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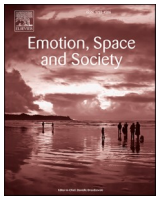

# Narrators of submersive affective atmospheres: Analysing oceanic representations through narratives of sound

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ABSTRACT

Art-science installations with a focus on marine research are a critical way that the ocean is experienced by various publics beyond the physical boundaries of the sea. Like ocean themed cinema, documentaries, music, photo exhibitions, aquariums, museums and so on they contribute to how oceans are imagined and experienced without the need to get wet. Although they can never quite replicate the ocean, they offer touching points for embodied engagement with alternative imaginaries of the sea. *Mirrors* is a sound installation that follows the acoustic journey of the Minke Whale as it travels from Antarctica to the coast of Namibia, which debuted in 2023 as part of an international marine biodiversity symposium. Drawing from the development and delivery of *Mirrors,* this paper contends that sound installations are one way that audiences can know the ocean as they uniquely capture underwater worlds and anthropogenic impacts on marine life. This paper argues that key to the success of this is being able to create narratives that can inspire oceanic imaginations through what is introduced for the first time in this paper as 'submersive affective atmospheres'.

## 1. Introduction: Submerging into the sounds of the sea

We take the steps that lead down to what is usually the mineral vault of the Landesmuseum Natur und Mensch, (Museum of Nature and Humankind), Oldenburg, North Germany. For the next few days, this space will look and sound completely different to how it is normally presented, where rows of glass cabinets line the walls, specifically lit to showcase sparkling geological samples of the earth. What is usually an open, doorless entrance is now covered by a thick black curtain. This is the only way in or out of this small square-shaped room (see Fig. 1). As we enter, it is now dark. Our eyes adjust to reveal that the space is lit only by blue LED lights, some of which line the floor, others cascade down from the walls with a waterfall motion effect (see Fig. 2). The glass cabinets are covered with black cloth so that only the brick walls they rest upon are visible. Upon entering water can be heard bubbling. This sound, together with our descent into the vault, feels as though we are submerging into ocean depths. The curtain closes. Within the middle of the room four pillars create a central space, and in that space, directly facing the entrance is a speaker on a stand. As the bubbling continues, a voice begins from the speaker in front:

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***NARRATOR***

Welcome to the deep sea...

You are now travelling to 200m under the Antarctic Ocean, the same depth that scientists place special waterproof microphones, called hydrophones, in the sea to record underwater sounds...

But why do they do this?

Because sound matters...

Of all the senses sound is the one that travels the farthest in the oceans and through listening to the sounds made by mammals under the sea, we can learn invaluable information about their reproductive habits, migration patterns, and the negative impact of human-made noise on the marine environment....

***(SUBMERGING SOUNDS BECOME QUIETER - ALL SPEAKERS)***

***NARRATOR***

I have heard you are joining us today to follow the journey of the Minke Whale as they migrate from Antarctica to Namibia...

Did you know that as the minke whale travels through the ocean that how it vocalises changes depending on where it is...

But I can only tell you so much...

As my mother used to say, experience is the best teacher

And I've got the perfect teacher to take you on today's journey...

***(VOCALIZATION OF THE MINKE WHALE ARE HEARD FROM ALL SPEAKERS)***

***NARRATOR***

Ah! Listen! I think she's ready ...

Remember to follow the sounds...

(The Minke whale noise continues)

First page of Mirrors script.

These are the first few moments of *Mirrors*, an 8-minute sound installation created by artist-researcher Geraint Rhys Whittaker in collaboration with Marine Acoustic Scientist Ilse van Opzeeland. It debuted at the Helmholtz Institute for Functional Marine Biodiversity's (HIFMB) international summer symposium, 2023, hosted in the museum, which was open to event participants, and the public during the period of the symposium. It was created specifically as a way of exploring how acoustic data can be reinterpreted through art for the purpose of presenting alternative methods of science communication, and for critical thinking around and with the ocean and ocean research (Lesen et al., 2016; Jung et al., 2022). Yet, it was also a first opportunity to offer some of the sound data, and creative work around it, to a wider audience beyond the academic, embracing the opportunity of being located in the city museum.

The installation follows the acoustic journey of 'Mina' the Minke whale, a migrating species, as it travels from the Antarctic Ocean to the coastal waters of Namibia, focusing on its vocalizations (using acoustic data collected by the Ocean Acoustic Group of the Alfred Wegener Institute for Polar and Marine Research (AWI)) as it moves through a seascape subject to anthropogenic change. It presents an orchestrated narrative, telling Mina's story through her own vocalizations, as well as the sounds of the humpback, orca and blue whales, the geological sounds of ice shelves collapsing, and the anthropogenic underwater sounds created by boats and seismic airguns. As the narrative develops, to replicate the movement of the Minke whale making its journey through the ocean, speakers in each four corners of the room are activated in sequence as to set the audience in motion around the space, in one direction, one speaker at a time. With each sound, the audience is

