



## 33<sup>rd</sup> Conference of the European Cetacean Society

### WORKSHOP



### ***Long Term Ecological Data Series in cetaceans: essential but challenging!***

*4<sup>th</sup> April 2022 - half day morning (9-13h CET - online)*

Organized by José MN. Azevedo, Laura González García & Marc Fernandez  
(MEEMO project, ACORES-01-0145-FEDER-000079)



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## **REPORT OF THE WORKSHOP**

### **Long Term Ecological Data Series in cetaceans: essential but challenging!**

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Keywords: LTER, cetaceans, opportunistic data, long term data series

#### **Abstract**

Ecological systems usually operate at large temporal scales, which are not always considered in traditional data collection. For instance, some questions, such as climate change or anthropogenic pressure potential effects, require long-term datasets to understand how ecosystems may respond to any disturbances or impacts. In the short run, traditional studies often provide high quality data for a specific space and time. However, long temporal series are needed to identify natural variability and potential trends in the environment and its populations, such as changes in distribution or the ecology of the species. Collecting long-term wildlife occurrence data is challenging and has been often undervalued. Dedicated data collection is generally expensive and limited in space and time for cetaceans. However, opportunistic platforms provide a cost-effective method to obtain information over long periods and defined areas. Nevertheless, challenges are evident for both opportunistic and dedicated programs. Here we summarize critical aspects for long-term initiatives to survive. We account for considerations such as standardization of protocols, long-term planning, specific training, or even robust data validation to guarantee data quality. Additionally, making the data openly available, standardised, providing biases and limitations, or even dedicated consultancy and expertise to avoid misleading conclusions are highly desirable steps towards a FAIR and better-quality scientific output. Finally, long-term initiatives need a long-term engagement. This might be achieved through enthusiastic people or leaders who can keep involved over time with data collectors, third parties interested in data and also the general public. Nowadays, collaboration is vital for highly mobile species such as cetaceans to get information over large areas and long periods. Only by doing so we will obtain the data we require for the studies we need.

## General introduction to LTER

In recent years, Long Term Ecological Research has become increasingly important to understand ecosystem complexity, identify natural variability, and detect rare events or disturbances caused by anthropogenic or natural changes. Initially defined in the early 80's with the foundation of the US LTER Network, LTER aims to: (1) foster and promote collaboration among researchers; (2) create standardized methodologies; (3) facilitate the exchange of data; and (4) provide valuable information to scientists, policy makers and the general public. Following these conceptual, collective efforts have led to the creation of the International and European LTER Networks (1993 and 2003 respectively). Although most of the sites registered within these platforms are terrestrial, marine and coastal areas have been progressively added to the list, representing nowadays around 15% of the sites verified by the ILTER (Muelbert et al., 2019; ILTER).

Ecological systems usually operate at large temporal scales, which are not always considered in traditional data collection. These typically provide a good understanding of the time window considered, but a weak and often misunderstood general context. Comparisons over time allow us to observe natural variability but also trends and/or changes in the populations and the ecosystems and, therefore, hypothesize their relationship with other natural or anthropogenic factors. For instance, climate change or cumulative effects of anthropogenic activities may have an impact that could be overlooked when analysing short periods of data. We need the big picture, the general context of the history, which may enclose more specific chapters that can be the subject of a more specific dedicated study. Nowadays, the lack of baseline data is a fact in several marine regions (Correia et al., 2021). Information about species distribution (such as the occurrence of a particular species in space and time) and abundance are the foundations of ecology and essential to understand the health of an ecosystem. Therefore, implementing long-term monitoring programs is necessary to fill this gap and complement our current understanding of ecosystem functioning. They provide important clues to improve management and conservation plans, allowing natural variation to occur while preserving species and ecosystems.

