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To Radio Waves, Are We The Ghosts? WAI 776: the Māori Claim to the Electromagnetic Spectrum at the Waitangi Tribunal

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WAI 776: the Māori Claim to the Electromagnetic Spectrum at the Waitangi Tribunal

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in Geography

by

Mat Keel

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ABSTRACT OF THE THESIS

To Radio Waves, Are We the Ghosts?

WAI 776: the Māori Claim to the Electromagnetic Spectrum at the Waitangi Tribunal

by

Mat Keel

Master of Arts in Geography

University of California, Los Angeles, 2015

Professor Eric Stewart Sheppard, Chair

Between 1989-1999, Māori brought three claims to the Waitangi Tribunal, a semi-judicial body for post-colonial mediations between Māori and the New Zealand Crown, in which they asserted that the radio spectrum was their historical territory and thus subject to *Tino Rangatiratanga*, a Māori term associated with sovereignty, loosely translated as "absolute chieftainship." These claims comprise a post-colonial conflict between disjunctive property rights regimes, catalyzed by emergent policies of neoliberal governance. I focus on the third claim, WAI 776, and explore how the already unstable ontology of the radio spectrum became politicized therein.

From this examination, I propose a speculative history in which the formal demise of the luminiferous ether, being contemporaneous with the modernization of colonialism, fused the conquest of atmospheric electromagnetic nature with the dissociated unconscious of the collective modern colonial subject, sublimating both into the environmentally noumenal. The claim, I argue, activates a multi-fold return of these repressed.

The thesis of Mat Keel is approved.

Judith A. Carney

Jessica R. Cattelino

Eric Stewart Sheppard, Committee Chair

University of California, Los Angeles

2015

DEDICATION

I very humbly dedicate this thesis with affection and gratitude to the memory of a pair of outstanding geographers, Denis Cosgrove and Julie Graham, both of whom I had the incredible good fortune to study under and both of whom have now passed away. Having identified this topic in 2003, shortly before I embarked on a decade's hiatus from graduate school, I would have liked nothing more than to share the completion of this long-postponed project with them now.

I would also like to thank the following peers, friends and family for their loyalty, intelligence and humility: Clare Beer, Hans Dobbratz, Patrick Dunn, Curtis Miller, Sam Nowak, my mother Karen Kuehl, my wife Shara and my beloved son Gus.

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I acknowledge David Bodanis who coined the phrase, “To radio waves, we are ghosts,” which I have re-appropriated here from his inspired 2005 book, *Electric Universe: the Shocking True Story of Electricity*.

I acknowledge Malcolm Evans and Garrick Tremain for generously allowing me to reprint their editorial cartoons, as well as Anthony Dunne and Fiona Raby for generously allowing me to reprint an image from their 2001 monograph, *Design Noir: The Secret Life of Electronic Objects*.

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I acknowledge Graeme Everton for making himself available to be interviewed about the radio frequencies claims, corresponding with me and sharing material from his personal archives.

INTRODUCTION

> What is the single most valuable piece of property worth owning at the dawn of the information age? The radio frequencies – the electromagnetic spectrum.
>
> – Jeremy Rifkin, 2001

Wireless technology played an instrumental role in the modernization of colonialism (Larkin 2008; Taylor 2002). Popular imagery involving early radio is heavily represented by two recurring types of photography. In one, the radio-set serves as an emblematic centerpiece of modern urban life, often photographed hearth-like, a radiant object at the center of a domestic gathering of white urban faces. In another, a mostly naked rural African or South American is bedecked in headphones attached to a radio receiver, and photographed so as to appear in puzzlement over the magic of distance and technology. Although the radio set is analogous to the phonograph that transfixed Nanook of the North, its signals now pervaded space, passing invisibly through the terrestrial environment. Radio connected core and periphery both physically and socially, constructing corresponding subjectivities relationally. To listen to radio was to be modern which was emphasized by "juxtaposing it to peoples thought to be premodern....frequently featuring indigenous peoples as both listeners and performers" (Taylor 2002, 426).

Brian Larkin argues that this differencing is part of a process that activates a "colonial sublime," whereby technology was used to represent "an overwhelming sense of grandeur and awe in the service of colonial power ... a world order in which the immaterial workings of God and his spirits were subordinated to the power of science to

rationally order and control the natural world" (Larkin 2008, 7). This displacement, he continues, was more than just a social differencing; it also afforded the possibility of "becom[ing] modern" to the indigenous subject who "domesticates the sublime and thus destroys it" (ibid). This recalls that colonists often thought of themselves and those colonized as characterized by "fundamental but not unalterable differences … marked by a vacillation regarding the fixity and fixability of their own 'natures' and those of the colonised" (Castree 2003, 193).

The advent of wireless technologies also involved another domestication, a more-than-human event that was not primarily figurative. Although they were indeed unprecedented, these technologies were operationalized within the vast and prehistoric field of atmospheric radio. Even the first humans were suspended within this invisible electromagnetic nature which takes place outside the register of human senses.

> Before we bipedal apes invented radio receivers, before we even exchanged our gills for lungs, there was radio. It was in lightning, in hydrogen atoms, in the big bang that propelled our universe into existence. But as soon as we invented technology that enabled us to listen to the transmissions of our planet, we saturated the airwaves with our own sounds – garage door openers, cordless phones, baby monitors, police dispatchers, pagers, and wireless microphones – *jamming* the oldest radio station around (Strauss 1993, 336).

The term jamming is drawn from technocratic discourses (Metzl 1998) related to the complicated and idiosyncratic contested spaces (Lefebvre 1974/1991) produced by wireless technologies in conjunction with the formation of the contemporary nation state. From their inception, these spaces have been simultaneously usurped and policed by nation states as well as they have participated in shaping the fabric of everyday life therein. The political economy of communications (Sakolsky & Dunifer 1998) is of

indisputably critical concern to modern geography yet it has also overshadowed the importance of wireless technologies to contemporary geographic thought in more extensive contexts (Hillis 1996).[1] Chief among these is a focus on how the advent of wireless engendered what is sometimes framed as the most significant natural intervention of the 20th century (Dunne & Raby 2001).

A report published by the Royal Geographical Society in 1926 details a recent "radio-telegraphy" expedition into the Brazilian Amazon rainforest of Roraima, then known as Rio Branco ("The Radio-Telegraphy of the Hamilton Rice Expedition, 1924-25," 1926). It is striking for its inclusion of photos like those described above within a text that explicitly narrates the domestication of atmospheric radio. (See Figures 1 & 2)

> Erection of an antenna was the first step in the establishment of radio stations at the jungle camps. Trees were the masts, and the vegetation for some distance-about the antenna trees was cleared away to give the wires *breathing space*. The receiving antenna was usually a 30-foot length of wire, suspended 1 foot off the ground. The low antenna reduced signal strength materially, but reduction in static more than compensated for this loss. In a tropical region, where every night is a static night, … the field station*, thumbed its nose to atmospherics* … a length of antenna wire thrown into the river served well ("The Radio-Telegraphy of the Hamilton Rice Expedition, 1924-25," 1926, 541).

This figuration of the complex assemblages that emerge around broadcasting is striking. It describes trees, rivers and the atmosphere all being revalued in new ways as they become subservient to wireless technologies. The narrative itself "breathe[s]" life into radio wires at the very same moment it describes the eradication of plant life. It

1 While the strongest case for preserving federal dominion over frequency allocation has always hinged on its instrumentality as a communications medium, my aim herein is to decouple the ontology of the radio spectrum from the use value attributed to it through communications technology.

derides “atmospherics” as adversarial to radio's “conquest of space.”[2] This is a colonialist framing (Whatmore 2002) that suggests how wireless both modernized and reconfigured the taxonomy of life that characterizes the genealogy of European/Western natural thought (Glacken 1967).

[Figure 1 about here.]

[Figure 2 about here.]

In concert with these photographs, the narrative of the report suggests how wireless technologies transformed both modern subjectivities and the natural world - not incidentally but in tandem.[3] Perhaps then, and maybe unconsciously to colonialist agents, the domestication of electromagnetic nature became fused with those social processes activated in Larkin's “colonial sublime,” reproducing the environmentally noumenal as a haunted but quotidian realm occupied by the ghosts of atmospherics, and dissociated unconscious fragments of the colonialist encounter. This is the speculative ground on which my thesis proceeds, wherein I examine how this fusing becomes legible in a post-colonial historical episode that took place in New Zealand at the end of the 20th century.

In March of 1999, Rangiaho Everton submitted a claim to the Waitangi Tribunal that Māori rights codified in the nation's founding covenant, The Treaty of Waitangi (1840), would be breached if a forthcoming auction by the Crown were allowed to proceed.[4] New Zealand's history since 1840 had been pervaded with similar conflicts over the usurpation, sale, and management of Māori lands. Yet the object of this claim

2 This phrasing circulates commonly in pre-war broadcast narratives as exemplified by McNicol (1946).

3 A future iteration of this work will also explore the relationship between this governance and Foucault's idea of governmentality in relation to Larkin's colonial sublime.

4 As will be discussed, Everton's claim followed an earlier Tribunal claim which addressed Māori access to broadcasting and affirmed Māori interests in the radio spectrum. I present hers in the introduction because of its unique primary emphasis on the radio spectrum as territory, setting it in contradistinction to its predecessor which had involved a primary appeal to the use of conventional broadcast radio for greater Māori media representation towards language and cultural preservation.

was not land but, rather, something named the radio spectrum, a post-war term used by developed nations to order and manage all electromagnetic frequencies that can be exploited by technology, and conventionally managed as a natural resource. The claim, accepted by the tribunal and indexed as WAI 776, asserted that Māori had "a right to a fair and equitable share " in the resource and further implied that the spectrum maps a space which had once been a sovereign Māori territory.[5]

Its text argues that, as a natural resource, management of the radio spectrum mandates that the Crown must prioritize Māori interests before commercial interests, a protection under the conventions of the Treaty of Waitangi (Waitangi Tribunal 1999b, Appendix 1). It is bolstered by a conventional understanding of the electromagnetic spectrum as a "critical natural resource" first codified in the US by President Kennedy in 1962 (Levin 1971, 3) and subsequently formally adopted by all the world's developed nations through the International Telecommunication Union (ITU), a specialized agency of the UN (Herter 1985).

Evidence given during the claim process supports that the spectrum was both known to and used by Māori before European settlement. First, not only did Māori have a tradition of communicating across the sky at long distances, which is analogous to wireless communication, but the space of the sky in which this was carried out was also considered sacred. Second, Māori exploited light waves to mark space, which demonstrates that they were technological actors and that, by reference to the electromagnetic spectrum, their facility with light manipulation was equivalent to the manipulation of electromagnetic radio waves.

5 Although the terms "sovereignty" and "territory" do not appear in the claim statement itself, they are used explicitly by Māori interview subject Graeme Everton in his explanation of the claim's etiology. As subsequent chapters of this work will include reference to the idea of "territorialization" in the ontology of Deleuze and Guattari, the reader should take note that two distinct meanings circulate throughout this text. I have done my best to clearly distinguish them whenever possible. In a future iteration of this paper, I intend to more fully explore these discrepant meanings beginning by closely engaging Stuart Elden's *The Birth of Territory* (2013).

These arguments are meant to establish that the radio spectrum maps a space which had been a sovereign Māori territory before European settlement. It is of critical significance that the claim's text implies an occult materiality when the electromagnetic spectrum is identified as "the *medium* on which electrical waves fluctuate through space" (Waitangi Tribunal 1999, Appendix 1). This may seem a linguistic subtlety but actually enacts a precise ontological maneuver; it re-associates the electromagnetic spectrum with its historical antecedent (Milutis 2005), the luminiferous ether.

Throughout European/Western history, the ether had been perennially theorized as a paradoxically subtle matter - filling all of space but imperceptible to the human senses. During the course of the 19th century, its existence was generally taken for granted. It was the preeminent ontological commitment around which experimental and theoretical forays into the science of electromagnetism were able to proceed. Its prominence within the incorrigible materialism of 19th century science is sometimes interpreted as part of a widely felt anxiety that an alternatively immaterial medium would revivify natural theology. This associates Larkin's "colonial sublime" with a preliminary domestication of European/Western immaterial natures. Eventually the ether was rendered "superfluous" by Einstein's *General Theory of Relativity*.

The importance of this move as it is enacted in the claim's text is that it allows the radio spectrum to become a *thing* in the world, by which it comes to have a history. This assignation mandates that, for the Crown to sell licenses to use the radio spectrum outside consultation with Māori would be a violation of the founding *Treaty of Waitangi* and so activates a broader discourse during the claim process involving how incongruities between the Māori and British versions of the treaty raise questions about what kind of governance Māori agreed to cede to the Crown (Renwick 1991).

The original text of the claim and the Tribunal's findings both prominently situate

WAI 776 within the historical context of the deregulation of media and public utilities in New Zealand in the mid-1980s, which had made the country a pioneer among other developed nations in the transnational movement towards the liberalization of public assets. With regards to the radio spectrum, this trend followed a more specific historical political debate about the nature of the radio spectrum and the relative merits of managing it as a form of private property or tradable commodity versus preserving it as a natural resource managed by the state.[6]

These contexts can be read to mark a significant rupture in the ontological status of the radio spectrum; first, as a public good managed by the state and, second, as the annihilation of an object that had been used to negotiate the immaterial over the course of a longer and more occult historical trajectory. In this sense, the movement to privatize spectra implies a further progressive abolition of pre-19th century ontologies of the natural world, which had survived their prohibition in natural science, becoming revivified in the post-war framing of the electromagnetic spectrum as a "critical natural resource" contemporaneous with the early US environmental movement.

Many intriguing inquiries might arise here, but I focus primarily on two research questions – first, why do conflicting ontologies of the radio spectrum become political in a post-colonial setting; and second, how can this episode inform broader inquiries into how the immaterial is (or is not) made legible and how it enters into (or evades) a political economic field?

My hypothesis is that, in the architecture of WAI 776, Māori demanded a politics be imposed onto the already unstable ontology of radio spectra. through which a multifocal 'return of the repressed' was activated.[7] First, the ether was liberated from its

6 Spectra is the plural of spectrum and refers, in contemporary discourses, to those fixed-frequency bands delineated in the radio spectrum.

7 My use of the term 'return of the repressed' is intended as a generalized black box. It should not be read as a commitment to any particular paradigm, rather as a bookmark for more protracted engagement with

transmutation into the radio spectrum – a disciplinary artifact which had reified radio electromagnetic frequencies into spectra, thus becoming a territory, and, later, a commodity. Second, because the ether was historically associated with the unconscious, its return carries with it the fragmentary, dissociated residue of relational processes in which modern colonialist subjects were produced and so the coherence of Western/European property frameworks is threatened by their mirroring in WAI 776.[8] Third, the reassertion of the ether also reintroduces the genealogy of European/Western etheric thought, which had historically comprised an interior opposition to hierarchical Apollonian representations of the natural world (Cosgrove 2001).

I explore this hypothesis in three parts. In Chapter 1, I examine the history of the idea of a radio spectrum. I emphasize its continuity with pre-modern ideas about the ether which influenced the reification of spectra as a paradoxically occult materiality. I argue that this assignation of materiality was bolstered by a formal post-war identification of the electromagnetic spectrum with natural resources which influenced how it eventually became situated in relationship to neoliberal discourses of environmental governance. In Chapter 2, I examine the claim itself. I focus especially on how the minority opinion's refutation of the claim relates to colonialism's self-reflexive anxiety about the unstable ontology inherent to modern colonialist property regimes, including ecological financial instruments and neoliberal environmental governance in general. In Chapter 3, I assemble these examinations of occult materiality to synthesize a broader consideration of electromagnetic natures in which I propose additive strategies for a more fertile alliance between post-colonial indigenous thought and those strains of thought collected under the rubric of more-than-human geography. Given the

the figuration of traumatic memory across the work of Freud, Jung, Janet, Lacan and Žižek.

8 A future iteration of this work will here make reference to Pierre Janet's theories of dissociation and traumatic memory with particular emphasis on their use in post-colonial studies.

limitations of the current format, this synthesis is best read as a manifesto calling for further investigation.

