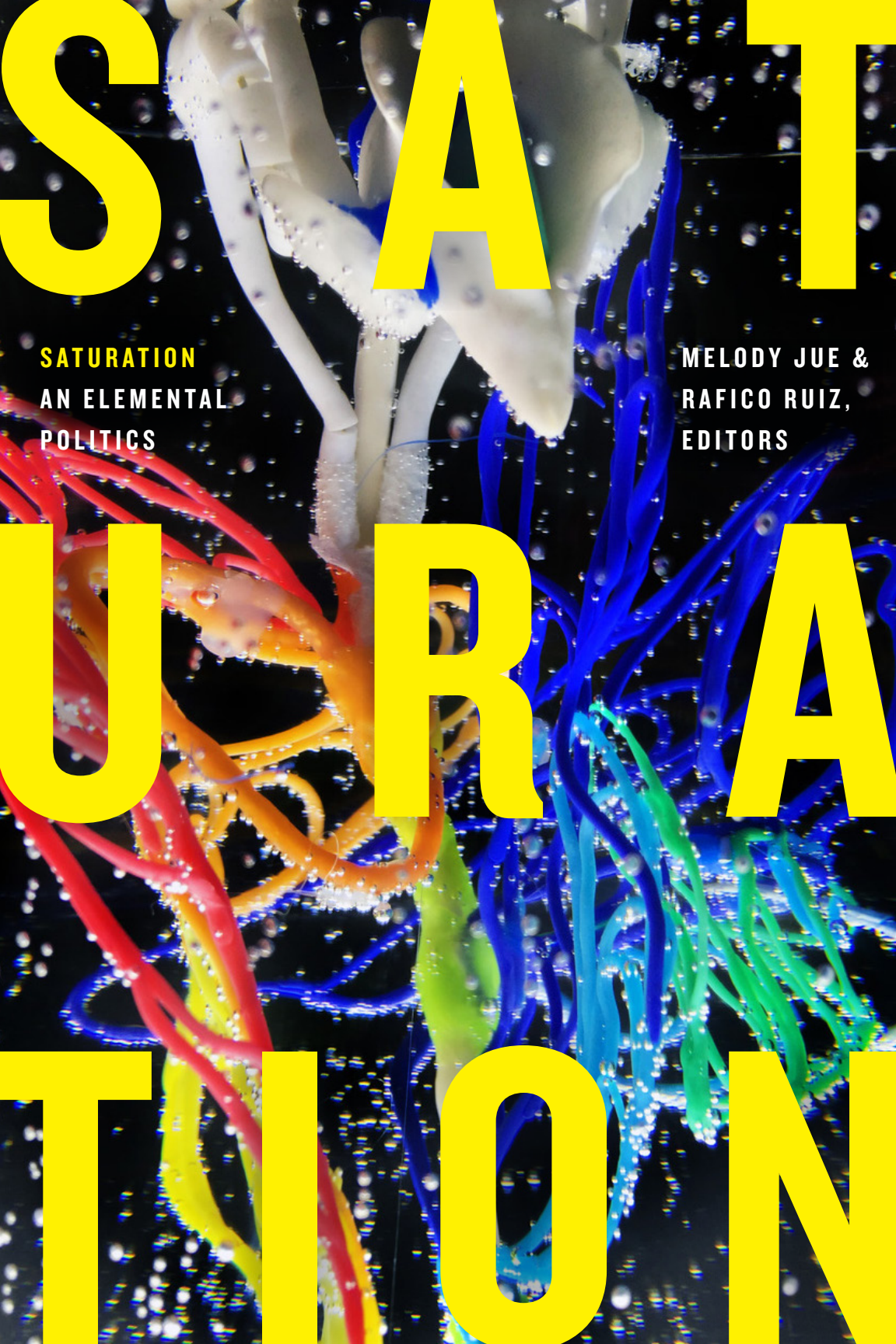
SATURATION
AN ELEMENTAL POLITICS
MELODY JUE & RAFICO RUIZ, EDITORS
SATURATION

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ELEMENTS *A series edited by Stacy Alaimo and Nicole Starosielski*

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AN ELEMENTAL POLITICS

EDITED BY MELODY JUE
AND RAFICO RUIZ

DUKE UNIVERSITY PRESS Durham and London 2021

Printed in the United States of America on acid-free paper ∞
Designed by Amy Ruth Buchanan
Typeset in Chaparral Pro and Knockout by BW&A Books, Inc.

Library of Congress Cataloging-in-Publication Data
Names: Jue, Melody, [date] editor. | Ruiz, Rafico, [date] editor.
Title: Saturation : an elemental politics / edited by Melody Jue
and Rafico Ruiz.
Other titles: Elements (Duke University Press)
Description: Durham : Duke University Press, 2021. | Series: Elements
| Includes bibliographical references and index.
Identifiers: LCCN 2020048530 (print) | LCCN 2020048531 (ebook)
ISBN 9781478009740 (hardcover)
ISBN 9781478011460 (paperback)
ISBN 9781478013044 (ebook)
Subjects: LCSH: Ocean—Philosophy. | Ocean and civilization.
| Mass media and the environment. | Human ecology and
the humanities. | Ecocriticism.
Classification: LCC GC10.2 .S28 2021 (print) | LCC GC10.2 (ebook)
| DDC 304.2/7—dc23
LC record available at https://lccn.loc.gov/2020048530
LC ebook record available at https://lccn.loc.gov/2020048531

Cover art: *Ecosystem of Excess*, 2014. © Pinar Yoldas.
Courtesy of the artist.

MJ: For Ben, with whom I gladly weather the elements

RR: For Anabel, Lola, and their generational precipitates

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ACKNOWLEDGMENTS

This book emerged out of a number of conversations on elemental thinking across several events. Melody organized a two-panel stream on "Elemental Media" at the Society for Literature, Science, and the Arts in 2015, with panelists including Christopher Walker, Alenda Chang, Nicole Starosielski, Jamie Skye Bianco, Heather Davis, and Tom Idema. Inspired by John Durham Peters's *The Marvelous Clouds* (2015), this panel explored how an elemental lens opens new kinds of critical engagements. Rather than representing the environment, panelists looked at how elements themselves—soils, heat, glaciers, water, atmosphere, plant life, petrochemicals—exhibit medial qualities. In 2016, Melody and Rafico co-organized a panel on "Hydrological Media" at the Society for Cinema and Media Studies, with participation from John Shiga and Chris Russill, examining how the varied materialities of water change the conditions of knowledge production about climate change. A month later, Melody participated in an "Elemental Media" conference at NYU organized by Nicole Starosielski (memorably the day after the 2016 election). At the same time, Nicole was launching a new book series for Duke University Press with Stacy Alaimo on "Elements," which is now home to Melody's first monograph *Wild Blue Media: Thinking through Seawater* (with Rafico's debut monograph, *Slow Disturbance: Infrastructural Mediation on the Settler Colonial Resource Frontier*, in the SST series), as well as the book that you now hold in your hands.

However, it was our co-organized 2017 workshop on "Saturation" at UC Santa Barbara that really provided the opportunity for working out the theoretical possibilities of this concept. As fate would have it, the day of the conference—February 17—happened to be one of the rainiest days in Santa Barbara in recent memory, pouring a deluge of more than 5 inches over the course of the day. While this may not seem like much in other geographies, in the dry Mediterranean environment of Southern California, 5 inches of rain was enough to cause severe flood-

ing and knock down trees. As the group discussed possible valences of saturation—literal, figurative, cognitive, watery, sonic, and more—workshop attendees would get the occasional "ping" of an emergency alert on their phones, advising of road closures and flooding conditions. We would like to thank Jeremy Douglass, Lisa Han, Mél Hogan, Paulina Mickiewicz, Rahul Mukerjee, Max Ritts, Chris Russill, Bhaskar Sarkar, and John Shiga for braving the elements and giving papers that shaped the conversation around "Saturation." The workshop also benefited from the engaged participation of our audience members, including Constance Penley, Janet Walker, Bishnupriya Ghosh, Sage Gerson, Tyler Morgenstern, and Daniel Martini Tybjerg. The "Saturation" workshop was generously supported by the UC Santa Barbara Academic Senate, the Interdisciplinary Humanities Center, Literature & Environment Center (English Department), Transcriptions Center (English Department), Film & Media Studies, and Comparative Literature.

