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# Counter-forensics and the geographies of images

**Abstract:** Counter-forensics emerged in order to deploy scientific investigative techniques usually wielded by the state against the state. In this article, we theorize how a counter-forensic approach can inform geographical approaches to the study of images. Our counter-forensic approach centers the material and semantic instability of images and highlights the indeterminacy of meaning and thus, the importance of the discursive activity of articulating the relationship between images and political claims. The article offers two case studies that deploy this approach. The first engages with cell phone images made by migrants at sea, showing how they can be read as evidence of the broader spatial politics of Europe’s external borders. The second case study examines the materiality of ultrasound technologies in relation to the changing legal terrain of abortion politics in the United States. Both studies use images as openings to intervene in contested politics that are part of the production of uneven geographies of state domination and control.

**Keywords:** critical forensics, images, evidence, borders, ultrasound

# I. Introduction

In this article, we turn to critical forensic practice as a means to engage images in their geographical and material specificity and re-articulate them in relation to geographical matters of concern. Research in critical forensic practice, in our reading, centers the material and semantic instability of images and highlights the indeterminacy of meaning and thus, the importance of the discursive activity of articulating the relationship between images and specific claims or narratives. On the one hand, this instability offers geography orientations towards imagery that expands their interpretive possibilities beyond representational readings. On the other hand, geographical concepts and approaches reorient processes of articulation that are central to meaning-making processes of critical forensics.

Legal apparatuses of the state increasingly rely on materiality as evidence, as forensic techniques have become central to the investigation of perceived legal transgressions. The ability for materials to speak in these cases marks a shift in legal proceedings, as the fallibility of human memory and testimony is gradually replaced by the perceived scientific reliability of forensic investigations (Keenan, 2014b). This turn is partially understood to be in response to scientific advancements that paved the way for new forensic methods. However, it is also understood as a concerted shift away from the perceived unreliability and fragility of human witness and testimony—forms of evidence that took on great prominence in the second half of the twentieth century in what has been referred to as the 'era of the witness' (Wieviorka, 2006). During this era, the testimony of survivors played a central role not only in the establishment of legal culpability but also in the construction of history and collective memory[1]. But like any instance of state science, state forensics are largely deployed to maintain and reproduce an existing political order. The power of the state to define moments of legal transgression that warrant prosecution while ignoring others has not come without contestation. Groups like *Forensic Architecture, Bellingcat*, and *SITU Research* have developed modes of counter-forensics that seek to challenge state narratives that hide, obfuscate, or misrepresent exercises of state violence.

Images, when used as evidence, can be interpreted using the tools and grammars of semiotics without engaging with their particular material instantiations. But any image can also be understood as a situated inscription resulting from a chain of translations produced in and through technical, discursive, and material means. It is this understanding that we engage in this article in order to theorize the possibilities for forensic practices to inform critical geographic scholarship that engages with images. Digital images, for example, do not merely represent a moment frozen in time, but re-present light scattering off various objects and reflected into an image scanner, which translates those waves into electromagnetic currents that can be reduced to digital bits. Screen settings, ambient environments, the technical affordances of pixels, image processing algorithms, and an end-user's sensory capacities all create the conditions under which the inscription of the image are received, felt, and interpreted. How can a shift to understanding material inscriptions at various moments along these chains of translation inform geographic inquiry? And how can these insights be used to articulate imagery in relation to the political claims we make in research?

[1] As seen, for example, in emblematic international judicial events, such as the trial of Nazi official Adolf Eichmann (Wieviorka, 2006) or in the International Criminal Tribunal for the former Yugoslavia (Stover, 2007).

Through two brief case studies, we explore how critical forensics can provide useful analytical pathways for deploying nonrepresentational approaches to images in geographic research. In our reading, nonrepresentational approaches do not entail doing away with analyzing visual content of images. Rather, we understand them to be interpretive modes that can help us move beyond the idea that the primary value of images in our research has to do with their indexical ability to resemble and re-present the objects and phenomena we study—an assumption that reproduces an epistemology in which the object of study, the researcher, and the representation are understood as separable entities. If, taking up Barad (2007), we are to understand representationalism as a "practice of bracketing out the significance of practices" (53), a critical forensic orientation towards the material and discursive activities through which images are made and interpreted helps bring these practices and their potential significance back into the picture. This analytic shift brings attention to material relations that can be made to emerge out of images in excess of their visuality.

We understand this as a generative pathway for geography, as these relational and material elements are important for taking up images as places from which to study and articulate a broader set of spatial dynamics. Through this work, we follow Susan Schuppli's (2020) argument there is a need to do more than "make things public" (e.g., through calls for accountability and transparency) and that we must "make things political." This politicization of images involves "doing the considerable work that is required to establish links between images and events that operate across multiple scales, durations, and geographies: a strategy of cross-cutting between locations and temporalities that both enlarges the frame of reference and also reframes the iconic images that we have simply allocated to history" (135). As early critical forensic texts help elucidate (Azoulay, 2008; Butler, 2013; Keenan, 2002), when we assume that 'good' or enough image —by virtue of its resemblance to the 'real' — can clearly and singlehandedly convey the necessary information to make convincing political claims, not only are we likely to be disappointed in images, but we also "miss the opening of new fields of action that they allow" (Keenan 2002, 113). Our readings of images in the case studies that follow, informed by critical forensic practice, demonstrate two potential nonrepresentational visual methodological approaches through which to engage images in spatial research. Further, we argue that taking up these ideas in geographic research can extend and enrich the spatialized politics of evidence in critical forensic literature.