My methodology is based primarily on examining discourses from three broad literature surveys of 1) the ether, 2) radio broadcast legislation and 3) the Waitangi Tribunal.[9] I situate these readings in relation to the coalescence of more-than-human geography and especially its linkages with post-colonial indigenous thought. I also rely heavily on etymological interpretation, primary source documents and popular media related to WAI 776 as well as an extensive interview with Māori Graeme Everton who was intimately involved in structuring the 1999 claim (G. Everton, Personal communication, December 18, 2014).

Before I proceed, I want to prominently note that my aim here is to delicately challenge the cautionary prohibition that figuring an alliance between more-than-human geography and post-colonial indigenous thought *necessarily* runs the risk of romanticizing the noble savage archetype (Greenhough 2014). I do, however, recognize and try to avoid the common analogical interpretation of indigenous cosmologies, as discussed in a paper by indigenous scholar Vanessa Watts (2013, 26) which has been a critical influence on the manner in which I have approached this study. In particular, I want to take seriously her assertion that any cleavage between epistemology and ontology is related to a foundational hierarchy of life and "non-life" and so comprises the underlying logic by which colonialism subjugates its others.

Although, in my analysis, I do associate the non-hierarchical etheric with certain specific aspects of indigenous property frameworks, I also note Achille Mbembe's recognition of the tendency to associate indigeneity en masse with innocence from "any notion of center, hierarchy, or stability" (Mbembe 2001, 3). For instance, in Chapter 1,

9 These surveys of vast bodies of literature are admittedly very limited by the constraints of the format.

when I draw attention to how the word “spectrum” evolves etymologically to connote determinate ordering at a site previously associated with supernaturalism, I do so not to characterize indigenous cosmologies or ontologies as themselves “supernatural” or pre-scientific but, instead, to ally their negative characterization as such with a process of dissociation in the relationship between colonizer and colonized.[10]

10 See Aragon (2010) for a discussion of the problematic with using the term 'supernatural' in a way that does not recognize corollary European/Western spiritual beliefs under that rubric.

MR. McCALEB RECEIVING A SHORT WAVE IN THE FIELD: TIME SIGNAL RECEIVER AND FRAME AERIAL IN BACKGROUND

Figure 1: Reprinted from ("The Radio-Telegraphy of the Hamilton Rice Expedition, 1924-25," 1926)

LISTENING IN ON THE RIO BRANCO

Figure 2: Reprinted from ("The Radio-Telegraphy of the Hamilton Rice Expedition, 1924-25," 1926)

CHAPTER ONE

Apparitions, Ether, and Electromagnetic Natures:
The Radio Spectrum as Natural Resource

> The globally mediated nature of human interaction … first requires the existence of a new 'type' of private property. After staring at the ever expanding edge of 'electrospace,' concentrating on the spatial, social and technical qualities of the electromagnetic spectrum, Dallas Smythe concludes that electrospace 'is to communications today as land is land to crops and water is to fish … a peculiar natural resource whose politico-economic and social aspects have largely been ignored by social scientists.
>
> – Phil Graham, "Utopian Frontiers," 2006

Introduction

The familiarity of the word spectrum belies its occult etymology.[11] In the late 17th century when Newton was conducting the experiments discussed in the *Opticks*, the terms "spectre" and "spectrum" were largely indistinguishable. Each worked to name an apparition. The contemporary usage of spectrum – to indicate "the entire range or extent of something, arranged by degree, quality, etc." - only emerged in the late 19th century as part of the language of the new science of electromagnetism which had then begun to supersede ether theories of light propagation.

The longitudinal etymology of spectrum then affords a compelling diachrony: a word's meaning evolves from signifying the appearance of unknown beings native to a haunted and unknown realm which is incomprehensible to the naked human senses to signifying both the epistemological ordering of any given thing by a particular degree or quality, and a reification of that same ordering which then becomes naturalized to mean the thing itself in its native habitat in the world. An especially salient derivative usage of

11 This discussion refers to the full entries for ("spectrum") and ("spectre") in the online OED, both cited in my bibliography but omitted as parenthetical citations for ease of reading.

the term as a verb appears fleetingly in the OED dating to 1849, and is defined as meaning, "to fill with spectres." A second derivative usage of the term as a noun, "spectredom," dates to the London Daily Telegraph in July 1897, where it now implies the "*management* of the realm or region of spectres."

Aesthetically speaking, it is inevitable that I should here turn to the figure of Newton as he has often been painted, wielding his prism in a darkened room so that light will reveal its parts, a "Spectrum of divers colours." This figuration is like a highly distilled mise en scène of the topic at hand - the phenomenal world is apprehended through a technology that produces an illusion but seems to reveal an ordered underlying materiality. Here as in hagiographic tales, Newton is like a sorcerer who commands the noumenal world to reveal its secrets (White 2007). A paranoiac investigator, his prism splits light like a skeleton key, and seems to open a door through which the range of the "natural" expands as it acquires the supernatural. Any determinate relationship between his interests in alchemy and eschatology and his achievements in mathematics or natural philosophy is speculative, but some authors, like science writer Michael White, have followed this lead to suggest that Newtonian mechanics may have been inspired by his familiarity with occultism:

> if studied from an intellectual standpoint, the occult could act as a glue, a *unifier* of fundamental principles; ... it could be rationalised and logicalised. Although he could not have visualized it at the time, what he did was to *transmute* what we now see as the irrational beliefs of the age into a new approach – science (White 2007, 107).

In the Opticks, Newton described the colored bands which seemed to flow out of his prism as the "least parts" of light itself, suggesting that light was an aggregate collection of lesser physical bodies. When later pressed on the implications of this theory,

however, Newton replied that his rays were "purely formal, theoretical constructions that did not commit him to a particular physical model of light" (Zajonc 1993, 84). Yet this fickle representation, which describes and orders a realm of phenomena beyond the reach of human senses and the ontological question it subsequently implies, suggests a more enduring problem – is there a particular politics or ethics which emerges from the negotiation of the immaterial? Is something uniquely at stake in representations of the invisible, such as the radio spectrum which later enabled nations to manage radio frequencies by reifying them, analogizing that reification to a space and, as I will shortly discuss, assuming that space as a sovereign territory?

Occult Materialism and the Ether

Newton's alternate framing of prismatic bands as sometimes a model and sometimes a set of objects is similar to the mutability of the ether throughout the history of European/Western thought (Milutis 2005) and especially during its culmination in the 19th century, a period when both theoretical and experimental physicists attempted to affirm its existence (Swenson 1972).

The concept of a space-filling aether had endured for centuries. It was likely first inherited from the Sanskrit notion of *Akasha*, which Aristotle called *Quintessence* and added as a fifth element to earlier Platonic categories of matter, as a name for bodies in the firmament that do not change (Jammer 1969). Frequently it was equated with the alchemical "prima materia," a primordial first substance from which every thing came into being (Davis 1998). Although theories of ether changed frequently over the centuries before it was ruled scientifically vestigial, several of its qualities were perennial. The ether was consistently thought to be invisible and subtler than other matter, as real as something one could touch, but undetectable by the senses.

Like other elemental substances, such as caloric and phlogiston, ether is rooted in

the Western metaphysical tradition. Beginning in the 17th century, as scientific understanding of chemistry took shape, these substances began to move towards irrelevancy. Newton himself had initially speculated that gravity operated through the reflective and absorbent qualities of this subtle matter as it flowed towards earth but was wary of including the antiquated ether in his models.

At the beginning of the 19th century, the idea of a luminiferous ether started to reassert itself in early theories of electromagnetism. In the previous century, the undulatory theory of light first proposed by Christiaan Huygens in the 17th century but widely rejected in favor of Newtonian mechanics began to garner new interest as his successors had now concluded that sound results from vibrations in a medium, such as air or water. The discovery of this relationship, between waves and their carrier medium, led to renewed speculation that light also acted like a wave, which implied the necessity of a medium (McNicol 1945). The ether served this instrumental role, offering light some *thing* through which to pass. In order to explain how light could propagate across such vast distances, it was further speculated that the luminiferous ether, being more subtle than air, must fill all of space. This implied a plenum where matter and space were essentially identical. Space "constituted a large portion of matter, and [ether], the medium that was thought to pervade it played an active role in the transmission of energy" (Kern 1983, 154). Yet this elusive substance also had to be too subtle to be perceived, imbuing it with paradoxical qualities as described by Nick Hebert, "although the universe was filled with a transparent glass much harder than steel, this glass offered not the slightest resistance to the passage of material bodies." He continues, "although its properties grew more preposterous with each new investigation, the existence of the ether itself was never called into question" (Herbert 1985, 6-7).

The 19th century was marked by a series of famous attempts to prove the existence

of this "preposterous" ether (Clarke & Henderson, 2002). Attempts to model its mechanical operation often resulted in a discrepancy between a functioning model or heuristic device (Worrall 1994) and a confounded mimetic pictorial representation. British physicist Oliver J. Lodge created some of the most famous models of the ether, made from cogwheels, but asserted that they were meant only "as analogies to the ether, not likenesses and … reflected a similitude of relations, not of things themselves" (Hunt in Clarke & Henderson 2002, 107).

In 1887, two American physicists, Albert Michelson and Edward Morley performed the most famous ether experiment. They constructed an apparatus that would measure light in two perpendicular directions. A difference in these measurements would confirm the relative movement of earth and ether, which was termed the "etheric wind." Their failure to detect this wind is typically portrayed as the decisive finding to put ether theories of light to rest, eventually leading Einstein to surmise that electromagnetic processes did not need an absolute stationary space in which to occur.[12] His special theory "removed the idea 'that the electromagnetic field is to be regarded as a state of a material' while the field thus [became] an irreducible element of physical description" (Kern 1983, 154) The plenum was emptied and the ether, unwilling to be conjured, was relegated to the scientifically vestigial.[13]

The ether now became the signifier of an absent-presence, a disappearing referent. Its representation was innately mechanical or analogous, but no longer

12 This is an extremely nuanced position far beyond the simplified discussion of the ether I have presented here. In 1920, Einstein gave a lecture entitled "Ether and Relativity" at the University of Leiden which concludes as follows: "We may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, *there exists an ether*. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time (measuring-rods and clocks), nor therefore any space-time intervals in the physical sense. *But this ether may not be thought of as endowed with the quality characteristic of ponderable media*, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it."

13 Although see Agassi (1973) for a more nuanced explication on how the EMF is both continuous and discontinuous with the ether.

necessarily reductive. Swenson writes of the title of his book the Ethereal Aether, “I have juxtaposed the noun-without-a-referent and the incongruent modifier, “ethereal” in order to emphasize that the failure of the aether-drift experiments to detect a relative wind has led, ironically, to the adjective being considered a more precise and useful word than the noun” (Swenson 1972, p xii), a conceit I will return to in this work's conclusions.

The idea of ether, however, continued to circulate, carrying forth the 19th century's electrical imaginary into the 20th century. Radio technologies viscerally revealed that human bodies existed living inside an unknown space. The immateriality thereof had long been associated with theological qualities, which natural electromagnetic phenomena like lightning had once seemed to enunciate (Marvin 1988). Now, these technologies offered the promethean capacity to play with, order and manipulate electricity and radio waves as well as they called forth that capacity's attendant anxieties including an apparent dematerialization of the human body (ibid).

Out Of Chaos, Order: From the Ether to the Spectrum

How did the idea of the radio spectrum as a sovereign territory of the US government begin to come into being in the 1920s?[14] What was the initial context in which US federal radio legislation crystallized? Here I will explore how the idea of tangible radio spectra became viable within US federal radio legislation, and examine those discourses activated by 20th century broadcast regulation, which would later play a central role in debates around the privatization of spectra in the 1980s.

The history of electromagnetism is typically represented as a neat progression wherein Michael Faraday's early intuitions of electromagnetism in the 1820s became formalized in Maxwell's equations during the 1860s. His equations proposed that the velocity of light is equivalent to the velocity of radio waves, and were subsequently

14 Barnouw's (1966) historical narrative of early broadcast legislation is both delightful and unparalleled.

verified in the 1880s when Heinrich Hertz successfully propagated radio waves across short distances in his laboratory. The emergent unified theory of electromagnetism could successfully account for the behavior and the conquest of a wide variety of phenomena, ordering all possible types of electromagnetic wave along an axis, arranged by frequency. As the prospecting experimental physicist had resembled an explorer, this unification of phenomena was coterminous with 19th century empire as is suggested in later discourses critical of federal broadcast legislation that compare radio waves to a "new-discovered continent" (Childs 1924, 523). I will return to the implications of this analogy later in this work but, for now, it should be noted that this "discovery" would ultimately enable technocratic states to manipulate wireless technologies into a global communications grid.

Guiglemo Marconi is the pivotal figure credited with implementing Hertz's wave propagation at geographic range. His autodidactic experimentation culminated in a triumphant cross-Atlantic transmission in December 1901, successfully demonstrating the viability of long-distance transmissions, and presaging the coalescence of wireless technologies into a transnational medium. Inspired by this development, a substantial community of amateur wireless enthusiasts materialized. These early adopters explored the novel possibilities engendered by the paradigm, forming an early colony of hackers and other amateurs who explored the possibilities of the medium.[15]

The earliest federal regulation of wireless technologies occurred in the United States.[16] Laws affecting radio use-rights and responsibilities were first legislated in

15 The use of the word hacker is meant to suggest the broad exploration of a technological medium by its early adopters, as discussed by Richard Stallman (2002), "it is hard to write a simple definition of something as varied as hacking, but I think what these activities have in common is playfulness, cleverness, and exploration. Thus, hacking means exploring the limits of what is possible, in a spirit of playful cleverness."

16 Although the 1906 International Telecommunication Union (ITU) conference in Berlin had earlier established a "principle of compulsory intercommunication between vessels at sea and the land" signed by 29 member nations (ITU 2015).

maritime settings. These laws dealt solely with point-to-point wireless which was associated with communication and trade, from which it followed that the Department of Commerce should hold jurisdiction over its management by recourse to the Interstate Commerce Clause. The Wireless Ship Act of 1910 was the first piece of such legislation, mandating that all ocean-going vessels above a certain size must be outfitted with suitable wireless technology. Amateur enthusiasts responded swiftly to this apparent encroachment on the free space engendered by wireless technologies. In protest, hackers, now become pirates (Sakolsky & Dunifer 1998), broadcasted obfuscatory messages intended to disrupt and distract Naval vessels. After the unrelated sinking of the Titanic, The Radio Act of 1912 was passed, fortifying federal dominion and extending the regulatory reach of the previous law. Licenses were now required for all operators in the US and penalties, set by the Hoover administration's Department of Commerce and Labor, could be imposed on violators in the form of fees and revocations.

As broadcast transmissions, as alternative to point-to-point transmissions, began to emerge in the years that followed, a new discourse surfaced – interference between proximate broadcasters was framed as creating further "chaos" on the air (Barnouw 1966). These disruptions began to imply a sense of space in the language of "crowding" and their discourse influenced The Radio Act of 1927 which re-assigned jurisdiction over broadcast from the Department of Commerce to the newly established Federal Radio Commission (FRC). The original text of the Radio Act of 1927, refers explicitly to the ether:

> No station license shall be granted by the commission or the Secretary of Commerce until the applicant therefor shall have signed a waiver of any claim to the use of any particular frequency or wave length or of *the ether* as against the regulatory powers of the United States ("United States Radio Act of 1927", Public

Law 632, 69th Congress, February 23, 1927 Section 3-H).

The Teapot Dome scandal at the beginning of the decade, in which President Harding's Secretary of the Interior had leased navy petroleum reserves to private oil companies, had shaped a bipartisan coalition of conservationists to implement radio regulation through a protectionist model, likening what would later be called the radio spectrum to oil or hydropower, a "*national* resource" (Barnouw 1966, 198).

The FRC was established as an independent commission to "determine regulatory policy for broadcasting in the United States" and was comprised of five commissioners appointed by Calvin Coolidge (Messere 2001). Each was afforded the authority to govern a discrete geographical region of the country. The act also formalized the notion that radio frequencies are finite and, thus, scarce. The overarching significance of this transition was that it implied a sovereign federal right by appeal to the public good and marked the genesis of the radio spectrum's identification with a natural resource.[17] Alongside the aforementioned geographic "continent" analogy, these developments seem to begin to suggest the idea of an invisible territory.