We would like to thank Stacy Alaimo and Nicole Starosielski for their unwavering support for the book as part of their "Elements" series and for their generous feedback that shaped the project. We also had the joy of working with fabulous editors at Duke Press, Courtney Berger and Sandra Korn, who helpfully guided the project along many stages. Stefan Helmreich and Nicole Starosielski offered careful feedback on early drafts of our introduction, and the collection benefited from the close and generous attention of two anonymous readers. We were also privileged to think alongside an outstanding group of contributors/friends who share a common cause in naming the vast, varied and often hidden phenomena that demand current and urgent recognition. Saturation is a material heuristic that drew in and on this support, and pushed us to think at its theoretical edges—to see its relevance across environmental situations.

Melody would like to thank her many colleagues at UC Santa Barbara in the departments of English and Film & Media Studies, several of whom (Bishnupriya Ghosh, Bhaskar Sarkar, and Janet Walker) are featured in this collection. Teresa Shewry, Rita Raley, and Alenda Chang offered many supportive conversations during the process of editing and writing this volume. Enda Duffy, Leah Norris, Rebecca Baker, Rita Raley, Brian Donnelly, and Stephanie Batiste contributed a heroic level of course support during a personal emergency. Katja Seltmann, Greg Wahlert, David Chapman, and Kathy-Ann Miller welcomed Melody's exploration of the seaweeds at Santa Barbara's Cheadle Center for Biodi-

versity and Ecological Restoration (CCBER), the subject of her chapter in this volume.

Melody would also like to thank the following people for opportunities to think elementally, across conferences and other writings: Nicole Starosielski, Stacy Alaimo, Rahul Mukherjee, Chris Russill, Katherine Hayles, Mark Hansen, Christopher Walker, Alyson Santoro, the Ocean Memory Working Group, Todd LeVasseur, Christina Gerhardt, Alenda Chang, Rafico Ruiz, Bishnupriya Ghosh and Bhaskar Sarkar, UCHRI, UCSB Film & Media Studies, Haus der Kulturen der Welt, Sophia Roosth, Brent Bellamy and Matthew Schneider-Mayerson, Christina Vagt, Wolf Kittler, Imagine Otherwise podcast, Akitoshi Nagahata, Colin Milburn, Tobias Menely, and Rafico Ruiz. Melody would also like to acknowledge the elemental thinking of her students, including Jeremy Chow, Lisa Han, Sage Gerson, Sydney Lane, Leah Norris, Somak Mukherjee, Rebecca Baker, Jamiee Cook, Sebaah Hamad, Lydia Borowicz, Maria Zazzarino, Maxximilian Seijo, and Surojit Kayal. Finally, thank you to Lauren Pawlak, Zach Blas, Christopher Tom, and Fanny Chu for moral support during a difficult time, and to Jennifer Rhee, Carolyn Laubender, and Jessica Hines. To my family, who saturates my life in so many ways: Ben Robbins, Terry Jue, Lori Jue, and Rodney Jue—whom we miss.

Rafico would like to thank colleagues and friends at Trent University where he was the Roberta Bondar Postdoctoral Fellow in Northern and Polar Studies, and a *Fonds de recherhe du Québec—Société Culture* Postdoctoral Fellow, while this collection took early shape. Stephen Bocking provided many an engaging and watery conversation along the shores of the Otonabee River; Finis Dunaway made time for a regular lunch where we exchanged notes on writing environmental histories that could matter; Liam Mitchell chatted over coffee about making the leap from PhD work to the scholarly beyond. Trent's School of the Environment and its Frost Centre for Canadian Studies and Indigenous Studies provided space and generously expansive time to pursue questions that would become central to this collection, particularly around carbon's reach across, within and through circumpolar worlds. Thanks as well to the energetic and incredibly smart students in Trent's inaugural "environmental media" seminar in the winter of 2017. Coming into the seminar from the fields of biology, Indigenous studies, development studies, education, and more, you brought goodwill and insight into collectively thinking about where environments and mediating processes meet. Over the years many generous readers and interlocutors helped move this collection along. For

that engagement, thanks to Darin Barney, Caroline Bem, Nick Couldry, Jeff Diamanti, Yuriko Furuhata, Jennifer Gabrys, Bishnupriya Ghosh, Lisa Han, Jane Hutton, Melody Jue, Aleksandra Kaminska, Ajit Menon, Paulina Mickiewicz, Tyler Morgenstern, Chris Russill, Rob Shields, John Shiga, Nicole Starosielski, Hannah Tollefson, Janet Walker, and Joanna Zylinska. For braving the elements of life with love and generosity: Paulina Mickiewicz, Anabel Ruiz, Lola Ruiz, Janice McAuley, Aly Ruiz, Simon Ruiz, Martha Zalazar, Bogda Mickiewicz, and Rafal Mickiewicz.

THINKING WITH SATURATION BEYOND WATER: THRESHOLDS, PHASE CHANGE, AND THE PRECIPITATE

Melody Jue and Rafico Ruiz

Saturation: An Elemental Politics engages with saturation as a material heuristic that begins with water. Saturation draws its etymology from the Latin *satur*, meaning "full or glutted," while the *Oxford English Dictionary* adds that saturation is the condition of being "thoroughly soaked." Yet saturation quickly exceeds its aquatic valances, offering a sensitivity to co-presences, transformations, and processes. Saturation is useful for analyzing situations in which the elements involved may be difficult or impossible to separate. As Tim Ingold once observed, "Rainfall can turn a ploughed field into a sea of mud, frost can shatter solid rocks, lightning can ignite forest fires on land parched by summer heat, and the wind can whip sand into dunes, snow into drifts, and the water of lakes and oceans into waves."[1] The chapters in *Saturation* evoke this material imaginary where the elements are not a neutral background, but lively forces that shape culture, politics, and communication.[2]

Saturation emerges at the interdisciplinary nexus of the environmental humanities, media studies, cultural studies, science and technology

studies, and postcolonial theory. Transdisciplinary in method, it aims to rethink the boundaries of media beyond anthropogenesis and account for the life-shaping agencies of nonhumans. Many of the chapters in *Saturation* draw inspiration from John Durham Peters's *The Marvelous Clouds* and Lisa Parks and Nicole Starosielski's collection *Signal Traffic: Critical Studies of Media Infrastructure* to consider the durational footprint of media technologies and infrastructural systems, studied within diffuse environmental contexts. Thus, more than an experiment in fluid poetics, *Saturation* is self-consciously a response to the phenomena of climate change as emerging from the confluence of global capitalism, petrochemical dependency, and the ongoing violence of colonialism.

Saturation offers two methodological strategies based on its properties as a material heuristic. A "material heuristic" is an interpretive lens that guides the way scholars speak about phenomena, based on some material or environmental feature. For example, "geologic strata" figures as a material heuristic for Michel Foucault and, later, Jussi Parikka, presenting a specific model for thinking about time and history as layered and accumulative.[3] Saturation, by contrast, is adequate to situations where discrete objects/substances/phenomena may be difficult to delineate. It involves an attitude of ontological openness, wherein the researcher does not know all the substances, elements, agencies, or processes in advance, but rather explores what may co-saturate within a given situation. Thus, *Saturation* builds on Karen Barad's *Meeting the Universe Halfway* in its ambitious attempt to articulate a theory of intra-action, which starts with broad "phenomena" rather than isolated objects. The way that Barad considers "phenomena" is similar to how *Saturation* considers "environments," as ontologically dense situations that yield identifiable agencies only through the intervention of in-depth study and situational analysis. *Saturation* is in dialogue with new materialist theories, but, like Barad, begins with situations rather than distinct objects, elements, or substances alone. Bhaskar Sarkar's chapter in this collection on media saturation in the global South exemplifies this type of situational thinking. Sarkar's chapter begins from a street market in northern India selling pirated VCDs and fried food in grease-saturated newspaper, a potent site for addressing the ways in which non-media like grease, dust, and microbes are co-present with media systems. The global South, often viewed as too crowded, too noisy, too polluted, too chaotic, and too corrupt, appears as a "super-saturated world always careening toward yet another crisis." Saturation never involves one thing alone, but rather the

thick distribution of many co-present elements within the forces of a broader global economy.

As a second methodological strategy, *Saturation* attends to processes of transformation that include thresholds, phase changes, and the precipitate. Phase changes describe material thresholds where an element is on the verge of changing form, a useful heuristic in the face of anthropogenic climate change. Some chapters in this collection describe literal transformations of material form, such as Ruiz's chapter on the economic desire to transport icebergs as a source of fresh water. Others examine meaningful "thresholds" whose crossing can result in forms of bodily harm, such as Rahul Mukherjee's chapter on people who identify as "electrosensitive" amid a sea of wireless signals, and Bishnupriya Ghosh's focus on blood as an epidemic medium that can accommodate low levels of the HIV virus. Finally, the "precipitate" is that which comes out of a saturated solution, theorized most explicitly by Lisa Yin Han's chapter on the necropolitics of seismic survey testing and the harm it does to whales. This leads Han to consider saturation not as a permanent condition but as a situation that can produce its own accidental abjections.