In order to make this argument, we first offer an overview of the shifting ground of critical forensics and its relationship to both images and geographical research. We then offer two case studies. The first examines cell phone images made by migrants at sea to show how they can be read as evidence of the broader spatial politics at Europe's external borders. The second explores ultrasound technologies in relation to the changing legal terrain of abortion politics in the United States. While these constitute two very different kinds of images, we understand them both as visual artifacts found at the disjunction between large structures of state violence and the situated materialities of these systems. The case studies set out to demonstrate two possible entryways for building (counter)claims and narratives based on analyses of the material and geographical specificity of images. The first by focusing on spaces where images are encountered and interpreted. And the second through the technological affordances through which they are made. But first, we proceed by sketching out a brief history of critical forensics and its application to geographical approaches to images.

## II. Counter-forensics

Counter-forensics is characterized by an inversion of the direction of the forensic gaze, whereby scientific and technological tools to generate evidence are used to make claims of and against state and corporate violence (Weizman, 2014). Counter-forensics thus turns the scientific investigative mode wielded by the state against the state—using it to illuminate human rights violations, environmental destruction, war crimes, etc. Some locate the beginnings of this inversion with a shift in human rights investigation in Latin America beginning around the 1980s, whereby human rights organizations and activists began to employ forensic anthropology and archeology to search for, exhume, and identify the remains of victims of enforced disappearance (Keenan 2014b; Sekula 2014). In these instances, state legal and law enforcement institutions carried out or were complicit in these disappearances, and thus were unwilling and entirely untrustworthy entities to carry out subsequent investigations. As part of transitional justice processes—first in Argentina and later across post-Cold War contexts from El Salvador to Bosnia—counter-forensic efforts emerged that used forensic methods developed and employed by state law enforcement and investigative entities to conduct independent investigations of state violence. This counter-forensic work was not just about reestablishing the identities of the victims to bring them back into a legal order, but rather, took up the exhumation of graves and identification of victims of state violence as an oppositional practice—openings from which new claims and narratives about violent histories and events could emerge.

Counter-forensic investigative work often operates in contexts where investigators lack access to the primary physical evidence of the events in question, because it has been intentionally destroyed or because the state will not authorize non-state authorities to access and examine it. Thus, a large part of counter-forensic practice is formulated around the need to think expansively about what kinds of entities (human and nonhuman) might function as witnesses insofar as they retain material traces that can be elicited to reconstitute contested events. In recent years, investigative entities like *Forensic Architecture*, *Bellingcat*, and *SITU Research* have developed popular forms of counter-forensics that use innovative digital methods of 'open-source investigation' and visual analysis to create evidence of state and corporate violence all over the world.

**Critical Forensic Practice**

Out of this counter-forensic work emerged critical forensic practice[2], an interdisciplinary area of study that examines how evidence is made and interpreted in order to develop new ways to make claims about violent events and practices. Researchers associated with *Forensic Architecture* at Goldsmiths University of London have been central in building this emerging field of research. They put forth a version of forensics that includes both the production of counter-forensic investigations and a critical orientation towards the practices of evidence making and interpretation (Weizman, 2014). As Susan Schuppli writes, critical forensic practice is not a "search for unequivocal certainties" but rather, is "oriented toward an opening-up of the expressive potential of things, including the creative retrieval and mobilization of affects" (Schuppli, 2020: 9). It thus widens what has traditionally been considered 'evidence' to include alternate forms of information, including nonhuman entities and cultural and artistic practices. Weizman and Fuller (2021) have theorized this widening as an "investigative aesthetics" whereby research adopts an expansive conception of which objects and entities are considered *sensoria* or *sensing* insofar as they have the "capacity to register information or to be affected" (33). An important contribution of critical forensic practice has also been to show that in spite of our forensic present that emphasizes material and advanced

[2] Through this article, we use counter-forensics as a term that encompasses a broader investigative tradition and set of practices, within which we situate the theoretical contributions of critical forensic practice.

technological analysis over testimony of victims and survivors, the supposed subject/object evidentiary divides are not so easily disentangled and material forensic evidence cannot "overcome the complexities of the subject, the ambiguity of language, and the frailty of witness memory" (Weizman, 2014: 10).

**Forums**

Central to critical forensics is a disarticulation of the terms 'forensics' and 'science' in service to law and criminal justice (Schuppli 2020) and a resurrection of the Greek origins of the word *forensis*, meaning that pertaining to the forum (Weizman, 2014). Building on Latour's idea of a "gathering" (2005), Keenan and Weizman (2012) define the forum as a technology through which "claims and counterclaims on behalf of objects can be presented and contested" (29). It can take many forms: institutional or informal, regimented or chaotic, stationary or itinerant. As they argue "the forum is not a given space, but is produced through a series of entangled performances. Indeed, it does not always exist prior to the presentation of evidence within it. Forums are gathered precisely *around* disputed things – because they are disputed" (29, emphasis in the original). An emphasis on the forum in critical forensics helps draw our attention to modes of assembly through which objects are made to mean, thus highlighting that evidence is not 'self-evident' but rather is always subject to contested and situated interpretations that are historically, geographically, culturally, and socially specific. What might constitute evidence of something in one forum could come to be evidence of something entirely different in another. Further, new forms of evidence can transform the forums in which they appear or generate entirely new ones. As Keenan writes, a "forensic sensibility" can come to refer to a "commitment to ambiguity, polyphony, and hence to the forum and to the interpretive dispute—and its resolution, however provisional—that must follow from the trace and its 'relative indeterminacy'" (Keenan 2014a, 67–68). Critical forensic practice thus sets out to center the never-ending task of articulating the relationship between the artifact and the event or narrative in question.