Although Roosevelt's Communications Act of 1934 transformed the FRC into the Federal Communications Commission (FCC), which still operates today, its underlying raison d'être remained consistent. Only upon its later amendment and renewal in 1996, did the Communications Act of 1934 come to formally include the term "electromagnetic spectrum." Neither this phrase or the phrase "radio spectrum" appeared in early 20th century radio legislation. In the flux of an ongoing scientific paradigm shift, legislators had grappled to understand the underlying science of wireless technologies. The ether, sometimes alternately denoted by the misleading portmanteau, "airwaves," served as an

17 An impressive body of literature on the political economy of communications has also focused on this episode as the origin of institutions like "fair-time" and other checks and balances against the reproduction of bias. This moment is also most likely the determinate historical origin of the common contemporary usage of the word spectrum.

analogical “black box” capable of explaining how voices were cast out into an arcane sea, only to arrive inside the listener's radio set like magic. The association between radio and the supernatural was also common in this time, impacting legislators as well as the lay public. Chief Justice William Howard Taft who served on the US Supreme Court from 1921 until his death in 1930 is famously reported to have remarked that he avoided interpreting radio communications law because it involved “something like trying to interpret the law of the occult …. like dealing with something supernatural” and that he hoped to put it off “as long as possible in the hope that it becomes more understandable” (Coase 1959, 40). The overall sense of a confounding occult materiality and a territorial substance conscripted by the federal government reproduced certain paradoxical qualities of the ether, not least of which was the inevitability of invoking analogies in its representation.

Yet the understanding of spectra as categorically finite was a reflection only on technological limitations of the very earliest protocols for the use of wireless technologies. As early as 1944, “spread spectrum technology” was patented by inventor and film actress Hedy Lamarr, a film actress who, inspired by her neighbor, an engineer, became interested in how technological developments could support the war effort.[18] Lamarr successfully solved the problem of frequency jamming, in which a submarine's communications system could be functionally disabled by an enemy who simply broadcast a stronger static signal over that frequency to which a given submarine's communication had been assigned. Lamarr's protocol demonstrated the viability of “intelligent flux,” or 'signal hopping,” in which communications were transmitted as encrypted fragments across multiple frequencies and reconstructed by the receiver using a code available only to both parties. Her protocol forms the basis of today's Wi-Fi

18 Lamarr's story is a thesis unto itself. A Hollywood starlet, she worked with her neighbor towards the war effort, eventually developing a broadcast model currently used in Wi-Fi technologies.

technology which operates through a dynamic spread spectrum modality. By demonstrating that signals did not need to remain confined to single bands, her invention implicitly challenged the foundational logic of fixed-frequency on which the federal regime of radio use rights was constructed. This episode's rhetorical power is enduring; a 2001 news editorial argued that a large-scale shift to spread spectrum technology would "prove that the scarcity of spectrum is just a myth and would make the billion-dollar licenses worthless" (Sousa 2001, 2).

Still the underlying notion of spectrum as scarce was rarely contested. Although the decades that followed the founding of the FCC witnessed an enduring debate which questioned the relative merits of regulating spectra as a common good or as a form of private property, this debate generally questioned only whether or not the condition of scarcity demanded that frequencies must be allocated by the state or could be sold at market but did not typically challenge the quality of scarcity itself.

Inventing the Spectrum

In order to situate the advent of the radio spectrum as part of a longer historical trajectory, it is necessary to first consider the electromagnetic spectrum itself. It is rather shocking to recognize that the electromagnetic spectrum is a naturalized representation, less than a hundred years old. Its stability represents the culmination of a centuries-long collective inquiry into the nature of light and electricity (Zajonc, 1993). For all that it is now perhaps passé to denaturalize scientific representations as artifacts of power/knowledge, there are compelling reasons to approach the electromagnetic spectrum in this manner, preeminent of which is that, despite how foundational it is to contemporary physical science, it is rarely, if ever, acknowledged as a representation.

This representation refers to both the method for and product resulting from, ordering 'natural' radiant energy by frequency. The term also becomes synonymous with

the object of that ordering, concretizing its reification. One of the first known occurrences of the term, electromagnetic spectrum, occurs in a 1937 physics textbook, in the form of a simple text table collecting "the wave length of various forms of vibration, from very long waves to the shortest known form of vibration, as represented by cosmic rays." Spectrum here refers to a totality – all possible values within an imagined continuum, - the full "potential range of frequencies of electromagnetic radiation."

The mutable but enduring influence of the ether on European/Western natural philosophy clearly inspired the way in which legislators negotiated the management of radio frequencies - framing them as similar to a plenum, a finite substance filling all of space, from which it then became indistinguishable. It refers both to that representational moment in which all types of radiating electromagnetic energy are organized along a chosen axis as well as it refers to that very same energy as it exists in its natural state.[19] I want to engage a more limited focused examination of how, in this reified framing of radio frequencies as finite that produces the radio spectrum, these two meanings become fused within a political economic field.

The radio spectrum is defined as only that part of the larger electromagnetic spectrum which is manipulable by technology. (See Figure 3) It is perpetually mutable as the development of technologies able to make use of increasingly higher frequencies, allows the radio spectrum to impose itself on progressively more of the larger electromagnetic spectrum, a dialectic that aesthetically recalls Newton's speculative acquisition of the supernatural into his natural philosophy.

[Figure 3 about here]

The initial production of the radio spectrum had produced a Euclidean ordering to manage broadcasting. This regime was constructed around the concept of "syntony,"

19 This framing could be used as the grounds for a protracted engagement with the larger critique of Kantian epistemology

here meaning the capacity of a receiver to tune into a given wavelength, and derived from the Greek word for harmony, which associates it with resonance and the hierarchical chain of being (Glacken 1967) and opposed it the cacophony of interference. Syntony allowed multitudinous signals to occur simultaneously, accessible from within the same geographic space. This ordering is characterized by an array of fixed frequencies in which given wave lengths are represented as discrete blocks and suggest the enclosure and subdivision of a larger finite space. Each block is assigned a specific use, within which a certain type of license may be issued; for instance, "broadcasting," "radio astronomy" or "meteorological satellite" (U.S. Dept. of Commerce NTIA Office of Spectrum Management, 2003). (See Figure 4) These licenses also enforce constraints on the power at which a given signal may be propagated and place boundaries on its geographic range.

[Figure 4 about here.]

Through wireless technologies, spatio-temporalities proliferate. The highly ordered regime, described above, involves a very complicated set of variables. The geographic dimension of a broadcast range is determined first by the strength of its signal, but equally so by an incalculably vast array of environmental factors including the ionosphere, time of day, and the nature of the materials in its path. Although the spatio-temporality of a given signal can be predicted adequately enough that radio engineers may produce an operable but rudimentary facsimile of its reach, broadcast ranges are endlessly expanding and contracting, generating a space of infinitely mutable flux.

Radio engineers visualize these ranges as oblong polygonal shapes layered on top of a regional map. A 1948 paper from The Geographical Review examines how stations in the Boston metropolitan area have each "made use of the terrain to provide as good reception as possible for the listeners in that area" (Cotcher 1948, 271). An

accompanying map visualizes how three different transmitter sitings produce variable broadcast footprints in relationship to the natural physical environment. (See Figure 5) One passage, quoted here at length, describes the role of the ionosphere in making broadcast signals innately erratic:

> By skipping process the signal may be carried great distances, particularly at night, when the properties of the ionosphere make for greater reflection. At best, the behavior of the skywave is erratic at broadcast frequencies. Since the primary listening area usually lies close to the transmitter, it is likely to be skipped by the skywave; hence it is with the part of the signal which travels along the earth's surface that the broadcast engineer is concerned when picking a transmitter site (Cotcher, "Radio-Broadcast-Transmitter Location: Metropolitan Boston as an Illustration," 1948, 271).

[Figure 5 about here.]

These cartographies are recognizably geographic, yet the dynamic objects they map are invisible to our naked senses and the map's value is derived within a metric of predictability, not mimesis. However, the reification of radio frequencies into bands, as described earlier, also produces a cartography. The ordering of this map presents its bands as constituent parts of a larger, finite space which then becomes sovereign and thus implies territory. This second map disciplines spectra into being, legitimizing its own authority.

These two types of maps exist in tension. In its excessiveness, the dynamic flux of the Dionysian broadcast footprint both confounds the Apollonian radio spectrum and draws attention to how traditional Western/European imperial cartographic space might come into relationship with other spatialities. In addition to the fixed syntonic regime of the spectrum and the radio engineer's fluctuating, predictive objects, another mapping

emerges in those uncanny etheric sensed spaces that coalesce as radio signals interact with the environment. Tuning a radio set across static to points of syntonic stability might be framed as similar to the “shamanic” spatio-temporality of ecstatic voyage across simultaneous worlds (Eliade 1951).

Regulation

The FCC model of federal broadcast regulation was eventually adopted by all developed nations around the world, including New Zealand, whose spectrum allocation chart is nearly identical to that used in the US. (See Figure 6) In these countries as in the United States, 20th century disputes over how it should be managed were typically activated as debates between the merit of protecting spectrum as a public commons versus using financial incentive to promote both extensive and inclusive technological development and more efficient exploitation (Levin 1971). This conflict is prevalent throughout the 20th century; from the early constitution of a public good in order to prevent the cacophonic interference of the 1920s, through decades of debate around its liberalization and ultimately its gradual deregulation as realized in the frequency auctions of the 1990s discussed later.

[Figure 6]

Historically, the argument in favor of preserving the federal allocation regime appealed almost exclusively to their instrumentality as a communications medium and emphasized their scarcity. A description from one of the most influential policy-oriented books on the management of spectra in 1971 describes the electromagnetic spectrum as, “a form of oscillating electrical and magnetic energy capable of traversing space without benefit of physical interconnections” and identifies the radio spectrum's principal economic value in its “use for conveying information of widely varying sorts at varying speeds over varying distances” (Levin 1971, 15). This use value is derived from

communications, as has been consistent since the earliest days of wireless regulation. As the 1934 act had included provisions mandating that broadcasters meet certain responsibilities to avoid promoting political bias, the contemporary iteration of this argument is broadly concerned with the subsumption of independent media to corporations through consolidation and also appeals to the spectrum primarily through the use value it obtains in communications. This is evident in popular contra-state movements advocating community radio and Low Power FM, especially in the immediate wake of the Telecommunications Act of 1996 (Sakolsky & Dunifer 1998).

Historical antagonists of the federal allocation model advocated transforming the spectrum into a form of private property or a tradable commodity. This position has historical roots dating back to the formation of the FCC in 1934 when independent policy analysts first began to argue for the liberalization of wireless regulation and releasing spectra into the market. The most paradigmatic paper representing this position is a 1959 publication by future Nobel laureate Ronald Coase, who acknowledges that radio frequencies are scarce but disagrees that their scarcity implies any federal mandate to license or manage them. Coase argues instead for private incentives that would promote the greatest efficiency of use. His argument forms the core argument for liberalization that would be frequently reiterated over the next several decades and eventually realized in neoliberal policies of deregulation and privatization during the 1980s and 1990s.

Then, in the 1960s, a new discourse of the spectrum began to circulate; the radio spectrum and its native electromagnetic spectrum were formally reified *and* assigned the status of natural resources. The first use of the moniker electromagnetic spectrum as a natural resource and as a name for the sum total of electromagnetic frequencies available for communications in the United States seems to appear in Kennedy's 1962 *Executive Order 10995*, part of a package of such orders later rescinded by Nixon, which authorizes

the executive branch of government to take control of all domestic communications during a national emergency.[20] The history of this term is difficult to trace precisely because the spectrum is so thoroughly naturalized a concept that it has been both written retroactively into historical accounts of broadcast legislation and into legislation itself, such that even the initial radio acts from the first part of the 20th century now read as though spectrum was always framed as it is today.

Kennedy's language transformed the very grounds on which the spectrum was understood to exist. During the debates around radio deregulation of the early 1980s, his assignation of natural resource status to the spectrum gained currency. In 1982, the Plenipotentiary Conference of the International Telecommunication Union, formally codified this understanding of "the radio frequencies spectrum" as a "limited natural resource" (Probst et al 1983). In 1985, a highly influential policy paper further figured the electromagnetic spectrum as a "critical natural resource" and situated it within a taxonomy of other natural resources (Herter 1985). Although The Telecommunications Act of 1996 is typically associated with federal deregulation, it also amended the 1934 act to write the "electromagnetic spectrum" backwards into historical legislation. Two important moves then occurred simultaneously; at the same moment this territory was described as "natural," the "spectrum" appeared for the first time in a federal statement. Together these movements enacted the concretization of a reification.

In the assignation of "natural resource" status and the formally recognized reification of frequencies into a "spectrum" a curious historical revision occurs. No such object had been declared in 1934. The mandate of early radio legislation had been to author a regime of rights to manage the use of a complicated and invisible technology within a national territory, not to negotiate the management of an invisible territory

20 The order reads, "the radio spectrum is a critical natural resource which requires elective, efficient and prudent administration in the national interest."

itself. When tasked with authoring this regime, which would come to form the basic architecture of all wireless management, the lingering explanatory power of the ether had clearly influenced the way legislators thought, affording them a comprehensible entity to manage and a correlate way of thinking about it. Like the occult, the ether was, by then, scientifically largely meaningless but remained analogically effective. When the spectrum was later deemed a natural resource, the implied conservation of its scarcity in a given regime of rights became ontologized, reifying "spectra" as both a *thing* and a natural one, albeit to be protected.

With this way of thinking about spectra, as a substance, the occult materiality of the ether was revivified. In those discourses where the electromagnetic spectrum is framed as a natural resource, the spectrum implicitly reasserts the original analogy to an oil reserve which had influenced The Radio Act of 1927.

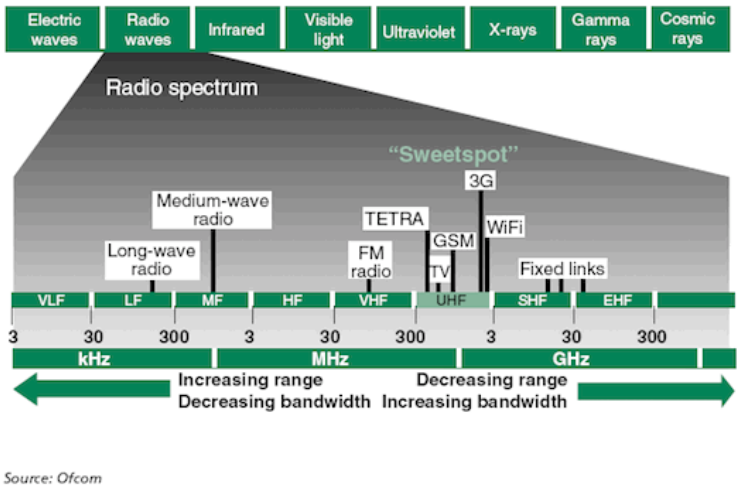

Figure 3: Reprinted from UK Parliament (2011)

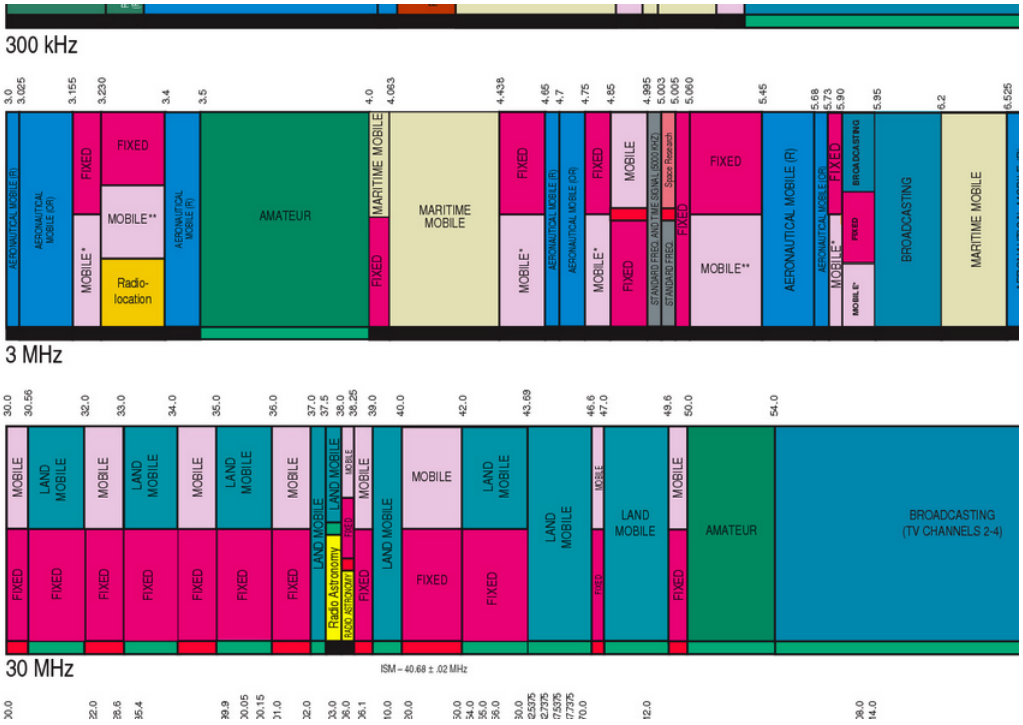

Figure 4: Reprinted from USDC NTIA Office of Spectrum Management (2003). Detail.

