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Grounding the view from nowhere:

The role of remote sensing technology in international human rights practice

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Geography

by

James Robin Walker

2021

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ABSTRACT OF THE DISSERTATION

Grounding the view from nowhere:

The role of remote sensing technology in international human rights practice

by

James Robin Walker

Doctor of Philosophy in Geography

University of California, Los Angeles, 2021

Professor Adam D. Moore, Chair

Satellite remote sensing has begun to play a pivotal role in defining how the world understands emerging crises, and stands at the fulcrum between human rights ideals and international humanitarian obligations. The adoption of a powerful narrative technology by non-traditional actors such as inter and non-governmental organizations raises serious practical and ethical concerns over the use of the “view from nowhere” afforded by orbital sensors. However, the use of such imagery to sway international dialogs has received limited interest in the academic literature. The subsequent gap in our understanding of the impact of technology on advocacy is significant. This dissertation argues that the adoption of RS technology has enhanced the position of INGOs as geo-political actors in their own right, allowing them to directly challenging the state’s traditional monopoly over international narrative creation. At the same time, remote

sensing is fundamentally altering how such institutions go about the process of documentation and evaluation. Taking a phenomenological, qualitative approach in order to understand what is happening inside the black box of rights based practice, this dissertation engages directly with the organizations and individuals who analyze, produce, and drive the use of remote sensing in the international human rights community. It explores the development and practice of RS use as applied to emerging human security threats, and examines the resulting ethical and policy concerns at the organizational level, as well as in the larger international context. Ultimately, it explores the tremendous impact remote sensing technology is having on the world of human rights advocacy, and serves to ground the view from nowhere by placing it within the context of its usage by the people and the organizations on the front lines of human rights advocacy in the 21st century.

The dissertation of James Robin Walker is approved.

John A. Agnew

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Adam D. Moore, Committee Chair

University of California, Los Angeles

2021

DEDICATION

This work is dedicated to the epistemic community of human rights activists pushing for greater accountability through the application of technology. You wrestle every day with the mangle of practice, and the world is a better place for it. Thank you.

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LIST OF ACRONYMS

AI	Amnesty International
AI/ML	Artificial Intelligence/Machine Learning
ANT	Actor Network Theory
AOI	Area of interest
CNN	Convolved Neural Network
DG	Digital Globe
EO	Earth Observation
ESA	European Space Agency
GEOINT	Geo-spatial Intelligence
HHI	Harvard Humanitarian Initiative
HRW	Human Rights Watch
ICC	International Criminal Court
ICJ	International Court of Justice
ICT	Information and Communication Technology
IGO	Inter-governmental Organization
IHR	International Human Rights
INGO	International Non-Governmental Organization
IPT	International Practice Theory
LEO	Low Earth Orbit
NDVI	Normalized Difference Vegetation Index
NGA	National Geo-spatial Intelligence Agency
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
PHR	Physicians for Human Rights
R2P	The “responsibility to protect” doctrine
RGB	Red/Green/Blue or “true color approximation” imagery
RS	Remote Sensing
SAR	Synthetic Aperture Radar
SP	Signal Program at HHI
SSP	Satellite Sentinel Program at HHI
STS	Science and Technology Studies
UN	United Nations
UNOSAT	United Nations Operational Satellite Applications Program
UNITAR	United Nations Institute for Training and Research
UNSC	United Nations Security Council
USGIF	United States Geo-spatial Intelligence Foundation
VHR	Very High Resolution (<2m imagery data)
VR	Virtual Reality
WFP	World Food Program

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OT Ford, Ago Mantegna, Scott Stevenson and Marcus Thomas provided mentorship as I found my graduate footing, Clare Beer, Sara Hughes, and Dian Tri Irawaty provided me with friendship, and taught me how to be a good TA, and Yoh Kawano and Albert Kochaphum from the IDRE Technology Sandbox made me feel part of something larger. I could not have completed this process without any of them. Most importantly, Heather Agnew was my co-conspirator, and a lifeline when I needed to ground myself. I will always be in her debt.

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Thank you.

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Certificate in Humanitarian Remote Sensing	Harvard Humanitarian Initiative, 2018
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A.A., Social & Behavioral Sciences	Pasadena City College, 2011
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Walker, J. R., 2018. The rise of GEOINT: Technology, intelligence and human rights. In *Visual Imagery and Human Rights Practice* (pp. 67-88). Palgrave Macmillan, Cham.