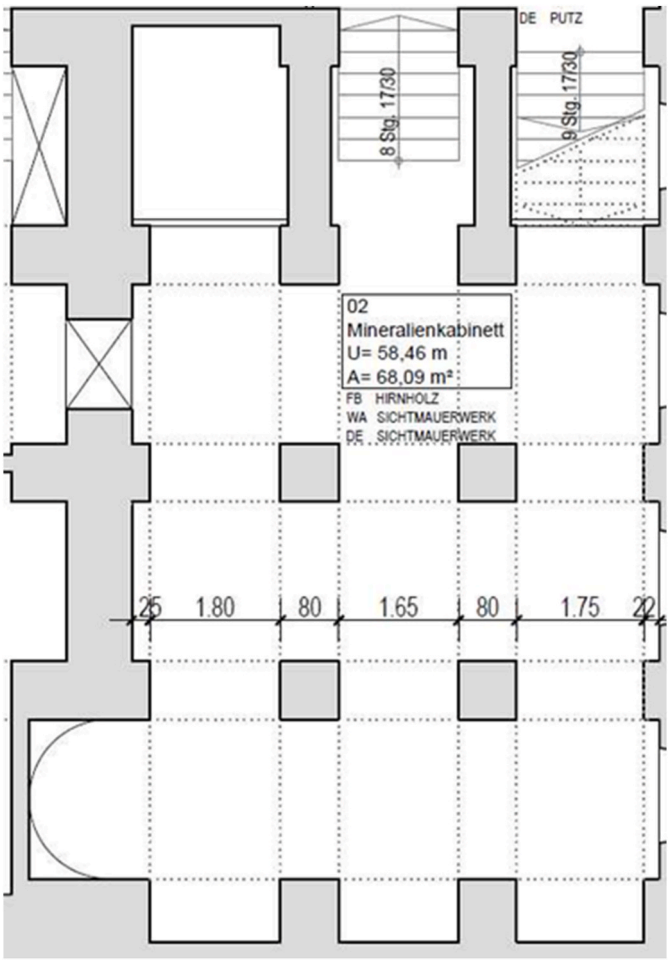


**Fig. 1.** Plan of mineral vault of the Landesmuseum Natur und Mensch.

*moved,* within what we call here a *submersive affective atmosphere*, created through art-science engagement.

In this article, we take the reader on a journey through the deep sea to discuss how *Mirrors* was conceived, describing the process from conception to development and delivery. As such we will show how sound installations can extend the way that the ocean is felt and experienced in 'excess' far beyond the geographic boundaries of the sea even in the driest of landed spaces (in the case of *Mirrors*, the earthly geologic mineral vault) (Peters and Steinberg, 2019; Barclay, 2019). Through primarily, but not exclusively, using sound, the *Mirrors* exhibition was designed to move the audience emotionally and physically through ocean depths, and across sea zones, by coupling ocean sounds with a *narrative* as a useful tool in creating connections between scientific oceanic data and audiences, placing this information in a "socially relevant context" (Weitkamp, 2019:249).

This paper adds to the lexicon of space, place, atmosphere and ocean studies, developing – for the first time – what we call *submersive affective atmospheres:* a mode of engaging the deep ocean through our curatorial practice. Through the design of *Mirrors*, a submersive atmosphere (an underwater atmosphere) was created which intended to bring the audience into touch with the (deep) ocean and life within it, a space that is often perceived to be marginal to the everyday experience of many people. In doing so, we contribute not only to thinking through the work of curating atmospheres (Böhme, 2017; Edensor and Sumartojo, 2015, Bille et al., 2015), through designing *submersion* as a window to watery worlds, but we also discuss *how* we attempted to achieve that submersion. Thus, we progress discussions of oceanic engagement beyond previous analysis of 'immersion' (i.e. Squire, 2016). Aware, however, that no matter how atmospheres are intended to be percieved, because of their "elusive" and "unpredictable" nature they can be experienced in "unintended" ways (Hauskeller and Rice, 2019: 151), we will also reflect on whether these attempts to design a submersive atmosphere were successfully received by the audience by discussing some of the feedback collected through surveys.[1] We will conclude by positing that submersive atmospheres offer another framing for thinking about society-space relations, where the idea of being submerged is crucial to creating (environmental) understanding and engagement, not least in deep ocean realms. We encourage further exploration of how *submersive atmospheres* might be created and curated in a variety of contexts and settings worldwide, to bring people into touch with (often distant) ocean worlds (and beyond), at a time where greater ocean citizenship and literacy is arguably essential for generating planetary stewardship (McKinley et al., 2023, Fletcher and Potts, 2007).

## 2. The journey begins: Establishing a new art-science project

The *Mirrors* installation emerged from an ongoing collaboration between the authors of this paper (especially Geraint and Ilse[2]) which investigates the various ways oceanic acoustic data can be reconfigured and reinterpreted through a creative lens to explore how scientific studies can be made more accessible, engaging and educational through sound art (Barclay, 2019; Tan and Perucho, 2018; Whittaker et al., 2024). From the outset of this collaboration, there was no pre-determined project, rather, we spent (and still spend) time discussing ideas we could potentially develop, not always knowing which ones will become something concrete. Most successful art-science collaborations require this *flexibility* to allow the time to develop trust and the space to think across and through disciplines (Carbone et al., 2019; Whittaker, 2023). A key part of developing and delivering these creative projects is how perceptive an "organizational structure" (Schnugg, 2019: 4) is to the benefits of art-science collaborations. Although the HIFMB is a marine biodiversity institute, its goals of 'enhancing integrative research across disciplines and in a transdisciplinary setting',[3] coupled with individuals who promote the value of public understanding through art, has allowed us the time to develop a variety of novel projects.[4] Because of this flexibility, we as a team felt comfortable to ask if a sound installation might be featured at the 2023 Summer Symposium held at the state museum (Landesmuseum Natur und Mensch).[5] This would offer an alternative component to 'traditional' academic paper presentations and roundtable discussions. As such, we were granted the

[1] In a forthcoming paper we will focus solely on the outcome of the audience feedback, as such, the reflections on the surveys in this paper will be used for illustrative purposes only when reflecting on how the intentions of the design were perceived.

[2] Author 2 has been involved in the wider development of the projects associated with the art-science collaborations led by Author 1.

[3] https://hifmb.de/institute/mission/.