Collecting long-term wildlife occurrence data is challenging, but opportunistic platforms often provide a cost-effective method to obtain information over long periods and defined areas. For cetaceans, regular long-term monitoring based on opportunistic or dedicated surveys has been shown to provide valuable information to analyse occurrence, richness, diversity, distribution and habitat preferences (Natoli et al., 2022; González García et al., 2022; Fernandez et al., 2021; Correia et al., 2021), migrations and individual movements (Mullin et al., 2022; Wenzel et al., 2020), or detection of rare species, among others. As ocean sentinels, information about cetaceans' ecology and distribution (such as changes in the phenology of migrations; shifts, expansions, or reductions in their distribution ranges; or changes in relative abundance over time) can be directly linked with the health of marine ecosystems.

Nevertheless, as it is well known, maintaining and keeping LTER is challenging due to many potential inconveniences, such as a lack of funding to maintain the initiatives. With this workshop, we encourage researchers to share their experience and outputs of LTE programs

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for cetaceans, especially those based on citizen science. Moreover, we promote discussion on how long-term initiatives can be kept alive, using real-world examples and opportunities.

### **Aims:**

- (1) To compile and disseminate during the workshop session ongoing cetacean Long Term Ecological (LTE) data initiatives, with a particular focus on those based on citizen science.
- (2) To identify the main challenges and opportunities in cetacean LTE data series.

### **Logistic challenges**

Until today, cetaceans are still not well represented within LTER sites, probably due to the several **challenges** associated with their surveys. For instance: the expensive nature of dedicated surveys, which are not usually the target of government funding, especially in long-term; the limited area surveyed, both in space and time, particularly in inaccessible regions like high seas where cetaceans spend a large part of their lives. The latter often leads to uneven distribution of records, usually biased towards more accessible areas and over shorter periods. Furthermore, cetacean monitoring is highly weather dependent, both in terms of survey opportunities and cetacean detectability, which is enormously hindered by rough seas and bad meteorological conditions.

However, some of these challenges are partially overcome in some independent initiatives, usually **based on citizen-science and/or opportunistic platforms** of observation. They have recently become increasingly important for cetacean surveys, as they can provide in a cost-effective way valuable information about cetaceans that otherwise would be unavailable. They rely on third parties, usually, commercial platforms (e.g., ferries – Arcangeli et al., 2019-, fishing boats -Machete et al., 2014; Catarino & Machete, 2020-, whale watching boats -Azevedo et al., 2021; González García et al., 2018; 2022; Fernández et al., 2021) for whom research is rarely the main goal, but who have access to less surveyed areas (e.g., high seas or remote touristic locations) and on a regular basis (e.g., daily whale watching trips, weekly ferry routes).

Ensuring **data reliability** in the long-term is highly challenging. However, it can be maximized by following protocols and providing some specific training to the observers when possible. In long-term programs, people change over time, with different involvement and interests and even different qualifications and skills. To ensure the minimum competencies needed and increase the chances of higher quality data recorded, **specific training** can be sometimes provided to the new surveyors (rather than using citizens without background on the topic). This training can be brief, simple, and highly focused on the project's requirements. Dedicated (trained) observers have been increasingly used for opportunistic cetacean data collection surveys. Simple **protocols** must exist to standardize data collection and guarantee data homogeneity over time. The essential very basic information must be included, and any other extra notes must be optional. They can help to validate some of the data. However, if mandatory, they might become extra time and effort consuming, leading to a decrease in the quality (or quantity) of the basic information required, mainly when working with opportunistic platforms or citizen science (time and effort consuming).

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Nonetheless, all data must comply with a robust **validation** process, which at the same time must be standardized and well defined in order to guarantee the minimum standards required for valid data. **Planification** in the long term (e.g., constant effort schemes) help to organize and maintain sampling over time. LTE datasets imply repeated surveys or measurements over time, requiring discipline, supervision, and perseverance to maintain the methodology as standardized as possible and ensure consistent data quality.

### Research challenges

**Long term research goals need time to set up.** Thinking about current long-term projects, probably when they started, goals were not fully clear as they might look today. Some long-term settings could only be adjusted with real implementation and time; some long-term objectives might be only developed once the program is set and data collection has started. However, all the experience that the scientific community has gained over the last 40 years greatly evidences the importance of long-term research for the past, present, and future.

