Deep sea

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The mystery evoked by the deep sea—its darkness, remoteness, and inaccessibility—has long captivated the public imagination. Iconic works of science fiction as well as pioneering documentaries reflect a fascination with unveiling the unknown; this spirit of discovery, of bringing light into the depths, remains alive today and has arguably even intensified. The deep sea has also emerged as a critical geopolitical space. Scientists race to study its fragile and little-understood ecosystems before commercial deep-sea mining gains momentum, aiming to fill urgent knowledge gaps. In this high-stakes environment, anthropologically 'being (down) there' is no longer solely about exploring the abyss itself. Rather, it is increasingly about gaining a voice within scientific discourse and broader societal debates. Today, more than ever, anthropology must engage with this sociopolitical space.

This entry highlights anthropology's shy yet critical approach to the deep sea as an ethnographic site—one imbued with meanings that shift depending on who encounters it, with what tools, and through which mediations. It does so through interdisciplinary insights from the social sciences and reflections that are profoundly anthropological in theory. The first section explores the deep sea's otherness or strangeness, a space that challenges terrestrial frameworks and poses questions about the nature of knowledge. The second examines how the deep sea is socially constructed through politics of (in)visibility and the deep sea's representation as a chaotic and messy space. The third highlights how relationships between human and non-human life in the deep sea can be reimagined in non-extractive and porous ways. The fourth presents another approach, viewing the deep sea as a privileged site from which to interrogate the past, critique the present, and envision Afrofuturistic futures. Polyphonic in nature, this entry invites readers to explore the deep sea through multiple social science perspectives, collectively capturing its complexity and significance.

Introduction: Under pressure

As the spectre of deep-sea mining (DSM) looms large, it has galvanised a diverse coalition of scientists, activists, NGOs, artists, writers, and global communities. In the near future, large quantities of minerals, including those used in electronics, batteries, and green technologies such as copper, nickel, cobalt, iron, manganese, and rare earth elements, are highly likely to be extracted from the seabed. Scientifically, the deep sea refers to oceanic regions below approximately 200 meters—the depth at which sunlight gives way to perpetual darkness. However, global attention is increasingly drawn to even greater depths, as DSM is expected to extend down to 5,000 meters. Now more than ever, the media spotlight is focused on the deep sea and its 'alien' creatures—organisms with extraordinary adaptations that allow them to survive under extreme pressure and in harsh, lightless conditions. At these depths, pressure increases dramatically, while temperature, oxygen levels, and food availability sharply decline. DSM is also under pressure, facing growing scrutiny from scientists, policymakers, and civil society. Unlike historical precedents in industries such as oil and gas—where legislation typically followed technological and commercial breakthroughs or

disasters—DSM is experiencing a reversal of this pattern: regulatory frameworks are being developed in advance, actively shaping and steering both technological innovation and commercialisation efforts.

A realm governed by the vast timescales of geological and ecological processes—what Richard Irvine (2014) calls 'deep time'—the deep sea has become a major geopolitical issue (Hannigan 2016), caught in a clash of competing temporalities. Despite the inherently slow epistemic process, scientists are working with urgency to fill critical knowledge gaps about its ecosystems before the accelerating mineral rush begins. In this high-stakes context, 'getting (down) there' is not only about reaching physical depths but also about navigating the tension between ocean preservation and industrial exploitation.

Today, more than ever, anthropology must engage with this seascape, which—as this entry shows—is increasingly seen as a sociopolitical space. In recent decades, anthropology has expanded its focus beyond coastal fishing communities to engage with the ocean more broadly (Helmreich 2009, 2015, 2023; Aswani 2020; Leivestad 2022; Dua 2024a, 2024b). This includes explorations of human-ocean creature relations (Uimonen and Masimbi, 2021; Ahlberg 2022), underwater worlds (Helmreich 2007; Rodineliussen 2024), and offshore industries (Appel 2012; Schober 2022; Markkula 2022), including deep-sea mining (Gentilucci 2022, 2024; Larsen 2024). This growing attention to the ocean is part of a broader shift in the social sciences and humanities—variously termed the 'oceanic turn' (Deloughrey 2016), the 'blue turn' (Braverman and Johnson 2020), or 'blue humanities' (Mentz 2023). These movements have contributed significantly to challenging 'terra-centric' perspectives on the sea (Steinberg and Peters 2015), advocating for approaches that think in and through the ocean as a form of radically situated knowledge (Jue 2020). More recently, hydrofeminist perspectives, which emphasise a reciprocal relationship with water—learning from it while also giving back by embracing shared responsibility—have further deepened these discussions (Shefer, Bozalek and Romano 2024). Despite the growing anthropological literature on the ocean, the deep sea itself remains relatively understudied in anthropology, especially when compared to the growing attention it has received in other social sciences.