[4] Other projects which have developed include *Polar Sounds* (a worldwide sound art project where over one hundred artists from over thirty countries created a variety of compositions using polar acoustic data) and the *Ocean Science Jam* (an event which brings together musicians, artists, dancers, performers, marine biodiversity scientists and the public to respond creatively in real time to visual and audio cues based on a theme related to marine scientists' work. https://hifmb.de/transfer/art-science/.

[5] This is a marine biodiversity conference which occurs every two years and which has become a significant international forum, drawing speakers globally whose work shapes ocean knowledge.

**Fig. 2.** Mirrors installation (Image: Geraint Rhys Whittaker).

opportunity and funding to do so.[6]

### 2.1. Oceanic representations: submersive affective atmospheres

Once confirming that we would be able to include an art-science intervention at the symposium, our first step was to visit the venue where it would be held. Rather than fit an already pre-existing sound piece into a pre-determined space, we (all 3 authors) wanted to view the room where our installation would be hosted to set out our expectations and limitations before it was created. This is particularly crucial for working with spaces that aren't necessarily designed for sound installations, where we have little or no control over the aural architecture, and where we would only be given a couple of days before the symposium to set up (Blesser and Salter, 2006). The room that we were given to house an installation was the most 'grounded' imaginable: the mineral vault located underneath one of the primary entrances of the museum. Here we would attempt not to take visitors to the depths of the geologic earth, but the oceans. Down two short flights of stairs, the room is described on the museum's website as having

> *deep ceilings, columns and arches made of brick (it) is a special room with its own atmosphere. The old building structure of the museum is the perfect place for the gem and mineral collection.*[7]

Important to note is that the room already had a distinct *atmosphere*: one cultivated by the architecture and the minerals on display, created at any given moment by the constellation of bodies also interacting in and with that space (Adey, 2013; McCormack, 2008). Atmospheres are both something "thoroughly material" (Turner and Peters, 2015: 314) – the physical planetary properties of gases, but also something that is "*held in the air*; an intangible, ephemeral state that elicits 'affects' on the body-subject" (Turner and Peters, 2015: 315, emphasis added). In other words, atmospheres can be thought of as 'conditions' (Adey, 2013).

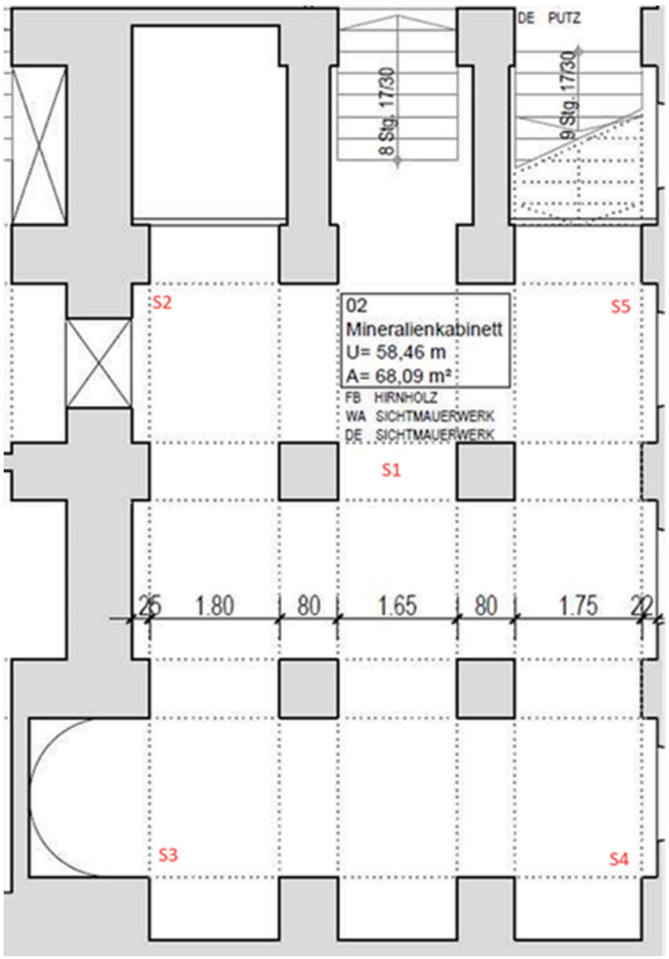


**Fig. 3.** Location of Speakers within Mineral Vault.

[6] Important to note here is that the financial cost of the *Mirrors* installation was not in line with major artistic installations. Other than the cost of the lights which was less than €200 and the hiring of voice actors, again less than €200, the primary cost was to hire student assistants to help administer the project over the two days of the installation. As such this can be considered a relatively low budget installation. Recent work has showed marine social sciences still represent a smaller percentage of work in this field, with lesser funding, with the need for increases not least with the agenda towards ocean citizenship and literacy (Partelow et al. 2023).

[7] https://www.naturundmensch.de/ausstellung/edle-steine-und-minerale.

They are the fleeting outcomes of space, "materiality, performance, sociality, technology" that "come to produce – in assemblage with bodies, in time and space – something larger and more encompassing": a structure of feeling or atmosphere (Adey, 2013: 314).