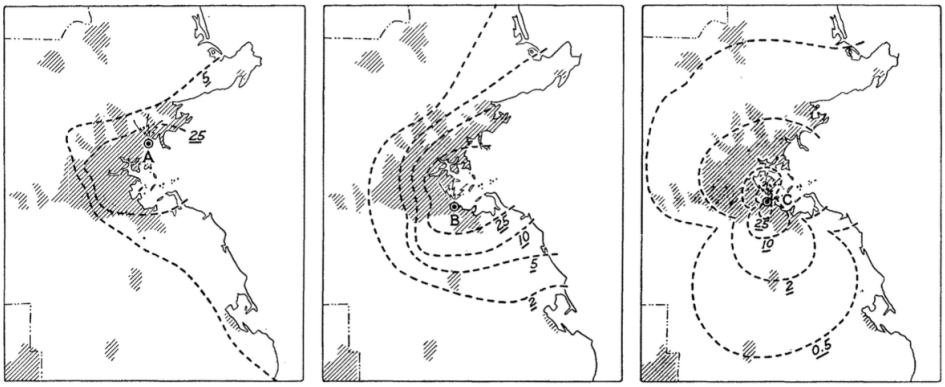

Figure 5: Reprinted from Cotcher (1945)

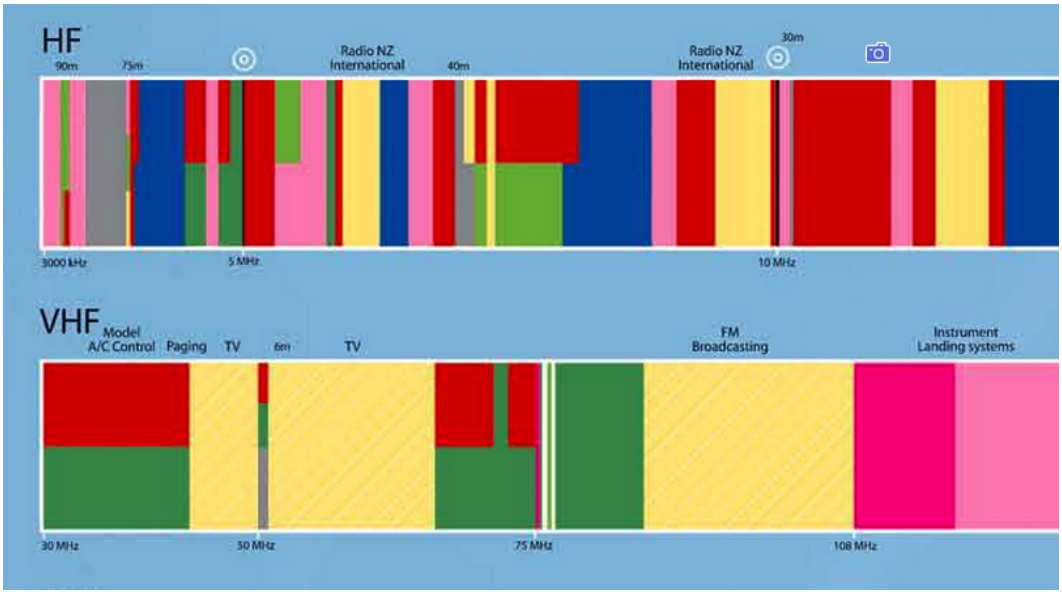

Figure 6: Reprinted from Radio Spectrum Management NZ (2008). Detail.

CHAPTER TWO

"We Were Presented with Evidence of Snaring of the Sun" :
The 1999 Radio Frequencies Claim at the Waitangi Tribunal

> Bandwidth is the oil of the information revolutions.
>
> – Jim Flash, Accel Partners Venture Capital, 1999.

> Māori didn't have any use for oil. We may have come across it at points in our history, but it was never thought of much.
>
> – Graeme Everton, Interview, 2014

Introduction

Here I introduce WAI 776, the 1999 Māori Radio Frequencies claim by analyzing primary source documents, popular media coverage, and my original interview with Graeme Everton, son of the deceased claimant and torchbearer of continued efforts to secure and protect Māori access to the spectrum and to any profits from its financialization. I contextualize the episode within its historical political-economic milieu by narrating the event and examining its discourses, which situates WAI 776 in relation to the historical discourse of the radio spectrum as a natural resource presented in Chapter 1.

The Waitangi Tribunal

The complicated history of land-rights, jurisprudence and Māori dispossession is beyond the scope of this work.[21] However, in order to understand the origin of The Waitangi Tribunal, some limited background is necessary. As occurred in other Polynesian settler-colonial nations, the British Government declared New Zealand *Terra Nullius,* an empty territory. Yet unlike what occurred in Australia, the *Treaty of*

21 An excellent starting point for engaging this history can be found in Richard Boast *Buying the Land*, Selling the Land (2008)

Waitangi drawn up under the administration of the nation's first lieutenant governor James Hobson in 1840, established a foundational covenant between the Crown and Māori.

The Waitangi Tribunal is a "permanent commission of inquiry" within the New Zealand Ministry of Justice. It was created in 1975 by the Parliamentary Treaty of Waitangi Act. The Tribunal process was fashioned in response to political pressure exerted by the popular Māori land rights protest movement, which had earlier catalyzed around opposition to The Māori Affairs Amendment Act of 1967. At that time, in the nearly 130 years since the Waitangi Treaty was signed, the vast majority of Māori lands had been acquired; some by private buyers, but most by the Crown. The 1967 act forced compulsory conversion of remaining "non-economic" Māori tribal lands into general (once-termed "European") lands. Māori perceived this dispossession as the Crown's final land grab; an assault on their identity and indigenous traditional knowledge, setting off a movement which popularized the slogan "the treaty is a fraud" and witnessed massive demonstrations protesting the "seemingly relentless alienation of Māori land" and Crown malfeasance with regards to treaty protections of indigenous sovereignty (Ministry of Culture and Heritage NZ 2015). In 1975, Te Rarawa leader, Whina Cooper, lead a group of 5000 protesters in a 1000 km month-long *hīkoi* or symbolic march to Wellington, united under the slogan, 'Not one more acre of Māori land' (ibid). Shortly thereafter, the Treaty of Waitangi Act was passed.

The Tribunal was founded to serve as an accessible means by which any Māori individual or group could request formal investigation of grievances related to the usurpation of Māori lands by the Crown and tasked with consideration of "any claim by a Māori or group of Māori who may have been prejudiced by laws and regulations or by acts, omissions, policies, or practices of the Crown … that are inconsistent with the

principles of the Treaty of Waitangi" (Waitangi Tribunal, 2014). As will be discussed shortly, these principles are, themselves, the source of much contention and force the tribunal to continuously synthesize Māori and Pākehā understandings of the original treaties.[22] The tribunal is only given authority to make "findings of fact and recommendations only, not binding determinations" (ibid). In the early years after the tribunal was founded, Māori activists protested its inefficacy and ten years later, the act was amended, expanding the tribunal's jurisdiction, enabling it to consider historical claims dating back to the 1840 treaty. In 2006, the act was amended again to establish a 2008 closing date on new historical Treaty claims or historical amendments to contemporary claims. The Waitangi Tribunal can be framed as a two-decade experiment in the semi-judicial negotiation of post-colonial conflict.

The most salient enduring feature of tribunal claims stems from a foundational divergence between Māori and Pākehā interpretations of the treaty which was drafted in English but translated into Māori. In the "imperial view," the Māori simply ceded their territory. Alternatively, while the Māori view of the treaty is necessarily speculative, contemporary Māori generally argue that 19th century Māori understood themselves as "entering into an alliance with the Queen, in which [she] would govern for … peace and the control of unruly settlers, while Māori would continue, as before, to govern themselves" (Durie 2004, 157).

The specific manner of protections encoded in the English and Māori versions of the Waitangi Treaty has been frequently contested through the tribunal process. The Crown and Māori share a general agreement that by signing the treaty, a coalition of Māori chiefs did consent to Crown governance over their lands, but the question of whether or not their lands and other *taonga* (valuable treasure) became the property or

22 Pākehā is a colloquialism for New Zealanders of European descent

territory of the Crown is disputed.

Tribunal debates often involve how sovereignty is associated with two distinct meanings in the Māori version of the treaty. The first, *kawanatanga*, referred to Crown governance, while the second, *rangatiratanga*, referred to Māori governance or "chieftainship." Contemporary Māori tend to understand the former, *kawanatanga,* as an attempt by the British to determine an analogue to governorship, a concept that did not exist in Māori. It is often argued that a better analogue for the kind of absolute authority understood by the Crown would have been the Polynesian *mana* which Māori would never have ceded. Additionally, the Māori term used for cession is *tuka rawa atu*, "to give absolutely" wherein the word *tuka* means "a gift, which also has reciprocal obligations" (Stokes 1992). The Māori text, as reconstructed by Kawharu (1989) further suggests that *taonga katoa* refers to both material and immaterial dimensions of a tribal group's estate and implies that intangible spiritual qualities are protected. Although the vast majority of claims have focused on land, this aspect of the treaty strengthens the possibility of claims like WAI 776 which deal with the immaterial.

Most legal scholars share the conclusion of Evelyn Stokes that "there is no dispute that Māori customary tenure of land and resources comprised a complex system of overlapping and interlocking usufructuary rights within a value system and territory" (Frame 2000, 2). The discourses that take place around claims at the Tribunal involve issues of sovereignty that arise in other post-settler-colonialist settings. The tribunal has then come to serve as a site for the mediation of Māori territorial claims to a diverse set of natural resources, sometimes validating an indigenous property rights regime within a formal framework of European/Western governance.[23]

Related discourses enacted in the tribunal process and echoed in popular media

23 See Frame, (2002)

can be read as a set of political dialogues that consider the nature of resources themselves, often then engaging ontological questions and how they diverge within indigenous and European/Western thought, as well as what discrepant political economic possibilities they imply. Māori assertions of *tino rangatiratanga* over what are sometimes classified as flow resources, like fisheries, and what are sometimes classified as stock resources, like geothermal energy, establish a framework within which the claim to the radio spectrum, becomes plausible. Sometimes classified as a ubiquitous resource, the radio spectrum is distinct among objects claimed as territory at the Tribunal. Its mediation makes legible a continuity between premodern European/Western ontologies of the immaterial and neoliberalism's imperative to antiquate any protective boundaries demarcating the limits of what may be commodified. This will discussed in more detail shortly.

The Radio Frequencies Claims (1990-1999)

By 1999, in New Zealand as in other developed nations, neoliberal policies had initiated the release of much of the commons into the marketplace, thereby enacting "the commodification and corporatization, privatization of hitherto public assets, … [opening] up new fields for capital accumulation in domains hitherto regarded off-limits to the calculus of profitability" (Harvey 2007). Of particular relevance to WAI 776, this affinity for deregulation and privatization targeted both telecommunications and natural resources. In the US, the transformation of frequency licenses into commodities had inspired some to more boldly suggest a further transmutation into explicitly private property (L. White, 2000). Similar discourses had followed the passage of The Telecommunications Act of 1996. These were exhilarated and included a language of prospecting, comparing spectrum auctions to the "1949 gold rush" or the "Oklahoma

land rush" (McMillan 1994, 1).[24] Phil Graham associates this enthusiasm with a 21st enclosures movement for "electrospace" (Graham 2006) and notes that its language is "shot through with all the clarion calls of colonialism, and with all the 'pioneering' images that adorn the imperialists's historical mindset" (Graham 2000, 3).

Across multiple post-settler-colonial nations, a small pan-national coalition of indigenous communities had also begun to organize around their common antipathy for globalization which was generally perceived as as threat to indigenous traditional knowledge. This can be associated with Arturo Escobar's contemporaneous supposition that, "we might be witnessing – in the wake of unprecedented intervention into nature at the molecular level – the final decline of the belief in the existence of pristine Nature outside of history and human context" (Escobar 1999, 1).

In the fall of 1999, a small international coalition of indigenous peoples, including several Māori, convened in Seattle at the same time as the third meeting of the WTO where they signed the Indigenous Peoples' Seattle Declaration (IPD 1999). The declaration registered a coherent critique of globalization and framed indigenous peoples those immediately threatened. This coalition was especially focused on the emerging threat of biotechnology as an instrument towards the commodification of life through practices like gene patenting and was framed as a contemporary reassertion of colonialism (Whitt 2009).[25] The *Indigenous Peoples Council on Bio-colonialism* (IPCB), which had first come into being in protest of National Geographic's Human Genome

24 The techno-utopian tome *Telecosm: How infinite bandwidth will revolutionize our world (*Gilder 2000) is particularly emblematic of this time.

25 While some have framed *tino rangatiranga* as a potential radical and embodied communitarian model alternative to capitalism (Brookes, 2014), it is also critical to reiterate that the framing of Māori self-determination movements in opposition to Neoliberalism is far too singular. The time period around WAI 776 was also marked by a proliferation of "dominant discourses associated with settlement [that] have become focused on Māori development (often economic and reflecting a neoliberal corporate model) which serves as a distraction from the issue of Māori-Crown (and Pākehā) relations and redress for past wrongs" (Bond & Kindon, 2013, section "The Close of Formal Settlement") From this vantage, WAI 776 itself can also be interpreted as a lean and well thought out attempt to simply secure Māori access to a promising emerging market.

Diversity Project (HGDP) several years earlier, generally emblematizes the broader imperatives of this movement:

> [We are] organized to assist indigenous peoples in the protection of their genetic resources, indigenous knowledge, cultural and human rights from the negative effects of biotechnology … and [provide] educational and technical support to indigenous peoples in the protection of their biological resources, cultural integrity, knowledge and collective rights (IPCB).

This echoes a statement in the Seattle declaration which critiqued the proliferation of a new taxonomy of life contemporaneous with biotechnology.

> The distinction between "essentially biological" and "non-biological" and "microbiological" processes is also erroneous. As far as we are concerned all these are life-forms and life-creating processes which are sacred and which should not become the subject of private property ownership (IPSD 1999).

Tthis challenge to a further diversification in the taxonomy of life relates these movements to the foundational split between ontology and epistemology associated with colonialist philosophies of nature, in general (Watts 2013). Although the Radio Frequencies claim does not, on the surface, deal with biology, the politicization of ontology it enacts can be effectively situated alongside a similar politicization in these contemporaneous challenges to biotechnology and bio-colonialism.

WAI 776

New Zealand was an assertive early pioneer of media deregulation (Spiller & Cardilli 1997), even inspiring subsequent US deregulation. Following the hallmark State Owned Enterprises Act of 1986 which had initiated broad deregulation and privatization of public assets, including the sale of the telecommunications branch of the New Zealand Post Office to US and New Zealand private interests in 1990. The Radio-

Communications Act of 1989 and The Broadcasting Act of 1989 worked in tandem to lay a groundwork that would allow the Crown to privatize the radio spectrum by regulating broadcast licenses similarly to tradable commodities on a largely unrestricted market (Morris & Shanahan 2005). In 1996, New Zealand became the first country to create property rights to the radio spectrum and to use "market-driven allocation mechanisms for the distribution of the newly created rights" (Radio Spectrum Management 2014).

