Title

Estimating the Future of Migration: Race, Climate Change, and the Militarization of Border Control

Author Details

Name: Matthew Abbey

Affiliation: Queen Mary University of London.

Email: m.abbey@qmul.ac.uk

ORCiD: https://orcid.org/0000-0003-3961-1223

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Abstract

This article explores the links between race, climate change, and the militarization of border control in the United States and the European Union, focusing on the growing number of

attempts to estimate the future of migration. The article argues that these estimates, particularly those focused on the number of ‘climate refugees,’ are not only undertaken for security or humanitarian purposes but to justify the militarization of borders. In light of artificial intelligence being heralded by many states and corporations as the solution to more efficient border control, the article seeks to highlight how the introduction of machine learning into estimates on future migration risks further obscuring the processes of racialization inherent to borders. By examining the racialized power dynamics of the climate change-migration-technology nexus, the article challenges the positing of estimates on future migration as potential facts. Instead, it posits them as manifestations of the Western desire to regulate the global movement of populations, leading to the entrenchment of racialized territorial divisions as situated within longer histories of colonialism. To conclude, the article will explore how the militarization of borders in response to climate change seeks to deny Western accountability for environmental destruction.

Keywords

migration, climate change, race, militarization, artificial intelligence

Introduction

The racialized, militarized borders of the West manifest in a variety of ways, with estimates on future migration being one of the more insidious. While environmental destruction looms ever brighter, a barrage of estimates on just how many people are going to flee climate change or other related environmental impacts occasionally dominate the headlines of Western newspapers and the reports of international organizations. To add to the confusion over what these estimations mean for the future of migration, various actors—including governments, militaries, police forces, and the companies involved in selling various arms or surveillance tools—herald the arrival of artificial intelligence as a more effective means of governing migration. With algorithms altering what it means to understand risk, further questions must be raised about who is accountable for the ethical implications of adopting machine learning within the management of human life, death, and migration. While it remains important to continuously grapple with how climate change, migration, and technology can lead to individuals facing specific harms at the border,[1] this article explores a wider set of questions surrounding the links between race, environmental destruction, and the increasingly militarized way of governing borders in the West using estimates on future migration, from forecasting and speculations to machine learning and beyond.

In light of a number of interlocking political, economic, and environmental crises ravaging the world, migration remains an option for a select few hoping to place their bets on a new future. In 2024 alone, there are numerous cases upon which we can see how climate change is causing devasting impacts. In Bangladesh, over 4.5 million people were impacted by torrential rains causing severe flooding, a common occurrence during the monsoon season.[2] In Somalia, the population continues trying to recover from severe droughts and floods, without any certainty these humanitarian disasters will not worsen in the future.[3] In Tunisia, sea levels are rising, leading to the disappearance of its beaches.[4] Meanwhile, the United States continues

to support neighboring countries such as India and Kenya to secure their borders, while the European Union continues externalizing its borders into Tunisia. As the world floods, dries up, and erodes, amongst other forms of environmental destruction, Western states have responded by militarizing their borders, as opposed to focusing on addressing climate change.[5] Not only this, but they have also militarized the borders of partner states to stop the movement of populations, resulting in Western politicians remarking that their own borders now extend to various other territories around the world where they seek to block migration.[6] Ignoring the violence of racism, colonialism, and capitalism that continues to structure the territorial division of the world, the militarization of borders continues relatively unabated. As this article will argue, a fundamental aspect of maintaining the division of the world through militarization involves the pre-emption of movement.

To address the nexus of climate change, migration, and technology, this article will explore issues of 'uncountability' (namely, the difficulty of counting social phenomena) and unaccountability within the use of estimates on future migration by a range of actors, from states to Western-led think tanks and international organizations, whether for security or humanitarian reasons. Given that governing migration is "among the most consistently racialized practices of most contemporary states",[7] the importance of race within debates on climate change,[8] and how AI can reinforce racial hierarchies,[9] the article will add novel insights into existing scholarship on the racialized, militarized violence of borders. As opposed to the militarization of borders only stemming from national security concerns about climate change, the function of race is integral to consider. As David Baldwin and Giovanni Bettini argue, focusing on race helps us to "think about how, why and for whom managing human migration has become a central prerogative for climate change governance."[10] Not only does race become the means by which some populations are posited as expendable, but it equally becomes the means by which they are posited as heralding from an expendable location.[11] In a way,

maintaining territorial divisions across the world is not only about segregating populations but also consigning some locations to history while allowing the West to command the future.

By analyzing the relevance of race within estimates on future migration, this article builds upon this existing scholarship on race, climate change, and migration.[12] In particular, the article will focus on how the use of estimates within our 'machine learning political order'[13] risks further entrenching the legitimacy of militarizing the border. As opposed to suggesting estimates on future migration are novel, or brought about by the growing awareness of links between climate change and migration, these estimates must be situated within the longue durée of colonialism attempting to control the movement of populations. As former special rapporteur on contemporary forms of racism Tendayi Achiume explained in a report for the United Nations General Assembly, many of these forms of militarized border control have "historical antecedents in colonial technologies of racialized governance."[14] The militarization of border control is a new form of Western colonialism built upon longer histories of dividing up the world.[15] While the governance of migration and climate change involves an array of global problems, the focus will be on the US and the EU, as this is where we can see the role of various wealthy states attempting to uphold the territorial division of the world using various forms of bordering, including the use of estimates. From the Berlin Conference of 1884–1885 dividing up Africa into territories for European conquest to the present use of estimates about future migration, race continues to play a fundamental role in the division of the world. Indeed, Western borders represent "a carceral structure aimed directly against freedom of mobility against populations on the other side of the border."[16]

To explore the role of estimates within the racialized, militarized borders of the West, it is necessary to discuss the figure at the heart of many of these estimates: the climate refugee. For it is the number of climate refugees (or climate migrants, depending on the terminology chosen) upon which these estimates are usually based. As the mantra usually goes, the climate

refugee is the representative of those displaced by climate change. Yet, as Baldwin and Bettini note, the figure of the climate refugee has come and somewhat disappeared within the scholarly work on climate change and migration, whereby its initial construction as an individual fleeing climate change eventually led to an analysis of the difficulty in isolating climate change as a causal factor leading to somebody needing to migrate.[17] Although the debate between these maximalist and minimalist positions has long been in existence,[18] a more critical body of scholarship within migration studies has invoked the difficulty of accounting for the different reasons why people migrate, given the highly subjective nature of individual reasoning and wider factors related to race, class, gender, sexuality, and disability.[19]

Yet, whether climate change is privileged as an agent causing migration or reduced to one of many factors, Baldwin and Bettini seek to redirect attention to how the "relation between climate change and human migration must be understood foremost as a relation of power rather than as a hard fact awaiting to be discovered, or an empirically observable phenomenon."[20] From states justifying the militarization of the border based on the creation of a new threat to lawyers needing a new legal challenge within international refugee law, to companies seeking new profits to activists needing to put a new face on their campaigns, the figure of the climate refugee represents various desires to place the human at the center of debates on climate change and migration.[21] Behind every estimation exists individual humans, with life either being protected or denied based on the various state and non-state actors involved.