**Forensics, images, and geography**

In arguing for a forensic approach to imagery, we seek to contribute to, on the one hand, a nascent body of literature in geography that recognizes the theoretical, political, and methodological possibilities for forensic approaches to inform critical social sciences. For some, forensics offers a generative synthesis of new materialist thought, nonrepresentational theories, and expansive approaches to visual analyses. For example, in forensic thought, Jo Sharp (2021) finds "new possibilities for feminist understandings of the ways in which bodies and other materialities are caught up in geopolitics" (999). Similarly, Alex Jeffrey (2021) writes of the "need to think of how questions of place, embodiment and materiality intersect in the conversion of matter or speech into evidence" (904). For Sasha Engelmann (2020), a critical forensic orientation insists on the contextualization of materiality—one resistant to objectified 'things' set apart from their entangled relations. In addition to these theoretical interventions, some geographers have explored how spatial methods can contribute to forensic research and vice versa. Molly Miranker and Alberto Giordano (2020), for example, deploy computational text analysis to examine spatial relationships expressed in border patrol texts in order to support forensic research into migrant deaths on the Texas-Mexico border. Recognizing the widespread use of geographic information systems to analyze quantitative data in forensic investigations, they call for the incorporation of qualitative data and humanistic approaches to support forensic work. Other geographers have turned to forensic thought to counter the erasure of deaths under state violence (Romanillos, 2015), elucidate harms that are the result of changes in light produced through urban planning (Laing Ebbensgaard, 2024), and understand and

retell historical events (McGeachan, 2019). Here, we add to this literature by showing how critical forensic thought can inform geographical approaches to interpreting images.

On the other hand, we draw from geographers who consider the material specificity of images beyond representational readings. Veronica della Dora (2009), for example, argues for understanding landscape images not as representations, but rather, as 'three-dimensional material objects' that shape 'geographical imaginations' as they move through different geographical contexts. Similarly, Gillian Rose (2003) considers family photographs as objects, considering their role in co-producing domestic spaces in ways that "exceed their cultural encoding" (8). Rose and della Dora show how understanding the social role of images requires going beyond their representational content. In these accounts, meaning itself is produced relationally as the specific materialities of images and their contexts come to matter.

Other scholars, while not always evoking the term 'forensics', have also recognized how attention to the evidentiary, material, and relational aspects of imagery can be generative avenues for research. Judah Schept (2014: 203), for example, in his study of prisons in Appalachia, argues for a 'counter-visual ethnography' attentive to "the ghosts of racialized regimes past, the sediment of dirty industry that seeps into and imbues the present, and the trans-historical and trans-local circulation of carceral logics and epistemologies that structure the contemporary empirical realities we observe, record, and analyze" (203). For Elisabeth Roberts (2013), in the space between representational and non-representational registers contained within images lies the disruptive potential of image to reorient affective and meaning making processes. Meaning, in Roberts's account, "emerges from relations between, or assemblages of, representational and non-representational registers" (398). For Schept and Roberts, the concrete materiality of sedimented pasts haunts images, requiring articulation that exceeds representation in order to be read. Haunting may also be invoked through visual art practices as a means of political intervention. Asha Best and Margaret M. Ramírez (2021), for example, show how Black women artists invoke hauntings in order to resist property regimes while showings their entanglements with extractive processes of racial capitalism. All of these examples, following Avery Gordon (2008), ask us to begin unraveling the "the sedimented conditions that constitute what is in place in the first place" (4). Through critical forensics, we see the potential to further animate the political and affective potential of images.

In the next section, we offer two cases studies where we deploy our proposed critical forensic approach to images. These short studies in no way exhaust the possibilities for critical forensics to inform geographical thought. Rather, we hope they provide examples of how this approach can identify openings in research and help re-articulate political claims made through image analyses.

## III. Counter-forensic approaches to images

### Border seascapes and the spatial politics of the Aegean Sea

In 2015, over one million people are estimated to have crossed the Mediterranean Sea into Europe in search of refuge, primarily from Syria, Afghanistan, and Iraq. Over 850,000 of these individuals came by way of the Aegean Sea via Turkey in a migratory moment widely characterized by European Union (EU) member state agencies and the news media as the as '*the* migration crisis' (Crawley et al., 2016). This so-called 'crisis' took on a particular mediatic and thus visual dimension, as the largely

out-of-sight space of the eastern Aegean Sea was made visible to global audiences through photographs, maps, and other visual material. As Pezzani and Heller (2013) theorize, since many border zones exist outside of the 'civilian gaze,' aesthetic techniques should be understood not as a representation of the border but rather as part of constituting the border itself. Images of migration and of border space in 2015 did not merely represent the migratory 'crisis' but rather, became part of the struggle of making and unmaking of border space.

Importantly, the 2015 migratory movement came in the wake of the Arab Spring, a constellation of revolutionary movements in the Middle East and North Africa beginning in the early 2010s. These movements relied on the use of social media platforms like Twitter and Facebook to circulate information and images, which played a crucial role both in catalyzing uprisings and in communicating them to a global audience (Sakr, 2021). Out of a spirit of radical technological solidarity undoubtedly influenced by these events, migrant-activist networks emerged on Facebook and other social media platforms to share resources and images with people navigating migratory journeys as well as with the public at large. The aesthetic politics of the border were thus enriched by the networked image making and sharing practices of those on the move who directly participated in the mediation of the migratory event that their movement partially constituted.