It is then crucial to highlight anthropology's subtle yet critical approach to the deep sea as an ethnographic site—one imbued with meanings that shift depending on who encounters it, with what tools, and through which mediations. Equally important are the foundational insights contributed by historians of science, geographers, media scholars, and cultural theorists. These reflections are pivotal to anthropology, enabling it to recentre its voice in the scientific and public debate. While the approaches outlined here are marked by distinct methods, analytical frameworks, and ethico-political aims, they share at least two key features: a critical engagement with the scientific and epistemological challenges posed by the deep sea, and an emphasis on the environment's unique materialities that blur the boundaries between distance and proximity, the known and the unknown, the familiar and the unfamiliar, the visible and the invisible, as well as connection and disconnection.

The entry is divided into four sections. The first focuses on the deep sea as an (un)familiar place that challenges epistemologies of life. The second takes on a political lens, showing how the deep sea's unique characteristics give rise to a politics of (in)visibility. The third section explores the potential for porous encounters between humans, machines, and the abyss. The last one approaches the deep sea as a colonial space in which the past, the present, and new alternative futures are claimed. The conclusion invites reflection on the deep sea as an ethnographic field, encouraging a rethinking of how fieldwork is conducted in unconventional or hard-to-access environments.

Life and knowledge at the edge

A significant inspiration to the anthropological study of the deep sea comes from historians, who trace the scientific and cultural history of how the deep ocean emerged as a distinct territory—one in which nations began to assert claims of sovereignty and control (Rozwadowski 2005). Between 1840 and 1880, British and American scientists and hydrographers extensively studied the deep sea, a period marked by heightened cultural fascination with maritime depths. Scientific exploration during this era intersected with a broader acknowledgment of the economic and social importance of the maritime world, shaped by mid-nineteenth century maritime practices, technologies, and cultures. This setting was characterised by a masculine naval culture, physical challenges, and harsh conditions—a blending of scientific inquiry with maritime work cultures. Notably, this period included the first global deep-sea exploration, conducted by the HMS *Challenger* expedition (1873–76), which carried out meteorological and biological observations, as well as soundings to identify potential submarine cable routes.

The deep ocean, once regarded as an 'unfathomable barrier', gradually became a space accessible to technological observation, facilitated by the laying of submarine cables aimed at generating knowledge about undersea landforms, deep trenches, and seafloor conditions (Starosielski 2015, 203). While these expeditions occasionally retrieved organisms when recovering cables, misconceptions of the deep sea as a lifeless abyss persisted for decades. The serendipitous encounter with life in extreme conditions 'turns out to be a relatively recent possibility, not just technologically but epistemologically' (Helmreich 2009, 36). It is worth highlighting here the vivid account of the encounter with hydrothermal vent chimneys, cylindric structures on the ocean floor that may emit mineral-rich water, during the 1978 Galapagos Hydrothermal Expedition (Ballard and Hively 2017): 'We couldn't help but wonder what so many animals were doing at that depth, in that eternal darkness. […] But we were not biologists. We were supposed to be finding warm water' (170). The discovery sparked profound fascination: 'We felt as if we had glimpsed unknown, alien life on a new world, or at least an alternate version of life as we know it' (Ballard and Hively 2017, 173).

This unfamiliar life at the bottom of the ocean, particularly deep-sea microbes thriving at the edges of hydrothermal vents and adapted to extreme conditions, captivated public imaginaries, scientific debate, and anthropological interest in these debates. Questions on whether these microbes could be humanity's

most ancient ancestors remain unanswered, but they show how these organisms challenge human-centred notions of lineage and evolution (Helmreich 2009). The deep sea is in fact a complex ecosystem that defies anthropocentric perspectives and resists being captured in a singular narrative. These organisms are 'strangers': beings that are 'not yet—or not fully ever—friend or enemy, self or other' (Helmreich 2009, 17).