This article will explore the attempts to create a factual basis in which to produce, maintain, and regulate the relationship between climate change and migration, leading to a barrage of estimates on the who, what, where, why, and how of the 'climate refugee'. So far, the use of these estimates has mostly focused on their deployment for security or humanitarian purposes,[22] with estimates being used to 'protect' borders or protect those on the move. In light of the growing efforts to address climate change and migration, this article will argue that,

beyond matters of security, estimates on future migration form an integral aspect of the militarization of the West's racialized borders, representing a colonial attempt to maintain a territorial division of the world based on the logics of pre-emption. Further, the article will argue that, with the supposed objective basis of estimates obscuring the presence of race as a defining feature of border control, the US and the EU's militarization of borders vis-à-vis climate change denies Western accountability for environmental destruction.

The Militarization of Borders

Since the early 2000s, the United States and the European Union have significantly militarized their borders in response to the perception of various national security threats coming to the fore. In the latter, this coincided with the establishment of free movement for EU citizens. Using an array of surveillance technologies and other tools, immigration control has increasingly adopted methods previously assumed to be the foray of the military. With enhanced budgets, advanced equipment, and wider policy remits, a range of tactics continue to be used with increased frequency, including pushbacks, offshoring, detention, the externalization of control to neighboring states, and contracts with lucrative private companies.[23] Furthermore, it has increasingly been recognized that AI can play a role in the militarization of borders too. What is commonly known as the 'smart border' now involves an array of new techniques being used within bordering, such as biometrics and geospatial mapping techniques.[24] The militarization of borders has resulted in a range of consequences, the most devasting being the growing amount of deaths of migrants. Relying on the logic of deterrence, these techniques attempt to dissuade the desire to migrate in the first place.[25] Despite the ongoing attempts to hold the US and EU accountable, the militarization of borders continues, with many states justifying the necessity of borders being able to respond to new threats as they arise. With climate change increasingly being perceived as a security threat,[26]

the US and EU continue to fortify their walls, literally and figuratively, in an attempt to maintain the division of the world. As Ashley Dawson argues, the 'climate refugee' has since become a figure demanding containment within the logics of border control.[27] In an attempt to control future migration, Western states are brokering deals with governments around the world to control the flow of populations.

While many Western states attempt to increase their own capabilities in the adoption of AI into migration governance, companies also play a role in the militarisation of borders. In light of the growing privatization of border control, many companies are proudly offering new technologies to various governments seeking to further militarize the border, taking advantage of the various crises being faced. As a report by the Transnational Institute states, "The border security industry is already profiting from the increased spending on border and immigration enforcement and expects even more profits from anticipated instability due to climate change."[28] While large companies such as Palantir and G4S regularly hit the news, existing research has identified a far wider range of companies forming the industry of border control, including Airbus, ATOS, CoreCivic, Cellebrite, CEDAT 85, Deloitte, Elbit Systems, GEO Group, GMBH, General Atomics, General Dynamics, IBM, L3Harris, Leidos, Leonardo, Lockheed Martin, MSAB, Northrop Grumman, Nuance, VFS Global, T3K-FORENSICS, Thales, and Tilde.[29] Not only do these companies play an active role in providing the necessary tools for border control, but they also influence the market with innovations, encourage purchases, lobby, form relations with various state institutions, and influence the means by which research into new technology is carried out.[30] As Mizue Aizeki et al. explain, "There can never be 'total' security and, thus, there will always be an alleged need for new technology to fill perceived gaps. Failure of any kind helps create a market for the next even more expensive product or service."[31] In light of this fact, the market is growing in the US and the EU.[32] Petra Molnar argues that migrants have become the testing ground for a hotbed of new

technologies designed to militarize how control over populations is sought.[33] In doing so, the West can seek to maintain the colonial order of the world, with borders coming to represent "visible signs of militarized colonial desires past and present."[34]

With a long history of classifying populations based on a set of norms surrounding race, class, gender, sexuality, and disability, the US and the EU have long relied on these methods of bordering to control their borders, involving what Heaven Crawley and Dimitris Skleparis label categorical fetishization.[35] In this way, the reliance on a racialized distinction in the militarization of borders intersects with an array of other norms upon which to justify the legitimacy of excluding some populations from the possibility of entry. Yet, while race undoubtedly implicates the individual at the border, whereby certain individuals are deemed threats, this article mostly focuses on how estimates become another means of controlling populations using the militarization of borders. As these estimates on future migration are concerned with the movement of populations, there is a racialized distinction upon whom is deemed a threat based on how race intersects with class, citizenship, gender, sexuality, and disability, in effect creating a particular category of persons deemed threatening. As Ann Laura Stoler, Maria Lugones and many others have argued,[36] a particular regime of norms was produced during much of the world during colonialism, which continues to reverberate throughout the US and the EU today, an attempt to legitimize the division of the world. What these classifications invoke is the fact of 'borders' dividing up populations as an important tool of colonialism.

As the rest of this article will explore, the use of estimates on future migration involves what Alexander G. Weheliye has coined a racializing assemblage,[37] referring to a range of processes by which race becomes the means in which populations are disciplined according to certain hierarchies, including class, gender, sexuality, and disability. As Baldwin and Bettini suggest, "If climate change represents for some a profound instability or the unruly movement

of populations, then attending to these techniques can help us grasp how governing climate change is also partly about fixing certain relations in place, ensuring that population movements do not become excessive."[38] In this way, estimates on future migration must be seen as not only creating the 'problem' of the climate refugee or trying to gauge what will happen, but justifying the attempt to control what will happen through militarization, relying on the racialization of some populations as a category of threat to be contained. With environmental destruction uprooting populations around the world, estimates about future migration become the means of maintaining territorial divisions; estimates are the pre-emptive strike against the possibility of migration. With AI playing an increased role in not only analyzing risks but determining what, or who, counts as a risk, it remains important to consider what is obscured by these states, companies, and international organizations claiming to have all the facts, especially as the means of estimating has fundamentally changed with the introduction of machine learning. The article will conclude by looking between the cracks of these estimates, focusing on what can be learned from other forms of perception.