An attention to atmosphere hence allows for understanding the "elusive, intangible, felt, aspects" of experience, which are often overlooked in other analyses of human engagement with space. Indeed, in work regarding museums specifically, research has shown that atmospheres are particularly resonant ways of understanding how people make sense of what they engage with. As Bjerregaard has written,

> … there is the capacity of the museum to generate a kind of embracing experience, wrapping the visitor in an atmosphere … this atmosphere also seems to dissolve the individual objects at display allowing them to become a part of the general experience of *space* (2015: 2 emphasis in original)

Thus, whilst atmospheres are emergent in given moments, they can also be designed, controlled or engineered (Edensor and Sumartojo, 2015; Turner and Peters, 2015; Waterton and Dittmer, 2014). In other words, to provide a feeling a person will encounter in a given space, curators will try to control atmospheres – they will deliberately try to elicit particular sensations to enable a message to be shared with a broader audience (see Peters and Turner, 2017). As such they will attempt to orchestrate the relational affective properties and how the emotions expressed within a space shape a *collective* experience that is more than just the individual (Lupton, 2017). As Anderson (2009: 80) puts it "atmospheres are spatially discharged affective qualities that are autonomous from the bodies that they emerge from, enable and perish with." Thus, through designing atmosphere, curators try to create a "shared affective space" (Vadén and Torvinen, 2019: 46). It must be remembered however that regardless of intention, how an individual experiences an atmosphere varies between those present and so a completely "shared" experience between every single person attending is as Griffero (2022: 31) highlights "a pretty rare" if not impossible experience to maintain. Saying this, atmospheres can be profoundly political driving groups to actions that can have both liberating and destructive effects (see Osler and Szanto, 2022; Böhme, 2022). Their capacity then for mobilising collectives to act in a certain way must not be overlooked, particularly when considering how art-science projects could be used as a form of science communication to invoke responses to some of the greatest challenges facing oceans (Whittaker, 2023).

For *Mirrors*, the challenge would be to transform the mineral vault, (normally used to represent the underground world), into a space that could house an installation presenting an atmosphere of the acoustic world of the deep ocean. We wanted to create a *submersive affective atmosphere*: that is, an atmosphere that creates oceanic imaginaries by transcending "conventional distinctions between experience, perception and environment" and bringing diverse embodied sensual experiences of the deep sea to the forefront of an experience (Peters and Steinberg, 2019: 13).

To further understand what we mean by submersive affective atmospheres, we first need to define what we mean by the word submersive, in other words, what does it mean to be submerged? In some contexts, being submerged is disruptive, for example when analysing the impacts of land loss due to seasonal flood level rising (Lelaurain et al., 2021; Keech and Ricketts, 2022; Guiteras et al., 2015), or in a medical context, being submerged is often used in reference to the impacts of drowning on a body (Ibsen and Koch, 2002; Suominen et al., 2002; Powell, 2022). As the sea is on the margins of land, not of "permanent sedentary habitation" (Steinberg, 1999: 386), and of three-dimensions, this means that unaided, submersion's impact on the human body is destructive and deadly (see Stratford and Murray, 2018). However, due to the advancement of often expensive technologies, from boats to autonomous underwater vehicles (AUVs) to dive gear, being submerged has also become understood as a transformative process (Squire, 2017). When exploring the wreckages of ships and other material objects such as bottles, bones, cars and so on which become discarded at the bottom of the ocean, Quigley (2023) highlights how over time their appearances alter and take on new forms and purposes. For others, such as James deCaires Taylor the sculptor and creator of the world's first underwater sculpture park, submersion is both a "humbling and life-affirming" experience (2014: 7). And for scientists, being able to submerge way beyond the boundaries of human capabilities has extended knowledge on the ocean. Thus, although the consequence and experience of being submerged means different things to different people in different places and contexts, for this paper it refers to being *fully* below the waterline.

Important here is to make a definitional difference between *immersion* and *submersion*. Much literature on ocean-society-space relations has engaged the concept of 'immersion' (see Squire, for example, 2016, 2017). In a technical sense, and in a watery context, *immersion* refers to when something is partially in the water but a part of it remains above the waterline, for example, when a person still has their head above the water. *Submersion* involves being fully under the water, including the head (Schipke and Pelzer, 2001; Morgan, 2008). It is important here to state this difference, because, when referring to watery engagements the two are often, in fact, used interchangeably. Indeed, scholars such as Helmreich (2016) or Squire (2016) have made important contributions to understanding embodied oceanic interactions – including the whole body as underwater – through *immersion*. We contend, however, that when analysing *representations of underwater worlds*, which have been orchestrated by humans, describing such experiences deserves a more specific focus and language to take us *under the water*. This is because immersion has become too broad a term; a person can be immersed in learning languages (Li, 2019), computer games (Colombo et al., 2023), shopping (Hagtvedt and Chandukala, 2023) and so on. Submersion offers a terminology for thinking of a more specific spatial engagement: that in which an atmosphere is created to represent the body being entirely enveloped (in this case, in water). So, although immersion has become what Schrimshaw (2017) calls 'the new orthodoxy' in sound art as well as wider artistic practices, to get into the depths of understanding how *oceanic* representations are presented, we need a specific language.

Using the term submersive helps us move away from what Cohen and Quigley (2019:2) call "terrestrially-inflected terms" "frames" and "senses" and suggests a lexicon more fitting for analysing representations of below water engagements. For centuries, we have used the land as a guiding point to make sense of the sea (Roman, 2019), and so using the term submersive allows us to make a clear break in the language used to understand specific place-based atmospheres, contributing towards "revising and reorienting" an "aesthetics of the undersea", which in turn allows us to imagine how the "physiology of the senses" and "materialities of the undersea" impact bodies through representations (Cohen and Quigley, 2019: 1). Unlike terrestrial understandings of place, submersion provides the opportunity to think of ways that connect and produce various distinctly *oceanic* ontologies (Deloughrey, 2017), or as Steinberg and Peters (2015: 261) puts it, helps "advocate thinking from the ocean as a means toward unearthing a material perspective that acknowledges the volumes within". When discussing *submersive affective atmospheres* then, we refer here to *watery representations* that mimic the aesthetics of the undersea created in excess away from the seas' edge (Peters and Steinberg, 2019). Although such representations can only ever be "illusions" of nature (Abberley, 2018: 1), their consequences however are still vitally important – the ocean beneath the waterline can still, somehow, be felt. We next turn to our (re)creation of the ocean through the *Mirrors* exhibition.