As previously explained, data quality may be highly variable in long term datasets. For instance, some data may be valid to analyse when but not how many animals were present at a specific time and space, providing great insights into temporal distribution, but being strongly biased for abundance studies. However, with a good knowledge of the data collection methodology, bearing in mind the limitations and opportunities of each dataset, **appropriate research questions** can be adopted. It is the researchers' responsibility to deal with data limitations properly. Bias must be accounted for, mainly when talking about opportunistic data. Clusters of records might reflect observers' effort instead of the species distribution.

In some cases, the considerable amount of data available in LTE datasets has shown to minimize some of the sampling bias associated with it (Giraud et al., 2014). Different time scales also address different questions; for instance, short-term variability should not be extrapolated to longer periods and vice versa. Limiting the scope of the studies (and data overanalyses) is essential to avoid misleading conclusions. Not all data are valid for all kinds of analyses!

Long term research and **data** have been increasingly demanded and **requested** by the public and private organizations. Data is needed to support decision-makers, implement management plans, address mitigation and conservation plans, and forecast potential future scenarios from an environmental perspective and a socio-economic view. Data is needed to get a sound understanding of our oceans' current and past situations and to understand how natural or human-induced changes in the environment may affect them. LTER provides the data needed to prepare the appropriate tools or take the best possible actions to minimize, avoid or respond to these potential impacts. However, data alone is not the answer, as by itself can lead to biased conclusions if expert knowledge and advice are not adequately applied.

There is an increasing trend of making the **data open shared** in the scientific community. [Open access to data enhances its quality, reduces the need for duplication of research, speeds up](#)

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scientific progress and helps to combat scientific fraud (European Commission, 2012). Several biodiversity data platforms (e.g., OBIS, GBIF, EMODNET) or institutional repositories already store and disseminate biodiversity datasets worldwide. Datasets must be structured and organized following standardized principles to be shareable (e.g., Wieczorek et al., 2012). The FAIR principle, established in 2016 to improve data management and stewardship, stands for “Findability”, “Accessibility”, “Interoperability”, and “Reuse” of the digital assets (Wilkinson et al., 2016). The four principles encourage human-machine links to make data easily readable by computers and facilitate its access and (re)use. Notwithstanding, limitations and sources of bias must be acknowledged to minimize misinterpretation, and recommendations or advice for analyses could be highly welcome by external users.

### **Keep initiatives alive**

Long term initiatives must keep **engagement** over the years. Regular feedback must be maintained to and from the participants who collect the data, with third parties interested in the data utilization, with stakeholders and sponsors or funding entities, and with the general public to enhance the outreach of the project and leverage its value. For cetaceans, the last step is usually easier than for other topics, as they are charismatic representatives of the complex ecosystem they inhabit. As flagship species, they have a strong potential to be supported by a broad audience, raise awareness about the entire ocean and its inhabitants, and induce longer society engagement in cetacean related initiatives. Nowadays, web presence, social media, etc., provide excellent tools to enhance engagement.

**Enthusiasm** must be transmitted! Sometimes underestimated, enthusiasm is vital to create and maintain long-lasting initiatives. It is often linked to the founder person(s) or leader(s) who sets up the work and outlines the roadmap. It must transmit the importance of the program, go beyond present (and past) actions and goals, and look to future needs and opportunities. One of the biggest challenges for long term projects is to pass on this enthusiasm to new generations, new leadership, and new participants. Change is almost mandatory for long-term initiatives (at least unavoidable most of the time!), but essential cornerstones must be kept over the years. Decades of data are likely to require **adaptation** to new realities, new technologies, different observers’ qualifications and backgrounds, different data usages, etc. Nobody can foresee what challenges will we have in 40-year time from now.