In 1990, two claims, WAI 26 and WAI 150, were filed at the Waitangi Tribunal. They would later be amalgamated into a single claim which argued that the Crown's establishment of "exclusive licenses which confer upon their possessors the right to propagate radio waves" without first consulting Māori was a direct violation of treaty protections (Waitangi Tribunal 2000, Appendix 1). As Graeme Everton, son of Rangiaho Everton, notes:

> When they did the statute for the radio spectrum they didn't explicitly say ownership of the radio spectrum. Then they would have had to transfer ownership before they could regulate it. Instead they *assumed ownership* without putting into statute and focused on more regulatory issues (G. Everton, Personal communication, December 18, 2014).

Although these precedent claims primarily emphasized the practical importance of spectrum access for the preservation of Māori language and culture they also, critically, first put forth the argument that the implied transformation of frequency bands into tradable commodities was the determinate action which had provoked Māori territorial concerns.

> When ... it is treated as a commodity to be traded, when restrictions are placed upon its use, and when for a variety of reasons Māori do not have acknowledged authority over or access to the resources, then they are entitled to and must

> exercise he *rangatiratanga* guaranteed by the Treaty, the Crown partner is obliged to respect and guarantee that, and then the parties negotiate a just outcome. Such exercise, and the honouring of the guarantee, are made necessary by scarcity or inaccessibility of the resource (Waitangi Tribunal 2000, Appendix 1).

The Tribunal's final recommendation at that time was for a portion of auction proceeds be put aside for the preservation of Māori language and culture.

A decade later, in March of 1999, in advance of an impending Crown auction of 2GHz high-frequency radio bands used for mobile networks, Māori Rangiaho Everton submitted her claim to the Waitangi Tribunal, arguing that what is called the radio spectrum, a term denoting all those bands of radio frequency that can be utilized by radio and wireless technologies, is a historical Māori territory and should be recognized a s *taonga,* a thing treasured by Māori people. Subsequently, she articulated, this territory was subject to *tino rangatiratanga*, a Māori principle associated with absolute sovereignty.

The submission was deemed urgent and immediately reviewed by the Tribunal who found it to be *prima facie* well-founded and made an emergency recommendation that the Crown halt the auction so as to allow the claim, now indexed as WAI 776, to receive a more focused consideration.

Everton's claim was based on two primary arguments, summarized as follows:

1. The radio spectrum is a space. It is the same space in which Māori historically communicated at long distances.
2. Māori historically controlled light. Because light waves and radio waves are both electromagnetic waves, as conjoined in the electromagnetic spectrum, Māori had a historical stewardship over electromagnetic waves that is

analogous to contemporary radio management.

Together, the claim asserts, this evidence demonstrates that Māori traditionally attributed value to the same object signified by the radio spectrum. This valuing establishes that the space mapped by the radio spectrum is *tapu,* meaning that its violation is a form of profanity. Graeme Everton describes how the claim argument was constructed:

> By the time we got to the claim, we had a really interesting bunch of people. There was an elder who was really involved in the early claim. He actually understood the concept of the radio spectrum, just in that spanning context, and he was able to relate it to the other aspects of lights and traditional callings from the mountains. He was an elder who was very critical in the whole connection. There was also an educator with a Ph.D. who was experienced in Māori knowledge systems. He was able to relate these concepts to natural phenomena we had already observed and our culture had already absorbed (G. Everton, Personal communication, December 18, 2014).

The first argument of the claim asserts that Māori knowledge included a tradition of communication at distances extending beyond the human senses and across the sky. This is an appeal by analogy in which shouting "at long distances" is portrayed as equivalent to wireless communication. The second argument of the claim is of greater significance to the present work. It asserts that Māori were both aware of and derived value by manipulating the spectrum which is described as *taonga* or "valued treasure." Evidence supporting historical manipulation of the latter was given in the trial but no detailed description of this evidence is available in the claim report's supporting documents. In their reports, the justices simply describe being given evidence for the

Māori 'snaring of the sun.' However, Graeme Everton recounts a Māori concept he calls "home fires burning," in which territory is created by radiance.

> As long as you kept the fire burning, the hearth warm, in the area where you were, then you could claim that territory. That required a space around that territory. The moment that the fire went out and you left and somebody else came into that territory, then they could claim it, as long as they lit their fire in that space. There's this whole idea that living in the space, occupying that space, you've got territory, you have sovereignty. (G. Everton, Personal communication, December 18, 2014).

The broad argumentation of the claim is alternately analogical and made by appeal to modern science. In the former instance, the Māori tradition of communication at distance is an analogue of wireless communication. In the latter instance, the argument depends on the ontology implied by the electromagnetic spectrum representation. By appeal to this representation, light waves and radio waves, although they engender entirely different human experiences, are united taxonomically as electromagnetic waves. Together these arguments fuse an indigenous epistemology with a European/Western ontology for the purpose of the claim, assigning a Māori "index" to a European/Western "object."

> We had a knowledge index that allowed us to understand the universe in our way, and it may not necessarily translate with the way non-Māori things work. But we had explained the universe. There was a real place for knowledge in our existence. Even though it wasn't the index of the Pākehā (G. Everton, Personal communication, December 18, 2014).

As discussed in the previous chapter, the radio spectrum comes into being as a

Deleuzian territorializing agent in dialectic with the electromagnetic spectrum (DeLanda 2003). The second Māori argument enacts a reterritorialization of the radio spectrum, as though the entryway through which Newton had invited the occult into the closed quarters of natural philosophy now reversed flow to become an exit, releasing its ghosts.

This argument is notable for its use of a scientific reasoning analogous to that which enabled James Clerk Maxwell, in his 1865 "Dynamical Theory of the Electromagnetic Field", to speculate that light is an electromagnetic wave and by correctly determining its velocity, predict the existence of radio waves. Although the particulars of how Māori snared the sun are not described in greater detail in the interim or final reports, this evidence implies a technological intervention, which is the determinant event by which the radio spectrum acquires territory in its parent electromagnetic spectrum. Thus their technological ability to manipulate light, an entirely different frequency than radio, establishes their historical territorial right to other parts of the electromagnetic spectrum. Similarly to how Maxwell had correctly predicted the existence of invisible electromagnetic waves by speculating that wave velocity was constant, Māori claim one range of frequency based on evidence of having used another range altogether.

The authors of the supportive majority opinion are convinced by this argument that Māori had made historical use of the electromagnetic spectrum and they accept that Māori ability to snare the sun implies the capacity to manipulate light and so is analogous to the manipulation of radio waves in wireless technology.[26] They recommend that the Crown should not proceed with auction outside of consultation with Māori. Alternatively, sole dissenting Justice Savage, the author of the minority opinion rejects the argument, framing it as irrelevant due to electromagnetic waves having been

26 In discussing the findings, I may amalgamate the interim and final reports, as there is little significant difference between them.

undiscovered at the time the treaty was signed. Despite expert testimony by Media professor Frederick Howard who carefully articulates the currency of the idea that the radio spectrum is a natural resource and cites a 1995 US Congressional Commission report entitled “Native American Sovereignty and Communications” which states that, “the electro-magnetic frequency spectrum could be viewed as another natural resource along with lands, forests, water and the like,” (Howard 1999, Section 3.12) the two findings subsequently disagree about whether or not the spectrum itself implies a Māori right to develop a natural resource.

This divergence can be likened to the conflict between the move enacted in the claim text where Māori identified the radio spectrum as a “medium” and a corollary ontological argument made in a 1982 Cato Institute policy paper written by Howard Mueller during early 1980s debates about the deregulation of federal radio management, quoted here at length:

> The spectrum is not a 'natural resource'; it does not even exist independently of specific transmitters and receivers. The economist's and politician's treatment of the spectrum as a resource is strangely reminiscent of the 19th century belief in the existence of an '*ether*' – an invisible, incorporeal *medium* through which radio waves pass. Physicists since Steinmetz and Einstein have discarded the notion of an ether, perhaps it is time policy makers caught up with them ... Radio signals do not interfere with each other in space, they interfere with each other in receivers (Mueller, *Property Rights in Radio communication: The Key to the Reform of Telecommunications Regulation*, 1982, 5-7).

This argument continues, becoming even more explicitly ontological:

> There is no 'spectrum' then: there are only transmitters and receivers of electromagnetic energy ... [which can] be generated by a variety of sources ... the

> resulting classificatory schema makes it easier for us to understands the behavior of electromagnetic transmitters and receivers, but the spectrum, the arrangement, is our own creation. No *platonic entity*, or "invisible resource" exists (Mueller, *Property Rights in Radio communication: The Key to the Reform of Telecommunications Regulation*, 1982, 5-7).

The argument then conjures a cartographic alternative to the newly discovered "continent" invoked in Chapter 1, "we measure this energy by frequency and arrange the frequencies in consecutive order on a *map* we call the 'electromagnetic spectrum'" (ibid).

Whereas the text of the Māori claim asserts a primordial space analogous to the ether, from which the possibility of a historically sovereign territory subject to Māori *rangatiratanga*, becomes plausible, Mueller asserts that any reification of the the spectrum is nothing more than a cartographic production. In a perhaps curious reversal of expectations, while the Māori essentialize the ether, the Cato Institute, as vocal neoliberalists, argue the ether is a base social construction.

The opinion of the majority of justices affirm the Māori declaration of an electromagnetic nature that preceded wireless technologies which acted upon it. Alternatively, the minority held that the right to generate radio waves could not reasonably be considered a treaty protection because spectra is simply a representational effect, the function of technologies that had not existed until more than forty years after the treaty was signed. The minority recommendation that the Crown instead reserve a portion of the auction's for the protection of Māori language and culture is in keeping with this instrumentalist view of technology. Savage further echoes the Cato Institute by suggesting that the terms of early New Zealand radio legislation are becoming obsolete as the ability for smarter and more complicated transmissions evolves.

In their conclusion, the authors of the majority opinion suggest that the claim

stands at the outer limits of what the treaty is understood to address. While previous claims had frequently expanded the bounds of the treaty's primary emphasis on land to include other contested resources, such as fishing rights and geothermal energy, WAI 776 clearly seemed to mark new ground. This implies a certain degree of anxiety about the progressive abstraction of notions of territory away from land towards the immaterial. A correlate anxiety accompanies the minority finding. In his interim report, Savage warns that, "the claimant's argument ... could progress to a claim to light, or to the air that we breathe" (Waitangi Tribunal 1999a, 19).

Could these anxieties perhaps be self-reflexive; related to the progressive commodification of nature in general and indicative of the fusion between the domestication of electromagnetic nature and the modernization of colonialism I proposed earlier?

Justice Savage's minority opinion seems to demand closer attention. In his refutation he notes that the Māori claim is based on describing the spectrum with the phrase *Kainga*, a term which refers to a singular spiritual dimension and which he interprets as "an assertion of *tino rangatiratanga* over all creation" (Waitangi Tribunal 1999a 12). Because of the slippage between the radio spectrum and the electromagnetic spectrum in the claimant's argument, he concludes that an affirmation of the Māori argument for "this narrow band of spectrum" could just as well be applied to "the light that comes from the stars or from our star (the sun) or the particles of air we breathe or the space that those particles occupy" (ibid).

In Savage's view, at the time of the treaty signing, neither party knew of the existence of radio waves and the idea of the electromagnetic spectrum had simply not yet been birthed. Furthermore, he asserts, the claim's underlying arguments could equally as well be applied equally to all creation and so could set a precedent for future claims to

resources “in general.” Here, Savage seems to be expressing a fundamental anxiety about the possibility that ‘everything’ might fall under the jurisdiction of the treaty.

Savage's reasoning is apt, yet it could also be directed towards any property regime that relates to the electromagnetic spectrum, or that otherwise names a universal totality. While the ether is an ontological totality because it permeates everything and is everywhere, the electromagnetic spectrum also works as a kind of universal conjoiner of energy that has different relationships to human bodies, such as, for instance sunlight versus x-rays. When asked about the meaning of *Kainga,* Graeme Everton similarly described it as “the home, or the place” and associated it with a question, “who should limit where the Māori view of the world was?” (G. Everton, Personal communication, December 18, 2014).

Two distinct views of nature can be extrapolated from these the majority and minority findings. In the first, the space in which radio waves travel is viewed as the medium which enables their transmission, and has an ontological primacy; the plenum is reasserted. In the second, this particular band of radio waves is considered as entirely human in origin, independent of any medium, a view that constructs electromagnetic nature as a metaphoric *Terra Nullius* par excellence (Whatmore 2004). Clearly this logic is flawed. Radio receivers built 80 years ago still work today, just as well as they would have worked ten thousand years ago, or in 1840.

These Majority and Minority findings and their correlate anxieties are re-iterated in two editorial cartoons. In the first, the signing of the Treaty of Waitangi is represented. (See Figure 7) A group of British subjects seated at a table interact with a group of Māori in traditional dress, holding spears at their sides. The lead Briton says, “Look it may well say 'radio waves and television transmissions' to you - but it’s still just a thumbprint to me.” The Māori appear indignant while the British look befuddled and

most hold their hands behind their back. The cartoon portrays the episode as a bewildering instance of historical incommensurability demanding of an honest negotiation. In the second cartoon, the leader of a group of Māori, about to enter a door marked "select committee," implores the others who accompany him, "OK, listen carefully - This is important, when I get to the part about Tino Rangatiratanga - claiming that we own the airwaves, it's essential you all keep a straight face." (See Figure 8) A burly Māori in sunglasses cracks, "if we pull this one off, we'll have a crack at oxygen." This time the mise en scene of the cartoon is contemporary. The Māori wear suits and sunglasses. The implied narrative, of a secret conspiratorial meeting to organize deceit conjures broad Orientalist tropes of the deceptive and thieving native (Said in Venn 2000).

[Figure 7 about here.]

[Figure 8 about here.]

In popular discourse, the radio frequencies claims similarly became a lightning rod for Pākehā animosity and were frequently used as an emblem to caricature the perceived overreach of Māori claims and the tribunal process at large.[27] Yet rather than serving as an outrageous outlier that tests the bounds of the treaty or the tribunal, the hearing over WAI 776 speaks directly to both foundational tensions within the treaty itself and to broader concerns about the limits of commodification in neoliberalism. Alex Frame portrays them as enacting a "Māori dividend," the natural outcome of the commodification of public and common goods, a "Tragedy of the Commodities:"

> The 'commodification' of the 'common heritage' has provoked novel claims and awakened dormant ones...Claims to water flows, electricity dams, airwaves, forests, flora and fauna, fish quota, geothermal resources, seabed, foreshore,

27 See especially David Round's *Truth or Treaty* (1998)

> minerals, have followed the tendency to treat these resources, previously viewed as common property, as commodities for sale to private purchases. Not surprisingly, the Māori reaction has been: if it *is* property, then it is *our* property (Frame 1999, 224).

One of the most intriguing negative critiques of the Tribunal comes from David Round's popular book *Truth or Treaty: Commonsense Questions about the Treaty of Waitangi*. Round condemns the tribunal as an emblem of liberal society's self-loathing in its admiration for Rousseau's noble savage. He attempts to unsettle this archetype and any association between Māori and environmental equilibrium, by discussing the role of Māori in the decimation of Moa, a series of large flightless birds extincted within less than 200 year of Māori arrival on Aotearoa-New Zealand. Yet with this argument, Round emphasizes Māori as ecological actors, in a sense attributing them historical agency as natural resource exploiters, and thus perhaps supporting their analogical electromagnetic stewardship in the claim (Round 1998, 142-3).

As discussed in Chapter 1, the history of electromagnetism was intimately interwoven with both the much longer history of inquiry into the nature of light and the search for an etheric medium through which electromagnetic waves travel. The persistent vernacular use of the term airwaves betrays how enduring was the popular pedagogic substituting of air for the long disproven luminiferous ether, as a heuristic tool to explain the working of early radio technology. In this sense, the European/Western scientific tradition, at the time The Treaty of Waitangi was signed, featured a notion similar to *kainga*, in the form of ether as the primordial substance or ground of all being. At the time the treaty was signed in 1840, neither the Crown nor Māori were aware of the spectrum. Yet the ether was a common ontological commitment in European/Western thought. At that time, James Clerk Maxwell was a nine year old boy in Scotland and it

would be more than twenty years before he first proposed the electromagnetic field that would eventually enable Einstein to conclude that the ether was unnecessary.

