IQOE
International Quiet Ocean Experiment
NEWSLETTER

April 2025 | Number 14

MEETING OF THE IQOE SCIENCE COMMITTEE

The IQOE Science Committee met in person (with some video participants) on 20–22 November 2024 in Reykjavik, Iceland to review progress of all IQOE activities and to plan actions for the final year of the project. Updates on specific activities will be given below. A major outcome of the meeting was a decision to develop a project to follow IQOE that will focus on implementation of the Ocean Sound Essential Ocean Variable (EOV). This project will be developed over the next year and will be submitted to the Scientific Committee on Oceanic Research (SCOR) and the Partnership for Observation of the Global Ocean (POGO) for co-sponsorship. Discussions have begun with the Global Ocean Observing System of UNESCO's Intergovernmental Oceanographic Commission to apply for Emerging System status for a global ocean sound observing system.

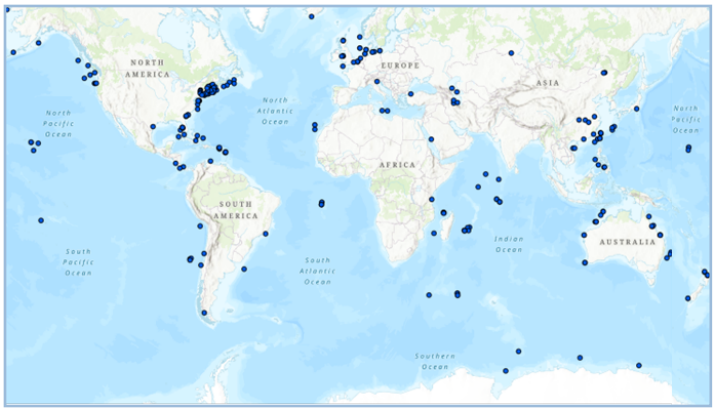
The results of the IQOE SC meeting were reported to SCOR in October 2024 and to POGO in February 2025. The SC expressed its gratitude to the two sponsors for their continued support, and also thanked the Lounsbery Foundation for its several contributions to important IQOE activities, including to making the book *Exploring Animal Behavior Through Sound: Volume 2* open access and supporting a project between the University of St. Andrews and the Comprehensive Test Ban Treaty Organization. Danielle Harris from the University of St. Andrews reported that this grant is intended to develop methods to estimate temporal trends of Indian blue whale populations and to study fin whale temporal trends from observations in the Pacific Ocean. Up to four research internships for undergraduates are included in the grant.

SOCIAL MEDIA

IQOE has opened a BlueSky account at iqoe.bsky.social. Please follow this account and suggest accounts to follow related to IQOE interests.

WORLD OCEAN PASSIVE ACOUSTIC MONITORING (WOPAM) DAYS

The first WOPAM Day was held on 8 June 2023 (World Ocean Day) and the second on 8 June 2024. WOPAM organizers expect to celebrate WOPAM Day each year going forward. Miles Parsons (Australian Institute of Marine Sciences) reported that organizers are in the process of working out data-sharing agreements among participants from 2023 and 2024 so the data can be collated in a single location, with funding from the Richard Lounsbery Foundation for a post-doctoral fellow at Cornell University. The MANTA system has been promoted to process data from WOPAM Days. The map below shows locations where observations were made for the 2024 WOPAM Day.



Isla Davidson, WOPAM co-manager and post-doctoral fellow, reported the following WOPAM achievements:

1. WOPAM has been established as an ongoing collaborative initiative within the aquatic bioacoustics community since its formation in 2023, maintaining a

voluntary community of more than 200 individuals including researchers, conservation practitioners, artists, and musicians.