Forecasts, Speculations, and Estimating the Future of Migration

Let's begin by looking at the most common methods of estimating future migration: forecasting and speculations. The use of forecasting involves using historical and present data to predict how many people are likely to migrate in the future. These attempts have taken place alongside the increased availability and demand for data.[39] As a result, a range of forecasting methods has been proposed to forecast migration, including causal forecasting, probabilistic forecasting, intention surveys, econometric models, spatial interaction models, and time-series extrapolations.[40] As Johann Fuchs et al. explain, most forecasts on migration are frequentist, with the model being developed using the available data and the subsequent output relying on relative frequency within the data.[41] Although the possibility of uncertainty can be approached

with sampling errors by considering what data has been inputted to guide the parameters, the result is a claim to objectivity based on the available data. In contrast to frequentist statistics, Fuchs et al. suggest stochastic models relying on Bayesian statistics would be preferable for estimates, as these would allow for auto- and cross-correlations to inform the model, with multiple variables being brought together to more accurately forecast migration with the constantly-updated data. While the use of Bayesian statistics has been adopted in estimating migration before, this used to be uncommon.[42] As scholars like Justin Joque have pointed out, there has been a shift to Bayesian approaches by many different actors working in a range of industries, recognizing the limitations of frequentism.[43] These methods will be discussed in the next section. While claiming to provide an objective analysis based on the available data, most deployments of frequentist statistics acknowledge the impossibility, or at least the difficulty, of escaping wider uncertainty about the claims being made about future migration.[44] As such, these methods have long been critiqued, including by the actors who deploy them.[45] Despite the many flaws of these forecasting methods, they are still used to make claims about the future.

The other popular method of estimating migration is speculation. The use of speculation involves gathering a group of experts with different viewpoints to discuss future scenarios. As opposed to forecasting how many people are likely to migrate, these methods involve speculating on whether more or fewer people will migrate, or seek to migrate.[46] As Emanuela Paoletti et al. explain, a scenario is "a combination of stories that describe different futures using methods that systematically gather perceptions and data about certainties and uncertainties. This is based on the appreciation that both linear and non-linear approaches to migration futures have to account for the highly uncertain environment we live in."[47] Whereas forecasting is mostly quantitative, scenarios involve qualitative speculation on what might happen, with a range of alternatives being proposed to account for the multiple factors that impact future migration.[48] Helga de Valk et al. explain further: "Although different scenarios

can be developed side by side without an evaluation of which scenario is the most likely, often a final aim is to reach some consensus on the likelihood of the different scenarios and rank them as such."[49] Hence, the use of speculation involves the attempt to evaluate the available scenarios, most commonly using what is known as the Delphi method. This adopts an iterative approach to ensure the possible scenarios are as accurate as possible, relying on major political, economic, and social trends to speculate on future migration.[50] According to those who use them, the value of scenarios exists in the encouragement of experts to think creatively about what the future may hold.[51] While disagreement often follows, given the divergent opinions on the future, this is not necessarily a bad thing, as otherwise there would be the risk of assuming accuracy in the scenarios, as opposed to them merely informing the possibility of what may come amidst an array of potential futures. Nonetheless, the parameters of scenarios are usually predefined, meaning the output is reliant on deciding what variables should be considered.[52] In effect, this means scenarios act upon the future by deciding how migration is speculated over.

As opposed to only estimating future migration, forecasting and speculation represent a specific logic of governance within border control in the United States and the European Union, often backed up with support by think tanks and international organizations. These forms of estimations involve what Brian Massumi calls ontopower: pre-empting a problem of the future, bringing the problem into the present, and justifying acting on the problem.[53] Future migration is 'figured out' using forecasting and speculation in order to justify a response. Given estimations imply the desire for action,[54] whether that means stopping the forecast from becoming a reality or reducing the likelihood of speculations coming true, these estimates involve an attempt to claim power over the future by controlling how the 'problem' of future migration is discussed. Not only do these methods figure out uncertainty, but they also allow for uncertainty to be acted upon. If a government can forecast its border will face increased rates of migration due to flooding in a neighboring country, it can increase its funding for

border control in the south. Or, if a government speculates there will be an increase in migration following desertification in a particular region of the world, it can seek to fund a regional government's containment of a population. With the threat of future migration being pre-empted, a government can also justify the increased militarization of its borders, leading to new technology being developed, new policies, new laws and new partnerships. Forecasting and speculation are the cornerstones of militarization, for militarization depends upon a threat in which to direct its efforts.

As opposed to estimates on future migration being a neutral indicator leading to the necessity of militarization, forecasting and speculation involves analyzing certain traits about populations to assess the likelihood of migration. From crop failures leading to a specific class of people migrating due to the unequal effects of humanitarian disasters on women, to sexual minorities and disabled people falling in between the gaps of refugee protection schemes, there are many specific traits about populations directly or indirectly used to estimate future migration within a range of specific contexts. With a range of quantitative and qualitative data informing forecasting and speculation, any number of potential traits about populations can be used to arrive at the output. While the effects of racialization may be considered within estimates on future migration, race is not used as an explicit marker upon which to analyze the likelihood of future migration. However, this does not mean race is not a predominant factor upon which the militarization of borders functions. For while race may not be explicitly used, nationality is. With nationality deemed an acceptable marker within estimates on future migration, substituting race for nationality becomes the means of implementing racialized border control,[55] meaning the racialization of border control is downplayed or ignored. Even if nationality was no longer deemed an appropriate marker for estimating future migration, other traits could be relied upon as proxies.[56] So long as the availability of data remains biased, estimates will be informed with biased data. Estimations on future migration thus become the

means of what Tamara Vukov refers to as 'racialized inscription', drawing upon Alexander G. Weheliye,[57] with the targeting of specific 'national' populations as a risk based on what the data says. Forecasting and speculation thus involve the "inscription of social forces of power and differentiation onto bodies." by estimating the number of people seeking to migrate with a particular race, nationality, or other racialized inscription. In this way, the use of forecasts and scenarios produces the racialization of 'potential' migrants as security threats, not only by using biased data or by accident but in the modus operandi of using estimates to maintain a territorial division of the world.