Life in the deep sea and the knowledge surrounding it are central themes in the ongoing debate on DSM. Establishing a baseline—the current state of the environment—for assessing the impact of mineral extraction is challenging due to significant scientific gaps in our understanding of the fauna inhabiting this remote and largely unexplored habitat. Anthropologists ask what it might mean for people to develop an interest in life at the ocean's depths—and to care for creatures so profoundly different from the animals humans typically recognise (Alaimo 2025). The deep sea is an unfamiliar environment: unlike forests, mountains, or other recognisable landscapes, it remains inaccessible to tourists or casual observers and can only be experienced through costly, technologically mediated scientific expeditions (Alaimo 2025). It evokes a multifaceted aesthetic engagement—ranging from 'the beautiful, the adorable, the surreal, the weird, the monstrous, the grotesque, the psychedelic, the unfathomable, and even the self-reflexive Anthropocene' (Alaimo 2025, 13). These aesthetic dimensions deeply influence human imagination and ethical reflection. The deep sea's extraterrestrial nature is a realm where life hovers at the very limits of what humans can comprehend (Helmreich 2009, Alaimo 2012).

However, this otherworldly perception of the deep sea should not alienate us from recognising the real and tangible consequences of climate change, ocean acidification, mining, industrial fishing, and pollution. The fact that abyssal zones differ from shallow waters does not imply a lack of interconnection between them. Oceanographers, for example, remind us that benthic creatures (organisms that live on or near the bottom of marine ecosystems such as sponges, worms, sea stars, etc.) rely on phenomena like whale falls, in which whale carcasses sink to the deep-sea floor. Framing the deep ocean as unknowable could reinforce the mistaken idea of it as 'a separate realm where human harms dissolve into invisibility' (Alaimo 2025, 11).

> As we encounter different aesthetic and scientific captures of deep-sea creatures, the question of what it means for the depths to be unknowable will repeatedly arise — as a way to dodge legal and financial responsibility, as an admission of scientific or scholarly failure, as a pervasive cultural trope, as a mathematical impasse, as an impetus for environmentally ethical epistemologies, or as an ordinary, even clichéd, sense of the wondrous and sublime (Alaimo 2025, 12).

The (un)knowability of the deep sea raises an epistemological dilemma. With DSM now at stake, this largely unknown and enigmatic maritime space is being transformed into one that must be rendered visible, mapped, and digitised as extensively as possible. Evidence must be gathered to reduce uncertainty and risks. Notably, the United Nations' Decade of Ocean Science for Sustainable Development has endorsed *Seabed2030*, a flagship programme driven by a global consortium of partners across industry,

government, academia, philanthropy, and civil society, with the ambitious goal of producing a complete map of the world's ocean floor by 2030.[ii] Furthermore, significant public and private funding is currently directed toward both 'unlocking' the value of the deep—to use the terminology favoured by many DSM stakeholders—and filling knowledge gaps in deep-sea ecosystems through scientific research. As the deep sea becomes increasingly entangled in economic, technological, and political ambitions, questions emerge not only about who has the right to know but also what kind of knowledge has to be sought. It is this tension that surfaced, for example, at the Deep-Sea Minerals Conference held in Bergen, Norway in April 2025, where the pressing issue was: when do we know that we know enough? — a question driven mostly by the market imperatives of DSM. It is therefore important to consider the 'context of motivation' among scientists leading deep-sea exploration—specifically, how they frame their mission as a pursuit of something larger than themselves, a moral imperative or higher calling (Oreskes 2021, 499). What scientists choose to make knowable (visible), and what they allow to remain unknowable (invisible), is ultimately a political decision.

