, providing open access to OPUS data products released under CC-BY 4.0.



Acoustic data featured by OPUS were recorded in the Southern Ocean (39 datasets), Arctic Ocean (10 datasets), North Sea (8 datasets), North Atlantic Ocean (2 datasets) and South Atlantic Ocean (2 datasets). For 57 datasets, OPUS provides both spectrogram data as well as accompanying audio data. Original sound data (collected by AWI) has and will continue to be published under CC-BY 4.0 through the PANGAEA data repository ([Felden et al., 2023](#)), including DOI assignment, while adopting FAIR principles. Further, as part of the SoundCoop initiative, OPUS displays 2 hybrid millidecade datasets from NOAA’s SanctSound project, based on MANTA-processed data at 1-minute resolution (without the associated audio files being provided, see also [Wall et al. 2025](#) for further information).

Further external passive acoustic datasets are currently being prepared for display through international collaborations

with the Flanders Marine Institute (VLIZ, Belgium) the Norwegian Polar Institute (NPI, Norway), the Institute of Marine Research (IMR, Norway), the National Institute of Oceanography and Applied Geophysics (OGS, Italy), the Oregon State University (USA), and the Zurich University of Arts (ZHdK, Switzerland). In particular, the ongoing passive acoustic data collection by the Zurich University of Arts ([Computer Signals Audio Archive](#)) will be archived via AWI and made publicly available via OPUS in the future.

Ongoing cooperation with the AWI’s Geophysics section recently resulted in OPUS’ ability to display OBS (ocean bottom seismometer) hydrophone data. Currently, 8 OBS datasets recorded in the Bransfield Strait, Antarctica (<https://doi.org/10.1594/PANGAEA.934130>) are featured via OPUS (e.g. [ZX.BRA02.2019_DEPAS-OBS](#)), with further datasets currently being prepared for public display. In addition, in close collaboration with IQOE, OPUS is currently developing workflows to display the IQOE PAM metadata database, enabling users to explore available data sets through OPUS, while being directed to the actual data holders for further information.

Alongside existing filtering options for time, data provider and deployment ID, the OPUS search functionality was further improved to allow users to filter datasets by dataset type; that is, datasets with a full representation of corresponding audio and spectrogram data (‘audio & spectrogram’), datasets without underlying audio data (‘spectrogram’) and datasets with only metadata available (‘metadata only’).

OPUS is embedded in the Marine Data Portal (<https://marine-data.de>) of the German Marine Research Alliance (DAM) as well as the Earth Data Portal (<https://earth-data.de/>) of the DataHub, a cross-center initiative of the German research centers of the Research Field Earth and Environment in the Helmholtz Association. The Marine Data Portal provides a centralized access point to German marine research data as well as data services to national and international research data infrastructures.

Interested users are very welcome to explore OPUS and share any feedback on its performance and functionality at opus-info@awi.de. A list of selected sounds from the polar oceans can be downloaded from <https://opus.aq/content.html#tutorial> for subsequent import into OPUS.

NEWS FROM ENDORSED PROJECTS

Development and Evaluation of noise Management Strategies to Keep the North Sea healthy (DEMASK)— Major activities of [DEMASK](#) in 2025 included the following: (1) an analysis of shipping scenarios and a paper on noise from Crew Transportation Vessels CTVs for the offshore wind energy, (2)

development of a framework for the selection of indicator species, and (3) development and testing of a strategy for the assessment of recreational vessels for coastal areas of Sweden. DEMASK also held its mid-term meeting to review progress of the project and knowledge gained, and to discuss the next steps towards protecting the North Sea's acoustic ecosystem.

More information about these activities is available in [DEMASK Newsletter #6](#).

NATIONAL/REGIONAL ACTIVITIES

Several national efforts beyond endorsed activities are directly relevant to IQOE.

Africa

The latest African Bioacoustics Community [newsletter](#) highlights bioacoustics research on the continent, publications, and information about regional events and opportunities.

Canada

Ongoing efforts in Canada, supported by Transport Canada, focus on noise cancellation techniques, coatings of propellers and ships, and other approaches to reduce noise that is disruptive to marine organisms (see <https://www.cbc.ca/news/canada/nova-scotia/atlantic-canadian-companies-trying-to-turn-down-dial-on-ocean-noise-1.7406146> and [Quieter ship design: Tackling engine and other machinery noise – Clear Seas](#)).

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