Saturation encourages us to think about habits in our vocabulary that reflect thinking with discrete objects and materials. For example, at a macro scale, the term "entanglement" suggests something that can be knotted (like a rope or vine) but not diffuse substances like water, soundwaves, or gases. Even when Barad references quantum entanglement, the "tangle" of entanglement is a figure borrowed from the macroscale of human experience before being adopted into a physics lexicon.[4] While entanglement remains a compelling term in environmental humanities research, it channels a noticeably terrestrial metaphor when used to describe more liquidy or diffuse phenomena. Preference for words like "object" and "entanglement" are part of what Dan Brayton has called the "deep encoding [of the land] in the terminology and conceptual categories that define ecocritical inquiry"[5] and which one of us (Jue) has called the "terrestrial bias" of contemporary theory.[6]

However, while the ocean is a space par excellence for thinking about forms of movement and proximity, this collection is not only about bodies of water. Indeed, what is perhaps most useful about saturation is that it can hold many different material and abstract senses together. To think with saturation is to acknowledge the co-presence of multiple phenomena within the complexity of our symbiogenic world. The heuristic of saturation has enabled our contributors to talk about multiple senses

of saturation in the same breath: watery and acoustic saturation, media and economic saturation, infrastructural and data saturation, and oceanic and photographic saturation, among others. Saturation enables a trans-elemental imaginary that positions scholars to compare materials and social forces that might not otherwise find themselves in the same conversation.

Thinking with the agency of the elements has long-standing precedents in Indigenous epistemological and phenomenological traditions across lands, ices, waters, and atmospheres. Such lineages and traditions of Indigenous earth keeping and guardianship exemplify what Marisol de la Cadena terms "earth beings" that can extend and affirm environment-driven understandings of ontological capacity and agency.[7] These worldviews have often been overridden by colonial epistemologies and forms of racialized violence. There is an "inhuman proximity" between brown and black bodies and the devastating effects of environmental racism and material toxicity; such bodies have been forcibly made into what Kathryn Yusoff describes as absorbent sites of erasure and forgetting—sites where histories of colonial dispossession and contamination co-saturate across social, bodily, and political registers.[8] Saturation involves a politics that is not just "in the air" given our present conjuncture, but also "of the air" in its call to trace co-present, multiscalar, and durational relations of power. Indeed, *Saturation* is not only about elements in political configurations, but about the politics of elemental formation through their mediations. The mediations of saturation have to do precisely with questions of "for whom"—for whom something constitutes a harmful threshold of experience or perception, or which lifeways certain saturations disrupt. Elemental mediations demand forms of analysis that can attend to the full relational spectrum of saturations that involve not only materiality but intentionality.

Saturation: An Elemental Politics imagines a future scholarship that attends to co-present social, ideological, and cultural phenomena that seep into each other—shaping an elemental politics through which to navigate our global warming–defined world. These phenomena may be of very different ontological natures, and the typical scholarly method would be to examine them in isolation (as materials, as elements, as individual beings). Instead, saturation gravitates to sticky situations where not all agential substances or actors are known in advance. Saturation focuses on situations, open to the question of "what saturates what" or "what precipitates out of what." Saturation begins from the epistemic

point of scholarly humility, and a willingness to track the interactions and divergences of many things or substances at once. Thinking with saturation also requires a consideration of the environmental specificity, or milieu-specificity, of language.[9] From bloodwork to surplus data, the heuristic of saturation is a call to an elemental scholarship that exceeds the solidity of earth, the fluidity of water, the temperature-sensitivity of fire, and the mobility of air. We think of elementality not as a taxonomy of substances, but as a politics of co-presences under flux.

It is our hope that *Saturation: An Elemental Politics* offers a timely response to the crisis of global climate change and its reverberations across economic, social, political, multispecies, and phenomenological registers. Indeed, we see saturation as a necessary analytic to deal with very particular climate change effects and social crises. However, saturation does not mean addressing environmental materiality without humans; rather, saturation opens a space for considering the interrelated agencies that inhere in a situation. By thinking through the heuristic of saturation, this book encourages scholars to contemplate phenomena of vastly different orders under the same umbrella of critical consideration—not to flatten them under the same ontological register, but to hold them in suspension and see how they participate in a situation across local and global scales of relation.

BEGINNING WITH WATER

The material imagination of saturation brings to mind liquid elements: the ground saturated with rain after a storm, summer air saturated with humidity, or oxygen saturated in the ocean. Recent work in the environmental humanities and media studies has embraced the "elemental" as a strategy for thinking through interconnection across material ecologies and geographies. The elemental evokes both ancient and contemporary sensibilities to include not only earth, air, wind, and fire, but also the elements of the periodic table (magnesium, carbon, uranium, etc.), synthetic substances like plastics, and the precarious melting of glaciers. Yet there remains an unresolved question of how to negotiate between scientific perspectives on the elemental and those inherited by older cultural genealogies. For example, as Hasok Chang and Ivan Illich have written, the mythic and cultural associations of "water" are not the same as the modern scientific formulation of H_2O as a pure element.[10] Indeed, water has long been associated in the West with

the feminine, but also has been channeled to think about posthuman subjectivity by scholars like Astrida Neimanis in *Bodies of Water: Posthuman Feminist Phenomenology*. *Bodies of Water* usefully updates Gaston Bachelard's sense of watery poetics to account for environmental pollution and toxicity, theorizing the condition of posthumanism in terms of watery flows between porous bodies.[11] A scientific view of elements both enables and constrains their theorization—sometimes bracketing out cultural valences, while opening the elements to reevaluation in light of anthropogenic climate change and an even broader array of chemical effects.[12] What has been appealing about thinking with the elements (like water) is precisely their function as heuristics. Less reified and bounded than objects, elements allow for a broad ecological sensibility that, nonetheless, activates specific cultural imaginaries. Bachelard—who famously articulated the poetics of fire, air, and water in three separate volumes—once wrote, "A material element must provide its own substance, its own rules and poetics."[13]

Many of the chapters in this collection are in dialogue with Peters's aforementioned *The Marvelous Clouds: Toward a Philosophy of Elemental Media*, which proposes a "philosophy of elemental media—the elements that lie at the taken-for-granted base of our habits and habitat—with special reference to the digital era."[14] By defining the elemental as that background or milieu which we take for granted, Peters challenges scholars to see an ontological similarity between the technological infrastructures that support communication networks, and the elemental environs that do similar work. Perhaps his most provocative claim is to expand the "media" concept beyond anthropogenic technologies, and channel critical attention to the infrastructural roles that the sky, ocean, and earth play in the transmission and storage of information: "If we mean mental content intentionally designed to say something to someone, of course clouds or fire don't communicate. But if we mean repositories of readable data and processes that sustain and enable existence, then of course clouds and fire have meaning."[15] In *Saturation*, several writers have taken up Peters's challenge to expand the media concept by considering the ocean as an acoustic medium (Shiga, Han), seaweeds as storage media (Jue), blood as an informatic medium (Ghosh), the watery footprint of media technologies (Zylinska), and the air as an infrastructural medium of wireless transmission (Mukherjee), among others. However, saturation differs from existing approaches to the elemental to the extent that it gravitates to situations that might be blurred con-

fluences of co-saturating substances. Saturation embodies the fluidity of relations that exceed attempts to contain, manage, and fix them to stable frameworks.