Both knowing and unknowing the deep sea present their own problems. In the name of science and for the 'love of facts'—and because environmental assessments are essential for regulating the future of deep-sea mining—scientific research can sometimes become entangled in extractive logics. For instance, whether or not to extract a sample from an active hydrothermal vent can become a point of contention among scientists. While collecting data to understand fluid chemistry is crucial for comparing life at active versus inactive vents—and ultimately for challenging the ambitions of deep-sea mining proponents—some stakeholders in deep-sea mining argue that such scientific practices should also be subject to regulation. For example, in an effort to protect coral reefs, scientists could deploy killer robots programmed to inject a lethal substance into crown-of-thorns starfish which feed on coral (Braverman 2020). While robots, with their physical capacity to perform tasks that humans cannot, can bring us emotionally and epistemologically closer to the ocean, they can also obscure the ethical implications of violence in marine ecosystems. By outsourcing harm to non-human actors, they displace responsibility (Braverman 2020, 162). The mechanisation of knowledge production in marine environments—deciding which species 'make live' or 'make die'—not only obscures human agency but also generates a space of biopolitical governance, where life is managed remotely and often invisibly (Braverman 2020, 148).

As in the oil and gas sector, environmental risk legislation in the DSM sector is tightly linked to the setting of ecological thresholds. To establish these thresholds for ecotoxicology (how toxic substances affect the reproduction and survival of organisms within an ecosystem) in deep-sea fauna, scientists assess the balance of entire ecosystems. While some species may be more resistant to stress than others, the goal is to integrate various data types to evaluate the overall impact. Crucially, the loss of a particular species is not necessarily a concern—what matters is whether its ecological function can be replaced. This involves determining whether another species can fulfil the role of a sensitive organism.

The current rush to collect as much data as possible—whether to support DSM, to monitor its impacts, or to oppose it—raises urgent anthropological questions. Why is it so difficult to leave the deep sea unknown, unmeasured, undivided, and uncontrolled? What does this compulsion to know—and thereby to claim—reveal about our broader relationships to nature, science, and power?

The deep sea is already deeply entangled with legal regimes, ranging from international treaties to national jurisdictions. These numerous and often overlapping legal frameworks are largely invisible to the public. 'Like the ocean's abyss, the legal abyss, too, is out of sight, out of mind, and out of the frame of reference for most lay persons' (Braverman 2024, 4). Most people onshore remain unaware of 'those dark, remote, and unexciting practices that take place in locations so vastly removed from the ocean' (Braverman 2024, 4).

Material politics of (in)visibility

The deep sea oscillates between visibility and invisibility depending on the stakes involved. It is both an untouched, mysterious frontier far from sight, and a critical, contested space for human industrial or scientific extraction. Catastrophic events—such as the Deepwater Horizon spill, one of the largest environmental disasters in history, which occurred in the Gulf of Mexico on April 20, 2010—have the power to expose and disrupt an industry, like the oil industry, that largely operates out of sight of the oil-consuming public (Watts 2015). It also showed to politicians, fishers, and tourism operators the danger of taking marine resources for granted (Adler 2019). The deep sea has long occupied a special place in the human imagination, seen as exotic, empty, otherworldly—a kind of earthly outer space. It is precisely the perceived absence of humans in the deep sea, coupled with the opaque materiality of water, that helps sustain the enduring notion of the ocean as a frontier space (Ratté 2019).

This frontier can be seen as a space of disorder, where the oil supply chain not only absorbs but also accumulates and generates systemic risk, because 'much of what is entailed in deepwater production is literally invisible (underwater), but also because the normalized operations [are] in extremis laid bare' (Watts 2015, 214). As a result, the offshore oil industry often remains hidden until a disaster makes its precariousness undeniable, drawing attention to the risks inherent in its operations and the ethical dilemmas that arise when the deep sea is treated as an invisible resource frontier. The chaos and 'messiness' of the deep sea are also key factors in ethnographies that analyse how companies, for example, legitimise deep-sea mining projects (Childs 2019; Han 2022). Hydrothermal vents, underwater volcanoes, and the irregular crusts of seamounts are characteristics of the deep sea that corporations emphasise to influence political decisions. The sediment plume — underwater 'clouds' composed of dissolved materials and fine particles suspended from the seabed and generated by mineral collectors — is often described by DSM actors as relatively imperceptible, in stark contrast to the black smoke of hydrothermal vents (Childs 2019). This reframing serves to minimise the environmental impact of mining operations, which create

sediment plume, as relatively invisible within the dynamic and chaotic deep-sea environment. The black smoke of hydrothermal vents, by contrast, is highlighted to depict the environment as legible and manageable (Childs 2019).