Furthermore, the possibility that affirming the Māori claim to spectra could lead to future territorial claims to resources or even the cosmos "in general" was not entirely idiosyncratic. As has been noted, WAI 776 was contemporaneous with a wider historical episode in which biotechnology and neoliberal policies for the deregulation and privatization of public holdings sometimes came into conflict with movements for indigenous self-determination, often in debates around indigenous knowledge, extraction and intellectual property (Whitt 2009). The foundational ontological dispute at the center of WAI 776 is echoed in other contemporaneous disputes around genetic modification and biotechnology in general, which also questioned the limits of commodified nature.

In a single panel cartoon, a face is divided into two parts. The left side of the panel is captioned 1840. (See Figure 9) Its background is black and the left half of a face arises from the background, rendered in white, and adorned in traditional black Māori Tā moko tattoos. The right half of the panel is captioned 1999, the year WAI 776 was filed. Its background is white. The outline of the face has largely disappeared; only some of its features remain. In the place of tattoos, radio wave forms now emerge, scattering away towards the far side of the picture plane. The immediacy of the message is clear – Māori use of wireless technologies should be seen as the continuation of other unique forms. The cartoon prominently asserts a dematerialization of the physical body as it transmutes into radio waves, suggesting a series of hybrid nature/culture pairs including body/tattoo and nature/radio transmission, asserting a continuance of territorial marking, analogizing tattooing the body to marking space with radio waves.

[Figure 9 about here.]

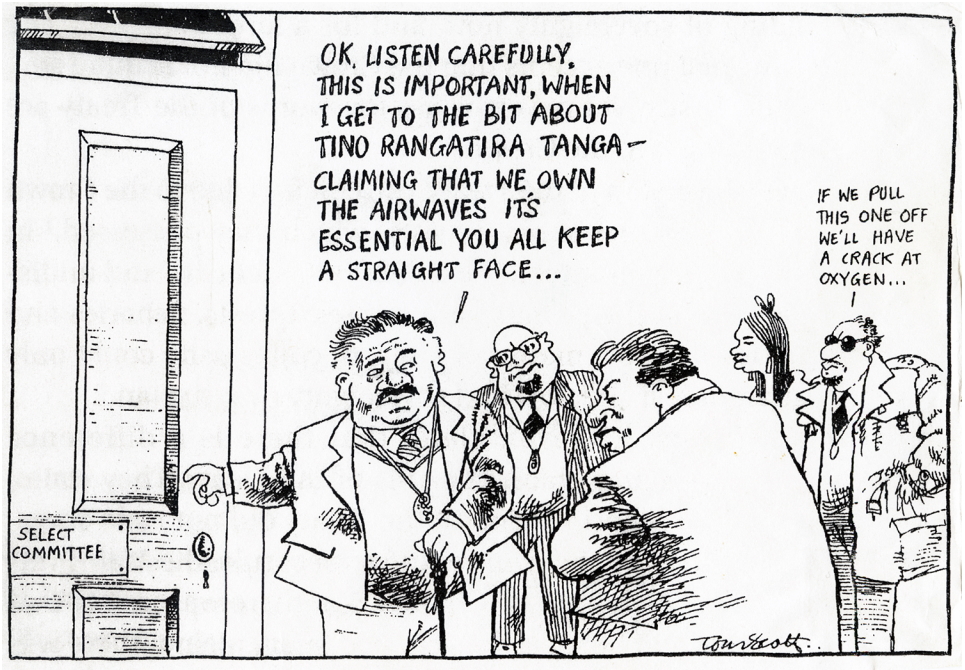

Figure 7: Reprinted from Scott (1998)

Figure 8: Reprinted from Tremain (1998)

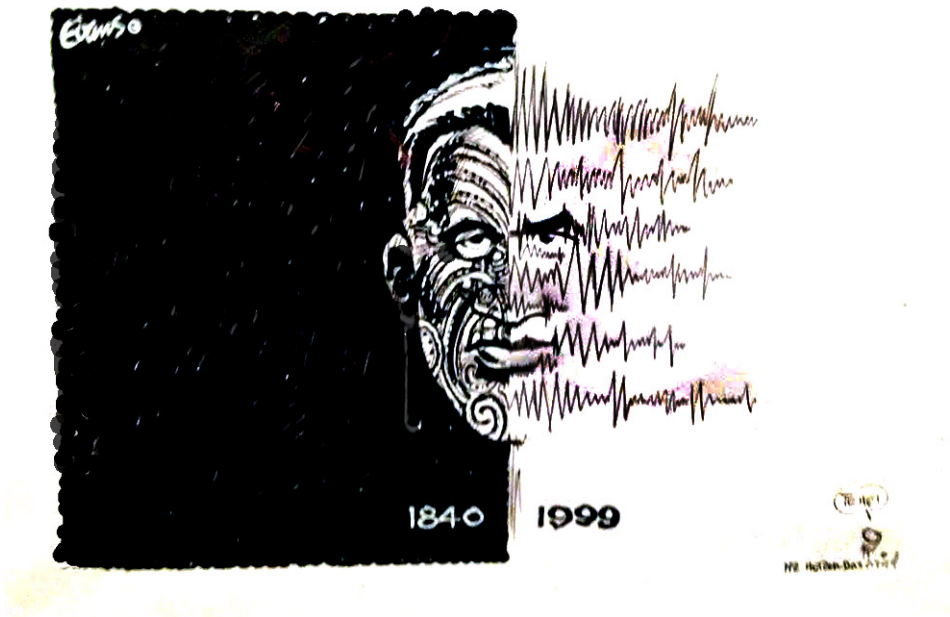

Figure 9: reproduced from Evans (1999)

CHAPTER THREE

ANALYSIS: RELEASE THE GHOSTS

> The deployment of haunting in postcolonial theory represents a suspended condition, in-between because it is symptomatic of an era poised between the traces of an increasingly inoperative colonial history and uncertain transnational forms of hierarchy and oppression.
>
> - Michael F. O'Riley, *Postcolonial Haunting* (2005)

> Coming to terms with processual ecologies of life and non-life (bacteria, plants, animals, energies, and technical objects), things that produce and preclude speaking – and us hearing or not – changes not just epistemological understandings of the sorts of worlds we should inhabit, but *the many worlds we do inhabit*.
>
> – Mark Jackson, *Committing Geographies Beyond Postcolonial Critique* (2015)

> Sire, I am from the other country.
>
> – Ivan Chtcheglov, *Formulary for a New Urbanism* (1953)

Introduction

In their adjudication of the 1999 Māori Radio Frequencies Claim, the justices at The Waitangi Tribunal perform a political discourse involving disparate ontologies of the radio spectrum. The difference in these ontologies hinges on whether or not the spectrum is the contemporary name for an occult materiality that was recognized and manipulated by Māori before 1840, or an antiquated epistemological relic that had only implied such a space as it formalized a now-expiring regime of rights to broadcast at certain frequencies within certain geographic ranges.

In their report, the majority of justices accept that Māori historically both recognized the space mapped by the spectrum in their cosmology and made use of other parts of the larger electromagnetic spectrum. These justices understand the object of the claim to be a form of space historically attributed different names by Māori and Pākehā, and so align this dispute over the spectrum with other territorial claims emanating from a foundational discrepancy between the two versions of the 1840 treaty. Alternatively,

dissenting justice Savage asserts that the radio spectrum is not the space itself but a map thereof, an "intellectual construct." Because the capacity for radio wave propagation in these particular frequencies had not yet been discovered at the time the treaty was signed, he argues, the claim is unfounded.

Both findings have merit but neither is independently satisfactory. The debate replicates a largely futile question – did the map follow or precede the territory? Undoubtedly, the radio spectrum is related to cartography. Yet, although it does participate in the production of proliferative spatio-temporalities, it does not map a conventionally geographic space. Geographic range, resonance, and simultaneity inhere to produce a space of almost infinite dynamism and flux, but one that holds together for the purposes of management only when represented in the most elementary way. Whereas cartographic production has been very effectively unpacked (Pickles 2005) in response to critiques of mimetic theories of representation, the spectrum is not easily recognizable through the lens of these critiques. Because it serves to negotiate the immaterial, it is a different kind of territorializing simulacra; one that claims no obvious referent and so typically eludes the illusion of naïve mimesis.[28] In this regard, Justice Savage's argument is convincing, yet the spectrum is equally so bound to all those associations that it inherits from the ether and its own etymological roots in ghostliness and the apparitional.

Negotiating the Immaterial

Like Newton's initial speculation that his bands of light were physical bodies, spectra are a representational effect that, for historically contingent reasons, later came to be formalized as something material. This tension was at the heart of both 20th century

28 While this framing can also be applied to other contemporary scientific representations of immaterial phenomena, the spectrum is unique for the historical context in which it emerged and for its foundational role within modern science.

debates about the financialization of the radio spectrum as discussed in Chapter 1 and the disjunct between Māori and Pākehā treaty interpretations discussed in Chapter 2, each of which involved the emergence of a politics around an ontological commitment to something immaterial and imperceptible to humans

Both ether and spectra imply such commitments. Yet, they differ in two critical ways. First, while the radio spectrum is impermeable - unaffected even by its "pollution," the ether is sensitive and perennially manipulable. The former can be broadly allied with Freud's unconscious as theater for a singular and impermeable Oedipal production, and the latter can be allied with Deleuze and Guattari's unconscious as factory (Deleuze & Guattari 1987).[29] Second, while the ether is radically accessible, the radio spectrum is associated with enclosure.

While the historic ether was understood as an occult materiality which eluded representation, the spectrum can be understood as the reification of a social relationship which subsequently comes to be mistaken for a concrete reality precisely because of its historical association with the ether.[30] During the course of the 20th century, the spectrum would regain ontological qualities that had previously been associated with the former. As discussed in Chapter 1, this revivification occurred mostly in discourses of that assigned the status of nature or property to spectra. However, the primary physical qualities of the frequencies organized into spectra are innately disjunctive the physical forms we typically associate with property. Radio frequencies are able to penetrate things like walls and other physical enclosures we usually experience as material. If we try to picture our own world as it might "appear" to them, a phantasmagoric simulacra of our

29 The latter of which has already begun to be skillfully unpacked (Milutis 2005)

30 A future iteration of this work would more closely examine the supposition by Whitehead (1926) of the 'Fallacy of Misplaced Concreteness," with particular emphasis on his reference to Newton as the progenitor of this problem in mocdern science as well as his own historical proximity to the ether to spectrum historical transition.

own sensory register emerges. Some of these physical structures become increasingly diffuse while others disappear altogether. In this world, objects are exceptions to a dynamic space of infinite flux.

Picturing the world the spectrum maps is clearly futile. The ether had also eluded pictorial representation, but allowed “similitudes of relation” to be created, analogical representations sometimes later invoked to argue that the 19th century ether was basically the 20th century electromagnetic field all along (Worrall 1994). Similarly, the radio spectrum itself does not claim to map space, only to construct a managerial ordering which operates by a metric of predictability, not mimesis.

The advent of the spectrum allowed the immaterial to be put to use but also implied our alienation from the natural world by replacing the accessible, manipulable ether. This suggests a historical transition in how the immaterial is negotiated. While the ether was characterized by non-hierarchical traversability, the emergence of the spectrum was associated with a managerial enclosure around that same world. This historical passage can be allied with my earlier discussion of how the modernization of colonialism produced a hinge point in which colonizers became modern subjects, and the colonized were offered the choice to become modern subjects by reproducing Newton's early transmutation[ion] of … irrational beliefs of the age into … science” by performing the banishing of their own immaterial worlds - reenacting the domestication of Larkin's colonial sublime.

Yet the formal prohibition of this ontological substrate was not instantaneous. Physicists like Paul Dirac continued to incorporate the ether into their models as late as 1951, well after Einstein's general theory of relativity was first published in 1915. While the foundational influence of relativity on aesthetics, capitalism and daily life has been well-studied, less is known about what happened to the ether as it gradually became an

organ vestigial to science and natural philosophy or what the broader implications of this banishing meant.[31] Because this transition was gradual, it produced a historical gap which affords an opportunity to examine the transition more closely.

Putting the Ghosts to Work

Ghostliness is associated with the contemporary post-colonial condition, symptomatic of the liminal space between "the traces of an increasingly inoperative colonial history and uncertain transnational forms of hierarchy and oppression," as in New Zealand after the passage of the landmark State Owned Enterprises Act of 1986 when the transnational acceleration of neoliberal policies threatened to further diminish Māori sovereignty. Yet ghostliness also strongly characterized this earlier "post-colonial" period between the Michelson Morley experiment of 1887 and the Federal Radio Act of 1927 as wireless technologies began to participate in shaping modern colonialist subjectivities.

Here I want to turn to the example of an alternative project to operationalize the ether into a natural resource, which enacted the commodification of electromagnetic nature as a form of primitive accumulation during the early modernization of colonialism but coalesced prior to federal broadcast legislation.

After Marconi's success in applying Hertz's rudimentary demonstration of wave propagation to long distances, amateur radio spread swiftly across Europe and America, becoming the first popular technology of the 20th century through which the modern colonial subject identified him/herself with modernity. As discussed earlier in this work, juxtapositional imagery from this time reified both the privileged telos of the modern colonialist subject and a corollary association between indigeneity and timelessness

31 In addition to Lefebvre (1974/1991) and his seminal influence on Marxist geography, see also Kern (1983) and Marshall Berman's discussion in *All that is Solid Melts into Air* (1988)

(Venn 2000; Taylor 2002).[32]`

Beginning in the late 19th century, adepts of European/Western esoteric schools, like Rudolf Steiner, CW Leadbetter and Madame Helena Blavatsky among others, hegemonized the ether into their philosophies (Milutis 2003). Blavatsky's seminal work *The Secret Doctrine* was published in 1888, the year after the negative finding of the Michelson-Morley experiment. Just as Newton's science may have following from the rationalization of an occult worldview, these adepts discovered and hegemonized aspects of Eastern philosophy and pan-national indigenous cosmologies into a systematic universal energy anatomy (Davis 1999). This anatomy involved two primary, related cartographies.

Its first mapping ordered "etheric chakras" in relationship to the human body and its organs (Powell 1925/1979). These chakras were re-appropriated from Hinduism as energetic vortices through which the human body sustained an unconscious and occult connection to the more-than-human world (Karagulla & Kunz 1989). (See Figure 10) This anatomy was presented in a language of instrumentality; it could be operationalized for both clairvoyance and the manipulation of reality through the creation of "thought-forms" by the directed use of "etheric faculties." The ether here was further associated with the unconscious in the form of the "Akashic record," a sublime inscriptive surface upon which every bit of history is recorded; so vast and so sensitive that it bears the permanent trace of all events, juxtaposing it to the later reified spectrum which is alternately framed as unable to be degraded or diminished.

The second mapping related this universal unconscious to a racialized geographic differencing which recalls both Freud's later notion of "primitive instincts" as well as Ellen Sempel's appropriation of Darwin (Cresswell 2013) in her theories of

32 A future iteration of this work would here make reference to Freud's *Civilization and its Discontennts*

environmental determinism. In original sources, this merger of the etheric and racialized geographic thought is sometimes explicit:

> The lower variety [of clairvoyance] appears sporadically in undeveloped people, such as savages of Central Africa, and is a sort of massive sensation vaguely belonging to the whole etheric body, rather than an exact and definite sense-perception communicated through a specialized organ. It is practically beyond the man's control (Powell, *The Etheric Double: The Health Aura of Man*, 1925/1979, 102).

This quote recalls Mbembe's admonishment of representations of Africa that associate it with "primordial chaos," a turn-of-phrase which is striking for the manner in which it joins two perennial qualities of the etheric imaginary which itself has longstanding associations with the unconscious.

Variants of this anatomy continue to circulate widely in contemporary iterations of these popular philosophies (Karagulla & Kunz 1989) as well as in popular holistic medicine (Gerber 2001) and "new-age" thought. These variants are generally cleansed of their explicitly Eugenicist taint, though it sometimes seems to have been sublimated into a more abstract notion of noumenal environmental "risk" (Mitchell & Cambrosio 1997, 231-2). Yet the association between the universal unconscious and racialized geographies sometimes reasserts itself more explicitly in later 20th century discourses, where it is mediated by wireless technologies and the radio spectrum rather than the ether.