Nowadays, there are hundreds of initiatives to collect wildlife data worldwide. Long-term research aims to cover extended periods, but large spatial scales are also welcome for further research. Each additional year of data added to the long-term dataset exponentially increases its value. Again, gaining perspective over time and space is a must. However, stand-alone initiatives do not always manage to survive for long times or cover large areas. Establishing ways of **collaboration** between them and implementing standardized protocols to accommodate different datasets under the same framework is essential to look at a broader scale in space and time. It often gives the needed fuel to the programs to survive. Cetaceans



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do not understand borders and environmental issues that affect the whole globe, therefore, the bigger picture is mandatory (but not exclusive!) and will only be achieved through collaboration.

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## **FINAL PROGRAM**

9:00-9:10 - Welcome and participants introduction

9:10-9:30 - Opening session & workshop objectives. [Marc Fernández](#) (MARE-Madeira)

***LTER in cetaceans: an opportunity to monitor oceanic ecosystems.***

### **Keynote speaker**

9:30-10 (20' talk + 10' Q&A) - [Simon Berrow](#) (Irish Whale and Dolphin Group)

***Long Term Monitoring of Cetaceans in Irish Waters: trends, challenges and opportunities over a 30-year period.***

### **Participant presentations**

10-10:20 (8' each)

- *Tour-operators as key tool to improve information on data deficient cetacean species.*  
**Rui Peres dos Santos** (CMMAR, Universidade do Algarve).
- *Sea turtle and Marine Mammal Surveys in Lagos Southwestern Nigeria.* **Oyeronke Adegbile** (NIOMR Lagos).

10:20-10:35 - Q&A

### **Break**

10:35-10:50 - Bathroom, coffee and back!

### **Keynote speaker**

10:50-11:20 (20' talk + 10' Q&A) - [Antonella Arcangeli](#) (ISPRA) & [Paola Tepsich](#) (CIMA)

***The Fixed Line Transect Mediterranean monitoring Network:  
a long-term collaborative challenge for systematic monitoring of cetaceans  
and main threats using ferries as platforms of research.***

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### ***Participant presentations***

11:20-12:00 (8' each)

- *Collecting data in the Eastern North Atlantic - focus on offshore waters* (CETUS Project). **Mafalda Correia** (CIIMAR).
- *Beyond whale watching*. **Inês Coelho & Maria Ana Ernesto** (Futurismo Azores Adventures).
- *Long-term datasets as a tool to study cetaceans in an insular oceanic system*. **Rita Ferreira** (MARE-Madeira).

12:00-12:15 - Q&A

### ***General discussion***

12:15-12:50 - General discussion.

12:50-13:00 - Wrap up and future actions.

## **BOOK OF ABSTRACTS**

### **ILTER in cetaceans: an opportunity to monitor oceanic ecosystems**

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The Long-Term Ecological Research (ILTER) concept was born in the late 70's, focusing on the need to change the paradigm of traditional ecological studies. Ecological patterns in broader time scales were not well understood and monitored. Consequently, a series of sites were established to be monitored regularly, following standardized methods on a long-term base. Nowadays, more than 800 ILTER sites are documented worldwide; however, only some are marine, and only a few take into account cetaceans. Cetaceans play an essential role in the marine habitat, providing several ecosystem services, ranging from socio/cultural aspects to climate change mitigation. Apex predators (such as cetaceans) play an essential role in the trophic regulation of the ecosystem and can be considered sentinel species to monitor ocean health. Even if only a few official long-term sites consider cetaceans as crucial species, many organizations and projects focused on keeping alive monitoring programs for many years despite the difficulties associated with funding and management. These efforts are primarily based on platforms of opportunity due to their cost-efficient nature, allowing the sustainability of data collection over decades. These programs provide excellent baseline information, but it is essential to complement them with dedicated efforts to provide answers to more complex questions.