#### 2.1.1. Playing the room

The creative process of imagining what the sound installation could be, and thus how we would create a submersive affective atmosphere began the moment we stepped into the vault to explore it for the first

time. We[8] visited twice in the months before the symposium and immediately started to map, at least in our imaginations, what could be possible. Within the room we freely discussed ideas, moving around the vault, turning lights on and off, clapping our hands and raising our voices to hear how sound travelled, colouring the room like an empty canvas with potential suggestions. It is in such moments where "sparks of ineffable inspiration" come into play (Whittaker, 2022: 613). These cannot be accounted for or explained other than they were designed by certain people (who bring with them all their experience and perspectives), in a particular place and time (Whittaker, 2022: 613).

We wanted to create an embodied oceanic experience submerging the audience in the sounds of the sea, creating 'audio atmospherics' (see Peters, 2017). Sound is a unique medium that is not only "immersive and proximal" but unlike other senses can both surround and "pass through bodies" (Cox, 2011: 148). If sound, then, is what Riedel describes as something of an "operative force for shaping feelings into something more" (Riedel, 2019: 2), how could we create an atmosphere that moved people both physically and emotionally and make them feel like they were submerged without actually being underwater? In other words, how could we transform the mineral vault's usual atmosphere into a "shared affective" oceanic space through collective listening? (Vadén and Torvinen, 2019: 46).

The architecture of the space would be critical to the early development of what the piece would eventually be. Architecture can "direct our consciousness towards the world" (Borucka, 2015: 3904) and when ascending into the low-lit mineral vault down a narrow flight of stairs with no windows for the first time, this immediately proved to be a point of inspiration and discussion. We felt the space could be used to play with the idea of *submersion, guiding* the audience *into* and through a sonic oceanic world. Most architecture has a sonic atmosphere (Sioli and Kiourtsohlou, 2022), and the vault, with its brick lined walls meant that there was little sound absorption within the room. As Pérez-Gómez (2019: 323), emphasises, the architecture of a building offers "fixity and tectonic coherence" which influences how an atmosphere is presented and experienced and thus, before we started the installation, we were aware that how the piece would be perceived would be "inextricably bounded" with both the "spatial location" and the "gallery's layout" (Krukar, 2014: 182). We therefore had to consider how through design, we could manipulate the space and it's "materialities" and "elements", to create a piece that would achieve our submersive atmospheric goals (Edensor and Sumartojo, 2015: 252).

After familiarising ourselves with the vault, conversations became more focused between Geraint and Ilse about how to present a sonic experience that not only used real oceanic acoustic data but also could *move* the audience around the space to mimic the movement of the Minke whale, at depth, as it migrates from the Antarctica Ocean to the coastal waters of Namibia. Numerous ideas and suggestions emerged; however, it was when Ilse shared reflections on recent acoustic data that shows how the Minke whale traverses the ocean that an idea began to formulate. We started to wonder how through this movement, changing soundscapes might affect how the vocalizations of the Minke whale could be perceived. Acoustically, in Antarctic waters, due to more ice coverage, the vocalizations of the Minke whale travel further, as the summer begins, the ice begins to melt and as it crashes into the sea these sounds can reverberate for kilometres. As the Minke whale then swims through the open ocean it encounters other vocalizing mammals thus experiencing different soundscapes, and when they arrive the coast of Namibia, they then can encounter the anthropogenic noises of ships, which can both physically harm them and mask their communication. Thus, this acoustic journey was the sketch that Geraint, as the artist, needed to start to create the sound installation.

[8] All three authors.

## 3. From deutschland to the deep sea: designing a submersive affective atmosphere

The intention then was for the sound installation to do two primary things; to create an atmosphere or what Böhme (2001: 47, translation from Schmidt, 2019: 525), calls a "spatially disseminated mood" which *submerged* the audience in the acoustic recordings of the Southern Ocean which are central to the story of the Minke whale's migration, and also to move the listeners both physically and emotionally around the vault. As Sumartojo and Pink (2019) emphasise, because people react differently to atmospheres, there will always be limitations to the extent that they can be manipulated and designed. As such, with *Mirrors*, we had to ask ourselves to what extent could we establish "interventions that create the circumstances through which" a submersive atmosphere could be hopefully felt for most of those people attending (Sumartojo and Pink, 2019: 95). To do this, Geraint 1 decided to make narrative, communicated through an audio installation, the central component of the piece. The following sections will explain how the audio narrative was curated and designed for the room and how the lighting of the space became a key component in the implementation of a submersive affective atmosphere. Although this paper focuses more on the process of creating and designing *Mirrors*, and a forthcoming paper will reflect and analyse the audience's responses, it is worth noting whether our intentions were largely received the way we intended them to be. As the audience left the installation, we asked them to scan QR codes to answer a survey on the exhibition and offered the opportunity for further conversations with follow-up interviews. Out of 110 people who visited the exhibition over two days, 63 surveys were returned, and 8 participants were interviewed in follow up discussions, after the event. Some of these reflections will be used in the following sections.