Estimates on future migration lead to the militarization of border control with the intention of racializing populations. As the militarization of borders continues into the future, estimates on the future of migration itself become the means of pre-empting the movement of racialized populations in order for the US and the EU to respond accordingly with the fortification of their borders, entrenching the division of the world. While estimates may not be an entirely new form of governance, the proliferation of estimates and other quantifying logics surrounding not only race but class, gender, sexuality, and disability is ushering in a new era of border control. With racial and other biases impossible to remove from the use of estimates, the more pressing question concerns the degree to which these attempts to capture the future are constantly updating, especially with algorithms further abstracting the data used to remake the future, militarizing the border in a myriad of ways. The following section will look towards the future of estimates by focusing on the arrival of machine learning, allowing the state to pre-empt and act upon its new, manufactured security threats. While forecasting and speculation are vastly different methods, not only are they sometimes used together, but they have also come together to inform the logic of algorithms.

Artificial Estimates

New technologies are playing an increasing role in border control across the United States and the European Union, leading to much hype about the effects of artificial intelligence on how borders are governed. Whether it's automated decision-making in visa applications relying on various data related to race, class, sexuality, gender, and disability to inform risk assessments, lie detection software picking up on potential deceit within asylum applications, or geospatial mapping within border regions detecting nearby physical movement, new technologies have been used in a variety of ways to make border control more 'efficient'.[58] While the United States claims to rely on AI to "address some of the most important risks our nation faces",[59] the European Union has turned to new technologies "to strengthen border control and mitigate security risks related to cross-border terrorism and serious crime."[60] In response, various companies have jumped on the occasion to supply the necessary technology, with companies such as Elbit Systems and Anduril Industries, amongst hundreds of others, playing a significant role in fuelling the so-called 'smart border' industry.[61] In light of the growing deployment of new technologies within border control, existing scholarship has focused on issues of rights, privacy, and justice,[62] all of which have been claimed as necessary for ensuring new technologies are ethically deployed at the border. This has been deemed especially important as the use of new technologies in border control is largely unregulated, leaving states and other actors relative flexibility in their implementation.[63] With the growing demand for data within border control, it is only logical that states and other actors are scrambling to keep up with the new technologies that claim to offer security in the face of an ever-growing number of supposed risks. While there is an abundance of new technologies being used in border control, what concerns this article is the use of machine learning to estimate future migration.

As Ulrich Beck taught us, while understandings of risk may change, the ongoing effects of living in a risk society continue,[64] with calculations continuously being made in an attempt to foreclose the possibility of succumbing to present and future risks. While migration has long

been deemed a threat to the state, climate change has led to the future of migration becoming deemed a specific threat to the future of the state itself. As a result, machine learning is increasingly being adopted within these attempts to forecast and speculate on future migration. Whether it's social media posts, weather patterns, Google searches, datasets on conflict, biometrics, or prior travel, among many other sources, a range of data is used to inform the deployment of machine learning within estimates on migration. From data mining and predictive modeling, a range of methods are also used to process large amounts of data and subsequently make assessments of the future.[65] Using machine learning has thus allowed for, or so its advocates claim, more effective responses to border control, especially regarding the allocation of resources.[66]

To give a few examples, we could look at the European Commission's feasibility study on whether forecasting and early warning tools for migration based on AI could be used to support border control.[67] The study aimed to figure out whether they could develop a tool "capable of forecasting and assessing the direction and intensity of irregular migratory flows to and within the EU and to provide early warnings and forecasts on this basis both in the short term (1 to 4 weeks) and in the medium term (1 to 3 months)." Following this, the European Commission partnered with the European Union Agency for Asylum (EUAA) and the University of Catania to develop a methodology known as *DynENet,* which can estimate the number of asylum claims going to be lodged across the EU within the next four weeks. Alternatively, we might look at the Danish Refugee Council's work together with the Danish Government, the EU and IBM on *Foresight,* another tool using machine learning to estimate future migration.[68] Relying on open-source data from a range of sources, including the UN, the World Bank, various NGOs and scholarly research, *Foresight* claims to estimate future migration by up to three years in advance. At present, the methodology focuses on 26 countries where levels of migration are known to be high, using 120 specific indicators in which to assess

the likelihood of future migration. Given the broader amount of data used by *Foresight*, including data on 'violence, governance, economy, environment and socio-demographics', it has been successfully deployed to support the Danish Refugee Council's operations.

While forecasting and speculation have long been undertaken on future migration, the arrival of machine learning is claimed to herald a new era of estimation, offering an array of methods beyond the limited use of frequentist statistics.[69] Instead, what machine learning claims to offer is a more direct reliance on Bayesian statistics to make a claim about the future. By combining forecasting with speculation, estimates on future migration are facing a paradigm shift. This is what makes *DynENet* and *Forecast* appear so successful at estimating migration; while they offer a means of forecasting migration, they herald the possibility of speculating on what the future will hold. In sum, machine learning has the ability to take speculation into new territory.

Although the calculation of risk once relied on past data to gauge the future using frequentist statistics, relying on finding the 'norm' within past data in order to make sense of the future, scholars such as Louise Amoore and Justin Joque have explored the increased ways in which the quantification of speculation has allowed for an array of possible futures to inform risk calculation.[70] As Amoore argues, "the politics of *possibility* pushes back the limits of risk calculation beyond probability, differentiating ever more finite categories of risk, defining new and mobile exceptions, exclusions, and special zones, and radically redefining the relationship to science and expertise."[71] Is it any wonder that *DynENet* can account for sudden increases, or *Forecast* hypothetical scenarios? As opposed to relying on the likelihood of an event happening based on past data only, or relying on norms in which to assess a population[72], or even qualitative speculations based on expert opinion alone, the quantification of speculation can account for an array of possible futures, continuously allowing for risk calculation to reproduce finite different outcomes. This represents an attempt to account for a growing

number of speculations, the outcome of which is not merely a different possibility but the quantification of multiple possibilities, whereby the risk itself is quantified amongst an array of variables that, while allowing for states and other actors to choose a specific act according to their interests, nonetheless demands they act with the knowledge of uncertainty, as Amoore explains. The results of these risk calculations can subsequently be embedded back into the machine learning, based on a qualitative and quantitative assessment of effectiveness, ensuring the speculation, so to speak, sticks within the 'politics of possibility' being defined by the state engaged in the speculation itself. In effect, this allows for an endless amount of variables about future migration to be analyzed through the use of risk calculations. This means the anticipatory logic of risk "acts not strictly to prevent the playing out of a particular course of events on the basis of past data tracked forward into probable futures but to pre-empt an unfolding and emergent event in relation to an array of possible projected futures … [that] incorporates the very unknowability and profound uncertainty of the future into imminent decision."[73] Risk calculation is thus what heralds a new form of governance in which an array of potential migratory futures can be explored.