Sediment plumes have emerged as a significant conceptual and analytical lens through which the deep sea is examined in the social sciences. They are characterised as 'spectral' phenomena, existing at the threshold between the perceptible and imperceptible, the visible and invisible (Han 2024). In popular imaginaries of the deep sea, expanding tendrils of fluid and smoke continue to evoke associations with war, fire, and contamination, 'connected to hell itself' (Ballard 2023). Traditionally, plumes have served as visual markers of destruction and disturbance, yet they can also function as invisible hazards, potential risks for investors, or visible manifestations of broader, intangible events and natural phenomena that can be strategically managed through dispersion (Han 2024). The efforts to regulate these environments and control plume mobility—'making visible that which is always in the process of becoming invisible' (Han 2024, 96)—depend on a range of technological interventions, including sensors, dyes, and other monitoring devices designed to render the unseen legible within modelling technologies. Examining how scientists and corporate managers interpret sediment plumes—through their abstraction into graphs, simulations, and digital imagery—reveals how the deep sea is not merely discovered but actively constructed through scientific and industrial practices (Gentilucci 2024).

Porous encounters

Anthropological reflections on how the remote, seemingly human-less deep sea is rendered knowable—via visualisation, digitisation, and data extraction—have turned attention toward the embodied experiences of scientists themselves, particularly as they operate marine robotics. Oceanographers' reliance on sensors and robotic technologies—deeply entangled with the sea's material and affective dimensions—produces novel sensory relationships between humans and nonhumans (Helmreich 2009; Lehman 2020). In a similar vein, the anthropology of outer space has highlighted the embodied engagements of scientists with their technological surrogates, such that they 'become rovers' by learning to 'see like a rover' (Vertesi 2015).

The sensory modes through which the deep sea has been scientifically understood have evolved over time—from the tactile to the auditory and, finally, to the visual (Helmreich 2009). This progression has made the submarine world simultaneously more comprehensible and more fantastical (Helmreich 2009). To gain experience of the deep sea, anthropologists and other social scientists rely on the same technical aids as the oceanographers with whom and through whom they study. Stefan Helmreich, for example, boarded the renowned submarine *Alvin*—the same that accompanied Ballard and other oceanographers during the first explorations of hydrothermal vents—which led him to conceptualise human interaction with the deep sea through the lens of what he terms the 'submarine cyborg'. This medium of engagement 'blurs distinctions between inside and outside, artifice and environment' and is simultaneously 'hyper-present and

invisible', much like the water surrounding the submarine itself (Helmreich 2009, 214). What distinguishes the submarine cyborg is not merely its ability to operate within boundaries but its capacity to dissolve them entirely, merging interior and exterior spaces.

The dissolution of boundaries in the deep sea has prompted scholars to explore more porous and reciprocal forms of engagement with the ocean. Investigations of the architectural innovations of Olivier Bocquet are interesting in this respect (Brugidou and Clouette 2021). Bocquet is an architect collaborating with scientific institutes in Paris to design underwater habitats, including those at abyssal depths. His projects extend beyond the technological advancements of deep-sea robotics to address a more fundamental question: abyssal habitability. Among his innovations is the BathyReef ramp, a 3D-printed biomimetic concrete mesh designed to support remotely operated vehicles (ROVs). Bocquet conducted an extensive inventory of sponge forms to identify those best suited to support the robot's weight while simultaneously fostering a habitat for microorganisms. The ramp is thus conceived not merely as a structural element but as a catalyst for life, engineered to attract bioluminescent microorganisms that may aggregate over time. This luminous presence, in turn, could attract other species, gradually transforming the structure into a multi-layered habitat—one that ultimately contributes to conceptualising the possibility of human habitability in the deep sea. The ramp is deliberately unfinished at the moment of immersion. Rather than being a static structure, it evolves dynamically as local and transient organisms colonise it, transforming it into a living system (Brugidou and Clouette 2021). The materiality of the deep sea and the relationships it enables allow the ramp to function as a sanctuary for organisms drawn to light. While its foundation is human made, its subsequent layers emerge through interactions with non-human actors such as robots, bacteria, and marine life. In this context, the human is no longer central to reflections on abyssal architecture. The design of a 'cohabitation reef' constitutes not only a technical challenge but an ontological one, redefining the relationship between human and non-human life in the deep-sea.