Fleming, S., Sedano, E., Carlin, M., Tracy, R. and Walker, J., 2018. The ethics of volunteered geographic information for GEOINT use. In *The State and Future of GEOINT 2018* (pp. 27 – 30). Hendon, Virginia: The United States Geospatial Intelligence Foundation.

Moore, A. and Walker, J., 2016. Tracing the US military's presence in Africa. *Geopolitics*, 21(3), pp.686-716.

PRESENTATIONS

“Practice Theory and the Evolution of Remote Sensing Use by International Human Rights Organizations.” Organizer and Chair, Remote Sensing and Human Rights panel at the American Association of Geographers Annual Conference, Seattle, 2021.

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“Survivors and the State of Exception.” Co-organizer, Geographies of the Wasteland panel at the American Association of Geographers Annual Conference, Boston, 2017.

- “Visions of Accountability: Technology and the Archimedean Point.” Invited TEDx presentation at the Sense of Place conference, UCLA, 2017.
- “GEOINT and Humanitarian Violence.” Locating Humanitarian Violence: Persistence, Circulation, and Emergence panel at the American Association of Geographers Annual Conference, San Francisco, 2016.
- “The Rise of GEOINT: Technology, Intelligence, and Human Rights.” Invited conference presentation at Honing the Visual: Evolving Practices in Human Rights Work conference, Annenberg School of Communications, University of Pennsylvania, 2016.
- “Up Close and Impersonal: AFRICOM and the Militarization of U.S. Foreign Policy in Africa.” Militarism and Humanitarianism panel at the American Association of Geographers Annual Conference, Chicago, 2015.
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- Human Rights Watch*: Research and remote sensing analysis for projects in East and Central Africa, for burn, smoke plume, and thermal anomaly detection, 2014.
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Chapter 1

What is the “view from nowhere?”

1.1 Introduction:

In the 21st century, Remote Sensing (RS) technologies – both drones and satellites - have become a key factor in documenting crimes against humanity and human rights abuses. With an increasing sense of urgency, state, intergovernmental (IGO), and International Non-Governmental Organizations (INGOs) regularly employ visceral imagery of war crimes, horror, and devastation in order to mobilize a response from the international community. In particular, INGOs focused on human rights advocacy such as Amnesty International (AI) and Human Rights Watch (HRW) have seized on RS imagery as a way of forcing the world to confront the issue of accountability, predicated in many ways on a changing geopolitical understanding of sovereignty as focused on the security of the people, rather than the security of the state. At the same time, the International Criminal Court (ICC) now looks to RS imagery as evidence of potential war crimes and other gross violations of human rights, and the U.N. has begun to use RS evidence in deliberations over emerging crisis situations across the globe. This places RS at the center of current debates over nontraditional, emerging, and human security based challenges to the international order. Paradoxically, the power of RS technology to impact our understanding of the “situation on the ground” is based on the ability of technology to document horror from a distance: in essence, by utilizing a voice that it enabled by a lack of geographic proximity. This is especially true in regards to systemic abuses committed by state actors within their own sovereign territory. Therefore, non-state use of RS data to affect perceptions of crisis

situations demands that we pay attention to the geopolitical impact of the panoptic “view from nowhere” enabled by RS imagery.

The purpose of this dissertation is to examine how RS technology empowers international human rights (IHR) actors in their efforts to shape crisis response mechanisms. In the Security Studies, Geography, and IR literatures, such mechanisms are considered almost entirely within the confines of the international state system. However, RS documentation is now produced through trans-national collaborations between INGO actors, private corporations, activists, lawyers, and academics. Consequently, the development of these technological tools has increased the ability of INGOs to challenge the authority and accountability of the state. Yet we still know relatively little about the effects of RS technologies on the agency and practices of such actors. Therefore, in this dissertation I examine the ways in which RS fundamentally alters the practice of IHR advocacy, serving to redefine the capacity of both IGO and INGO actors as geopolitical forces. I focus on how RS transforms non-state capacity in the international arena, through direct engagement with the technology and the organizations that seek to leverage it in the field. I also explore the ways in which the technology fundamentally alters the conception and practice of rights based advocacy at multiple levels within organizations, as well as in the context of expositional narrative creation.