2. WOPAM has organized and facilitated two international workshops with nearly 100 participants to discuss and agree on WOPAM strategy for the future, as well as a MANTA acoustic analysis training workshop for about 40 participants.
3. WOPAM is now partnering with three conservation organizations: a) the Malamba Coastal Collaborative in Mozambique, b) the Fauna and Flora across Eastern African Coastline project, and c) The Charles Darwin Foundation working in the Eastern Tropical Pacific. These partnerships enable, through connection and involvement with WOPAM, co-created strategies for using bioacoustics to support ongoing project-specific conservation impacts.
4. WOPAM and the African Bioacoustics Community (ABC) worked together to secure funding for a 10-year partnership to continue to contribute recordings to WOPAM from the ABC team.
5. After presenting on WOPAM at the African Bioacoustics Community Conference, Isla was invited to give a seminar on Global Bioacoustics Collaborations by FishSounds, which is accessed globally.
6. WOPAM worked with musicians and composers to co-create an original music piece using only sounds from the WOPAM community that was played at New York Climate Week 2024.
7. WOPAM established and maintained partnerships with organizations, foundations and companies such as Aqoustics, On the Edge, and the Wildlife Conservation Society to facilitate and connect WOPAM to multi-disciplinary efforts such as attendance to the UN's Ocean Conference; co-creating interactive educational displays at aquariums such as The Deep in Hull, England; using AI and machine learning to improve signal detection in recordings with undescribed sounds; and interactive storytelling using sound for diverse target audiences.
8. As a WOPAM co-manager, Isla was invited to speak on "Science Weekly" a weekly podcast by *Scientific American.* Isla was also invited to give two educational/outreach talks in relation to ocean sound, WOPAM and marine wildlife: one with the KAIA Initiative (a youth-led Ocean Conservation foundation in Singapore with 150+ subscribers), and a *National Geographic Kids* (aged 7–12 years old) talk with almost 500 unique views when live and an estimated reach of 1,000 young people. This talk was then made into an article and published as a piece in their physical *Nat Geo Kids* magazine which has 63,000 subscribers across UK, Ireland, Australia and New Zealand.

GLOBAL LIBRARY OF UNDERWATER BIOLOGICAL SOUND (GLUBS)

Lucia Di Iorio (University of Perpignan, France) provided an update about GLUBS. It has five working groups: (1) cyberinfrastructure, (2) artificial intelligence, (3) known sounds, (4) unknown sounds, and (5) public engagement. GLUBS has been endorsed by the UN Decade of Ocean Science for Sustainable Development and is contributing to the WildLabs Horizon Scan on future needs for bioacoustical observations. GLUBS has submitted information to the World Register of Marine Species (WoRMS) on known acoustic capabilities of marine species (Looby et al., 2023). (To look for listings on soniferous behavior, pick a species, select the Attributes link at the bottom of the page, then find the attribute "species exhibits underwater soniferous behavior" for more details. See *Grampus griseus* for example.)

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. GLUBS is hoping to lay out its framework and infrastructure. It is seeking funding to build out the project, through approaches to foundations and national funding agencies.

GLUBS is leading 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". Ten papers have been accepted for this Research Focus so far, with several others in review or expected to be submitted.

ACTIONS TO IMPLEMENT THE OCEAN SOUND ESSENTIAL OCEAN VARIABLE (EOV)

Peter Tyack (University of St. Andrews/Woods Hole Oceanographic Institution) reported that IQOE is making progress on actions related to recommendations from the Ocean Sound EOV Implementation Plan:

1. Set up international coordination for observations from hydrophones and particle motion detectors—**The IQOE WG on the Global Hydrophone Network was set up to address this recommendation. The WG is currently discussing the development of national and regional groups to help the work of the WG and sustain it beyond 2025.**
2 Maintain the existing global set of hydrophones and particle motion detectors and historic ocean sound datasets—**IQOE is working on compiling metadata for observations made from hydrophones, but not yet for particle motion detectors. The metadatabase**

on hydrophone observations is updated often and a deadline has been set for 30 April 2025 for inclusion in the first metadata report.