Visibility in the Aegean at the time was in many ways restricted, as the space was often inaccessible to independent media outlets and lacked citizen eyewitnesses. While sea space is constantly registered through an assemblage of state and corporate remote sensing technologies, as well as images made by EU border enforcement agencies, these forms of inscription are often not accessible to civilians, both due to access restrictions and lack of technical expertise necessary to meaningfully interpret them (Heller et al., 2017). Given the sociotechnical conditions of visibility in border sea space in 2015, the image making practices of people on the move working to document, expose, and contest violent EU bordering practices constitute an important tool of witnessing border violence in the Aegean. These images allow activists and investigators to reconstruct deadly events and make claims about lethal EU bordering practices.[3]

Engaging a series of digital photographs that emerged through these practices, this section considers how an attunement to elements of these images beyond or in excess of their visual content allows them to function as rich evidence of the spatial border politics in the Aegean. As this brief case study argues, the evidentiary value of these images is not 'self-evident,' but rather, must be articulated through a careful back-and-forth between the visual artifact and the larger aesthetic politics of border enforcement and state violence in which they are made and intervene. Importantly, our reading does not seek to unearth or speculate into the 'original' intentions of the image-makers, nor does it ask what they understood these images to mean. Rather, we approach these images as ones necessarily unmoored from their authors and their immediate cultural milieu through their publication and circulation on the internet—an act we read to be taken in the hopes of reaching spatially and culturally noncontingent audiences that might make meaning out of them as evidence of migratory experiences and of deadly EU bordering practices of the Aegean.

The images analyzed here come from the documentation of a group of migrant-activists called

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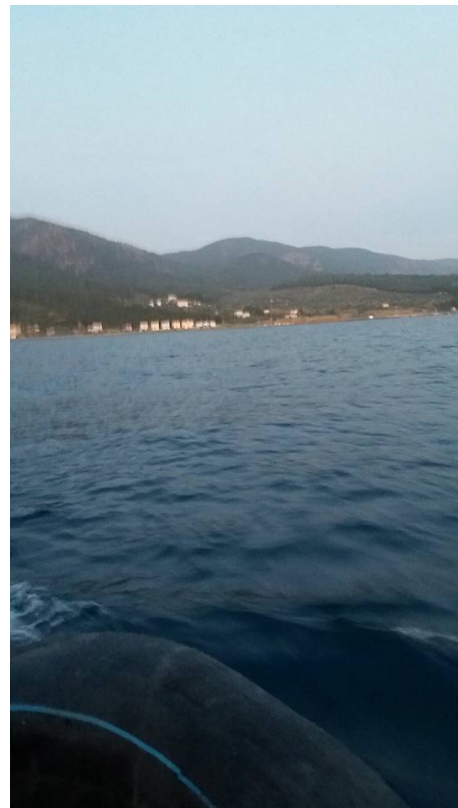
[3] See, for example, Forensic Architecture's investigation *Shipwreck at the Threshold of Europe, Lesvos, Aegean Sea, 28 October 2015* (2020), which reconstructs a deadly 2015 shipwreck in the Aegean using, among other sources, the video footage captured by Amel Alzakout, a survivor of the wreck who filmed the event using a wrist mounted waterproof camera.

Maritime Organization for Follow-Up and Rescue (MOFR), a collective run by around 15 volunteers, mostly Syrian refugees spread out over Turkey, Tunisia, Egypt, Lebanon, Syria and throughout Europe. From late 2014 to early 2016, MOFR assisted refugees crossing the maritime border between Turkey and Greece through correspondences over WhatsApp, mostly by way of conversation and image, map, and location sharing. As part of this work, MOFR built an archive of their activities on Facebook, carefully documenting and cataloging the over 350 trips they assisted, and posting images and screenshots of their correspondences alongside short trip summaries. Throughout MOFR's Facebook archive, a reoccurring genre of image is a vertical photo of the sea taken from aboard the small inflatable rafts on which the image-maker attempts the dangerous journeys across the Aegean Sea (Figure 1 and 2). Amongst the over 2,800 photos and screenshots that comprise MOFR's online archive, we find dozens of these pensive seascapes. Some of these images look back at the wake of the boat and the Turkish coast fading into the distance, but mostly they are aimed ahead at the anxiously awaited Greek shore.[4]



[4] The discussion of the MOFR images in this section is based on Bea's analysis of materials found on a public Facebook Page entitled "Marine Follow-up and Rescue Organization Documentation Section" accessed in 2022. On the page, MOFR documents activities of their organization from November 13th 2015 to March 9th, 2016. The page includes over 2,800 maps, images, and WhatsApp screenshots corresponding to over 350 Facebook posts. The posts were typically made in both Arabic and English. The WhatsApp screenshots exist almost entirely of conversations in Arabic, for which Bea relied on professional translation to interpret screenshots that accompanied maps and images of interest. MOFR content was analyzed alongside other maps and images of the Eastern Mediterranean Sea circulated over a similar period by border enforcement agencies, NGOs, and the news media, with a particular attention to the way sea space and movement through it was represented visually.

Figure 1. Seascape from MOFR Facebook Page, posted February 16, 2016.

Figure 2. Seascape from MOFR Facebook Page, posted February 28, 2016.

Made in the context of EU migratory politics of deterrence, the question arises of how this genre of image found in the MOFR archive can be interpreted as an intervention in and evidence of the spatial politics of the Aegean Sea. Deterrence or 'prevention through deterrence,' refers to a range of shifting border regime practices that work to 'deter' migration by producing danger and suffering during migratory journeys. Bordering tactics such as increased enforcement of shorter or comparatively safer migration routes (De León, 2015; No More Deaths et al., 2015), the weaponization of physical geography (Doty, 2011), and the criminalization and withdrawal of life-saving resources and rescue operations (Gordon and Larsen, 2022; Pezzani, 2021), actively work together to produce deadly geographies of deterrence. In the case of migration in the Mediterranean, aesthetic politics form an integral part of the way deterrence bordering practices are enacted and sustained and vice versa. Here, following other scholarship in critical forensic practice, we take up 'aesthetic politics' in the Rancierian sense of that related to the "distribution of the sensible," which signals how what is visible and audible within a given political order is subject to inclusions and exclusions (Rancière, 2006). Within the political order of EU's external borders, the dominant aesthetics of maritime border space (re)produce particular affective and conceptual understandings of the sea that are strategically leveraged by the border regime to advance deterrence. However, as this section takes up, these aesthetic politics can be challenged, as new aesthetic modes and political acts confront the dominant distribution (Rancière, 2006). In what follows, we look at how a counter-forensic reading of the MOFR seascapes allows them to be interpreted as intervening in the dominant aesthetic politics of the Aegean and as evidence of the contested spatial politics of deterrence.