In several chapters in this collection, a theory of saturation emerges from Indigenous practices of subject formation and land/water-based identification in order to contest the largely Western spaces and politics of environmental degradation, ocean-based dispossession, and racialization (Slater, Ritts, Ruiz). These chapters address ongoing colonial relationships that inhere through the emergence of novel planetary environments where multiple saturants are always in play. Here, land, air, water, and more are always interacting, not only within worldviews and ecologies but also as substances within ecological organs: "Because the Everglades function like kidneys," Winona LaDuke writes, "most of the toxins that are in the larger ecosystem end up in the Everglades eventually. More pollution and less Everglades means less filtering, and the system becomes a toxic sink."[16] Saturation enables us to engage with phenomena as they concurrently emerge across specific locales and scales, necessitating an analytical sensitivity to multiple saturants. Like Teresa Montoya's embodied tracking of the Giant King Mine spill and its yellow plumes of aqueous toxicity affecting successive Diné communities along the San Juan River,[17] *Saturation* is a call to build a radical theory of milieu that holds aqueous, contextual relations up for analysis.[18]

As a material heuristic, saturation naturally evokes a coastal, or littoral, imaginary, oriented to and shaped by terrestrial, atmospheric, and aquatic phenomena. Scholars tend to think of the coast as a kind of chronotope (in Margaret Cohen's sense, borrowing from Bahktin) for the way that it gives place a "poetic function and imaginative resonance."[19] Yet coastalness is also an ongoing site of negotiation through what Kamau Brathwaite called a "tidal dialectic" or "tidalectic," the unending oscillation of moon-pushed waters that continually reshape the shore.[20] Such a formulation shares kinship with Haraway's prescient formulation of "boundary objects," an orientation toward the thresholds of lifeworlds.[21] *Saturation* also shares kinship with anticolonial "seascape epistemologies" that contest terrestrial and anthropogenic narratives of space as a predominantly geopolitical container, moving toward an oceanic-ecological thinking that accounts for the co-presence of phenomena and open-ended becoming.[22] Epeli Hau'ofa's "sea of islands" trope performs a decolonial gesture of imagining Oceania as networked islands "of" the sea, rather than isolated spots "in" the ocean.[23] Through

the subtle change of prepositions, Hau'ofa's "sea of islands" builds on traditional navigational practices in Oceania to articulate a stronger sense of diasporic belonging. Similarly, Karin Amimoto Ingersoll sees traditional *Kanaka maoli* knowledge forms as embodying an emergent ecological knowledge, distinct from Western science. For Ingersoll, seascape epistemology "does not encompass a knowledge of 'the ocean' and 'the wind' as things. Seascape epistemology is not a knowledge of the sea. Instead, it is a knowledge about the ocean and the wind as an interconnected system that allows for successful navigation."[24] Our collection allies itself with political projects that sustain the relationships between water-based Indigenous lifeworlds and the future horizons of lively ways of knowing. The waters of these coastal imaginaries are, following Elizabeth DeLoughrey, "heavy" with the density of past environmental and racial violence.[25] *Saturation: An Elemental Politics* accounts for ways of moving through the volumetric space of oceanic submersion that become co-determined by postcolonial materialities, geographies, bodies, and other varied immersions.[26]

Whether it engages changes in sea level rise, atmospheric carbon, or underground aquifers, saturation suggests a spatial turn toward the emergent relationships through *volumes* rather than across mere surfaces. This attention to volume may begin with water, but can also address imaginations of land. For example, Kim TallBear's vibrant treatment of pipestone, a red-hued catlinite rock and "artifact of 'blood'" for the Dakota largely used in carving, highlights both pipestone's elemental connections to liquid blood and its volumetric imaginary:

> From a Dakota standpoint, the pipestone narrative is one of renewed peoplehood. A flood story tells of the death of a people and the pooling of their blood at this site, thus resulting in the stone's red color and its description as sacred. The stone is sometimes spoken of as a relative. Unlike with blood or DNA, pipestone does not possess a cellular vibrancy. Yet without it, prayers would be grounded, human social relations impaired, and everyday lives of quarriers and carvers depleted of the meaning they derive from working with stone.[27]

TallBear's volumetric thinking is not grounded by the coordinates of the Cartesian grid, but rather is bound to an environment-responsive and aqueous ontology of suspension, diffuse co-presence, and nonlinear time—four-dimensional stone that is the result of the accretion of a sa-

cred liquid.[28] One of the aims of *Saturation: An Elemental Politics* is to extend this kind of volumetric thinking and examine how it accounts for co-saturating elements and their set of relationships with one another.

Indeed, saturation's aquatic origins direct us toward the suspended and relational states that are modeled by the lifeworlds of bodies of water. This spatial focus highlights saturation's ability to articulate terrestrial space not as a container, but as a volumetric thickness. Franck Billé foregrounds such an embodied experience of spatiality in his introduction to "Speaking Volumes": "As our bodies grate against the textured materiality of that purportedly empty space, as we choke on its dust, as our lungs struggle to fill with oxygen, and as our social lives become enmeshed in and demarcated by invisible electromagnetic fields, we are continually confronted with the textured and voluminous presence of this space."[29] We share Billé's concern with engaging a sense of space as "textured" and voluminous, or even frictional (to use Anna Tsing's term).[30] Saturation involves such considerations of material thickness, pull, and friction that highlight more-than-human species and spatial capacities that challenge post-Cartesian conceptions of materialization and space formation. In this respect, *Saturation* also builds on New Materialism's espousal of post-Cartesian ontologies: an aquifer made up of paleowater, sand, and bitumen (Slater); a sonic, necropolitical sea of low-frequency sonar and beaked whale carcasses (Han). Saturation is a heuristic that can hold together a number of co-interacting substances. For example, one should address sound, or water, or whales, or oil prospecting not alone, but in relation. This relational arrangement of co-saturating and co-present substances establishes an open-ended temporal horizon to the heuristic—there will always be further saturants to come.

We begin *Saturation: An Elemental Politics* with interventions that think through the material imagination of water. Each chapter traces forms of water that are not merely entangled (in a rope-like sense), but rather *saturated* with other material, cultural, and cognitive elements. Stefan Helmreich's chapter "The Colors of Saturated Seas" examines how scientific visualizations of the ocean often rely on the saturated palette of the rainbow color map. Regardless of the substances that such rainbow maps codify (such as heat, wave height, or aragonite), Helmreich shows how the use of red tends to suggest a "radiant symbolic heat" to viewers. The persistent interpretation of red as "heat" or "danger" in these maps demonstrates a structured mingling of the viewer's common-sense experience alongside the semiotic register of what such colors signify.

Drawing on Charles Sanders Peirce's theory of phenomenology, which Peirce named *phanerochemistry*, Helmreich identifies two saturated phenomena: the literal saturation of the seas with heat or aragonite, and the interpretive saturation whereby the viewer enjoins their perception of heat alongside the varied semiotic uses of the color red.

Where Helmreich's chapter adds to our literacy of reading scientific visualizations, Joanna Zylinska's chapter, "Hydromedia: From Water Literacy to the Ethics of Saturation," argues for a "water literacy" needed in media theory. Zylinska begins with the dual premises that (1) all media can be understood as hydromedia and (2) water itself is a medium that saturates our environment by means of multiple processes of connection, communication, solidification, and rupture. Through readings of the artwork *Hydropolis* (2015) and the Virtual Museum of Digital Water, Zylinska shows how water is involved in the production and usage of media devices. While this may seem counterintuitive for devices and technologies that would short-circuit from spilled coffee, Zylinska sees water as part of the infrastructure that makes technical production possible; water is not only a component of media technologies but a medium itself through the processes of saturation in which it participates—material and cognitive.

If it is difficult to see water's footprint in media technologies, perhaps it is equally challenging to imagine the presence of water within rocks and geologic formations. Avery Slater's chapter, "Fossil Fuels, Fossil Waters: Aquifers, Pipelines, and Indigenous Water Rights," centers on the Ogallala aquifer, an immense body of water-saturated sand that lies below the High Plains of the United States and that supports the region's agricultural industrialism. As an unconfined aquifer, the Ogallala is especially permeable to water penetration from above, yet is replenishing much more slowly than it has in both the recent and distant past through heavy agricultural demand and "planned depletion." Through readings of Indigenous and activist literature, Slater shows how the future of the Ogallala would be endangered by the proposed building of TransCanada's Keystone XL pipeline and the high probability of leaks and oil spills, while tracing the complex legal, treaty-based regimes that contemporary Native Americans are navigating in order to claim their original treaty rights to uncontaminated water.

Across these three chapters, the complexities of each situation quickly exceed water itself, involving many co-saturating agencies. For

Helmreich, the literal saturations of aragonite in seawater parallel the cognitive mingling of sensory "heat" with color semiosis; for Zylinska, cognitive saturation is co-present with the watery saturation of media; and for Slater, groundwater saturation belies complex legal frameworks for commodity rights. Although materiality is key to thinking with saturation, the framework of saturation opens to a way of thinking with the material alongside the cultural and the cognitive. Thus, while saturation begins with water and watery metaphors, it is useful beyond water as a heuristic for thinking through co-present agencies, elements, and phenomena that traverse ideological systems and physical substances alike. In the next section, we show how saturation moves beyond water to give rise to three related concepts: thresholds, phase change, and the precipitate.