Keywords: ILTER, cetaceans

**Long Term Monitoring of Cetaceans in Irish Waters: trends, challenges and opportunities over a 30 year period**

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Each year of monitoring data added to a time-series, adds value at an ever-increasing rate. However, maintaining long monitoring at decadal scales provides many challenges from funding to personnel, to data storage and access. The Irish Whale and Dolphin Group (IWDG) have been running a number of such long term for some 30 years. These range from Cetacean Sighting Schemes to photo-id of a resident bottlenose dolphin population, ferry surveys and studies on humpback whales. Most of these schemes rely heavily on citizen science, which brings huge benefits but also limitations on analysis and interpretation. The IWDG Casual Cetacean Sighting Scheme has collected over 30,000 sighting records. Robust and consistent validation ensures these data can be used to explore distribution and relative abundance and identify long-term changes. IWDG ship surveys, including ferry surveys along three routes led to the publication of the first offshore atlas of cetacean distribution in Ireland and some platforms used have recently been adopted by government agencies as part of their Ecosystem Approach to Fisheries Management. A photo-id study initiated in the Shannon Estuary in 1993, led to it being designated as a Special Area of Conservation for bottlenose dolphins and is now revealing subtle changes to the population's distribution. While the IWDG WhaleTrack Ireland project has shown an increase in humpback whales in inshore Irish waters with high re-sighting rates and summer residency. All these datasets are currently being mined to identify potential Marine Protected Areas for cetaceans and inform risk assessments for the rapidly developing offshore renewable energy sector. In this presentation we present some of the findings of these schemes, discuss the challenges and opportunities they present and provide recommendations to similar schemes nearer the start of their own time-series.

Keywords: time-series, sightings, ferry surveys, photo-id, bottlenose dolphin, humpback whale

**Tour-operators as key tool to improve information on data deficient cetacean species**

*Rui Peres dos Santos*<sup>\*1,2</sup>, *Yasmina Rodríguez*<sup>3</sup>, *Richard Sears*<sup>2</sup> and *Rita Castilho*<sup>1</sup>

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Even though the majority of cetacean species are well-documented worldwide, there are still information gaps of some species. Using whale-watching tour operators as an opportunistic platform, we have the goal to obtain baseline data from false killer whales (*Pseudorca crassidens*), a poorly known odontocete species, in the Azores archipelago (Portugal). We aim to describe this species in the area, their main behaviours, and its relationship with another cetacean species. A total of 45 encounters of false killer whales were detected from April to October between 2012 and 2016. The mean size of the groups was  $31.36 \pm 5.93$  ( $\pm$  SE) animals per sighting. During the study period 59 individuals were photo-identified and 13 animals were re-sighted. From these, 69% were matched almost twice in different years. In two cases, animals were recaptured in five different occasions between 2012, 2015 and 2016. Common bottlenose dolphins were almost sighted 40% of the times with our target species. Our results show the importance of opportunistic platforms to provide useful information on population data deficient species, namely on false killer whales.

Keywords: False killer whales, distribution, photo-identification, NE Atlantic

**Sea turtle and marine mammal surveys in Lagos Southwestern Nigeria.**

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Nigeria is a maritime state located in West Africa. Five sea turtle species are found in Nigerian and West African waters. They nest in beaches all along Nigeria's 853km. Along the 75km stretch of sandy beaches in Lagos, sea turtles nest are found especially during the nesting season from September to April. Marine mammal mainly found in Nigerian waters include the toothed whales and dolphins. Sea turtle nesting and marine mammal surveys undertaken along two 10km beach stretches in Lekki Lagos between 2013 and 2020 have indicated three main nesting sea turtle species: Olive ridley, leatherback and green turtles. During the nesting surveys, marine mammal *Delphinus delphis* (common dolphins) were observed moving in nearshore waters alongside direct observation of sea turtles stranding, bycatch and nesting. Sea turtles nesting activity in Lagos appears to be at a peak in November and December. Dolphins were observed playing in the near shore waters in December and January. It is clear that Lagos was a nesting ground for sea turtles and dolphins before the advent of coastal developments. It is therefore expedient for conservation programmes to protect these species to be taken to prevent further exploitation of these species.