For instance, shortly after the Rwandan genocide, during which a Hutu Power radio station had played an instrumental role in the systematic coordination of killings, an article in *Foreign Affairs* proposed jamming similar transmissions in future regional conflicts (Metzl 1998). The article was accompanied by a familiarly archetypal image of three Rwandans crouching around a radio, one with a machete on the ground at his side

suggesting close-at-hand dormant primitive instincts, as expressed in a caption that asks, “Tuning into Genocide?” (See Figure 11) This continuity across two distinct transformations of the ether into a post-colonial “natural resource” makes the speculative fusion between the environmentally noumenal and the social differencing during the modernization of colonialism more legible.

[Figure 10 about here]

[Figure 11 about here]

Lost History

The ontology of Manuel DeLanda includes a critical point related to a more foundational loss of history in scientific representations. He argues that the reification endemic to ostensibly materialist scientific classification schemas threatens to obliterate those individual histories associated with matter's creative capacities (DeLanda 2002). Speaking of the periodic table, DeLanda argues that its reification of chemical species erases the individual morphogenetic history of given atoms. Sympathetic critics of DeLanda's neo-realism contend this loss is not of significant consequence, and that, as DeLanda himself has described the problem of “redundant causation,” he can offer no reason to make the idiosyncratic history of given atoms the primary object of philosophy (Harman 2008).

Yet this problem of lost morphogenetic history articulates a key characteristic of what was at stake in the replacement of the ether by the spectrum. Both the periodic table and the electromagnetic spectrum comprise scientific taxonomies of the natural world. As the table reifies individual chemical species, the spectrum reifies electromagnetic wave species, universalizing their variable capacities by appeal to the single privileged quality of frequency. Alternatively, the ether had been associated with two of the qualities of matter DeLanda implies are lost in the reification of

electromagnetic wave species; first, generative agency, and second, subtlety as emblematized by the sensitive inscriptive surface of the speculative Akashic record. These qualities associate the ether with a capacity for reciprocality across human and more-than-human worlds, which historically characterized etheric thought (Milutis 2005). The enclosure of the ether in the radio spectrum then begins to suggest something more significant than an incidental analogical use in the Federal Radio Act of 1927. In its subsumption, the relational field of the ether was replaced by the unidirectional access endemic to the spectrum. This can be associated with the unidirectional passage of time with which subjects allied themselves to become modern, as discussed throughout this work. As the lost morphogenetic history of spectra seems to have obliterated the ether, were innate etheric capacities also lost in the constitution of the modern subject?

Representations

Atmospheric disruptions within the control grid created by the spectrum's negotiation of the immaterial participate in a relational nomadic mapping that resembles both the reciprocality of the etheric imaginary and the agency or “etheric faculties” of the premodern subject. The earliest wireless technologies iterate Deleuze's idea of “nomadic science” (DeLanda 2003). They emerge close to the ground, made from easily accessible materials and are paradoxically at odds with that royal science which had attempted to detect a “wind” that would prove the existence of an ether, and thus unify all phenomena by grounding them in primordial matter. Even as the spectrum disciplined that nomadic science, by usurping radio frequencies into a sovereign territory of the state, iterations of this nomadism continue. Aspects of natural electromagnetic nature(s) that had been more legible in the etheric imaginary's negotiation of the immaterial acquire a quality of ghostliness in the modern world the spectrum negotiates.

Atmospherics, as they are described in the report quoted in my introduction expand their own ability to make representations within the technocratic control grid of wireless technologies. For instance, the moment at which an AM radio signal disappears while you are driving beneath an underpass or the moment at which an approaching storm causes a wash of high-pitched noise are disruptions that point to the ontological instability of the reified spectrum.

These disruptions are more-than-human representations; they acquire traces of the environment through which they move with us. In a dropped cell-phone call or the sudden wash of static across an otherwise undisturbed radio signal, our faith in the mimetic reliability of our immediate environment is unsettled. We momentarily apprehend the presence of the immaterial, beyond the horizon of our senses, like the horror film's protagonist, who, gazing in the mirror, is shocked by the sudden appearance of a threatening ghoul, but turns backwards to find the room empty of any apparition. These strange representations are intimately familiar to us; quotidian reminders that the royal science which produced the spectrum erased something else. As radio waves conspire with weather, time and objects in unpredictable ways, atmospheric radio is constantly thumbing its nose right back.

Perhaps the ether and the spectrum might be better counterposed as constituent parts of an Apollonian/Dionysian dialectic, rather than iterations within a historical progression. Whereas the spectrum names the totality of energy, the ether names a void as the condition from which all else arose. The differencing between them represents an enduring tension in the history of natural philosophy, long predating the 20th century. The imperative to organize frequencies discretely and hierarchically into the radio spectrum can be loosely allied with the Elizabethan Great Chain of Being as well as that concept's precedents in Aristotelian philosophy (Glacken 1967) and its influence on

Linnaean taxonomy in his Table of the Animal Kingdom.[33] Alternatively, the ether was historically often associated with the unconscious. T.S. Elliott's, *The Love Song of J. Alfred Prufrock*, from 1909 begins with the invitation, "Let us go then, you and I / When the evening is spread out against the sky" then suddenly invokes an unexpected and jarring simile to, "a patient *etherized* upon a table" signifying both the protagonist's passage into the etheric realms of the unconscious as well as the ether's inability to be accurately pictured (Clarke and Henderson 2002). In its ubiquity and imperceptibility, the ether was also sometimes associated with an anarchic opposition to hierarchy. In the 16th century, occult medical doctor Paracelsus called magnets "the monarch of secrets" because of their ability to heal by manipulating etheric waves. This radically open accessibility implicitly destabilized power/knowledge and unseated archons from their thrones (Milutis 2006, 6). This figuration of the ether is further associated with primordial chaos, the first thing to exist or the "the waveform plane out of which everything comes into being … [encompassing] the entirety of human action and thought" (ibid, 5).

As ways to negotiate the immaterial, both the ether and the spectrum make appeal to the totality of the universe. Yet what about other ways of representing our reciprocal relationship with the immaterial in the hybridic field of electromagnetic natures? The inclination to represent this relationship as coherent but operating largely in a Platonic realm parallel to the world apprehended through the register of our immediate senses is enduring. This tendency is found in modern milieus as variable as 19th century spiritualism with its fantastic "ectoplasmic" material which passed back and forth between human and spirit-realms (Marvin 1988), and Kant's critical

33 I want to clarify that, while the spectrum's hierarchical qualities recall the Great Chain of Being, the axis along which it is organized does not nercessarily correlate to "value" in the same way as the former. A lower frequency in the FM band, for instance, is not necessarily worth less than a higher one.

phenomenology with its primary differencing between noumena and phenomena.

Radio engineering represented this relationship by initiating a language of rationalized vision (Manovich 1993) that spoke of a given transmitter's ability to "see" a certain distance or operate at a "line of sight." This language is also suffused with analogies of parallelism, drawing on the experiential qualities of land or the human body in its language of broadcast "footprints", "contours" and "surfaces" (Sinclair, 1997). The analogy to land is especially persistent, and appears in later discourses around federal legislation as well as post-war policy papers that eventually inform the Māori claim.[34] All of these analogies imagine forms as presence in the absence of any sensible referent, again recalling the representational problematics of the 19th century ether.

Other attempts have emerged in the work of architects and designers. Michele Bertomen (1996) uses the metaphor of a viscous "soup" to give body to the sheer volume suggested by the vastness of electromagnetic activity. Her analogy, characteristic of the pre-millenial exuberance for cyberspace, is one of both immersion and containment. She associates this soup with a shift in the meaning of the archetypal tower form, which, in an increasingly wireless-saturated world, indicates a shifting dialectic between their form and function. In Western/European history, she writes, the height of towers had once been associated with conferring vision as a god's eye view or power/knowledge, whereas broadcast towers signify both immersion and incarceration within a shifting, relational network.

Designers Anthony Dunne and Fiona Raby (2001) suggest the name "Hertzian space" for the perpetually mutable environments produced by the interplay between wireless technologies and urban forms. They associate invisible hybridic electromagnetic

34 The text of the claim that initiated WAI 776 describes the management rights to be auctioned as follows: "they are tradable, and can be mortgaged, or be subject to caveats, in a scheme very similar to The Land Transfer Act of 1952."

natures with the unconscious and lushly render electromagnetic fields emitting from household appliances, visualizing then in a manner that recalls renderings of the esoteric "etheric" or "astral" bodies; increasingly amorphous extensions of material forms that leak into space – as though the object is dreaming itself into dematerialization. (See Figure 12)

[Figure 12 about here]

Timothy Morton proposes the intriguing notion of "hyperobjects," through which the sublime continues to manifest at the horizon where our senses fail.

> These are objects that are massively distributed in time and space. Hyperobjects become visible to humans in an age of ecological crisis. Indeed, it's really the other way around: hyperobjects have alerted us to the ecological crisis that defines our age (Morton 2011, 207).

In his object-oriented ontology, Morton draws on Hakim Bey's idea of the Temporary Autonomous Zone (TAZ) to characterize these objects which unsettle time/space and from which constraints and possibilities radiate. This rendering of the intelligent radiant object brings to mind the dreamy etheric bodies of human bodies and domestic appliances represented by Dunne and Raby. Yet in so far as these objects alert "us" to "ecological crisis," Morton's notion recalls the re-appropriation of indigenous cosmologies in European/Western thought under the universalizing rubric of "shamanism" (Eliade 1951; Znamenski 2007) as the basis for a moral stance.

These contemporary efforts to visualize vast hybridic electromagnetic natures, even as a space of potentiality, also then capitulate to totalizing motifs. By attempting to make these natures and their political economic contestations legible all at once, they sometimes seem to replicate the modern colonialist imposition of the radio spectrum onto the same Terra Nullius problematized both by WAI 776 and by the agential

nomadic semioses discussed above. As the paradoxical portmanteau “Hertzian space,” used in Dunne and Raby's otherwise visionary series of design experiments related to wireless and the human body, transforms this field into something manageable, it inevitably erases its complications and paradoxical qualities .

Political Economic Discourses of Spectra

Here I explore how this world has been represented and managed in the discourses of broadcast legislation. While the first conscription of radio frequencies by the federal government in the early 20th century iterated a form of accumulation by dispossession (Harvey 2003), the Māori claim occurs at the onset of a regime of global neoliberal environmental governance wherein the primary role of the state remains protection of property rights and one of its secondary functions is to save or manage nature by its commodification (McCarthy and Prudham 2004). The privatization of frequencies contested in the Māori claim are, in the first instance, part of this larger trend towards the reproduction of natural resources as financial instruments or “ecological commodities,” part of a historical shift to “nature as an accumulation strategy” (Smith 2007). Yet the qualities of these frequencies notably diverge from other contemporaneously activated ecological commodities.

Situated within a common taxonomy of natural resources, radio frequencies bear some similarity to both what are portrayed as stock resources like coal and petroleum deposits and what are portrayed as flow resources like timber or fisheries. They are also similar to resources like air, land or water, but they are distinctly immune to degradation by use as well as to collapse. Unlike oil or biodiversity, they can not easily be assigned any financial incentive to remain undisturbed. Furthermore, the manner in which they are used is not susceptible to the same kinds of concerns or interventions that accompany other natural resources. Even the term “electro-pollution,” for instance,

denotes interference that is reversible without any lasting impact. Spectra have thus rarely, if ever, been brought into environmental discourses.

Yet the ascription of nature to spectra has often been a part of later discourses of the radio spectrum. First implied in early FRC legislation, this ascription became more deeply embedded in these discourses through Kennedy's declaration that the larger electromagnetic spectrum is a natural resource, an event that occurred almost contemporaneously with the beginning of the popular environmental movement and the publication of Rachel Carlson's Silent Spring.

The New Zealand Crown's decision to release bands of spectra for auction was clearly in line with larger neoliberal trends that would enable the privatization of public assets. Yet this episode should also be understood not just as the localization of "larger trends of deregulation, reductions in social services, free trade and structural adjustment," but also a specific form of environmental governance shaped by the particularities of its own historical trajectory (Mansfield 2004). The context of the Māori claim has clear roots in the mid-20th century when a movement first began to transform federally allocated broadcasting licenses for discrete frequencies at fixed geographic ranges from a public good into a regime of private property rights. As discussed earlier in this paper, the argument for privatization was not significantly affected by Kennedy's declaration that the radio spectrum was a "critical natural resource."

For other natural resources, new exchange values produced by financial instruments expanded the fold of 'social nature,' by replacing the process in which naturally derived or 'harvested' use value became exchange value through the application of labor (Smith 2007). Spectra work a bit differently. In their ubiquity, radio frequencies are more closely allied with those "natural" processes, like gravity, that Neil Smith sets in contradistinction to social nature. Nor is that which makes them 'natural' necessarily

transformed by their use, although, other forms of life may be transformed in relation to them. For instance, ornithologists continue to discover the impact of EMF on avian navigation (Friederici 2015) and some limited evidence suggests that magneto-reception may also play a role in human navigation which supports the common hypothesis that Polynesians historically made use of "unconscious senses" to navigating the ocean (Springer 1995). Although human intervention in electromagnetic nature does not fundamentally alter spectra itself, its effect on capacities like these remains uncertain.

In some Marxian discourses, spectra are even cited as a paradigmatic example of the reification of commodities in general, described as "making money out of thin air," and their sale as "like selling sand to the arabs, or ice to the Eskimos ... selling nothing" (Mohr, 2002a). This implies the coterminous genesis of use and exchange value, a conjunction recalling the paradoxical term, ethereal aether, as as a kind of binding of presence and non-presence – a "nothing that connects everything" (Milutis 2005) and echoes Baudrillard's (2001) seminal theory of the simulacra as the map which engenders the territory as well as recalling the futile investigation around the historical primacy of map or territory in the introduction to this chapter.

In the appropriately named Specters of Marx, Derrida draws attention to Marx's fixation with ghosts – reading them as anxious emblems of Marx's obsession with how exchange value haunts and always preempts the possibility of a pure use value that precedes commodification.[35] Apparitions recur frequently in Marx's writing, Derrida continues, because Marx wants to reveal the magician's sleight of hand and, in so doing, identify the very moment of commodification, in order to exorcise it. Exchange value then implies a "derivative corruption of the pure naturality of the former" (Choat 2010, 81). Derrida's framing of Marx's view of commodification as a magic trick can be allied

35 Marx's most famous invocation of the word specter occurs in the first line of The Communist Manifesto which was published in the same decade that the Waitangi Treaty was signed.

with my earlier figuration of Newton, the sorcerer, who first speculated that the bands from his prism inhered as bodies, presaging the production of fixed-frequency radio spectra as commodities.

This primacy of use value is implied at the tribunal by Justice Savage, whose reasoning is allied with a Lockean philosophy that "[denigrates] 'unimproved' nature as value-less" (McCarthy and Prudham, 2003) from which it follows that historical awareness of those aspects of the natural world that would later come to be appraised as natural resources by the government of New Zealand could not legitimize Māori territorial rights therein. Furthermore, in their noumenal state, imperceptible spectra have often failed to activate a popular movement as part of the dialectic of Polanyi's double movement in which social protections arise when the market tries to separate itself from society.

Political economy and Marxist geography have traditionally recognized social nature as an annihilation of natural processes, "the refusal to incorporate an understanding of how human labour, much of it science-driven, has itself transformed the 'natural' world – [it] has been highly destructive" (Smith 2007). Yet because spectra are immune to destruction, they are not easily countenanced in a discourse of social nature predicated on annihilation of the natural. This creates a tension that makes the Māori claim especially compelling.