FORMS OF SATURATION ANALYSIS

We offer "Thresholds," "Phase Change," and "Precipitate" as distinct parts of this book and techniques of analysis that pertain specifically to the chemical poetics of saturation in its material imagination. The saturation point of a chemical solution is a meaningful "threshold," past which no additional material can dissolve; in thermodynamics, a saturation state is the point where a "phase change" begins or ends (for example, liquid to gas); the "precipitate" is that extra substance which falls out of a fully saturated solution. The triumvirate of thresholds, phase changes, and the precipitate name the key *processes* involved in saturation thinking, processes that contribute to a poetical imagination beyond their technical meanings in chemistry. After all, conditions of saturation are never really static—within the medium of time, thresholds may be approached or exceeded, things fall out of solution, and the phase of matter may shift in life-changing ways.

The chapters in "Thresholds" examine the varied boundary conditions that comprise saturating environments, and account for the crossing of contested thresholds of detection, exposure, and biopolitical violence. The chapters in "Phase Change" describe transformations of material form, while attending to the particular materials and sites of saturation through which such material changes manifest. Those in "Precipitate" focus on the spatial and temporal conjunctures across which co-saturating substances and phenomena shift between elemental configurations, sus-

pensions, and provisional relations. These lively situations involve instances of material transformation that evolve within the context of power, politics, and cultural valence.

Although grouped thematically across these three categories, the chapters in this collection evoke more than one facet of saturation. For example, Shiga's chapter examines underwater thresholds of sonic perceptibility while framing ocean space as equally saturated with a racialized politics of listening; Hogan's chapter reads through the diffuse, aqueous data promises of "the cloud" to examine the logic of a data center industrial complex predicated on a paradigm of saturation; Jue's chapter considers the light saturation of photosynthesis alongside the chemical saturation of photosensitive paper; Ruiz's analysis of desalination technologies returns us to water, while also examining the environmental impact of salt as a precipitate. The situations that our contributors gravitate to—where things do not fit neatly in discrete categories—are precisely where saturation thinking is useful. Indeed, saturation allows our contributors to talk about messy phenomena where material, semiotic, and ideological registers overlap. Thus beyond water, the chapters in this collection show how saturation can be particularly useful for describing matters of economic surplus, the abject, volumetric thinking, and other activations/transformations of matter.

IN "THRESHOLDS," our contributors examine the politics—biopolitical, interspecies, and otherwise—of crossing or exceeding limits within distinct volumetric phenomena. Here, the threshold constitutes an upper boundary beyond which a change will occur, dependent on context. The chapters in this part discuss how exceeding threshold conditions can result in a change in form, bodily violence, or the emergence of a precipitate from conditions of saturation (to go with a liquid metaphor). They pay close attention to how the volumetric space of a body registers forms of disturbance: the shock of high-decibel sounds to whales, the subtle transmission of wireless signals, the cinematic representations of submarine sonar. While other chapters in this collection also strongly draw on thresholds in their theorizations of saturation (Ghosh, Han), the three chapters clustered here share a common attention to sensory perception and the precarious conditions of bodies within spatial volumes. A critical attention to media and somatic thresholds—or how technologies and bodies register the same signals differently—lead Mukherjee,

Ritts, and Shiga to theorize a more volumetric understanding of the aerial and ocean environments as media.

John Shiga takes up the question of detecting acoustic phenomena underwater in "Sonic Saturation and Militarized Subjectivity in Cold War Submarine Films." Shiga shows how sounds saturate the seawater of the open ocean, military ships, and masculine subjectivities. Beginning with the groaning of ship hulls in *Das Boot* and *Hunt for Red October*, Shiga theorizes the figure of the "strained listener," where masculinity is performed as the "capacity to discern friend from foe in the soundscape, which requires self-constraint on verge of petrification." In these films, strained listening depends on the relationship between man and machine, an augmented cyborg ear ready to detect phenomena that cross the threshold of audibility. In other cinematic moments, the crewmen are oversaturated by sound that cannot be classified and responded to in time. Concluding with a discussion of the black crewman Jonsey in *Hunt for Red October*—who "hacks" the sound-detecting system by projecting Paganini's music into the water—Shiga brings theories of racialized masculinity, labor, and militarization into conversation with his theorization of sonic saturation.

Continuing with a different form of wave media, Rahul Mukherjee's chapter "Wireless Saturation" considers the divisive political, biological, and infrastructural thresholds that alternately emerge and become breached in relation to the phenomenology of "wirelessness." Mukherjee describes the condition of wirelessness as an indiscriminate projection of electromagnetic fields by telecommunications companies, an ambience that may affect the phenomenological experience of self-identifying "electrosensitives." By asking, "Are humans capable of electroreception?" Mukherjee disrupts the flat ontologies of the electromagnetic spectrum, largely undertaken in the service of telecommunications capitalism and wireless science, and extends human physiology toward its possible capability of detecting electromagnetic frequencies. Mukherjee understands "wireless saturation" as a series of relational thresholds that conduct signal capacity and toxic environments.

Max Ritts considers how underwater remote sensing activities are changing the characterization of maritime spaces through the threshold of screen interfaces. In "Saturation as a Logic of Enclosure?" Ritts traces "saturation" as an accompanying logic in the normalization of marine enclosure—linking practices of gaming, eco-governance, and digital immersion. Beyond the literal saturation of the ocean with technical

sensing devices, Ritts identifies Canada's support of Digital Fishers as a "saturated state" that aims to normalize sustainable marine development through crowdsourced ocean monitoring technologies and that relies on the commercialization of marine scientific knowledge. Drawing on the tradition of autonomist Marxism, Ritts shows how citizen-sensing initiatives that have taken shape along Canada's West Coast have been coopted by state-led forms of ocean monitoring that aim to characterize maritime spaces as safe and controllable, and ready for increased tanker traffic among other forms of marine development.

"PHASE CHANGE" explores the capacity of matter to change form, drawing on the thermodynamic imaginary of how water changes phases across solid, liquid, and gaseous forms with the addition or subtraction of heat. In fact, thinking with phase change began with (but exceeded) water when it was first raised during the workshop on saturation that originally took place at UC Santa Barbara on February 17, 2017. On this date, the arid coastline of Central California received a historic amount of rainfall, causing extreme flooding and ensuring that every participant dripped their way into the meeting room. It was under the conditions of this rare rainstorm that our colleague, Janet Walker, observed that the heuristic of saturation might be thought of in terms of "phase states." Exemplified by water (moving between ice, liquid, vapor), phase states describe material thresholds where an element is on the verge of changing form. Perhaps, Walker suggested, we could revise Mary Douglas's phrase describing "dirt as matter out of place" (306) to read, "climate change as matter out of phase" (307)—a phrase Walker revisits in her afterword to this book.[31] To think of matter being "out of phase" within the global phenomenon of climate change necessitates thinking not only about material substances but also about energy. To this end, Nicole Starosielski's work on "thermocultures" anticipates the significance of phase change. In "The Materiality of Media Heat," Starosielski outlines several ways of thinking with temperature: taking a medium's temperature, analyzing its thermodynamic conductivity, and analyzing phase transitions. Noting Marx's formulation that "all that is solid melts into air," Starosielski writes that "the transitions of phases—of states of matter—brought about by temperature changes form an apt set of metaphors to describe the process of media and cultural change," particularly in the form of meltdowns.[32]

The chapters in "Phase Change" attend to situations where something literally or figuratively changes from one state to another and, here, happen to involve multispecies relationships. Ghosh's focus on blood as an epidemic medium in "Becoming Undetectable in the Chthulucene" exemplifies the significance of theorizing saturation in relation to phase change, as well as thresholds. Ghosh begins by describing the nuances of the viral load test, which measures the quantity of HIV-1 RNA in the blood. Below a certain threshold, it is said that the HIV has become "undetectable." Dwelling with the significance of this acceptable low saturation level, Ghosh names the condition of living with HIV "multispecies accommodation" (162). She frames saturation as both a threshold that demarcates host and parasite, and a phase change in ecological relations. For Ghosh, blood surveillance establishes HIV saturation as "an anticipated condition that *must never arrive*" (164), part of a broader epidemic media ecology of scientific testing, paper records, and the liquid medium of blood itself.