> (T)he boundaries of the human are no longer central to the reflection on abyssal architecture. […] The design of a cohabitation reef becomes the technical, and even ontological, challenge of architectural work. This is what we call the symbiotic paradigm (Brugidou and Clouette 2021, 3).

If capitalist, extractivist, and industrial approaches to the deep sea are 'a-porous' ('aporétique'), this example examined by social scientists offers an alternative framework—one in which human presence in the abyss is porous, shaped through the gradual co-creation of a shared habitat as microorganisms settle and transform the environment (Brugidou and Clouette 2021, 3). Understanding the deep sea as a highly sensory place that allows for porous human–non-human encounters helps us acknowledge the agency of the beings that inhabit it. In contrast to portrayals of the deep sea as an empty, lifeless void, ethnographic writing reveals it to be a vibrant, non-human-rich ecosystem—one that may even be haunted by 'ghosts' (Palermo 2022).

The Blackness of the abyss

In the social sciences and humanities, the deep sea is sometimes conceptualised as a 'ghostscape'—a space where the histories of the transatlantic slave trade resurface, and where Afrofuturist imaginaries and alternative world-views begin to take shape:

> Coming from the Abyss, these ghosts re-emerge to question us about the past, the present, and possible alternative sea-related futures, as a presence-absence on the threshold between the visible and the invisible, the no-longer and the not-yet: a space of possibilities (Palermo 2022, 41).

This perspective challenges visions of the 'cyborgs of the deep' as the only 'heroes' that will allow society to meet the requests of the 'Green Shift', i.e. of transitioning towards more environmentally friendly ways of living (Palermo and Steinberg 2024, 9). The deep sea is populated by 'unseen bodies […] whose hauntings persist' even as their stories are obscured by the plumes of the remotely operated vehicles (ROVs) used to collect minerals (Palermo and Steinberg 2024). Recognising these ghosts and incorporating Black history into our understanding of the deep sea means examining the relationship between colonialism, exploration and the ocean.

Thus, the abyss is the space of the White Whale described in *Moby-Dick*—the formidable, uncontrollable force that defies human dominance and 'whose rolling and vaulting in the depths of the sea stands for the alliance between modernity, capitalism, coloniality, and the conquest of ocean-space' (Palermo and Steinberg 2024, 10). The whale's roundness symbolises the idea of the globe as something to be conquered, mapped, and controlled, while its elusiveness reflects the unattainable nature of these desires when driven by capitalist and colonial imperatives. The abyss is also the space of 'the Drexciyan myth', developed by Drexciya—an electronic music duo from Detroit, composed of James Stinson and Gerald Donald. They reimagine the transatlantic voyage of slaves ('the Middle Passage') as the origin of an underwater nation, born from the unborn children of enslaved African pregnant women thrown overboard during the transatlantic crossing. Such Afrofuturist mythology—expressed through music, visual art, comic books and novellas—show that our understandings of the deep sea are deeply historically informed, often harking back to times of slavery and colonialism.

Some scholars have even called for the Middle Passage to be formally recognised as cultural heritage within the legal framework of the International Seabed Authority (ISA), which governs DSM activities in international waters (Turner et al. 2020). While the ISA does adopt the language of heritage—referring to deep-sea resources as the 'common heritage of humankind' and requiring that 'a prospector shall immediately notify the Secretary-General in writing of any finding in the Area of an object of actual or potential archaeological or historical nature and its location'—it notably excludes recognition of intangible heritage.[2] It is not uncommon to find marine archaeologists at DSM-related meetings—perhaps because

their interests align more closely with [mining](#) operations than one might expect. Indeed, 'the blue archive and the blue frontier are two sides of the same coin' (Han 2024, 30), and special attention must be paid to how we collectively make sense of the deep sea.

> The construction of a speculative seabed archive through the language of common heritage can thus, practically speaking, become a tool of colonization. In the blue archive, the notion of a 'resource' or 'cultural artifact' is thereby invented alongside the designation of others as obstacles (ocean waste, natural turbulence, indigenous communities, environmental fragility) (Han 2024, 45-46).