### 3.1. Telling a story through sound and narrative

From an early age, sound and narrative intersect in many ways to serve as a tool that can elicit strong emotional responses, a prime early example, is a parent reading to their child from a story book (Green and Brock, 2000; Hogan, 2011; Mildorf and Kinzel, 2016). For this paper, narrative is defined as a form of storytelling, "a format of communication involving a temporal sequence of events influenced by the actions of specific characters" (Dahlstrom and Ho, 2012: 593). This is not to say that this is the only way narrative should be or has been defined. As Mildorf and Kinzel (2016: 10) emphasise, narratives don't always require a narrator or indeed do not need to have a traditional linear storyline. Various examples of media using narrative focus instead on what Fludernik (1996) calls a 'narrativity', that is, a relationship between the listener and the composition which allows them to connect to it and mobilize their own "human experience", making the listener a key component in how a narrative is perceived (translation from Bernaerts, 2016: 133). For example, in radio, this does not just rely on voice but also "music, noise, fading, cutting, mixing, the (stereophonic) positioning of the signals, electro-acoustic manipulation, original sound (actuality) and silence" (Huwiler, 2016: 102). As such, the use of narrative will be understood as a device that connects audiences to specific 'storyworlds' desired by the authors, which helps move the audience beyond the linearity of a plot line, provoking them to explore their own imaginations to question where the events that unfold in front of them might take them (Ryan and Thon, 2017). Innovations in science and technology (and in our case the ability to be able to record acoustic data) has meant radical changes in the way we are able to create narratives of the ocean deep (Cohen, 2018). Thus, through *Mirrors*, we were able to merge the real acoustic recordings of the ocean with a fictional narrative which became a critical part of the orchestration of a submersive affective atmosphere. The following section will describe how this narrative developed by discussing the creative decisions behind the piece, how it was presented in the room, and how it was perceived.

### 3.2. Making mirrors

Upon entering the room, the first thing the audience hears is the bubbling of water, which complements their *descent* into the vault and submersion into the ocean. For this, all speakers **(S1-S5)** were triggered to play at the same time to submerge the whole vault in the sound of the sea.[9] A slight delay was added to the bubbling sound to emphasise how soundwaves slow down the deeper they travel in the ocean. This lasted 1 minute to also give time for the audience to file into the room and stand opposite **S1**. The introduction of this ambient sound as the first thing the audience hears was used to create what Henriques (2011) calls a "sonic dominance", that is, a homogenic acoustic atmosphere that tells those present of the political context of a place (Riedel, 2019; Whittaker, 2024). By doing so, this encourages those present to recognise that they are entering a submersive space.

Once the curtain closes and the audiences' eyes adjust to the light of the room, what they see also becomes important in developing the desired atmosphere. Blue LED light strips were used to line the floors as well as cascade down the walls. The combination of having to descend into the basement and then seeing the blue lighting was fundamental in establishing the initial feeling of being submerged in the ocean and to "modulate the corporeal space" in a submersive atmosphere (Griffero, 2010:95). The control of light and dark plays an important role in the "formation and emergence of atmospheres" (Edensor, 2015:332). With the absence of natural light, artificial blue lighting was used as a space making tool to influence and manipulate the mood of the vault, or as Graser (2023:27) puts it, it became a "unifying element" to connect the exhibition space, the audience, and the intention of the artistic piece. The subtle blue lighting which met the audience as they descended into the vault was therefore essential in encouraging them to feel like they were submerging in the ocean creating what Whitehead (2018:21) calls an interior "mise-en-scène", in other words, the way a space can be staged to represent an "expressive visual coherence" that dictates how a mood develops. The lack of white light or imagery also contributed towards focusing the participant's sensual experience on sound. As such it created favourable conditions for what Truax (2019) calls an "acoustic community" to develop, that is, as soon as the audience entered the vault their senses were focused on the audio that was playing, that of the sound of water bubbling as if submerging into the ocean. The following comment was thus typical of the audience responses to the lights:

> *'And I think the room was really perfect for it. Because it was kind of in the, you know, in the cellar and it's really beautiful, but also this dark and atmospheric and lights and was really nice.' (Interviewee 7)*

One minute into the bubbling of water, the narrative begins with an introduction from a male narrator. It is important to mention here the power of gender roles in voice-overs and voice acting. From commercials and advertising (Lindsey, 2015), to political broadcasting (Strach et al., 2015; Fowler et al., 2021), to cartoons (Wright and Lallo, 2009), the gender used for a voice over can impact how listeners experience and respond to audio. Not only can gender impact a listener but also accents, the language used, pronunciation and the delivery of the performance. Although it is not the intention of this article to analyse this in depth, it is important to mention the choice of using a man's voice for the narrator. This was not a trivial decision. The narrator speaks for around 1 minute as an introductory character, (as will be later discussed), and we wanted this first voice in the installation to sound familiar – a little like David Attenborough[10], so that when the audience first walks into the space, they feel they are listening to something known (not least when descending into a dark, unfamiliar space). However, when Mina the Minke whale is introduced and begins talking directly *to* the audience, they discover that this is not a typical nature documentary that is narrated *about* the environment, but one that then submerges them *in* a story, *in* an ocean environment. It is also worth noting that although there are advances in Artificial Intelligence (AI) text to speech technology, with AI generated voices now becoming common in multimedia (Connock, 2022), because the script was 8 minutes long and we wanted organic voices for this project, we decided to employ human voice actors.