Continuing Ghosh's multispecies focus, Jue's chapter "The Media of Seaweeds: Between Kelp Forest and Archive" traces the phase changes of seaweeds across hydrated and dehydrated forms. Comparing natural history archives of dried seaweeds to both paper and a form of writing, Jue considers the specific role of water in rehydrating dried kelp into their former morphology, as well as the role of water in cyanotype photography. Dwelling with the significance of the first cyanotype "book" being a field guide to British seaweeds, Jue draws a comparison between the role of sunlight developing local morphologies and the role of sunshine developing photosensitive paper, arriving at a theory of the ocean as a distributed photographic medium involving the photosynthesis of kelp. Jue's chapter negotiates tissue saturation and light saturation as key agencies in the formation of seaweed archives, theorizing saturation as a form of biomedia "activation."

Where Ghosh and Jue consider phase changes in blood and cyanotypes, Ruiz's chapter turns to the political ecologies and histories of desalination as a hydro technology in Southern California. In "Drought Conditions: Desalination and Deep Climate Change in Southern California," Ruiz examines contemporary desalination practices around San Diego that are on the cusp of what he calls "deep climate change" (206), an unstable condition wherein water will cross and recross its own phase transitions and in the process disrupt and disregard established hydrological cycles. Framing desalination as a form of environmental medi-

ation, he examines its exploration in the late 1970s when officials and corporate-minded scientists saw potential fresh water as being held in Antarctic icebergs. These officials projected that such icy phenomena could reorient ownership regimes surrounding the global water supply. Ruiz's contribution pauses on California's iceberg-led drought forecasting of the late 1970s in order to think through how the earth, under the conditions of anthropogenic environmental change, is "enclosed in the phase states of water-based saturation" (215) and how the precipitates it generates, including both salt and sea level rise, lead to practices of shortsighted commodification.

THE CONCLUDING CHAPTERS within "Precipitate" address that which comes out of saturated solutions. "Precipitation" as a noun normally refers to rain, but in chemistry, the precipitate takes on a special meaning: a substance (usually solid) that emerges out of a saturated solution when conditions are changed (the temperature is lowered, for example). Figuratively, it is also possible to see the precipitate as that which emerges out of a crisis—a crisis whose nature is rendered perceptible by the injured bodies that register its effects. The chapters in this collection go further and see the precipitate in terms of elimination, where that which is extracted cannot be returned to its solution—a beached whale, economic surplus, or the salty remainder of desalination techniques.[33] Yet in its verbal form, to "precipitate" means to cause something to happen. We might then ask, What are the "precipitates" of thinking with saturation as a heuristic? What kinds of writing and research might precipitate out of saturation-focused environmental humanities inquiry?

Lisa Yin Han channels the chemical analogy offered by the "precipitate" to think about the economic and necropolitical, and the consequences of what happens when a certain threshold is passed. In "Precipitates of the Deep Sea: Seismic Surveys and Sonic Saturation, Han frames injured whales as a precipitate out of the sonic saturation of the ocean, seeing their response of beaching themselves as literally coming out of solution. In her estimation, practices of ocean imaging that map deep sea geological structures in search of mineral, oil, and gas deposits produce deafening acoustic interruptions in the life-worlds of sea creatures. This anthropogenic noise makes up a series of sonic saturation points of the ocean that render its volume into a necropolitical space, whose most visible precipitates are beached whales. For Han, the figure

of the beached whale marks the point at which seismic surveys exceed the threshold of the whale's biological limits. Here, the whales are the precipitate that emerges (beaches) out of the sea, a fatal response to the noise of underwater blasts tied to extractive industries.

Moving beyond water, Sarkar's chapter, "Media Saturation and Southern Agencies," theorizes a type of saturation specific to the global South, where the challenge of making a living "instigates desperate forms of creativity and enterprise often bordering on the illegal" (246). In the space of a street market in northern India—selling pirated VCDs alongside newspaper-wrapped fried snacks—Sarkar considers the ways in which non-media (grease, dust, bioforms) interfere with the hygienic aspirations of media technologies and communication systems. A tendency toward both illicit and biological proliferation specific to the global South might be thought of in terms of the production of precipitates, where non-media like dust are always on the verge of transforming media into something other. This leads Sarkar to theorize a "Southern saturation" (255) that emerges from the "material conditions of exploitation, appropriation, and inequity that have been constitutive of colonial and neocolonial denouements of modernity" (249).[34]

The politics of economic saturation also figure prominently in Marija Cetinić and Jeff Diamanti's chapter, "Oil Barrels: The Aesthetics of Saturation and the Blockage of Politics," which examines Christo and Jeanne-Claude's artistic engagements with the 42-gallon oil barrel. They describe the iconic barrel as a form of "macro-media" that served to structure cultural and political economic imaginaries after Bretton Woods. Like Sarkar's examination of states of continual crisis, Cetinić and Diamanti theorize the artists' mobilization of the oil barrel in response to particular moments of oil's economic saturation that respond to post–World War II periodizations of capitalism. Over three decades, Christo and Jeanne-Claude's work shows the oil barrel as a type of aesthetic precipitate that can "visualize and formalize the abstractions of oil's market function" (271). Cetinić and Diamanti's reading opens out onto a consideration of a post-oil imaginary through Christo and Jeanne-Claude's articulation of blockage. In order to begin to conceive of "a political theory of energy impasse" (271) in this post-oil imaginary, the authors read the artists' oil archive, spanning from the 1960s to today, as a chronicle of oil's gradual saturation of the sphere of exchange.

The flow of oil through networks of global capitalism is not the only substance to draw on aqueous metaphors; just think about the way we

speak about data and information flows.[35] Data saturation—a term that Mél Hogan uses to name the convergence of neoliberal capitalism with the overproduction of data server farms—also draws on the figurative senses of watery saturation to address data storage in "the cloud." In Hogan's chapter, the cloud is a virtual and material infrastructure predicated on what Hogan also calls the "data center industrial complex." However, rather than read the cloud and its associated infrastructural networks as sites of storage and containment, Hogan asks, "What if we view data centers as promoting a surplus of data creation?" (288). Drawing on structural critiques of the prison industrial complex—wherein for-profit prisons are built in the anticipation of more prisoners to fill them—Hogan closely examines the data center-industrial complex of server farms. Hogan argues that the demand for more data production arises first from the growth of data infrastructure and those who profit from its construction. Here, the cart comes before the horse: rather than server farms being built to house data, data is produced to fill the expanding number of server farms. An overabundance of data—a surplus, or a precipitate—is thus needed to maintain the exponential growth of business. Just as the agricultural industrial complex relies on an analogous coupling of commodity and production, Hogan argues that "forced surplus production is not a miscalculation, but rather a way of keeping [server] farmers reliant on the investments they made" (292).

THRESHOLDS, PHASE CHANGES, and the Precipitate offer a specific chemical poetics for thinking with saturation, delineating a matrix of processes of which we should be aware. This poetics of saturation generates capacious ways of analyzing phenomena that occur at the same time, and their expanding consequences and social implications. Although there are many moments of co-saturation—where chapters in this collection overlap with more than one of the above parts—we have organized them in a way that highlights specific ways of thinking through water, thresholds, phase changes, and the precipitate. In this book, saturation is about material and social forces always on the move, never completely static, encouraging us to think with a material imaginary that is distinct from the poststructuralist fascination with the "rupture" (can a rupture ever occur in the air, or only in solid objects?) or the new materialist penchant for matter that is "entangled" (can entanglement describe the comingling of salt and fresh water in a delta?). To be clear,

rupture and entanglement are still useful in specific situations (as Jue writes of milieu-specific theory), but saturation thinking is necessary for addressing configurations of matter on edge, blurred agencies, gestalts, and sublimations.[36] Saturation expands our analytic toolkit, enabling an accounting for situations with uncertain boundaries, even as we reify them through the abstraction and approximation of naming.

ELEMENTAL POLITICS

Saturation is an invitation to trace co-present phenomena that are specific to both local and global scales of relation, and in this tracing, account for the relation of economics and environment, sound and extraction, data and interpretation. Through saturation, we might hold phenomena of vastly different orders under the same umbrella of critical consideration and see how they participate in a situation. Indeed, saturation enables us to consider the earth's atmosphere and hydrological cycle alongside the political economies of both northern and southern saturations, data alongside species conservation, cognitive saturation alongside architectural environs. Being able to say, "this saturates that" or "this precipitates out of that" is the start of generating theoretical approaches that are sensitive to the flux and flow of matter on the move.