While forecasting and speculations continue, what machine learning will alter is how estimates are made in the first place. While the most common form of statistics sought objectivity by relying on frequentism, as discussed, machine learning has largely relied on a form of Bayesian statistics that "starts its calculations with a guess and then persistently updates probabilities as new evidence is gathered."[74] Given Bayesian statistics relies on subjective input from the outset, undoubtedly involving bias, its goal is not to offer an objective means of assessment but rather produce the most probable outcome, whereby the model is continuously updated with new data or played around with using different weights until the outcome adheres to what is desired. As Amoore further explains, machine learning identifies clusters, derives attributes from the clusters, and compares the output to the desired output, the intention being

to find norms in the data in which one can claim to act; hence, this is an iterative process of finding solutions to particular problems that relies on the finding of correlation only to justify action. While a range of existing work on new technologies and migration may focus on the role of machine learning in embedding further harm onto individuals surrounding rights, privacy, and justice, both Joque and Amoore emphasize how this new paradigm of machine learning, using Bayesian statistics, is changing how political topics, such as climate change and migration, are being understood in the first place.[75] As Bayesian statistics continues to influence multiple forms of governance, it is expected that estimates on future migration will further rely on this particular way of thinking about the future, too.

Yet, as discussed, forecasts and speculation are not merely about mapping what could come. Risk calculation, or indeed forecasting and speculations, without or without the use of machine learning, forms part of the same means by which predicting the future allows one to gain control of the future, thereby bringing the future into the present by using risk calculation to claim a necessary response to the alleged risk. Machine learning has merely become the means by which the militarization of the future is not only possible but justified, forecasting and speculating on the threat upon which it can forcefully respond. Instead of leaving the future open, demanding the state respond as necessary when the threat emerges, the risk of future migration, especially pronounced in light of climate change, is signifying the threat justifying the militarization of border control using machine learning. As such, it has become 'necessary' for the US and EU to adopt these new technologies, however much this necessity has been fabricated by the production of the climate refugee as a threat. The future is not only simply militarized due to the presence of new technologies arriving at the scene of the border but because border control can attempt to account for an array of possibilities, quantify them, and prepare accordingly—with the necessary tools (technology, policies, laws and partnerships)

readily there to intercept the possibility of movement against the division of the world attempting to be maintained.

From Bangladesh to Somalia, to Tunisia and beyond, the 'climate refugee' will be increasingly analyzed not for what people have historically done in response to climate change but using a far wider array of possibilities surrounding their possible future. Machine learning opens the door for new meanings, categorizations, and relationships, leaving the climate refugee becoming subject to heightened speculation. Using data far beyond what can be easily proscribed to the specific individual seeking to migrate, the options are limitless, with machine learning bringing together a range of data in new ways to justify the militarization of the border in profoundly new ways. Not only will machine learning intensify the militarization of border control by creating 'new' threats, but there will also be epistemological changes in how we think about the future, with a datafied militarization of border control slowly becoming heralded as the chief way of forecasting and speculating on future migration.

Uncountable Numbers

While the attempt to estimate future migration using machine learning will only grow, it is arguably the output of such forecasts and speculations that comes to matter. In discourses on climate change and migration, the exact figure of expected 'climate refugees' garners public attention, not the use of frequentist or Bayesian statistics. While countless other estimates migration exist too, many of which are country or region-specific, there are a few prominent examples spanning the globe. First, the World Bank estimated that up to 216 million people could be internally displaced because of climate change by 2050.[76] Despite acknowledging the uncertainty of producing such an estimate, the international organization used historical climate change impacts, population distribution data, demographic data, socioeconomic trends, and scenario-based approaches to arrive at the figure. Second, the Institute for Economics & Peace

has suggested that 1.2 billion people may have to migrate by 2050 owing to factors related to ecological threats.[77] This figure is derived from a multi-indicator composite register of risk, where certain regions with significant ecological threats are posited as necessitating the need for migration. Third, Christian Aid estimated that up to 250 million people could flee the impacts of climate change by 2050, along with another 50 million people from natural disasters and 645 million people from development projects.[78] Although these Christian Aid numbers have been widely cited, there is no information on how they were developed.[79]

As shown with the variance of the above numbers, there is no clarity about future migration, with many different estimates being touted as scientifically accurate. Indeed, the numbers of 'climate refugees' are hence not only controversial but, in many cases, scientifically wrong.[80] Not merely are the parameters used to estimate future migration analytically dubious, but the nonlinear effects of climate change, with multiple tipping points altering planetary ecosystems in an abundance of ways, are difficult to estimate. Despite this uncertainty, the numbers are masqueraded as fact. As a result, these numbers are reproduced by a variety of other actors, ranging from the IOM citing that between 25 million to 1 billion people could migrate due to climate change by 2050,[81] or the *Guardian* remarking that 1.2 billion people could be displaced by 2050 given the effects of climate change.[82] Whether or not the numbers are true is hardly the point, however. The number itself is what captures attention regardless of the scientific accuracy. An estimate may be developed using complicated machine learning methods, but, nonetheless, it is the output of such estimates that seems to matter more for how climate change and migration are understood. This is a problem due to the difficulty of debunking numbers once they have been accepted by the public.[83] Although the number may simply be an estimate of the future, it risks being framed by states, international organizations, and nongovernmental organizations as *the* future.