The narrators voice first comes from **S1 only** to direct the attention of the audience who have gathered opposite, whilst the bubbling continues from **S2-S5** with the volume slightly reduced to emphasise the first voice. This bubbling then continues throughout the whole piece, coming from all speakers with the volume turned down, to add an ambient base level and reinforce the idea of submersion into the ocean. A watery constant. The content of what the first narrator says is to serve three purposes. One is to begin the story and to focus the attention of the audience on sound. Two is to instruct the audience that they will have to move around the room in a certain direction. Moving the audience around the room from speaker to speaker was a crucial part of making the piece a more embodied experience. We wanted to somewhat mimic the movement of the minke whale as it moves from the Antarctic Ocean to the coastal waters of Namibia, as such, we wanted the audience to move with the audio, the ocean and life within it – to live alongside the submerged reality of Mina. Each speaker was thus a representation of a different location south to north in the ocean and represented features that the Minke whale might encounter. Each speaker thus became a point to reflect on how sound is impacted differently as Mina moves through the ocean and various soundscapes. To represent these changes, not only did we play with how the acoustic data was presented in each speaker (to mimic how a location change might impact the ocean sounds), but such movement was also written into the script. Mina announces each location verbally, so the audience knows, as they move from speaker to speaker, where they are along that journey. In this context, by being told to move, the audience change from being passive listeners to participants, through moving together with the audio. In this way they contribute towards creating a "collective space of shared social engagement" (Bishop, 2012:275) and hopefully, feel that they are, together, being submerged in this journey of ocean acoustics.

Indeed, when asked whether moving themselves, helped the audience to better understand the movement of the Minke whale as it travels from the Antarctic Ocean to the coast of Namibia, 82.3% of survey participants said that it did, with 8% saying no and 9.7% did not know. For most survey participants, this bodily movement then becomes not only about "populating" an oceanic space but about "extending" "embodying" and "creating" it (Manning, 2009: 13). As such, the movement deepened the atmospheric experience and "awareness of one's surroundings" (Sumartojo and Pink, 2019: 106), that is, that they were submerged on an oceanic acoustic journey, not just through or across the oceans, but also in its depths.

The third role of the narrator was to introduce the audience to the vocalizations of the Minke whale and then eventually to Mina, our protagonist. The first introduction to Mina is through hearing real vocalizations of the Minke whale being played through all speakers. Reverb[11] was added to project the vocalization all around the room. Once the vocalization repeats for a few times we hear the voice of Mina, played by a voice actor. Her voice is projected only from **S2** which encourages the audience to make that first step and turn to face **S2**, to begin the journey around the room and 'through the ocean'. With a jovial and playful voice, she introduces herself to the audience and her vocalizations as she talks about how her voice travels far in the ice-

[9] See Fig. 3 which shows where the speakers were located in the vault (**S** = speakers, **Numbers 12345** = The ascending order they were triggered).

[10] David Attenborough is a British broadcaster and natural historian whose voice has been synonymous with nature documentaries in the UK and beyond since the 1950's.

[11] In this context, reverb is an effect, digitally added to the sound clip in the editing phase to simulate reverberation.

covered habitat of Antarctica. There is a politics to the personification of animals to which we were aware in designing *Mirrors* (see Schmitt, 2023; Barclay, 2019, Wilson, 2019). Although there are tensions in anthromorphism (Schmitt, 2023), giving a human voice to Mina was a creative decision and was used to open the "capacity for imaginative appreciation of another's perspective" and to open "the opportunity for cross-species intersubjectivity" which can help "play a role in the development of empathetic relationships with other animals" (Parkinson, 2020: 2). Although there are arguments contra to such relations, given the audience, aims of the project and our desire to generate a submersive atmosphere of humans being *with* the sea and the life within, we opted for this vocal articulation. Indeed, voice can give the audience reference points from which they can identify and can be an important tool for developing empathy (Blythe et al., 2021; Holmes, 2022). As such, human voice was used to create relatability and to bring the audience into touch with a remote oceanic place that due to its usual inaccessibility would not be possible (Blythe et al., 2021).

Key to developing a submersive atmosphere then was reminding the audience of where they were, *the ocean*, and thus having a protagonist was a technique which was designed to create what Neimanis (2014) calls watery 'entanglements' between body and ocean to help the audience 'know' the ocean and the story of ocean acoustics. As Habermas (2018: 149) states, "identification and immersion tend to increase the power of a narrative" and so this relationship between body and ocean thus became a key component of how we designed a submersive affective atmosphere, as it allowed us to create moments for the body and ocean to be intertwined through sound, voice, movement and light. It also served as an acoustic device to encourage the audience to fill their gaps of oceanic knowledge with their own "imagination" "perception", "memory" and "anticipation" (Truax, 2019: 654). When asked if giving a human voice to Mina was an effective tool for allowing the audience to relate to the species and the storyline, 71.4% stated that it was, 7.9% disagreed and 20.6% were unsure. It was also mentioned in further discussions at the time, and in some of the follow up interviews that using a human voice made it easier to relate, built empathy, helped the audience understand the journey of the whale, and was a helpful tool in explaining how soundscapes can change with a location change, in such an alien place for human experience. Of course, what an artist decides to do with the acoustic data will vary and we are not saying that empathy cannot be built with creating a sound installation with just the acoustic data alone. How someone reacts to an art piece is as much to do with an individual's taste and what they like and dislike. However, for most of those audience members who filled in surveys, giving Mina a human voice helped facilitate oceanic-human experiences and connectedness, which put at the forefront "ecological solidarity and material transgressions which flow through the Anthropocene Ocean" (Jeffery, 2019: 36).

After Mina introduces herself, she shows the audience how her vocalizations travel further when the ice is at its thickest. To do this we again hear the real acoustic recordings of the Minke whale call which is triggered across all speakers. Further reverb is added here to allow the sound to travel through the room to emphasise the vocalisations and to highlight the role of ice in creating a unique oceanic soundscape in Antarctic waters. Here is where the vocalisations sound their clearest and the audience is left for some moments to listen to a few verses of this call.