To outline our vision of the elemental politics of "saturation" as a concept, we conclude by revisiting the particular circumstances of the workshop on "Saturation" in Santa Barbara, California, a small coastal city in proximity to the nexus of oil production, drought, fire, flood, and earthquake fault lines. It is the compression of all of these threats in one small region that makes Santa Barbara one barometer among many for different kinds of saturation effects related to immediate disasters and the slow violence of climate change alike. The Santa Barbara Oil Spill of 1969 was—at the time—the largest oil spill in U.S. history, precipitating a national environmental movement that contributed to the formation of national environmental policy and the establishment of Earth Day in 1970. Yet oil platforms (including another spill in 2015) and naturally occurring seepage still exist in the area, and it is easy to confuse the cause of small-scale tar balls that wash up on the beaches. These tar balls—often mixed with sand and rocks—remind us of other novel forms of matter related to oil production such as "plastiglomerates," that forge discarded plastic waste and geological matter together.[37] In addition to its embeddedness within the infrastructure of petroculture, Santa Barbara's arid

location on the south coast of California is also prone to drought, wildfires, and flood—all of which are increasing due to anthropogenic climate change. Coincidentally, the day of the "Saturation Conference" that launched this collection—February 17, 2017—experienced a historic degree of rainfall, and at times it seemed that the quasi-peninsular campus was at risk of becoming a shrinking island. While the conference began with the literal inundation of water, it quickly expanded into other ways to think about elemental co-presence that proved useful for addressing an event that happened later that year: the Thomas Fire. The rain during the month of the conference led to a surge in vegetation growth, which became fuel for the outbreak of the deadly Thomas Fire in December 2017—a fire that was (at the time) the largest wildfire in modern California history, exceeding the size of many U.S. cities, and covering the area with flurries of ash for over two weeks.[38] While national coverage of the disaster often focused on the wealth of the affected communities, there was in reality a vulnerable demographic whose lives were also disrupted by the ferocity of the disaster (a point that Walker reiterates in her afterword).

Yet just as the Thomas Fire began, a group of oceanography graduate students took the opportunity to recalibrate their planned sea expedition and use it to study the deposition of ash in seawater. During their public talk about the cruise, "Oceanography in the Thomas Fire," the students passed around several vials of seawater that they had collected (figure I.1).[39] Held together by a length of cellophane tape, the plastic quartet offers an arresting way to think with saturation. From a scientific perspective, the vials in the photograph embody the new orientation of their research concerning the effects of "dry air deposition." The photograph also shows how the sweat of fingerprints smeared the inked labels, even as the seawater might be measured for the saturations of various substances. The vial "Thomas Fire Ash" was collected from ash scraped off car windows at Santa Barbara Airport's long-term parking lot, before being added to the vial "Seawater and TF Ash," which was later strained of ash particles to leave the yellow fluid in "Leachate" (ash "tea").

Although one could call each vial an object—discretely contained—it would be more adequate to think of them in relation to multiple senses of saturation of the air, water, microbes, sound, and mass media. During their voyage, the graduate researchers wanted to know if the ash would be "bioavailable" to microbes and other organisms that might slurp up the suddenly arrived ash (fish guts were found to be black). They also

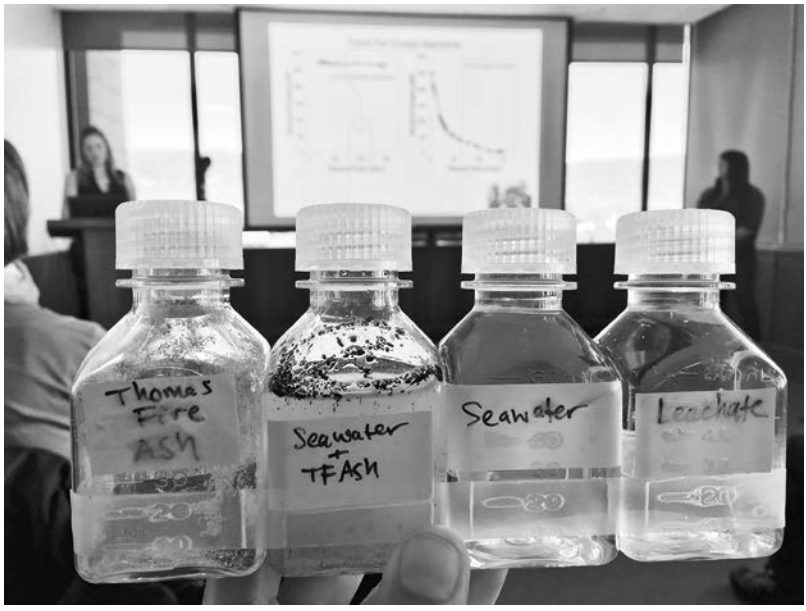

FIGURE I.1: Samples collected during the Thomas Fire by Kelsey Bisson and Eleanor Arrington. Photograph by Melody Jue, 2018.

used an acoustic echo-sounder to measure particle distribution in seawater, which utilizes lasers to see what may be reflected or changed in a given light field. One could say that even the seafloor itself was already saturated by past fires in California history—fires that have left ashy layers in ocean sediments after filtering through the water column. Back on land, local news had twenty-four-hour coverage of the fires, Direct Relief International distributed over 400,000 free N-95 masks to the community, and a welcome tide of firefighters flowed into the restaurants that were still open. Beyond the vials, the protracted event of the Thomas Fire—which burned nearly 282,000 acres over two weeks—involved multiple senses of saturation: the transcorporeal saturation of ash into ocean and lungs, the media and cognitive saturation of the news, the light saturation used in scientific measuring practices, and the saturation of the seafloor stratigraphic record with the traces of past fires.

The multi-elemental experience of the Thomas Fire—including drought, flood, fire, and mud—was not solely a local phenomenon, but rather nested within the totality of conditions brought about by anthropogenic climate change. As the global atmosphere becomes increasingly saturated with carbon dioxide, causing the oceans to warm and acidify

through their own absorption of CO_2, the Earth faces changing and unequal intensifications of weather. We recall the very specific saturation effects in Santa Barbara not to privilege California as a site of scholarly production, but to situate where our collective discussion of saturation began. The conference on "Saturation" in turn attracted work addressing a diverse geographic range, including India, Canada, Saudi Arabia, Indigenous water rights in North Dakota, Poland, and the high seas.

Scholars across media studies and beyond can look to saturation as a means of accounting for the increasing ubiquity of global "smart" technologies that are networked across global chains of data extraction. In trying to account for the ubiquity and continued proliferation of environmental monitoring infrastructures, Jennifer Gabrys examines how they constitute a compressed planetary overlay reminiscent of an inversion of Moore's Law: "Compression establishes the scale of implosion, which differs from explosion in that it reorders the qualities of an already saturated medium or situation. Saturation, a rushing inward rather than just a dispersing outward to occupy distant terrain, aptly characterizes this era of electric intensity. The growth of media, the condition of overload, is as much a media implosion as a media explosion."[40] Gabrys usefully highlights "rushing inward" as a way of thinking about the cognitive, economic, media-driven and broader political economic dimensions of saturation. Saturation positions us to look for diffuse copresences in media environments—wireless signals read across electrosensitive bodies, or the development of kelp and cyanotypes activated through both oceans and light. To reiterate, saturation is more than materialist analysis: saturation is about coincidence of material *and* semiotic, and how the semiotic becomes thought through material analogies and metaphors (such as Hogan's "data saturation" and Mukherjee's "wireless saturation"). The chapters in our collection necessarily attend to scale as part of an elemental politics, thinking through situations that suspend and conceal the global in the local. This is an urgent view of the earth as more-than-human, and an effort at "making kin" across biotic lifeworlds.[41]

Saturation allows for a learning-through-doing, and the chapters that follow are experimental in their willingness to take up this process-oriented approach, exploring multiple saturants in a given material situation. As Candis Callison remarks, "how one talks about the environment is based on how one comes to know it."[42] Positionality matters. We offer saturation as a possible analytic for addressing cultural and politi-

cal commitments that involve phenomena *across* spatial and durational contexts, such as "extractive zones," Macarena Gómez-Barris's name for how capitalism knows the earth.[43] This detrimental and instrumental knowledge includes oil and gas exploration that is increasingly tied to former sites of refuge for Indigenous lifeworlds and an array of at-risk species—the "living oil" of our times.[44] Saturation has the capacity to address diffuse spatial and temporal phenomena—oil under caribou herds, ocean acidification, heat-driven cyclones, or ash-laden air—both materially *and* figuratively. Looking at such processes in time requires a scalar thinking that tracks what saturates what, and under which milieu-specific conditions. We offer saturation as a heuristic for addressing the intensifying effects of anthropogenic climate change, globalization, and media technologies, not from any critical outside, but from positions deeply within the elements.