The ubiquitous spread of RS technology, and its enthusiastic adoption by the IHR community presents both opportunities and challenges. For critical academics, one of the most significant issue revolves around the contested nature of technologically derived “knowledge.” In particular, the ways in which digital evidence can become fetishized as being self evidently objective – a word that provokes well deserved scrutiny from academics. As such, Thomas Nagel’s “view from nowhere” stems from what he described as “A singular problem: how to

combine the perspective of a particular person inside the world with an objective view of that same world, the person and his viewpoint included” (1986, p.3). The tensions Nagel identified between the objective and the subjective do not, however, necessarily render them mutually exclusive. Empirical, concrete truth can (and does) exist, even when mediated through the lens of subjective analysis and comprehension. As Nagel puts it:

I shall offer a defense and also a critique of objectivity. Both are necessary in the present intellectual climate, for objectivity is both underrated and overrated, sometimes by the same persons. It is underrated by those who don't regard it as a method of understanding the world as it is in itself. It is overrated by those who believe it can provide a complete view of the world on its own, replacing the subjective views from which it has developed. These errors are connected: they both stem from an insufficiently robust sense of reality and of its independence of any particular form of human understanding. (1986, p.5)

Authors such as Dodge and Perkins have identified RS as a prime candidate for analysis along these lines, and have gone so far as to organize special collections of papers on the topic of high resolution RS imagery in order to question the “seductively objective view of the world that they claim to represent – what one might term, following Thomas Nagel, the ‘view from nowhere’. The key question is how this view is manufactured and mediated.” (2009, p 498).

Likewise, when Haraway identified the techno-fetishistic “god trick” implicit in the militaristic, top-down impact of the satellite view from nowhere as part of an “ideology of direct, devouring, generative, and unrestricting vision, whose technological meditations are simultaneously celebrated and presented as utterly transparent” (1988, p. 582), she did so in order to point out the need for a thorough review and rejection of its supposed objectivity, and to push for a feminist understanding of *situated knowledge*. While I do not presume to offer such a comprehensive vision in this dissertation, I gratefully pick up the threads laid down to explore the supposedly unmediated view enabled by RS, and the significance of situating the technology

in the context of its use. This is the essence of my work – a desire to ground the view from nowhere, through an exploration of its application by groups, by individuals, and by the network of human and material actants in general - both in terms of the relevance of suitably situated knowledge for advocacy from the ground up, and in terms of perception and utility within INGO investigative practices. As the world becomes a more digitally driven place, I believe that understanding the implications of new technologies in this context is a significant and useful project – from an academic standpoint, and from a practical desire to better understand and utilize such innovations in the future. As a result, this work is intended to ground our understanding of the RS view from nowhere by examining the evolution and specific geographic and temporal conditions of its use in 21st century human rights advocacy.

1.2 Research questions:

The rapid adoption of RS technology over the past decade has significantly enhanced the capacity of non-state actors to **gather data for use in** institutions such as the UN and the ICC. Imagery is also frequently deployed in an effort to affect public perceptions of crisis situations, and exert moral and political influence. For example, the heavily RS dependent report on the Syrian crisis released by HRW in 2014 (Solvang 2014) was timed for maximum effect during the ongoing “Geneva II” peace conference, and garnered extensive press coverage as a result. The paradoxical use of remote sensing in the context of “witnessing” - whereby the act of observation is conducted from as remote a position as physically possible, while representing immediacy and geographic proximity - is central to the effectiveness of the process. Academic and political critiques suggest this is a fundamental flaw in the development of the modern human rights ideal. Critical scholars posit that such technologically derived “evidence” is

increasingly used to displace (or even replace) first hand human experience (Hasian 2016, Herscher 2010, 2014), effectively removing the human from human rights monitoring and advocacy.

The idea that technology might fundamentally alter the very essence of rights based advocacy is a provocative one. However, in reviewing the critical literature on the subject, it quickly becomes apparent that, despite the excellent scholarship available from a purely theoretical perspective, relatively little work has been done at the ground level, with human rights practitioners. Therefore, in order to understand the effects of such an innovative technology on rights based practice, this dissertation engages with a series of interlocking questions that sit at the heart of RS adoption:

- How does RS technology help INGOs affect the perception of (and response to) crisis situations?
- How does the application of a new technology like RS shape its own context and usage in the human rights world?
- What impact does RS have on the rhetoric of human rights activism and documentation?
- How are the working practices of investigation affected by RS, at multiple levels within IHR organizations?

In essence, how is RS understood and utilized by INGO actors in their efforts to affect crisis responses, on the ground, within the organization, and in the international arena?