Articulating the relationships between these images and the complex spatial-aesthetic politics of the Aegean calls for an engagement with visual elements beyond the image's referents. In Ariella Azoulay's (2010) terms, this includes attention to traces found in the image of the "event of photography"—the always unfinished series of encounters between the various actors involved in making and viewing of a photograph. Azoulay distinguishes this from the "photographed event," as in, what the resulting photograph captures in its frame. As Schuppli (2020) argues, a mode of reading images attentive to an "expanded field of operative relationships" (140) has the potential to free the image from the "indexical demands to account for events solely at the level of content" and to allow us to forge relations of significance across different scales, expanding the various relationships and events to which the image can function as witness (145). Further, these MOFR seascapes, like most images, appear and are interpreted in different forums—encounters that constitute a continuation of the ongoing event of photography. This ongoingness is important as it helps prevent discursive closure, making the image resistant to fixing of one stable meaning. Thus, an attention to the "event of photography" includes not just an examination of traces found in the image of the moment in which it was captured, but also to the "migration" of the image (Heller, 2014) and the different evidentiary meanings it can be made to take on in different interpretive forums.

We do not (and cannot) know every forum in which these images appeared, however, here we identify two. First are the WhatsApp chats of people on the move corresponding with MOFR volunteers, where these images were originally sent and used. And second is their circulation on

Facebook, where they existed in conversation with hundreds of thousands of other images, maps, and visual materials circulating as part of the aesthetic border politics of this migratory moment and working to visualize the space of the Aegean Sea.

In the forum of the WhatsApp chat, a closer look at MOFR's correspondences with those at sea (screenshotted and shared as part of their documentation) reveal more about the role of these images as part of MOFR's activities. MOFR volunteers often requested these images from the distant boat passengers they corresponded with, saying things like "Take a picture of the sea for me. But from both sides" or simply asking, "How are the waves?" The seascapes presumably helped MOFR volunteers to understand conditions at sea—important information as they instructed those aboard the unseaworthy rafts how to safely navigate to Greek territory and made difficult decisions about when to alert the coast guard if the boat was in peril. [5] Much of MOFR's correspondence with those at sea center around keeping passengers calm, not only from a place of care and solidarity but also as a safety measure, as panic on these crowded rafts can be dangerous. Thus, when sea conditions are favorable to safe movement, the seascapes can also function to reassure and calm passengers and MOFR volunteers alike.

Within the forum of the WhatsApp chat, the images evidence the ever-shifting materiality of the sea in a context where this information is crucial for safely traversing this space. In this way, the seascapes stand in a stark contrast to border regime representations that often advance a spatial imaginary of the sea as smooth, immaterial, and undifferentiated "pure distance" (Steinberg, 2009)—an aesthetic useful for depicting maritime borders as spaces of frictionless movement and migratory 'flows' in need of enforcement. This can perhaps be seen most clearly in the maps of EU border enforcement agencies that so often represent the sea as featureless and the migratory 'routes' through it as smooth and unidirectional lines and arrows, representations devoid of the varied temporalities and experiences of migratory trajectories (Cobarrubias, 2019; Kelly, 2019; van Houtum and Bueno Lacy, 2020). MOFR's seascapes thus also come to evidence digital practices of solidarity and emergency assistance that disrupt deterrence's production of the sea as immaterial space of limited citizen visibility.

Once these images have left the personal devices of these individuals and joined the deluge of visual materials on social media networks working to make and unmake border space in the Aegean, they can be made to take on other layers of meaning in relation to the spatial politics of this migratory moment. In the ephemeral Facebook forum, these images exist alongside and in conversation with

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[5] When boats were in distress, MOFR volunteers often called on the Greek or Turkish Coast Guard and/or non-government rescue operations to push for a timely response and pass on geographic coordinate or other relevant information. The question of calling state entities for emergency assistance was a complex one in this context. According to Article 19 of the EU Charter of Fundamental Rights, collective expulsions are prohibited. In the Aegean, this means that Greek authorities cannot force or compel groups of migrants back into Turkey without a reasonable examination of their right to apply for asylum or other legal guarantees to which they have access in European territory. Thus, in accordance with EU law and international protocols of non-refoulement, in the time period corresponding to this study, those rescued at sea in Greek maritime territory must be brought to Greek land, making it imperative to (whenever possible) assure one has crossed the Greek maritime border before calling for help. In practice, however, illegal collective expulsions —often referred to as 'push' 'pull' or 'drift' backs— are a common practice of the Greek, Turkish, and European border enforcement agencies in the Aegean, as has been extensively documented by people on the move in collaboration with organizations like Border Violence Monitoring Network, Forensic Architecture, Aegean Boat Report, and WatchTheMed Alarm Phone.

other representations of border sea space, where they can be read to evidence deterrence and challenge the dominate aesthetic politics of the Aegean in other ways.

As opposed to the high-res, saturated, wide-angle images made by professional photojournalists, often capturing overcrowded unseaworthy vessels from above—which many of us have perhaps become accustomed to seeing as part the mainstream media's aesthetic approach to representing boat migration—these images are captured from a more embodied point-of-view. The horizon sits high in the frame, around the presumed eye level of the photographer, allowing us to gather that the passenger/photographer/person-on-the-move sits low in a vessel half submerged in the sea. This is a very distinct vantage point from images taken by Frontex or by authorized press aboard large border enforcement vessels where the ship's deck sits high above the water's surface.[6] As a *Forensic Architecture* investigation points out, the high hull of ships operated by EU border enforcement agencies reminds that these are law-enforcement vessels, designed to repel entry not accommodate it, thus making them ineffective and at-times dangerous equipment with which to conduct so-called search and rescue operations in the Aegean.[7] The point-of-view of the seascapes thus positions these images as evidence made 'from below,' both literally and figurately, disrupting the various views-from-above so prevalent in representations of the sea and of boat migration in the Aegean in 2015. Attention to the point-of-view of these images opens them up as evidence of a larger set of border enforcement frameworks that force people on the move into close proximity with a volatile sea.