**The Fixed Line Transect Mediterranean monitoring Network: a long-term collaborative challenge for systematic monitoring of cetaceans and main threats using ferry as platform of research.**

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The 'Fixed Line Transect Mediterranean monitoring Network' (FLT Med Net) is an international project coordinated by ISPRA since 2007. The project aims to coordinate in the Mediterranean marine region a continuous monitoring of mega and macro marine fauna (cetaceans, sea turtles, seabirds, other macro marine fauna), maritime traffic and floating marine macro litter. Surveys are systematically carried out along 16 cross-border transects, using scheduled ferries as observation platforms. Two specific research protocols are applied for data collection on mega-macro fauna, maritime traffic, and floating marine litter. Since 2018 a specific protocol for ferry based environmental DNA (eDNA) sampling was developed with the University of Milan Bicocca. Surveys are continuously undertaken with at least five surveys per season during all the seasons. The monitored transects across several Mediterranean offshore marine region and countries (i.e., Italy, France, Spain, Greece, Tunisia, Morocco). Since 2007 more than 1.000.000km were surveyed recording thousands of cetacean sightings. The most sighted species were fin whales (*Balaenoptera physalus*) and striped dolphins (*Stenella coeruleoalba*), followed by bottlenose dolphin (*Tursiops truncatus*), sperm whale (*Physeter macrocephalus*), Cuvier's beaked whale (*Ziphius cavirostris*), long finned pilot whale (*Globicephala melas*), short-beaked common dolphin (*Delphinus delphis*), and Risso's dolphin (*Grampus griseus*) with some occasional sightings of rough-toothed dolphin (*Steno bredanensis*) and killer whale (*Orcinus orca*). Difference in distribution and seasonal variations were recorded throughout the years in the whole Mediterranean studied areas. More than a thousand sightings of marine turtles (mostly *Caretta caretta*) were recorded, allowing seasonal comparison in species distribution and habitat use. The network regularly produces scientific papers, and tutors several university theses (Bachelor, Masters, PhD). Among the recent published articles, many investigated species presence and distribution for conservation purposes, habitat use, long-term trends, correlation with environmental features and influence of the main threats of maritime traffic and marine litter.

**Scientific partners collaborating in the project:** ISPRA, Stazione Zoologica di Napoli, University of Pisa DIBIOL, CIMA Research Foundation, University of Torino, University of Palermo DiSTeM, University of Milano Bicocca, University of Barcelona, University of Tuscia, University of Catania, GAIA Research Institute, EcoOcean Institut, Accademia del Leviatano, Nereide, MareCamp.

**Ferry companies contributing to the project:** Corsica-Sardinia Ferry; Grimaldi Lines; Tirrenia CIN; Minoan; CTN; Baleária; Siremar. **Date:** 1 June 2007 – currently active

Keywords: cetaceans, sea turtle, Mediterranean, monitoring, assessment, long-term trend

**Collecting data in the Eastern North Atlantic - focus on offshore waters  
(CETUS Project)**

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The CETUS Project started in 2012 with the aim to collect long-term cetacean occurrence data in the Eastern North Atlantic. Considering data gaps in the area, focus was given to offshore areas. With the goal for long-term monitoring in remote areas, the priority was to apply a cost-effective methodology. As such, platforms of opportunity were selected for data collection, but undertaken by dedicated observers. Until now, the Project has yielded several relevant outputs on cetacean occurrence, diversity, distribution in space and time, and habitat. The CETUS dataset has been published open access, along with a data paper to improve its usage. These outputs are fundamental to comply with the first two FAIR data principles: findability and accessibility. The third principle, interoperability, can be achieved by working towards common standards on data collection, processing, and analysis. Projects such as the “Europe Marine Transborder Transect” (IMPEL Water & Land), aiming at setting-up guidelines in order to standardize monitor protocols, are then necessary. Finally, the fourth principle, reusability, it is partially covered by the data paper. However, in long-term cetacean monitoring programs similar to CETUS, this principle needs to be further addressed by acknowledge bias on data collection, such as: species identification success, observer’s experience, detectability factors, monitoring effort. Such sources of bias need to be identified, quantified, and properly reported.