The jurisdictional structure of maritime space has increasingly become the politically-sanctioned battleground for turning the deep sea and its seabed into economic territory (Gentilucci 2022). For several decades, coastal states have been permitted to submit claims to the Commission on the Limits of the Continental Shelf (CLCS, established in 1997) to extend their continental shelf. In the juridical definition, this concept refers to the seabed and subsoil extending beyond a coastal state's territorial sea, up to 200 nautical miles from the baseline, within which the state holds exclusive rights to explore and exploit natural resources. Meanwhile, the ISA—composed of 167 member states, with the United States being a notable exception—has entered into 15-year contracts for the exploration of mineral resources in the deep-seabed with 22 contractors operating across various oceanic regions.

Alongside legal and extractive frameworks, alternative imaginaries—such as those inspired by Drexciyan mythology—disrupt dominant logics of ownership and exploitation. Attuning ourselves to these forgotten heroes, buried in the seabed and disturbed by the drilling of robotic machines, invites a critical rethinking of the ongoing territorialisation of the ocean. These visions 're-turn colonial geo-logics, slowly tearing at colonial pasts, presents, and futures in an iterative, ongoing process of imaginative decolonisation' (Stuer 2025, 33-4). The ghosts of a violent past call us to awareness, mourning, and action, urging us to envision oceanic futures that resist repetition and reclaim submerged histories (Patrizi 2024).

Conclusion: 'Being (down) there'

The deep sea is not yet a distinct subfield within anthropology, nor is it likely to become one. It will probably be integrated into the broader domain of the anthropology of the ocean. Yet this does not diminish its significance as a site for anthropological reflection. On the contrary, the issues raised by scholars engaging with the deep sea are deeply anthropological in nature. They involve questions of otherness and estrangement, which unsettle terrestrial assumptions and challenge conventional [ethnographic](#) methods. The deep sea also invites to contemplate concepts such as chaos and disorder, and to critically examine the politics of corporate legitimacy. It blurs the boundaries between the visible and the invisible, the interior and the exterior, the knowable and the unknowable, the familiar and the alien. In doing so, it opens up

space for porous, entangled, and multi-species encounters but also for rethinking the past and imagining alternative futures.

All the reflections raised in this entry lead back to a central question: can the deep sea be considered an ethnographic site? And if so, how can anthropologists uphold the foundational principle of 'being there'—a core tenet of ethnographic fieldwork—when the field itself resists direct human presence? Much like outer space, the deep sea challenges conventional understandings of fieldwork (Messeri 2016; Gorbanenko et al. 2025). However, physical and experiential distance from the object of study does not necessarily undermine anthropological engagement. 'Are we still anthropologists if we go to space using only our imaginations?' (Dovey and Potts 2025, 130). Anthropology needs to expand 'being-in-person modes of ethnographic immersion' (Dovey and Potts 2025, 130) and embrace a 'one step-removed presence'—a partial, mediated, and prosthetic form of engagement (Helmreich 2007).

> Marine biologists' immersion of devices, like their robot, in the deep sea, my immersion for a time in their social practice and language; their remote readouts of deep dynamics, my semi-detached participant-observation... The more I thought about it, though, the stranger fieldwork seemed as a word for what we were doing... (Helmreich 2007, 21–2).

Like oceanographers, anthropologists cannot directly observe the deep sea with their own eyes. The engagement with this environment is highly mediated—through research vessels, remote sensors, autonomous machines, graphs, images, algorithms, and other technologies. Anthropologists who want to ask about this 'out of sight and reach' realm, the deep sea, should look 'over the shoulder of marine biologists' (Helmreich 2007, 28) and scientists at work. However, they may encounter challenges in doing so, such as trying to join research-based sea expeditions.

Being on board a research cruise, sitting in control rooms where scientists navigate remotely operated vehicles (ROVs), or observing their work in laboratories—all of this depends on access and permissions granted. The deep sea today is not a neutral scientific space—on the contrary, it is highly contested and politicised. In the current 'call for science' to gather knowledge before industrial exploitation intensifies, anthropologists—and social scientists more broadly—are not always welcomed participants. Research cruises are costly endeavours, often funded by industry, and participation is tightly controlled. Priority is typically given to natural scientists collecting quantitative and computational data, rendering anthropologists potentially superfluous in their eyes.

What kind of knowledge, then, can anthropologists contribute? This entry aims to encourage deeper engagement with this ethnographic realm, asserting the importance of claiming a voice within both scientific discourse and broader societal debates.

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