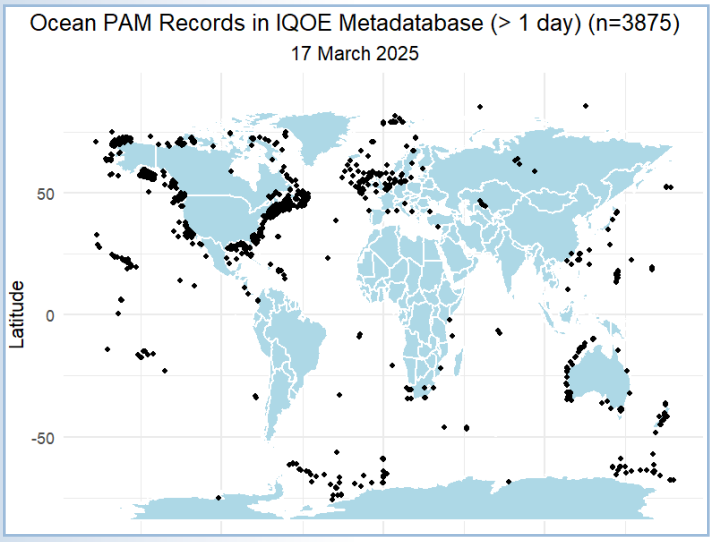
3. Foster inclusion of particle motion sensors and their deployment systems where needed—**IQOE is investigating the formation of a global network of ocean particle motion observers.**
4. Review existing deployments of ocean acoustic sensors, identify gaps in coverage and propose how to mature them into a GOOS observation network—**This recommendation will be carried out by the IQOE WG on the Global Hydrophone Network based on the metadatabase of ocean sound observations. IQOE is discussing the development of the global hydrophone network as an Emerging GOOS Network.**
5. Develop standards for GOOS-compatible underwater acoustic recording systems and explore adding acoustic sensors to existing GOOS networks—**IQOE is in discussion with the OceanSiTES network about adding hydrophones to its installations.**
6. Working group(s) on calibration, standardizing data analysis, and data management—**Calibration and standardization work is being conducted beyond IQOE, by the International Standards Organisation (ISO), MANTA, and OPUS.**
7. Develop standardized open-access databases of ocean sound produced by known human, biotic, and abiotic sources—**GLUBS is working on the biotic components. OPUS is providing an open-access tool for accessing acoustic data from various sources.**
8. Develop low-cost underwater acoustic measurement systems for educational and citizen science applications—**IQOE set up a Task Team on Low-Cost Hydrophones for Research, Education, and Citizen Science (see below).**
9. Engage with industry and regulators along with ocean acoustic modelers to develop hindcast, nowcast and forecast ocean soundscape scenarios. **This work has not started yet.**
10. Outreach to policy makers, industry representatives, the media, and other stakeholders. **IQOE is planning a series of Webinars that will make basic information about IQOE activities available.**
11. Develop a self-sustaining observation network for the Ocean Sound EOV. **This work has started with the IQOE WG on the Global Hydrophone Network.**

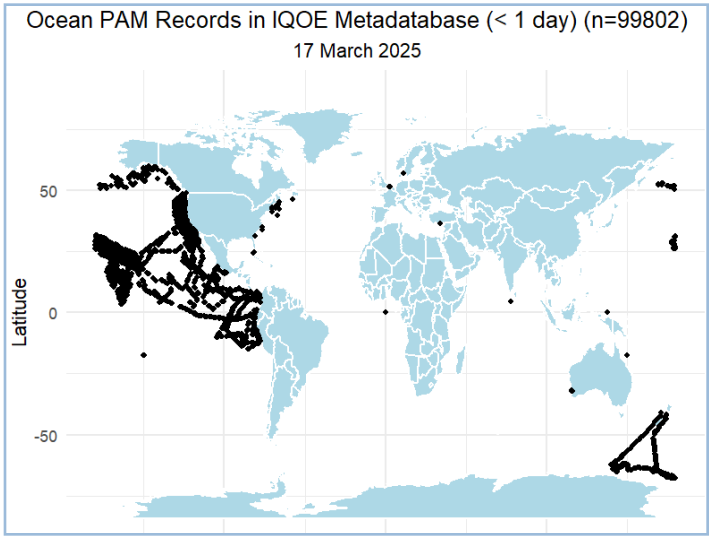
UPDATE ON COVID-19 PANDEMIC NOISE OBSERVATIONS AND PUBLICATIONS

Since the previous IQOE Newsletter, no new papers have been added to the portal on effects of the COVID-19 pandemic on ocean sound at https://iqoe.org/covid-pause-papers. IQOE is currently examining what can be learned from published papers and contacting individuals to encourage a quantitative study of acoustic data available for sources worldwide.

GLOBAL OCEAN SOUND METADATABASE AND WG

Ed Urban (IQOE Project Manager) reported that, as of 17 March 2025, there were 3,875 public and 681 private passive acoustic observations since 1999 that are at least one day in duration, and 99,802 shorter recordings. See maps below.





IQOE will close submission for the first metadata product on 30 April 2025. After this time, a DOI will be sought for the metadata product comprised of the short- and long-term public metadata, with all metadata providers listed as contributors to the product. An article will be written describing the metadata and submitted to a peer-reviewed journal.

IQOE intends to update the database at least annually with additional metadata submitted.

Metadata can be submitted using this form.