**Beyond whale-watching**

*Inês Coelho*<sup>\*1, 2</sup>, *Maria Ernesto*<sup>\*1, 2</sup> and *Laura González García*<sup>1, 3</sup>

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Cetacean opportunistic data have become an extremely valuable approach to collect large amounts of data in a cost-effective way, over long periods of time and with a regular spatial cover, allowing to monitor cetacean species and contribute to their conservation. Whale-watching vessels have progressively become more important as an alternative source of information, since the collection of data does not greatly interfere with the tours and the onboard data collection and subsequent research increases the value of the experience itself. Since 2008, different types of cetacean data have been collected by Futurismo Azores Adventures, a whale watching company located in São Miguel Island, Azores. Occurrence data from land (lookouts) and sea (boats) have been registered throughout the years. Biologists onboard record, among other data, the species, time, GPS coordinates, behaviour and group size. Photographic data is also collected for identification purposes, being useful to assess groups or associations of individuals (common, bottlenose and Risso's dolphins, and sperm whales); and movements of individuals, such as humpback or sperm whales, whose migrations have been supported by photo matches between the Azores and different Atlantic areas (e.g., Cape Verde, Iceland, Norway or Bahamas). During the last years, acoustic recordings has been conducted also during the trips using a basic hydrophone on board. These data were already successfully used to estimate the sizes of sperm whales around São Miguel. The lack of quantified effort and data bias related to the commercial interests are common limitations associated with these datasets and should not be ignored. Their effects should be minimized and taken into consideration to avoid misleading conclusions. Nonetheless, multiple projects have successfully been conducted from Bachelor/Masters/ PhD thesis, international conferences, and scientific publications, proving that opportunistic whale watching data is valuable resource with an academic, educational and scientific perspective.

Keywords: cetaceans, long term data series, opportunistic data, whale watching, Azores

**Long-term datasets as a tool to study cetaceans in an insular oceanic system**

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Research and conservation of cetaceans present numerous difficulties due to their high mobility (often over difficult-to-access oceanic areas) and complex behaviours of such long-lived species. Therefore, long-term databases are used to decode patterns and reveal connections that would be undetectable in shorter periods of time. In Madeira Archipelago (NE Atlantic), we have been compiling a diversified dataset since 2004 that englobes effort-related sightings, and photographs of cetaceans collected from platforms of opportunity, such as whale-watching boats and an inter-island ferry. This dataset has been the basis of several analyses and led to 15 scientific publications (so far), exploring diversified themes ranging from baseline research on temporal and spatial distribution to site fidelity and behaviour analyses of multiple species of cetaceans. By establishing collaborations with other teams in neighbouring areas, it was possible to reach a new understanding of the movement patterns of multiple species in this area of the Atlantic Ocean. Collaborative relationships with stakeholders are essential for the successful establishment of these datasets, resulting in an immense amount of open-access data available for research that provides valuable support to conservation measures.