After this introduction, the vocalizations are interrupted by the loud cracking of sea ice, which comes from **S3** and diverts the attention to encourage the audience to move towards this direction. Moments later Mina's voice comes from **S3** and by this point, the audience has moved across to stand opposite **S3**. Here she explains that during the summer when the ice melts, the oceans become louder, so it is more difficult for her to vocalize. The use of thunderous live recordings of the sea ice detaching and crashing into the ocean are used at this speaker to emphasise how enormous the sound of ice shelving really is. This is a moment for the audience to reflect on how this might alter the soundscape of the ocean at this time of the year. It is also an opportunity to provide an acoustic reminder of the aural impacts of climate change on the ocean.

After the audience are left with these sounds reverberating around the speakers, they are encouraged to continue walking to **S4** as Mina's voice states that they are now in the 'open ocean'. Here, as she travels through the ocean, she encounters varying acoustic environments represented by the different vocalizing mammals she meets along the way. To emphasise this, through all speakers we hear real recordings of the trumpeting of the humpback whale, the clicking calls of the orca, and the deep bass of the blue whale. Because the vocalization of the blue whale is at a frequency too low for humans to hear (19–26hz), we still wanted the audience to experience this call and so we used the pitched recording from the ocean acoustic group, which sounds all but like a vibration. In the room however, it formed a powerful buzz felt from all the speakers. This lingers for a few moments.

Mina's voice then moves towards the final location on the journey, **S5** which represents the ocean off the coast of Namibia. As the audience aggregate near **S5** Mina tries to talk, however, her voice becomes distorted as the live recordings of shipping noise make it difficult for her to vocalize and for us as an audience to hear her words. Synthetic sounds are also added to emphasise a feeling of disorientation that is created due to the increasing ship traffic and Mina's voice is triggered with a long delay, reverb and other effects that mimic a distortion so as to make the audience feel uncomfortable and not be able to hear what she is saying. Her voice bounces between the speakers to create a sense of imbalance and discomfort, to mimic the possible effect of the louder oceans on mammals. This was also a technique to remind the audience that "human bodies are acutely, and often hazardously, out of place in subaqueous zones" (Quigley, 2023: 9). When discussing with the audience this final crescendo of disruptive noise, it was reflected on as a 'demanding' 'loud' and 'uncomfortable' moment. One which made them ponder how the impact of human presence in the oceans was not only a visual one but often remains unseen. This was also reflected in the survey responses. The piece then finishes with Mina stating she is heading back to the ice, a place where she feels more comfortable. As she bids farewell, the audience are then left with the bubbling sounds of the ocean as the piece finishes and the curtain opens for the audience to leave, reflecting perhaps on these notions of dis/comfort, ocean worlds and life within, the ongoing climate crisis, and changes people bring to bear on the planet.

## 4. Conclusion: Submerging in future Submersive atmospheres

We have used this article to introduce the notion of *submersive affective atmospheres* as a way to better understand how representations of the ocean can bring people into touch with the specific qualities, character and conditions of the deep sea and life within it. Submersive affective atmospheres are those which are constructed to represent and reflect oceanic themes, which intend to take the audience on affective journeys that submerge them under the waterline in an explicitly oceanic experience. *Mirrors* used sound, narrative, light and movement to create an experience which connected those in the room to acoustic recordings usually collected for the purpose of scientific investigation and reinterpreted them in an alternative way to show that they are more than just data, and to engage publics in grappling with planetary change, and ocean change explicitly.

As Schuldt et al. (2016: 3) have argued, the oceans are "psychologically distant along multiple dimensions", and so there can be a wide gap in understanding and emotion between society and the sea (Hulme, 2009; Peters, 2010; Steinberg, 2001; Levi and Peters, 2024). As such, representations – and modes of engaging the sea at distance – play a vital role in increasing oceanic awareness. In the case of *Mirrors*, this art-science collaboration produced a sound piece which helped create a submersive affective atmosphere that exposed the audience to the sounds and stories of the Minke whale to make connections through

emotional engagement. In showing how we were narrators of a submersive experience we have likewise offered a description of the *process* of how an art-science collaboration project developed from design to delivery, focusing on the often underexamined element of how an exhibit comes to be (rather than simply the output, Whittaker, 2023).

Making an audience feel something about the ocean increases the likelihood that they will have an interest in marine conservation and ocean health (Whittaker, 2023; Brennan, 2018; Dupont, 2017; Jefferson et al., 2015, 2021; Stoll-Kleemann, 2019). As such, this article argues for further art-science installations that produce submersive affective atmospheres and to understand how these representations are then experienced. We also encourage others to understand how such explicitly watery atmospheres are created not only in the art-science world but also in other contexts such as cinemas, theatres, aquariums, museum displays and so on (Abberley, 2018). By doing so, we can further map the various ways that the ocean extends its immediate spaces and understand the ways that oceanic knowledges are created, shared and understood. This takes us beyond the language of immersion, arguably to something deeper. Understanding this can thus help us map how the ocean is experienced in 'excess', or as Cohen and Quigley (2019: 7) argue, how the "undersea is a vital atmosphere for revising and reorienting aesthetics, and for rejigging humanistic thought". In turn, this may make "the undersea more perceptually available" to "galvanise greater concern and better care for it" (Quigley, 2019: 29). This is vital as questions linked to ocean citizenship and literacy in the face of growing anthropogenic pressures, mount and key strategies, such as the UN Ocean Decade, aim to foster greater connections with our water worlds (McKinley et al., 2023).

## CRediT authorship contribution statement

**Geraint Rhys Whittaker:** Writing – review & editing, Writing – original draft. **Kimberley Peters:** Writing – review & editing. **Ilse van Opzeeland:** Writing – review & editing.

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