LOW-COST HYDROPHONES

Lucille Chapuis (La Trobe University, Australia)—the chair of the IQOE Task Team on Low-cost Hydrophones for Research, Education and Citizen Science—provided an update to the SC on the Task Team's work (see abstract from OCEANS 2024 meeting). The goal of the group is to create an open-source design for a calibratable hydrophone that could cost as little as 200 USD per unit, making it feasible to deploy a larger number of units for a lower price than for more sophisticated hydrophones, and would make uses beyond research more feasible. The team is making good progress toward having a design ready for beta testing by mid-2025 by up to 50 beta testers around the world. Since the previous *IQOE Newsletter,* the team has obtained 20,000 euro from POGO and SCOR to produce units for beta testing.

An online survey of end-users was answered by 138 respondents, yielding some expected results, but also some unexpected findings (see infographic). 90% of respondents believe that such a low-cost autonomous device is needed, including a significant portion of respondents who were senior researchers. The temperature and depth specifications match well with the current design of the device. Part of the team's work will be to develop an outreach and educational platform on how to gather data, analyze it, and share it. The IQOE SC congratulated Lucille and the task team for its progress so far.

Breaking News: The "Global Sounds: Low-Cost Hydrophone Project" has been officially endorsed by the UN Ocean Decade as a Decade Action!

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.

OPUS

Developed by the Ocean Acoustics group of the Alfred Wegener Institute for Polar and Marine Research (AWI), the Open Portal to Underwater Soundscapes OPUS (https://opus.aq/) currently features 58 long-term acoustic datasets, 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 (9 datasets), North Sea (8 datasets), North Atlantic Ocean (2 datasets) and South Atlantic Ocean (2 datasets). For 52 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 datasets from NOAA's SanctSound project, based on MANTA-processed data at 1-minute resolution (without the associated audio files being provided).

Further external passive acoustic datasets are currently being prepared for display through collaborations with the Flanders Marine Institute VLIZ and the Zurich University of Arts ZHdK.

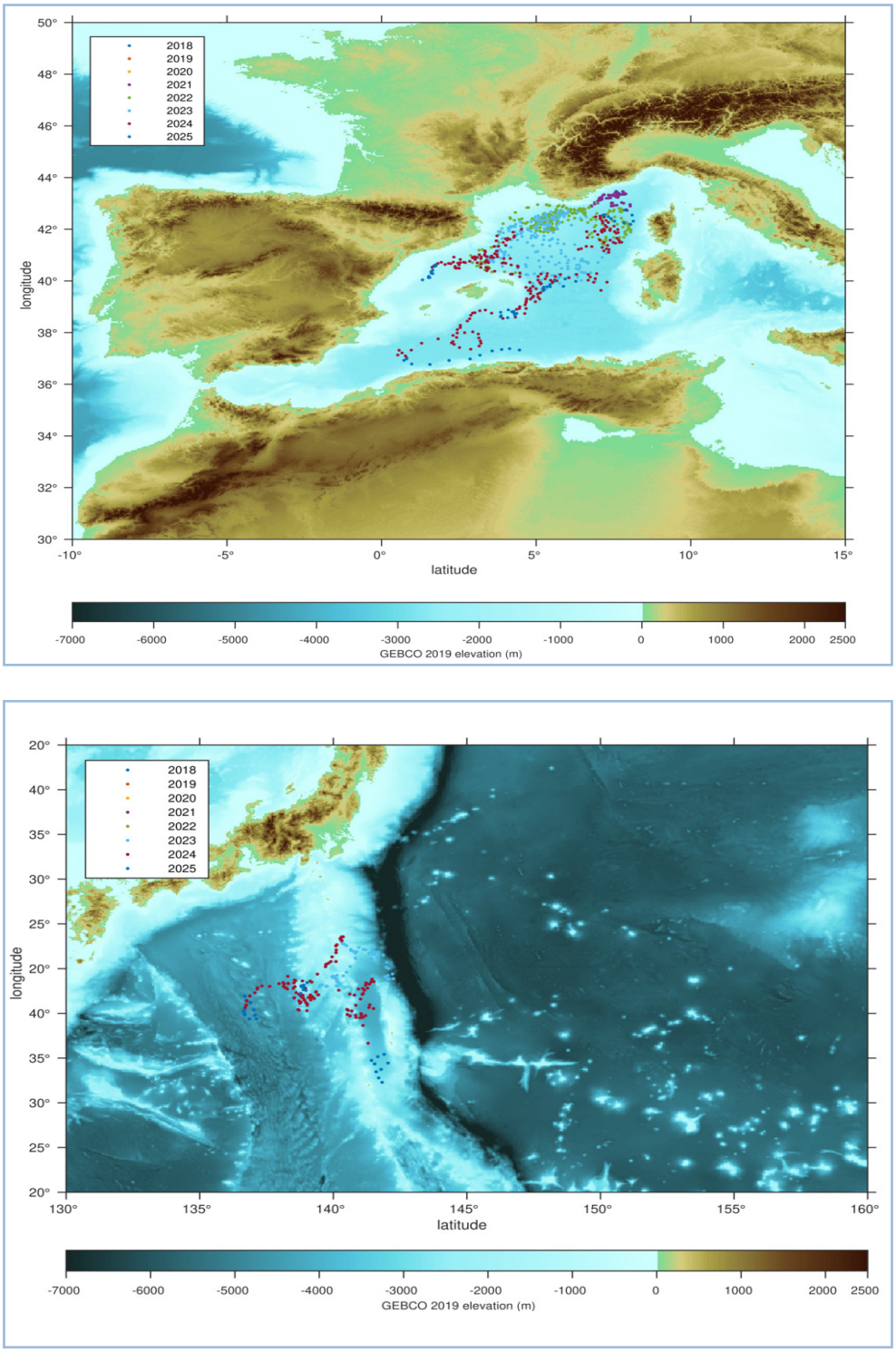
Ongoing cooperation with the AWI's Geophysics section recently resulted in OPUS' ability to display OBS (ocean bottom seismometer) hydrophone data. In addition, in close collaboration with IQOE, OPUS is currently developing workflows for displaying the IQOE PAM database after IQOE's sunset by the end of 2025, 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 welcome to explore OPUS and share any feedback on its performance and functionality with us 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.