## **LIST OF PARTICIPANTS**

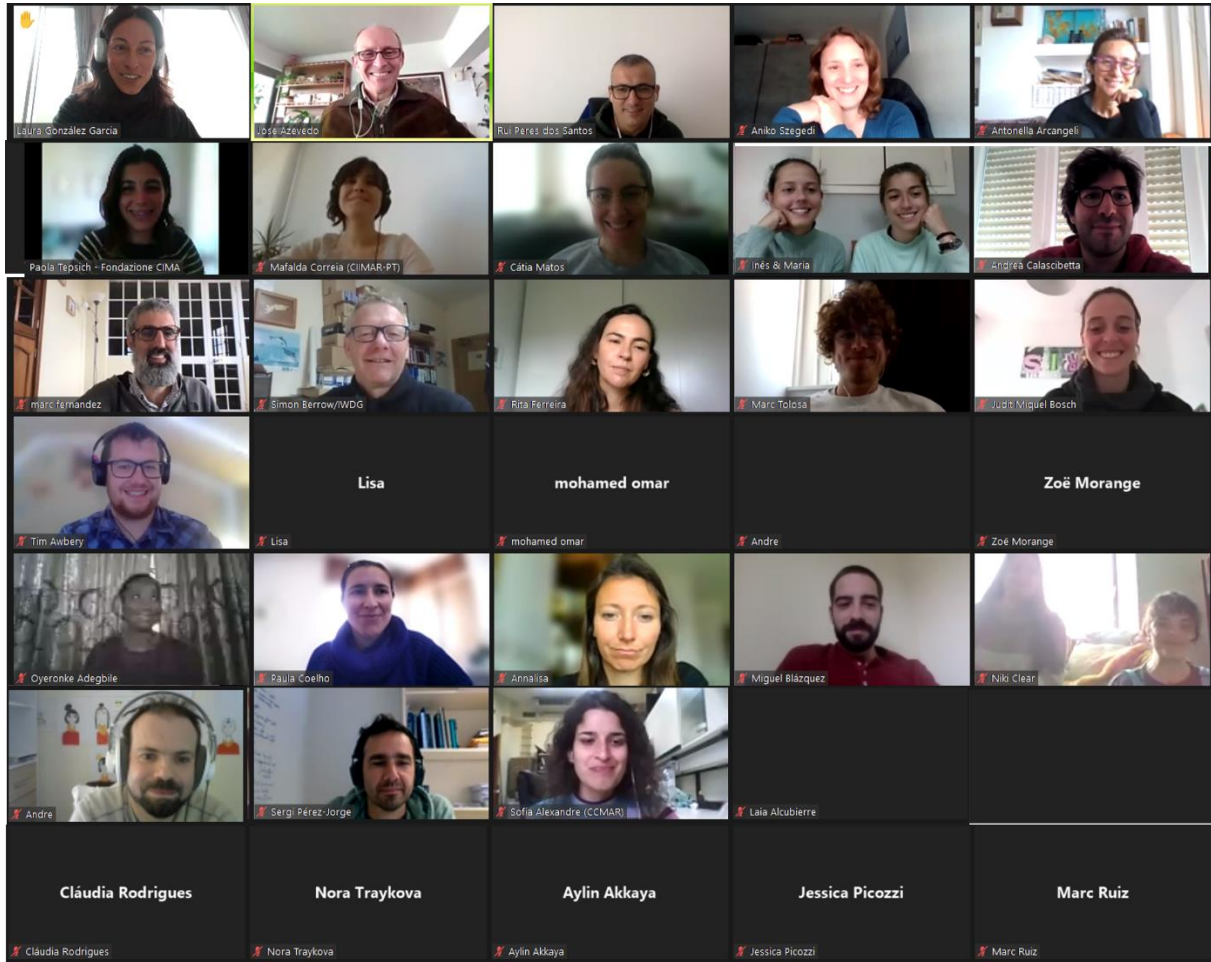
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2. José Manuel N. Azevedo (*organizer, GBA- University of the Azores, Portugal*)
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7. Antonella Arcangeli (*ISPRA, Italy*)
8. Paola Tepsich (*Fondazione CIMA, Italy*)
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38. Sergi Pérez-Jorge (*Institute of Marine Research, Azores, Portugal*)
39. Cláudia Oliveira (*Okeanos R&D, and Institute of Marine Research, Azores, Portugal*)

53 registrations – 39 in the room

**Long Term Ecological Data Series in cetaceans: essential but challenging!**

**Long Term Ecological Data Series in cetaceans:  
essential but challenging!**

4<sup>th</sup> April 2022 - half day morning (9-13h CET - online)



*Thank you all!*

Organized by José MN. Azevedo, Laura González García & Marc Fernandez  
(MEEMO project, ACORES-01-0145-FEDER-000079)