NOTES

1. Tim Ingold, "Earth, Sky, Wind, and Weather," *Journal of the Royal Anthropological Institute* 13:1 (April 2007): S32.

2. Duke University Press, "Elements," https://www.dukeupress.edu/books/browse/by-series/series-detail?IdNumber=4219856, accessed June 25, 2019.

3. Michel Foucault, *The Archaeology of Knowledge* (New York: Vintage, 1982); Jussi Parikka, *A Geology of Media* (Minneapolis: University of Minnesota Press, 2015).

4. In *Meeting the Universe Halfway* (Durham, NC: Duke University Press, 2007), Karen Barad makes a strong case for using a valence of entanglement that comes from physics—quantum entanglement—to talk about intra-action within phenomena. Quantum entanglement would not describe the knottiness of a vine but would instead describe a certain relationality between particles that exert some kind of mutual influence on one another.

5. Dan Brayton, *Shakespeare's Ocean: An Ecocritical Exploration* (Charlottesville: University of Virginia Press, 2012).

6. Melody Jue, *Wild Blue Media: Thinking through Seawater* (Durham, NC: Duke University Press, 2020).

7. Donna Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin," *Environmental Humanities* 6 (2015): 160. See also Marisol de la Cadena, *Earth Beings: Ecologies of Practice across Andean Worlds* (Durham, NC: Duke University Press, 2015); Winona LaDuke, *All Our Relations: Native Struggles for Land and Life* (Chicago: Haymarket Books, 2017).

8. Kathryn Yusoff, *A Billion Black Anthropocenes* (Minneapolis: University of Minnesota Press, 2018).

9. Jue, *Wild Blue Media*.

10. Hasok Chang, *Is Water H2O?* (Cambridge: Springer, 2017); Ivan Illich, *H2O*

and the Waters of Forgetfulness (Dallas, TX: Dallas Institute of Humanities & Culture, 1985).

11. Luce Irigaray, *This Sex Which Is Not One* (Ithaca, NY: Cornell University Press, 1985); Luce Irigaray, *Marine Lover of Friedrich Nietzsche* (New York: Columbia University Press, 1991).

12. See Nicholas Shapiro and Eben Kirksey, "Chemo-Ethnography: An Introduction," *Cultural Anthropology* 32:4 (2017): 481–493.

13. Gaston Bachelard, *Water and Dreams: On the Material Imagination of Matter* (1983), 3. It is the poetic imagination of the elements that has most acutely captured scholarly imaginations. Recent collections like Jeffrey Jerome Cohen and Lowell Duckert's *Elemental Ecocriticism: Thinking with Earth, Air, Water, and Fire* (Minneapolis: University of Minnesota Press, 2015) repurposes the four elements of ancient Greece as a way of outlining a materialist ecocriticism. Other works, like Elizabeth Ellsworth and Jamie Kruse's collection *Making the Geologic Now: Responses to Material Conditions of Contemporary Life* (Brooklyn, NY: Punctum Books, 2012) and Jussi Parikka's monograph *A Geology of Media*, focus on the specific element of earth and geologic language as a field of transdisciplinary analysis.

14. John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (Chicago: University of Chicago Press, 2015), 1.

15. Peters, *The Marvelous Clouds*, 4.

16. LaDuke, *All Our Relations*, 31.

17. Teresa Montoya, "Yellow Water: Rupture and Return One Year after the Gold King Mine Spill," *Anthropology Now*, January 21, 2018, http://anthronow.com/print/yellow-water-gold-king-mine-spill.

18. Georges Canguilhem, "The Living and Its Milieu," *Grey Room* 3 (Spring 2001): 7–31.

19. Margaret Cohen, "Chronotopes of the Sea," in *The Novel,* ed. Franco Moretti (Princeton, NJ: Princeton University Press, 2006), 2: 647.

20. Kamau Brathwaite, *Conversations with Nathaniel Mackey* (Taipei, Taiwan: We Press, 1999); see also Elizabeth DeLoughrey, *Routes and Roots: Navigating Caribbean and Pacific Island Literatures* (Honolulu: University of Hawai'i Press, 2007).

21. Haraway ("Anthropocene"), in turn, draws on the phrase's original context of use in Susan Leigh Star and James R. Griesemer's "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39," *Social Studies of Science* 19:3 (1989): 387–420.

22. Karin Amimoto Ingersoll, *Waves of Knowing: A Seascape Epistemology* (Durham, NC: Duke University Press, 2017).

23. Ingersoll, *Waves of Knowing*, 16.

24. Ingersoll, *Waves of Knowing*, 6.

25. Elizabeth DeLoughrey, "Submarine Futures of the Anthropocene," *Comparative Literature* 69:1 (2017): 32–44.

26. DeLoughrey, "Submarine Futures of the Anthropocene," 32. For another theory of oceanic submersion, see also Jue, *Wild Blue Media*, 1–33.

27. Kim TallBear, "An Indigenous Reflection on Working beyond the Human/Not Human," *GLQ: A Journal of Lesbian and Gay Studies* 21:2–3 (June 2015): 232.

28. Philip Steinberg and Kimberley Peters, "Wet Ontologies, Fluid Spaces: Giving Depth to Volume through Oceanic Thinking," *Environment and Planning D: Society and Space* 33 (2015): 247–264. See also Franck Billé, *Volumetric States: Sovereign Spaces, Material Boundaries, and the Territorial Imagination* (forthcoming).

29. Franck Billé, "Introduction: Speaking Volumes," *Theorizing the Contemporary, Cultural Anthropology* website, October 24, 2017, https://culanth.org/fieldsights/1241-introduction-speaking-volumes.

30. Anna Tsing, *Friction: An Ethnography of Global Connection* (Princeton, NJ: Princeton University Press, 2005).

31. Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London: Routledge, 2002 [1966]), 44.

32. Nicole Starosielski, "The Materiality of Media Heat," *International Journal of Communication* 8 (2014): 2.

33. Bishnupriya Ghosh made these two keen observations during the Saturation Workshop in February 2017.

34. For a parallel treatment, see Ravi Sundaram's *Pirate Modernity: Delhi's Media Urbanism* (London: Routledge, 2010).

35. As Janine MacLeod points out, aquatic metaphors often serve to naturalize and reify "flows of capital" as a normal condition that obscures the fate of actual waters under the regime of capitalism: "Reification here refers to the process by which a quasi-abstraction like capital comes to seem as real as a river. The term also describes a displacement from context, in which the origins of a thing, its production by labour and by ecological processes, get forgotten." Janine MacLeod, "Water and the Material Imagination: Reading the Sea of Memory against Flows of Capital," in *Thinking with Water* (Montreal: McGill-Queen's University Press, 2013), 43.

36. Jue, *Wild Blue Media*, 3.

37. See Jennifer Gabrys, "Plastiglomerates and Speculative Geologies," Jennifer Gabrys's website, October 2014, https://www.jennifergabrys.net/2014/10/plastiglomerates-speculative-geologies/; also see Gay Hawkins, Emily Potter, and Kane Race, *Plastic Water: The Social and Material Life of Bottled Water* (Cambridge, MA: MIT Press, 2015).

38. The Thomas Fire was surpassed by the Woolsey Fire and Mendocino Complex Fire in 2018.

39. In their talk "Oceanography in the Thomas Fire," PhD students Kelsey Bisson (geography) and Eleanor Arrington (earth science) described their process of redesigning shipboard experiments in order to test the effects of ash deposition in seawater, a rare situation given that the unpredictability of major fires rarely corresponds with the temporality of ocean science cruises (planned a year in advance).

40. Jennifer Gabrys, *Digital Rubbish: A Natural History of Electronics* (Ann Arbor: University of Michigan Press, 2011), 37.

41. Donna Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016), 99–103.

42. Candis Callison, *How Climate Change Comes to Matter: The Communal Life of Facts* (Durham, NC: Duke University Press, 2014), 46.

43. Macarena Gómez-Barris, *The Extractive Zone: Social Ecologies and Decolonial Perspectives* (Durham, NC: Duke University Press, 2017).

44. At the time of writing, the U.S. Department of the Interior's initiative to open the Coastal Plain of the Arctic National Wildlife Refuge is one example of oil exploration affecting Indigenous lifeworlds. See Scholars for Arctic National Wildlife Refuge: https://thelastoil.unm.edu/scholars-for-defending-the-arctic-refuge/. On "living oil," see Stephanie LeMenager, *Living Oil: Petroleum Culture in the American Century* (New York: Oxford University Press, 2014).