MERMAID

As mentioned in the Ocean Sound Essential Ocean Variable Implementation Plan (pp. 48–49), Mobile Earthquake Recorder in Marine Areas by Independent Divers (MERMAID) floats provide a potential source of passive acoustic recordings for both ambient sound observations and bioacoustics. These floats are designed primarily to detect earthquakes, but the hydrophones they include can provide observations at low frequencies, and they could provide a platform for higher frequency observations. Seventy MERMAID floats are currently active as part of the EarthScope-Oceans project.



Examples of time series of deployments in Mediterranean Sea (top) and off Japan (bottom) (provided by Frederik J. Simons, Princeton University, USA)

MERMAID floats collect acoustic and seismic data related to earthquakes while parked at a depth of 1,500 m. When an earthquake is detected above a pre-set strength and a pre-set signal-to-noise level, the float rises to the ocean surface and reports data filtered for seismic signals and sounds below 20 Hz via an Iridium satellite link. Acoustic signals could be processed onboard the floats to relay spectral probability densities of acoustic signals for any desired time period from hours or longer and they could be adapted to sample across all depths at which they are capable of being deployed. In present deployments, the floats surface on average every 6.25 days, so transmission is relatively frequent and surfacing time can be pre-set, depending on the sampling design. Like Argo floats, MERMAID floats deployed by different institutions can have different capabilities. For example, Mediterranean units are designed to not report earthquakes, but only noise spectral densities. Japanese units are equipped with CTD profilers and 4,000-m diving capability. All other units are capable down to 2,000 m, but are usually parked at 1,500 m. Some French MERMAID floats plan to add higher-frequency hydrophones (and the required processing capability) for bioacoustic purposes. Brazilian MERMAID floats will soon have ocean-bottom landing capability (hence they are stationary for a longer period).

NEWS FROM ENDORSED PROJECTS

Development and Evaluation of noise MAnagement Strategies to Keep the North Sea healthy (DEMASK)— In summer 2024, DEMASK scientists measured noise from recreational boating on the west coast of Sweden around the Kosterhavet National Marine Park. Hydrophones were deployed at five locations during July and August 2024. This research will provide necessary data to help marine policymakers determine how to limit the impacts of human activities on marine organisms in this area.

DEMASK has been actively engaged with both the scientific community and policymakers, making presentations at the 8th Effects of Sound in the Ocean on Marine Mammals (ESOMM) meeting in September 2024, participating in a HELCOM conference in September 2024, and participating in the Second Roundtable on Underwater Noise and Shipping.

More information about these activities is available in DEMASK Newsletter #3.

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.

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.

Africa

The latest African Bioacoustics Community newsletter has just been issued. It highlights bioacoustics research on the continent, publications from this research, and information about events and opportunities in the region.

Endorsed projects (3): DEMASK, NRS, PHYSIC

Publications in Aquatic Acoustic Archive**:** 7,115

IQOE Email List: 422

BlueSky: @iqoe.bsky.social

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