The frame of the seascapes takes the shape of the recognizable elongated vertical rectangle we have come to associate with cell phone images. We are perhaps more used to seeing images of the horizon in 'landscape' dimensions, and so, the use of the 'portrait' frame to photograph a landscape stands out, evoking a first-person perspective and implicitly referencing the image-author despite their absence from the frame. This framing also adds to the vernacular aesthetic of these images. The seascapes are low-resolution cell phone images, sometimes slightly blurry or out of focus. As Hito Steyerl (2009) theorizes, low-quality, blurred, and 'poor' images convey particular affective modes and structures of meaning, as they "diminish the distinctions between author and audience" resulting in images that feel more lifelike. Further, often images are made 'poor' by virtue of their being uploaded, downloaded, and shared, compressed to facilitate the speed of travel—a process which "transforms quality into accessibility." As Steyerl writes by losing some of its "visual substance" the poor image "recovers some of its political punch and creates a new aura around it." Here, the frame and quality of the seascapes brings the viewer closer to the situated gaze of the image-maker. As opposed to the "distant and distancing visual representations" of border enforcement (Mountz 2010, 51), the frame and quality of the seascapes brings the viewer closer to the embodied experiences of these dangerous journeys, pushing back on distant and disembodied visual representations of boat migration advanced by dominant aesthetics of the border regime.

These images might be easily dismissed as not possessing very much evidentiary value in regard to their visual content; they do not easily convey the boat's location, nor do they explicitly depict the

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[6] For an example, see the European Agency for the Management of Operational Cooperation at the External Borders' (commonly known as 'Frontex') images from their 2015-2016 Join Operation Poseidon Sea in the Eastern Mediterranean Sea: https://web.archive.org/web/20231215201257/https://frontex.europa.eu/media-centre/multimedia/photos/poseidon-sea-rapid-intervention-2015-2016-SUfUx3.

[7] See Forensic Architecture's 2020 investigation "Shipwreck at the Threshold of Europe, Lesvos, Aegean Sea": https://forensic-architecture.org/investigation/shipwreck-at-the-threshold-of-europe.

violent activities of Frontex or the Greek or Turkish coast guard. They are what Tina Campt might call *quiet images* that, assumed to be mute, "must be attended to by way of the unspoken relations that structure them" (2017: 8). Here, a reading informed by methodological insights drawn from critical forensic practice allows us to articulate relationships between these visual artifacts and the larger apparatus of border enforcement and state violence by which they are informed and thus to which they can bear witness. Attention to the 'event of photography' offers us a way of reading beyond a representational approach that treats images as mere 'stand-ins' whose evidentiary value to us as researchers corresponds only to the extent to which their referents can reliably and clearly illustrate the event or action in question. Further, attending to the various forums the image enters or that are forged around it expands the space of interpretation beyond the frame of image to the multiple socially, politically, and technologically distinct spaces through which the image is produced, encountered, and made to mean. Looking closely at the geographic and material specificity of these encounters expands the interpretive possibility of these images so that we can work to articulate connections between them and the broader spatial-aesthetic politics of bordering in the Aegean Sea.

**Ultrasound and the materiality of bodily interiors**

The 2022 repeal of the constitutional right to abortion in the United States means that ultrasound images (also called sonograms) and their interpretation have taken on increased significance within legal and political forums. Ultrasound technology is the primary way that doctors can peer into bodies in real time, providing a non-invasive and cost-effective means to view fetal development and approximate gestational age. With abortion legislation in the hands of individual states, the US is now an uneven patchwork of abortion law, with some states banning the medical procedure past a specified gestational age as determined by sonograms. Additionally, sonograms can serve as proof of pregnancy with legal implications for doctors providing care or people navigating the complex legal terrain of at-home medical abortions using drugs like mifepristone and misoprostol. The ability for ultrasound to offer direct access to a patient's insides has now become a potential evidentiary threat to the bodily autonomy of those subject to anti-choice legal forums.

Even before recent legislative changes, sonograms have long been deployed politically to construct the fetus as autonomous subject, separate from the body of a pregnant person (Petchesky, 1987). The erasure of the pregnant body and the production of the fetus as an individual with distinct legal rights continues to be a strategy of anti-abortion movements who rely heavily on fetal imagery. This has led to the strange practice of fetuses "testifying" in court, which consists of its image and heartbeat as mediated by an ultrasound (Denbow, 2015). Ultrasound images become part of complex and shifting discursive networks that battle over bodily representations that, in turn, produce uneven reproductive laws, practices, and understandings. The sonogram is variously articulated to take on different meanings, from a diagnostic tool to a commemorative keepsake of an imagined child to a piece of evidence that marks the interpretive limits of bodily autonomy. But sonograms are the result of specific material processes and practices that differ from photography, even if they are often imaginatively interpreted as being the result of similar processes.

In this section, we deploy a critical forensic approach attuned to the technical production of ultrasound images. Attending to the technicity of ultrasound image beyond their representational content highlights the bodily materiality, relationality, and contingency evidenced in those images. Ultrasound finds its roots in SOund Navigation and Ranging (SONAR) technology, which was heavily developed during World War II to aid in the detection of submarines. Similar to echo

location techniques used by animals like bats and dolphins, SONAR devices emit high frequency sound waves and detect the returning echoes. The time it takes the waves to return and their quality upon detection can be used to determine the distance, size, and quality of objects that reflected the waves. Despite changes to transducers that facilitate certain types of ultrasound scans, the basic functioning of the device remains very similar to its 1940s roots: emit high frequency sound waves and detect the echoes. For the purposes of this paper, two major changes in ultrasound are relevant. The first is technological, as computers have enabled novel ways for wave data to be collected, processed, and displayed as images. The second is contextual, as medical practices have decentered patient narratives in favor of interpreting bodies directly through technoscientific visualization techniques.