Property Frameworks

Whereas both neoliberal and Marxist frameworks of property (Castree 2004) seem to grapple to recognize spectra, the earlier discussion of the difference between totalizing representations of spectra and the unpredictable semiosis of hybridic electromagnetic natures, bears some resemblance to the disjunct between indigenous

Polynesian and European/Western frameworks.[36]

Seeking a commonly grounded synthesis of Māori and Pākehā property frameworks for future jurisprudence, Alex Frame explores the syntactical structure of Lockean and Māori frameworks of property, and notes that, in both, "objects in the world get 'injected' with something as a result of the actions of human beings" (Frame 1999, 225) but that in the Māori framework, both the object and the individual are members of a society. Whereas the European/Western origin of property, Frame argues, is most typically associated with Blackstone's "extremist" 17th century framing of it as the "sole and despotic dominion" of human control over an inert world, the Māori origin of property invokes a set of "reciprocal rights and obligations involving people and an animated world" (Frame 1999, 225).

Although the property at the heart of WAI 776 unsteadies a neat comparison between these two frameworks, the multilateral quality of Māori origins of property can provisionally be associated with broadly relational ontologies of nature (Lorimer 2012) and the "material return" (Whatmore 2006) native to more-than-human geography, which shares some affinity with the etheric imaginary.[37] In the ontologies of Deleuze and DeLanda, for instance (Deleuze Guattari, 1987; DeLanda 2002; 2003) form is not a closing off from within a field, but a crystallization within which the morphogenetic flows that brought the object into being remain accessible. Objects are then part of a dialectic between flux and crystallization, with capacities for traversing forwards and backwards into being (DeLanda 2002).

This quality shares affinity with Māori property frameworks and the notion of more-than-human "societies" in which objects participate. Both the neorealist object and

36 I clearly recognize and acknowledge the long legacy of studies relating to Polynesian property since Mauss and have attempted to focus narrowly on Māori property here by reference to experts in that field.

37 I choose Whatmore's term "return" also for its reference to the report cited in my introduction which both depicts assemblages and acknowledges, albeit combatively, more-than-human agencies

the Māori object of property are inextricably suspended in a relational field that precludes any operable cleavage between epistemology and ontology. That cleavage is the foundational taxonomy between life/non-life referred to in the Seattle declaration. It is what operationalized colonialism and enables the erasure of non-human agency from the constituency of more-than-human relationships. This cleavage is active even in romantic primitivist accounts like Morton's which implies an earlier historical relation to indigenous frameworks as intelligent mythos, wherein indigenous cosmologies are used to exemplify "examples of a symbolic interconnectedness – an abstraction of a moral code… a way in which to view the world – the basis for an epistemological stance" (Watts 2013, 26). Analogies to immersion or parallelism found in representations of ether and electromagnetic nature earlier in this paper also exemplify this type of analogical abstraction.

The First Continent

The early radio transmissions of Hertz and Marconi did not bring the natural electromagnetic environment or its assemblages into being. In any discussion of these assemblages, especially in the context of a post-colonial dispute over their role as territory, it becomes critical to implicate wireless technologies in a domestication of atmospheric radio which predated biological life, however unstable that domestication has proved to be.

Some of those discourses around early broadcast legislation refer to the capacity to manipulate electromagnetic waves as a "new-discovered continent," intimating its exponential potential and conceptualizing it by use of a geographic analogy (Childs, 1924, 522-23). Yet, as Neil Strauss points out in the introduction to this work, humans everywhere already lived on that undeveloped continent. Natural radio signals have always existed. A radio receiver during the paleolithic would have picked up atmospheric

noise from lightning storms and natural phenomena like whistlers, charged ions falling to earth. Even as this continent has been domesticated, this non-human semiosis endures. Around the world, a small subculture of natural radio listeners regularly congregates in remote locations to listen to, record and share their documentations of atmospheric radio. Similarly, in West Virginia, a United States National Radio Quiet Zone was established by the FCC in 1958 to protect powerful radio telescopes, directed towards cosmic noise, from the interference of wireless propagation. This zone implies an accidental form of conservation.[38]

The metaphor of a new continent can also be extended to include an archetypal colonialist encounter of first contact with these phenomena – the natural world acquiring a form of agency in relation to its human listeners within the invention of a hybridic natural theater, analogous to speaking natures found in most cosmologies of nature. Yet did we even notice what we had discovered? Did we listen?

When we invert the visualizing inherent to radio engineering and quixotically attempt to imagine how we might appear to each of these wave-species, our own form becomes uncharacteristically etheric. The saltwater that comprises most of our bodies is a conductor, forever participating in shaping these "kaleidoscopic spatialities" of flux and intensities which allow for "multiple, non-hierarchical, and protean connections between autonomous entities" (Springer 2013, 1607). Our bodies are mutable here, unrecognizable; boundaries bleeding as if our form is dreaming itself away, dissipating into space. We begin to resemble those diffuse etheric bodies native to esoteric energy anatomies; iterations of our human physical form mutating and dematerializing as they extend further afield. Any equivalence between the discrete human body and the subject

38 It is worth mentioning anthropologist Richard L. Garner, a naturalist who studied apes in the African "wild" and "designed a special electrified steel cage [that he] lived in [for] many months, keeping nature at a technologically remote distance … a 'place of safety from the wild beasts that prowl throgh the forests at night' [equipped with] an electric battery good for three hundred hours." (Marvin 1988, 116)

dissolves. To radio waves, are we the ghosts?

Familiar forms in the natural and built environment also bear unfamiliar capacities on this continent – acquiring variable agency to disrupt, attract or repel wireless signals, as though the effort to conquer space in the modernization of colonialism through the invention of a global communications grid remains always prone to the return of the physical environment that it was intended to transcend, even "young Marconi knew that success required distance, and clear demonstration that the waves would overcome obstacles such as hills and mountains" (Barnouw 1966, 5).

In a long-lost one panel cartoon, a man on his roof adjusts his television antenna, adjusting and contorting himself into awkward forms, when suddenly his wife shouts up from the house below to hold it right there, that the signal is perfect. As ghostly conductors, we find ourselves the bearers of "uncertain agencies". Perhaps we become paranoid investigators, acquire EMF dosimeters and attempt to map this ever-shifting world. When we identify ourselves as subject of this electromagnetic continent, we discover ourselves like haunted nomads without maps, like "blind actants," an inversion of how the the non-human sometimes finds itself caught in webs of human semiosis (Watts 2013). Our etheric faculties persist primarily in returns of the repressed. Thus Dunne and Raby's objects dream, or lightning speaks on an AM radio and the world is a spectredom full of new ghosts.

Anxiety Everywhere

> In the invisible topography of EMFs, the boundary between bodies and the environment, between nature and culture is re-located and re-ordered, but never contained. That 'erosion of boundaries evokes the melodrama of *uncertain agency everywhere* (Mitchell & Cambrosio, 1997, 259).
>
> This ubiquitous and "uncertain" agency relates back to the earlier historical

transition from the ether to spectrum as well as to the privatization of the latter. Graeme Everton, the Māori torchbearer of ongoing spectra negotiations, explains how Māori territorial concerns had arisen as a direct response to the Crown's plan to open the common domain of spectra to a hitherto restricted, “calculus of profitability,” marking a historical transition in the status of common property:

> The moment that [the spectrum] moved from being a public good to a private asset, it triggered for Māori that the Crown couldn’t assume that it owned *everything*. The Crown started with the precept that it owns *everything*, and therefore it gets the right to decide who uses it. But the moment the Crown decided that it was worth owning, or worth controlling, they set up statutes to take control, obviously Māori would be upset with that, because the assumption that the Crown could do that, or own something, - that they just assumed it, bumped up against our belief in sovereignty (G. Everton, Personal communication, December 18, 2014).

Everton's emphasis on the word 'everything' can be read as a challenge to the progressive abstraction of property towards the intangible, as in biotechnology. Yet this challenge to the limits of commodification can also be related to the totalizing quality of representations of radio spectra discussed earlier. The premodern ether had worked as an ontological commitment to the open metaphysical ground of all being, the condition of possibility for 'everything', though it subsequently eluded representation. Alternatively, in modern scientism, the electromagnetic spectrum is a representation that names and orders “all possible” frequencies of electromagnetic radiation. In this regard, the advance of technologies that are able to use increasing ranges of frequency implies a historical process in which the radio spectrum is territorializing the electromagnetic spectrum. If the former shifts from a protected public good, to a form of

private property, it then implies the commodification of 'everything.' As the radio spectrum moves to territorialize the larger electromagnetic spectrum, a vast and almost unthinkable dimension of the natural world stands to be be reproduced as 'social nature' (Smith 2007).

Clearly, electromagnetic nature can not be effectively reduced to a parallel world. The effects of EMF on human physiology are speculative, contentious and not well understood. The longitudinal impact of our exposure to Wi-Fi signals, for instance, is not yet known. Not surprisingly then, the rapid but invisible proliferation of electromagnetic environmental modification has provoked anxieties, if not clear empirical outcomes.

The surge in cellular and wireless networks has engendered a speculative syndrome dubbed “electrosensitivity,” even producing a group of refugees, some of whom have gone so far as to relocate themselves in rural milieus far afield of urban EMF (Stromberg 2013). Dunne and Raby (2001) re-appropriate the “Faraday Cage”, invented in 1836 by Michael Faraday, an early antagonist of luminiferous ether theories, to further explore these anxieties. The Faraday cage is an enclosed space made of fine mesh; its surface diffuses electromagnetic energy, protecting the interior space from intrusion. This binding of anxiety and invisible proliferation is associated with the proliferation of consumer electronic objects:

> Is there a natural EM environment, and how has this been changed by man? All life on earth has evolved in a sea of natural low-frequency EM fields. ... Over the last century, this natural background has changed sharply, with the introduction of a vast range of man-made devices and systems. These artificial EM fields expose humans in many orders of magnitude above *natural* background levels (Adey quoted in Mitchell & Cambrosio 1997, 232).

Dunne and Raby also hyperbolize that wireless technologies have initiated “the greatest

alteration of the natural world" in the 20th century (2001, 10). These anxieties about the unseen have a certain resonance with Justice Savage's anxiety about the possibility of setting precedent for Māori territorial claims to gamma rays or sunlight.

These anxieties similarly characterize the earlier historical period between the Michelson-Morley experiment and the founding of the FRC. In 1908, during the historical transition between the ether and the spectrum, Lenin made a series of uncharacteristically clumsy attacks on the implications of the new physics, raging as if "trying to hold down a tent in the wind … defending the objective, material world in absolute space and time he believed to be the foundation of Marxism and .. feared, was threatened by …. recent developments in physics" (Kern 1983, 134). Similarly, in the wake of the prevalent social constructionism of the late 1990s, some orthodox Marxist declarations to "re-materialize" geography (P. Jackson 2000) implied the reassertion of a metaphysics of matter (Kearnes 2003), at times closely resembling Lenin.

Holding onto Nature

The legibility of electromagnetic natures benefits from the almost uncanny hospitality afforded them by emerging onto-epistemologies (Whatmore 2002; Lorimer 2012; Jackson 2015.) Yet the traditional category of nature also remains valuable here (Castree 2003; 2004), and can serve as an effective strategic essentialism that allows those problematics suggested by electromagnetic natures to be recognized as enduring. Given the overall paucity of contemporary geographic thought related to radio, framing these assemblages solely through the lens of the more-than-human threatens to replicate a contemporary debate in political ecology revolving around the apparent disappearance of biophysical processes and actors from its literature and an overemphasis on the primacy of non-equilibrium states, obscuring human disturbance of ecosystems, resulting in a more textually-oriented political economy only nominally ecological, a

"politics without ecology" (P. Walker, 2005).[39] Furthermore, in social constructionist philosophies, language sometimes replaces transcendental form as the manner of agency which acts upon passive matter, stripping it bare of its own unique potentialities (DeLanda 2003).

By instead using this essentialized "nature" to juxtapose the vast excess of electromagnetic activity against the ordering that inheres in the electromagnetic spectrum, the process of domestication suggested throughout this paper is made legible and the association of wave species with animals implied in my earlier discussion of DeLanda becomes more salient.

In this reading, the bounded space of the Faraday Cage or the larger National Radio Quiet Zone can be framed as variants of other nature preserves, protecting the habitat of naturally occurring radio waves. Yet because this conservation is only incidental, it raises the spectre of an ethics. There is no obviously apparent *other,* also affected in the human manipulation and commodification of electromagnetic nature.

There is much we don't know and, perhaps, even more we don't know that we don't know.

39 And, as a committee member pointed out, therefore perhaps also only nominally "political."

Figure 10: Reprinted from Powell (1925/1979)

Figure 11: Reprinted from Metzl (1988)

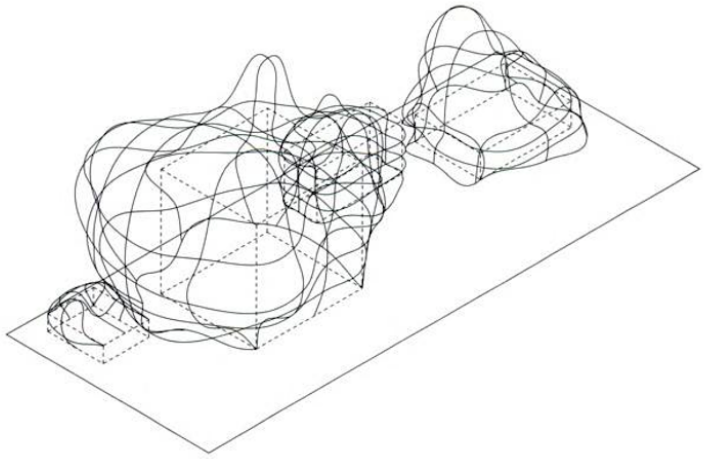

Figure 12: Reprinted from Dunne and Raby (2001)

CONCLUSIONS

> [T]here are ... unknown unknowns. There are things we don't know we don't know.
>
> – Donald Rumsfeld

I began this work by interpreting the enduring association between indigenous others and the non-hierarchical, supernatural or chaotic tendency in modern European/Western thought as evidence of a relationship between colonialist processes of differencing and the historical displacement of the etheric imaginary which had been associated with those very same qualities. I speculated that this association evidenced a fusing that had taken place during the modernization of colonialism between the negotiation of the immaterial and the negotiation of the relationship between the colonizer and the colonized. This fusing later reasserted itself during the episode around WAI 776 which demanded that a politics be afforded to the unstable ontology of the immaterial as the property of European/Western thought.

The claim process activated anxiety in the form of a self-reflexive critique of how colonialism usurped space and assumed territory by power/knowledge, challenging its assumption of sovereignty to the immaterial. I emblematized this reflexivity through an implied comparison between a series of figurations, including those of Newton and Justice Savage.[40] The latter's anxiety that recognizing a Māori right to develop frequency bands would set a precedent for future rights to sunlight or gamma rays revealed how the progression of the science of electromagnetism had earlier allowed European/Western

40 These figurations are intentionally presented as associated with larger bodies of thought. Savage, for instance, is himself Māori.

colonialism to stake claims to the universal. This movement began with Newton and his prism, engendered the spectrum and, over time transmuted the supernatural or immaterial itself into property.

By drawing attention to an immaterial world, one of many "we [already] do inhabit" (Jackson 2015), I have attempted to locate key problematics of more-than-human geography within an earlier historical context. Whereas more-than-human-geography is frequently contextualized in relationship to the emergence of biotechnology and a correlate destabilizing of the boundary between life and non-life (Whatmore 2005; Greenhough 2013), I have argued here that early wireless technologies similarly destabilized ontologies of nature(s) in the context of the earlier modernization of colonialism.

I am left with a new set of questions.

What does the current tendency to recognize the creative, generative capacities of matter by analogizing it to "life" say about the grounds on which we recognize an ethical commitment? By breathing life into the agential abiotic, might we threaten to assert life as a transcendental use value around which to manage nature(s)? In this reconfiguration, might we threaten to unconsciously reassert life as foundational, as it was, also, in the history of European/Western colonialist thought? This work has dealt with an aspect of the natural world that demonstrates vociferous agency and irreducible complexity and so could easily be figured as a form of life. Yet this part of the natural world is not fragile and cannot be destroyed. To figure it analogically would belittle the real and enduring incommensurability of our relationship to it.

Can the immaterial enter into a political-economic framework only if it is first disciplined through the ascription of human value? Can a viable political economy of the immaterial and its entanglement within conflict, subjectivity, or nationalism, be

negotiated across time and space in all its paradoxical substantiveness and unknowability without forever capitulating to totalizing analogies?

Assuming the dialectic of the etherial aether remains enduring, how can we learn to live alongside the unknown unknown ethically?

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