To control the future with a number brings us back to the militarization of border control. Across the United States and the European Union, border control has long relied on the production of a specific threat to justify the militarization of the border. From the designation of Chinese and other Asian populations as a threat to the West with fears of 'Yellow Peril' emerging in the late 19th century, to the continued framing of Muslim men as trying to sneak into the West to conduct terrorist attacks, to the claim that African migrants are arriving in the West with HIV/AID to receive treatment, the militarization of borders have used various racist, classist, sexist, gendered, and ableist tropes to posit a specific population as threatening. While there are various stereotypes of the 'climate refugee' too, mostly reducing the reason for migration to climate change alone, this new threat has been framed as numerical, with the *number* of climate refugees becoming the threat needing to be stopped. The number catapults action, with the state being able to claim it necessary to militarize the border to protect the population from the 'factual' threat of future migration. In a way, a number has become a pivotal means of popularizing a risk, not only to obscure reality but to fearmonger, an important aspect of militarization. It is the outcome of estimations that allows for the state to justify the militarization of its borders, justifying new technology, policies, laws and partnerships. This is why Gregory White was right to suggest the 'threat' of migration stemming from climate change may embolden those opposed to migration itself.[84] For example, the most 'alarming' estimate of 1.2 billion 'climate refugees' by 2050 could be used to justify an expansion of border control. While there may be calls to specifically prohibit estimating migration for "the purpose of interdicting, curtailing and preventing migration"[85] in light of the potential harm caused a state often hides its security intentions behind the façade of humanitarianism, whereby the use of estimates can be framed as another means of the state claiming it seeks to protect migrants from potential harm.[86] This means we need to grapple not necessarily with claimed

intentions but with the way estimates are materially contributing to the militarization of borders.

Instead of machine learning enhancing the accuracy of estimating future migration, it will entrench the way a singular output (or number) surrounding climate change and migration comes to the fore. While estimating future migration may involve exploring a host of possible outcomes, a single output is chosen as the "algorithm's orientation to action."[87] This means that, however difficult it may be to ascertain the level of future migration, the multiplicity of potential outcomes will be reduced to a single output to guide border control. However much the outputs of machine learning remain difficult to verify, they nonetheless have a metaphysical force in how they change the way in which a threat comes to be understood.[88] As Amoore reiterates, "what matters to the algorithm, and what the algorithm makes matter, is the capacity to generate an actionable output from a set of attributes."[89] With the number of climate refugees *as* the output, machine learning can play a significant role in contributing to the militarization of border control, not only producing the threat but justifying a response to the threat. With the world becoming increasingly datafied, machine learning can provide the numerical basis upon which to militarize border control. The legitimacy of estimating future migration is backed up by the claim that artificial intelligence provides an objective way of analyzing threats.[90] As Jessica Bither and Astrid Ziebarth argue, it is a problem to claim machine learning is neutral or apolitical when it is being used for a range of political agendas. [91] Even if various subjective decisions inform the functioning of machine learning, from deciding upon which data to include or how much weight to give certain data, these are masked by the numerical basis of the output, allowing for a specific future to be decided upon as *the* threat requiring the militarization of borders.

What this means is that machine learning can obscure the data being used to inform estimates on future migration. As discussed, while race may not be an explicit data point used

within estimates on future migration, nationality—as a proxy of race—can be. The militarization of border control based on estimates on future migration thus involves the use of race as an obscured marker upon which to designate a population as threatening. The use of machine learning therefore plays a significant role in trying to mask the degree to which race continues to be one of the most fundamental aspects of border control. Thus, AI both cements old problems and creates new ones, focusing on how the 'problem to be solved' of climate change and migration obscures the role of race within border control. While it is relatively well established that borders are racialized and racializing, my focus here surrounds the structural inability of machine learning to overcome its reliance on race to base its calculations, along with class, sexuality, gender, and disability. As Amoore highlights, the "machine learning model itself has extraordinary resilience in the face of complete moral and political failures because a weight can always be adjusted, a threshold modified, a parameter tweaked,"[92] meaning the presence of race will continue unabated, even if attempted to be removed by restricting the type of data allowed into the model or using a different weight. Bias data cannot be excised from machine learning in light of the limitless potential of proxy data. As such, the solution is not seeking to remove bias from machine learning to 'fix' border control or make it 'fair' but recognizing that estimating future migration will always rely on data that posits racialized populations as threats. Given the available data affirms the existence of racism, with a long history of colonialism informing some of racism's most devasting effects, estimates on future migration only seem to entrench border control as the legitimate way of dividing up the world. With border control linked to past and presents forms of colonialism, migrants will continue to be posited as threatening to the colonial order of the world imposed by the West within these attempts of estimation.

Conclusion

This article has explored how estimates on future migration are an important aspect of militarizing the border across the United States and the European Union. In this attempt to create a link between climate change and migration, the state has been able to justify the militarization of its borders, deploying a range of new technologies provided by the growing number of corporations capitalizing on the emerging market for artificial intelligence. These estimates being produced not only predict what could happen but seek to control what will happen, resulting in the growing militarization of the border. By pre-empting movement, the state is able to maintain the territorial division of the world based on a racial hierarchy. With borders long being produced, regulated and reinforced by the West, estimates on future migration have become another means of ensuring borders exclude many racialized populations. While perhaps providing more nuance to understandings of risk, the introduction of machine learning into estimates on future migration further masks the presence of race as a defining feature of border control. In light of these continued efforts to divide the world being likely to continue, with the budget for militarization increasing,[93] this article will conclude by raising the specter of accountability.

What do estimates on future migration seek to hide? By effacing the presence of racism within border control to instead focus on producing climate change and migration as a threat to be governed, migrants become the scapegoats of the environmental destruction caused by the West. As several scholars have increasingly argued, the imposition of racism, colonialism, and capitalism is responsible for environmental destruction.[94] To give an example, this manifests through Western governments or corporations exploiting natural resources in poorer countries using extractivism.[95] By positing the threat of future migration as stemming from an imagined elsewhere, the question of accountability over environmental destruction is avoided. The overt attempt to create the problem of climate and migration hence means the West can avoid accountability for its own role in producing the environmental destruction, a fact well

documented.[96] As the nongovernmental organization CARE explains, "Despite the fact that the poorest 50% of the world's population is responsible for just 7% of global emissions, developing countries will face 75-80% of the costs of climate change."[97] The failure to address accountability for environmental destruction is made clear by the lack of acknowledgment within many debates on climate change that many Western states owe a range of debt for the emissions caused.[98]

Hence, as these estimates become a means of pre-empting the militarization of border control, accountability for environmental destruction becomes absent. Instead of focusing on the racism of environmental destruction, attempting to solve the problem of climate change, or even grappling with the nuanced factors leading to the necessity of plight, estimates posit migration itself as the problem that the state needs to protect itself from, avoiding accountability for its role in what prompts migration. Instead of fixing the 'problem' of scientifically wrong estimates, as if this could be overcome, machine learning will entrench the legitimacy of estimating future migration based on its claims to objectivity, leading to border control maintaining the division of the world while ignoring the degree in which racism permeates the very attempt to produce the problem of climate change and migration. Accordingly, the climate refugee is produced as the problem, void of what constitutes the necessity of plight. The use of estimates avoids accounting for the reasons why racism prompts some people to flee environmental destruction in the first place, allowing for responsibility to be evaded precisely by offering estimations and, hence, a temporary, militarized solution to the threat. Considering it is a political choice to manufacture threats as opposed to addressing the root causes of environmental destruction,[99] estimates represent a technobureaucratic attempt to control for risks that violently blur the origins of such risk in the first place. This poses a problem for how climate change and migration are understood, with estimates being ushered in as 'factual' at greater rates with the deployment of machine learning.