Ultrasound can be understood as part of a wider forensic turn in practices of medical diagnosis. As Weizman (2011) shows, up until the end of the 20th century, a major task of physicians was to listen to patients' own narration of their experience of illness, which was followed by physical examinations that might corroborate these symptoms. However, advancements in medical imaging and laboratory techniques allowed doctors to bypass patient's verbal testimony and listen directly to their bodies. Reflecting on the invention of the stethoscope, Abu Hamdan (2014) writes "understanding how to interpret sound from hearts, stomachs, and lungs meant that the doctor could communicate with the objective truth of the body, as this emerging acoustic lexicon was thought of as a collection of voices which, unlike the speech of the patient, didn't lie; these were voices which couldn't dramatize, embellish, and exaggerate their condition" (69). Ultrasound extends these logics, as sound waves are transformed into computationally-rendered visions of bodily interiors, allowing privileged access and subsequent interpretation of various bodily processes. But even the most advanced medical visualization technologies like MRI, as Kelly Joyce (2005) argues, rely on tacit knowledges and habituated practices that inform decision making and interpretation in order to make diagnoses. Similarly, in analyzing the physics of ultrasound, Karen Barad (1998) argues that "[p]roducing a "good" ultrasound image is not as simple as snapping a picture; neither is reading one" (101).

In order to produce a "good" image, a technician with specialized skills must manually adjust a transducer, interpreting the results in real time before selecting an image. The technician becomes part of a complex technological assemblage, guided by audible, visual, and tactile clues that mediate their connection with a patient's body (Keating, 2023). As one textbook describes the process:

> One of the drawbacks of [B-mode] ultrasound imaging is the skill and experience required to obtain good images and to make a diagnosis. Imaging in this way is demanding in terms of keeping track of the spatial relationships in the anatomy, and part of using this skill is being able to do 3D visualization in one's head during an exam. An ultrasound exam does not consist of just picture-perfect images such as those in this chapter. Instead, pictures are selected from a highly interactive searching process, during which many image planes are scanned in real time (Szabo, 2014: 402–403)

The visual results of complex and contingent medical imaging processes often discursively assume the illusion of being a transparent mirror of reality (Joyce, 2005). The series of uncertainties that went into producing the image are obscured as they are routinized in practice. The requisite skills that emerge out of habituated practices that are not transparent to an observer means that ultrasound images, in the current political climate, are potentially subject to manipulation by practitioners. In other words, doctors providing care in places subject to anti-choice legislation can potentially reorient their skills to produce poor or unclear images that frustrate future legal efforts to locate or diagnose a fetus. Mandatory ultrasounds laws for those seeking abortions are subject to

similar counter practices. Of course, this is speculative and likely should remain so as doctors are thrown into the front lines of shifting, oppressive legal apparatuses of the state.

More germane to this article is the potential for re-articulating the potential meaning of ultrasound images through attention to the materiality of this highly mediated process. It is important to remember that ultrasound images are translations of sound waves that have reflected off interior bodily surfaces. A number of steps are required to translate these detected waves into the pixels of a digital monitor. Even before they become numbers, the sound waves are converted to continuous voltages as detected by the piezoelectric elements. They must then pass through an analog-to-digital converter, which "provides only an approximate translation of the original signal" (Zagzebski 1996, 72). So even before they reach the scan converter and become available to software operations, detected sound waves have already been translated several times. Further translation is required, which can happen at a number of points in the process depending on the device, as the data must be compressed from the wide dynamic range of the original signal to the narrower limits of human perception (Szabo, 2014).

Ultrasound images, especially resulting from the familiar B-mode scans that typifies fetal imaging, are grainy. This feature is not the result of imperfect machinery, but a direct consequence of the material properties of the process. As sound waves are propagated through a patient's body, they are reflected by some surfaces, absorbed by others, and scattered throughout the body. In fact, only 1% of those sound waves ever make it back to the ultrasound transducer (Soni et al., 2020). Part of those that are received by the transducer return as scatter—waves that have been reflected in numerous ways, producing interferences. This scatter produces the mottled look of typical ultrasound images, commonly referred to as "speckle" or "texture" by practitioners (Zagzebski, 1996).

Scatter can make certain types of diagnoses more difficult and make ultrasound seem less sophisticated than other medical imaging technologies, spurring researchers to produce computational methods to reduce them (Szabo, 2014). Scatter, however, is not only an error to remedy. It is the result of how sound waves interact with different types of bodily tissues. Hence, the quality of scatter reveals something about the tissue it represents, acting as a potential diagnostic device. Efforts in "tissue characterization" attempt to engage with and interpret scatter as it relates to particular types of tissue. The complex and changing structure of tissue and how it interacts with ultrasonic waves differing in position and frequency make this a difficult and ongoing research problem in ultrasound (Szabo 2014). In the propagation or reduction of scatter, we find and important tension in ultrasound imaging. Here the desire for "better" images runs up against the rich information contained within the grainy and seemingly "bad" image. In the translation from sound waves to image something is always lost. Of course what is lost has much to do with the purpose of the particular scan, but these decisions are often hidden away behind the functioning of the software.

Similar to speckle are artifacts, which are consistently described in ultrasound texts as images that do not accurately represent existing physical structures (McLean and Huang, 2012; Soni et al., 2020; Zagzebski, 1996). They are flickering signifiers (Hayles, 1993) with no stable referents, displayed in the wrong place because of errors, which might include problems with wave speed, size of the ultrasound beam, multiple reflections, or attenuation errors. These artifacts appear because the scanner is programmed with assumptions that assert that ultrasound waves are uniform, reflected only once, and travel at a constant speed with constant energy (McLean and Huang, 2012). Artifacts

appear as a result of the messy contingencies produced as waves bouncing within the body do not align with these assumptions. Like speckles, artifacts can make ultrasounds difficult to interpret, which can lead to misdiagnoses. They can also, however, be used productively to make explore tissue structure and diagnose certain conditions like gallstones and pulmonary edema (Soni et al., 2020). Artifacts, like speckle, expose a tension between image fidelity, interpretation, and usable data. They appear within the gap between the need for particular types of diagnostic images and the unpredictability arising from the material reality of waves bouncing erratically off differential surfaces within the body. Against a narrow understanding of speckle and artifacts as errors, we can also understand them as rich material evidence of the relationality and interdependence of interior bodily structures.

As an ultrasound technician manipulates the transducer to find an image of a fetus, they seek to avoid interior bodily structures that obstruct a clear view, while speckle and artifacts inevitably populate the screen. Computational techniques enable the algorithmic erasure of these view-obstructing structures as well as the reduction of speckle and artifacts. Here, algorithms join with the skilled manipulation of the technical apparatus as a technician interprets and re-interprets fetal imagery, responding in real time to shifting images in an attempt to capture the best fetal image. Speckle and artifacts and interior bodily structures—those things that speak to the deep material relationality of the body—are reduced as much as possible, but inevitably haunt ultrasound imagery. But these traces of evidence could be articulated otherwise. For example, in commercial ultrasound studios that produce 3D and 4D keepsake sonograms (using other algorithmic interpretations of ultrasound data), Julie Palmer (2009) finds that the placenta and umbilical cord interrupt attempts to clearly demarcate the boundaries of the fetus. She shows how their presence requires explanation by the technician, arguing, "[t]he way they choose to do this will reflect dominant cultural understanding of the pregnant body as well as the commercial pressures inherent in non-diagnostic scanning, but it might also present the opportunity for thinking differently about the interconnections – material and social – between pregnant women and foetuses" (78). One avenue for this opportunity is Rachel Colls and Maria Fannin's (2013) geographical theorization of the placenta as a relational organ that mediates connections between and within bodies. The placenta offers an account of a 'fluid and processual' relation that resists the cleaving of two distinct subject positions (Maher, 2002). Confronting the evidence of the materiality and relationality of bodies that cannot be fully suppressed by algorithmic manipulations of ultrasound data can lead to other accounts that rearticulate how ultrasound images are imbued with meaning.

A counter forensic approach to sonography can lead us to understand fetal imagery as a trick of individuation, where the relationality of bodily materiality is expertly erased through the careful manipulation of technical tools and selection of imagery. Rich information that speaks to relational surfaces and complex materiality are filtered away, leaving only the individuated body. Of course, the boundaries drawn are myths that produce and reinforce ideological orientations towards the fetus. As Barad (1998) argues, "material rearrangements both facilitate and are in part conditioned by political discourses insisting on the autonomy and subjectivity of the fetus" (101). As one textbook observes, the process of boundary drawing requires an imaginative interpretation: "As the ultrasound technologist moved the transducer about, he identified shapes on a nearby TV screen that, *with a bit of imagination*, Ms. Sexton could visualize as separate organs, including the liver and gall bladder"(Wolbarst, 1999: 132, emphasis added). The sonogram is a fragile achievement—a freezing of motion as the transducer sweeps across bodily interiors—imbued with meaning through algorithmic and imaginative means. These relations of meaning making can find other expressions through careful analyses of technoscientific processes and articulations of meaning that center the

materiality and relationality of bodily interiors. It is through this process that we find the 'expressive potential' (Schuppli, 2020) of sonograms as a technical analysis provides an opening through which to differently articulate their meaning and make counter claims within legal and political forums.

## IV. Conclusion

The two case studies explored here take up images as potential openings. Both ultrasound images and MOFR's seascapes find themselves tied-up in political contestations that are part of the production of uneven geographies of state domination and control. They both emerge in the gap between structural systems of state violence—in these cases, oppressive medicolegal frameworks and multi-national law enforcement regimes—and the messy, material, and lived experiences of these systems. Speckle or the pixelated cellphone image, far from being useless or illegible noise, provide openings from which we might begin to tack between the image and the larger social structures it finds itself situated within and inscribed by. Legal forums, medical diagnosis, and no-border activism, all urgently seek images that clearly and unequivocally depict the issues they seek to address. However, critical forensics begins from the premise that no such image nor field of vision exists (Azoulay, 2008). A 'forensic sensibility' as part of the visual methodologies explored here emphasizes this non-self-evidence of images. As such, images demand careful attention to the material contingencies of their creation and encounters while affirming the constant need to do the considerable work of forging connections between specific images and their place in a broader political discourses. Stuart Hall (2016) theorizes cultural meaning-making as acts of articulation that involve forming a "connection or link that can make a unity of two different elements under certain conditions" (121). As he reminds us, these articulations require "particular conditions of existence to appear at all" and are not "eternal" but rather must be "positively sustained" and constantly renewed (2016: 121). They are sometimes tenuous and always subject to contestation and dis- and re-articulations. Nevertheless, as we argue, careful articulations of evidence are necessary for making and sustaining political claims through images. As opposed to efforts to reinscribe state order by resolving political claims through the supposed certainty of evidence, critical forensics uses evidence as openings—deploying it to unravel complex relationships between systems of violence and repression and material experiences of the world. In counter-forensic approaches to images, we see one path towards a geographical politics of evidence.

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