Not only this but the growing hype of AI within border control risks downplaying the degree to which new technologies can result in further violence being committed against migrants. As we have seen, AI is changing border control in the US and the EU with the state being provided with a range of new technologies upon which to maintain the territorial division of the world. The problem of accountability is even more tricky in light of the growing number of corporations playing a significant role in border control, not only supplying the necessary technology but effectively running many aspects of border control, from holding migrants in detention centers to chartering deportations.[100] This is especially a problem when we consider the most 'effective' means of border control is often linked to financial gain.[101] There is also the problem of machine learning techniques either being deemed confidential by the corporations who made them or governments invoking national security to classify them.[102] While there is already a growing body of work exploring the nuances of accountability for the harms of AI within border control,[103] the harms specific to estimates concern the future of militarization. As opposed to estimates on the future being neutral or apolitical, they inform the militarization of border control, with consequences for racialized populations seeking to migrate. The use of such estimations is incorrectly posited as neutral or apolitical in its assessment of the future of climate change and migration to mask how different actors have specific interests in controlling the future by measuring the possible outcomes and deciding upon one, relying on machine learning to produce the desired output. Hence, estimates on future migration elide how border control is inherently racist in its attempt to exclude certain populations, entrenching borders and the subsequent division of the world based on a lingering colonial attempt to maintain power in an ever-changing world. With environmental destruction in many parts of the world being caused by the West, the militarization of borders attempts to seal off the US and the EU from the effects of its destruction. The resultant militarization allows

for a temporal hierarchy: the West steps into the future while other parts of the world succumb to destruction.

Yet, while estimates on future migration represent another means of militarizing the border, they equally expose the world as being full of mobility already.[104] Every attempt at border control is an indication that populations are increasingly mobile. As Aimee Bahng argues, not only do estimates flatten the nuance of migration into statistical aggregation, but the calculation of risk is also an attempt to gain knowledge over phenomena with unmeasurable certainty, with the attempt to turn the unknowable into a probabilistic forecast that seeks to enclose uncertainty within the domain of calculable risk.[105] If estimates claim to work towards solving the 'problem' of future migration, what might a rejection of such logic entail? Against the demands of machine learning to quantify the future, what could it mean to value forms of knowledge beyond the quantifiable? By raising the cracks of machine learning upon which new possibilities can emerge, Louise Amoore gestures towards the importance of grappling with the "situated, embodied, and partial perspective of all forms of scientific knowledge."[106] While estimates of climate refugees have informed many of the debates on climate change and migration, this represents only a singular aspect of the story. With environmental destruction looming in unquantifiable ways, more estimates are not necessarily the solution. As Malcom Ferdinand suggests, instead, it might be worth considering the range of other ways of looking at the world beyond the use of estimates as a means of control.[107] Only then might a glimmer of accountability become possible.

Notes

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Endnotes

[1] Several scholars have made interesting points about the importance of upholding the rights of migrants in relation to climate change and artificial intelligence, while not necessarily assuming that rights are the answer to wider structural problems about borders. See Bettini et al., "One Step Forward, Two Steps Back?"; Molnar, The Walls Have Eyes.

[2] Al Jazeera, "Deadly Floods Leave Millions Stranded."

[3] Islamic Relief, "Somalia's Crisis Deepens."
[4] Gerard, "Tunisia's Sandy Beaches Eaten Away."
[5] This has long been a tactic of the United States and the European Union. From migration across Central America to the migration across the Mediterranean, as opposed to tackling the root causes of migration, the problem has come to be defined by the inability of borders to adequately keep populations barred from entry. See Miller et al., *Global Climate Wall.*
[6] Several good examples of these types of agreements are noted in Buxton and Akkerman, *Outsourcing Oppression.*
[7] Bhattacharyya, *Rethinking Racial Capitalism*, 129.
[8] Williams, *Climate Change is Racist*
[9] A growing amount of scholarship is exploring the links between artificial intelligence and race. See Benjamin, *Race After Technology* for one of many examples.
[10] Baldwin and Bettini, *Life Adrift*, 15.
[11] See Gonzalez, "Racial Capitalism, Climate Justice."
[12] Some of these links have been mapped out already. See Ahuja, *Planetary Specters.*
[13] Amoore, "Machine Learning Political Orders."
[14] Achiume, "Contemporary Forms of Racism."
[15] Buxton and Akkerman, *Outsourcing Oppression.*
[16] Joh, "Walls/Borders."
[17] Baldwin and Bettini, *Life Adrift.*
[18] More information on this debate is noted in Gemenne, "Why the Numbers Don't Add Up" and Suhrke, "Environmental Degradation".
[19] See some of my previous work in Abbey, "Truths, Fakes and the Deserving Queer Migrant."
[20] Baldwin and Bettini, *Life Adrift*, 2.
[21] This is explored in Bettini, "And Yet It Moves!" A wider discussion on the Anthropocene is also noted in this article. While outside the remit of this article, the various debates on the Anthropocene remain highly relevant to how we should think about the links between climate change, migration, and technology.
[22] See Bettini, "Climate Barbarians at the Gate?" and Ahuja, *Planetary Specters.*
[23] A fuller description of these methods is provided in Genova, *Borders of Europe* and Buxton and Akkerman, *Outsourcing Oppression.*
[24] See Molnar, *The Walls Have Eyes* for a good overview of many different techniques.
[25] More information on these methods can be found in Aizeki et al., *Smart Borders or a Humane World?*
[26] These discourses are notably found in Gore, *Earth in the Balance* and Boas, *Climate Migration and Security.*
[27] Dawson, *Extreme Cities.*
[28] Miller et al., *Global Climate Wall.*
[29]This article is indebted to Ozkul, *Automating Immigration and Asylum* and Miller et al., *Global Climate Wall* for this list.
[30] A longer explanation on this market is provided in Miller et al., *Global Climate Wall..*
[31] Aizeki et al., *Smart Borders or a Human World?*
[32] See Miller et al., *Global Climate Wall.*
[33] This has been notably explored in Molnar, *The Walls Have Eyes.*
[34] Joh, "Walls/Borders."
[35] Crawley and Skleparis, "Refugees, Migrants, Neither, Both".
[36] There is a wide range in scholarship on these topics from a range of perspectives, ranging from the work of Stoler, *Race and the Education of Desire* to Lugones, "Heterosexualism."
[37] Weheliye, *Habeas Viscus*
[38] Baldwin and Bettini, *Life Adrift*, 15-16.
[39] See Leese et al., "Data Matters."

[40] These methods are explored further in Willekens, "Monitoring International Migration Flows"; Carammia et al., "Forecasting Asylum-related Migration Flows"; and Valk et al., "Forecasting International Migration"
[41] Fuchs et al., "Migration Forecasting."
[42] Bijak, *Forecasting International Migration in Europe.*
[43] Joque, *Revolutionary Mathematics.*
[44] See longer explanation in Disney et al., *Evaluation of Existing Migration Forecasting Methods.*
[45] See Gemenne, "Why the Numbers Don't Add Up" and Jakobeit and Methmann, "Climate Refugees."
[46] There is a longer explanation in Lachmanová and Drbohlav, "The Probable Future Development."
[47] Paoletti et al., "The Concept and Theory of Migration Scenarios", 17.
[48] See Wiśniowski et al., "Bayesian Population Forecasting."
[49] Valk et al., "Forecasting International Migration", 466.
[50] See following for examples: International Organization of Migration, *Assessing Migration Scenarios;* Wiśniowski et al., "Bayesian Population Forecasting"; Organisation for Economic Co-operation and Development, *Perspectives on Global Development 2017*
[51] See Paoletti et al., "The Concept and Theory of Migration Scenarios."
[52] This is explained further in Valk et al., "Forecasting International Migration."
[53] Massumi, *Ontopolitics.*
[54] For a longer description of what numbers do for policy, see Stone, *Policy Paradox.*
[55] Access Now et al., "Uses of AI in Migration and Border Control."
[56] Amoore, "Machine Learning Political Orders"; Wiggins, "Biometric Borders."
[57] Vukov, "Target Practice", 92.
[58] Access Now et al., "Uses of AI in Migration and Border Control"; Amnesty International, "Xenophobic Machines"; Molnar, *The Walls Have Eyes*; Brouwer, "Schengen and the Administration of Exclusion"; Akhmetova, "Efficient Discrimination"; Beduschi, "International Migration Management."
[59] United States Department of Homeland Security, "Using AI to Secure the Homeland"
[60] European Parliamentary Research Service, "Artificial Intelligence Diplomacy."
[61] For a longer explanation on the role of these companies, see Electronic Frontier Foundation, "Hundreds of Tech Companies."
[62] See Molnar, "Technology on the Margins."
[63] This is explored further in Bircan and Korkmaz, "Big Data for Whose Sake?."
[64] Beck, *Risk Society.*
[65] See Access Now et al., "Uses of AI in Migration and Border Control."
[66] See Molnar, "Technology on the Margins."
[67] European Commission, "Feasibility Study on a Forecasting."
[68] Danish Refugee Council, "Predictive Analytics in Humanitarian Action."
[69] A good description of some of these methods are provided in Bither and Ziebarth, "AI, Digital Identities, Biometrics, Blockchain."
[70] Amoore, *The Politics of Possibility*; Amoore, *Cloud Ethics*; Joque, *Revolutionary Mathematics.*
[71] Amoore, *The Politics of Possibility*, 8.
[72] The role of norms in this regard is explored further in Mader, *Sleights of Reason.*
[73] Amoore, The Politics of Possibility, 9.
[74] Joque, *Revolutionary Mathematics*, 12.
[75] Joque, Revolutionary Mathematics, Amoore, *Cloud Ethics.*
[76] World Bank, *Groundswell.*
[77] Institute for Economics & Peace, *Ecological Threat Register 2020*
[78] Christian Aid, *Human Tide*
[79] This is detailed further in Gemenne, "Why the Numbers Don't Add Up"

[80] See Bettini, "Where Next?"; Gemenne, "Why the Numbers Don't Add Up"
[81] International Organization of Migration, *A Complex Nexus*
[82] Henley, "Climate Crisis Could Displace 1.2bn People."
[83] The role of numbers within society is explored further in Andreas and Greenhill, "Introduction: The Politics of Numbers."
[84] This is also noted in White, *Climate Change and Migration.*
[85] Access Now et al., "Uses of AI in Migration and Border Control."
[86] There are many examples of these claims, such as stopping the safe passage of makeshifts boats to protect migrants from people smugglers. See Genova, *Borders of Europe.*
[87] Amoore, *Cloud Ethics*, 80.
[88] See also Joque, *Revolutionary Mathematics.*
[89] Amoore, *Cloud Ethics*, 4.
[90] Gillespie, "Algorithm."
[91] Bither and Ziebarth, "AI, Digital Identities, Biometrics, Blockchain."
[92] Amoore, "Machine Learning Political Orders", 31.
[93] This is explored further in Bárcena et al., *Niobium and the EU* and Miller et al., *Global Climate Wall.*
[94] A few notable examples include Moore, *Capitalism in the Web of Life*; Yusoff, *A Billion Black Anthropocenes or None;* and Ferdinand, *Decolonial Ecology.*
[95] See Gómez-Barris, *The Extractive Zone.*
[96] See Falkner and Buzan, *Great Powers, Climate Change.*
[97] Hattle, "Climate Adaptation Finance."
[98] Dawson, *Extreme Cities.*
[99] This is further explored in Aizeki et al., *Smart Borders or a Human World?.*
[100] Other examples are noted in Genova, *Borders of Europe* and Akkerman, *Outsourcing Oppression.*
[101] See Sarat and Prabhat, *Privatisation of Migration Control.*
[102] See Molnar and Gill, "Bots at the Gate."
[103] One example is Nalbandian, "Increasing the Accountability."
[104] These questions on mobility are further explored in Baldwin and Bettini, *Life Adrift.*
[105] Bahng, *Migrant Futures.*
[106] Amoore, *Cloud Ethics*, 166.
[107] Ferdinand, *Decolonial Ecology.*