1.3 Academic prompts:

In attempting to understand the ways in which RS technology is shifting the practice of IHR actors like AI and HRW, this work engages with two distinct yet complimentary prompts

emerging from Science and Technology Studies (STS) scholars focused on the international realm. The first comes from Martin Müller (2012) who challenges critical theorists to look “inside the black box of the organization” in order to understand how groups like INGOs shape modern geopolitics. Drawing on Actor Network Theory (ANT), Müller prompts researchers to explore the socio-material practices that shape organizations as they evolve into new geopolitical actors. The second comes from the works of Kristin Sandvik (2014a, 2014b) and the Peace Research Institute Oslo, who calls on academics to take up the discussion over the effect and utility of new technologies on the humanitarian world, instead of allowing it to rest exclusively on the shoulders of practitioners and “bloggers.” These calls to action overlap, engaging with two distinct threads that emerge at the intersection between the geographic, political science, sociology, and security studies literatures – first, the changing nature of the relationship between state and non-state actors, and secondly, the development of remote sensing as a technology of power. The conjunction of INGOs and RS highlights a significant gap present in both streams; namely how RS technology affects the practice, capacity, and influence available to INGOs as they respond to crises, and challenge notions of state sovereignty.

Engaging with the first stream, I start from Müller’s (2012) admonition that researchers need to look past the “unitary actor” myth, and focus their attention inside the socio-material practices of organizations. In constructivist IR theory, authors such as Adler (2013), Barnett (2011), Finnemore (1993, 1996), Sikkink (2011), and Keck & Sikkink (2014) have explored the ways in which international organizations - and in particular non-state or INGO groups – play a role in the formation and development of international normative ideals. Müller builds upon this rich literature, but goes a step further in highlighting the socio-material elements that constitute these organizations. From an STS perspective, he advocates for a more comprehensive and

inclusive understanding of the role that technology plays in the creation of new geopolitical forces. The adoption and use of RS technology in the human rights field provides an ideal opportunity to engage with this literature, by examining the influence a new technology like RS has, both within the “black-box” of the organization itself, as well as in a larger context.

In tandem with STS, the emerging field of International Practice Theory (IPT) in IR also looks to incorporate the material aspect of organizational influence. Bueger & Gadinger (2015) frame practice theory as “focus[ed] on how groups perform their practical activities in world politics to renew and reproduce social orders.” While the core of practice theory literature (Adler 2013, Adler & Pouliot 2011a, 2011b, Bueger & Gadinger 2014, 2015, Pouliot 2007, 2008) has previously examined INGO actors, it has yet to engage directly with RS as a new technical element in the arsenal of everyday practice. This dissertation provides an important addition to this literature, highlighting how the evolving process of data gathering and image use has impacted the socio-material practice and influence of INGOs over time.

This kind of “interior” exploration of INGO practice is also intended to engage with the larger topic of state/non-state relations, and the continued evolution of the INGO world over the past three decades. The normative shift from “state security” to “human security” on the international plane has been explored by authors as diverse as Barnett (2011), Fassin (2011), Hardt & Negri (2001), Sahoun & Evans (2002), and Weiss (2012). Humanitarian and human rights oriented scholar practitioners like de Waal (1995) and Slim (2001, 2003) suggest INGOs played an important role in this process, while critical theorists like Wieszman (2003, 2011) Perugini & Gordan (2015), and Reid-Henry (2015) suggest that the INGO world has ostensibly been assimilated into the hegemonic structure of the international order. What has been missing from many of these positions is an understanding of the role that technology played – and

continues to play – in affecting organizations as they engage with the “new humanitarianism” of the 21st century.

In turning to the second stream of *RS as a technology of power*, I begin with the call to arms from Sandvik, and her demand that critical theorists take up the discussion over the impact of technology on the humanitarian and rights based arenas (Sandvik et al 2014). She highlights the constantly evolving world of humanitarian tech, and draws attention to the resulting impacts on “humanitarian space.” As with Müller, Sandvik works from an STS perspective, focused on understanding what technology does *to* the humanitarian world, rather than what it does *for* the humanitarian world. In that context, the ‘material turn’ has produced a variety of useful insights into what are described as the ordering effects of technology. Winner (2010) argues that tech cannot be seen simply as a tool. He draws a distinction between what he defines as *technical arrangements as forms of order* (where political intent is embedded within technological development), and *inherently political technologies* that engender social shifts towards either democratic or authoritarian outcomes. Theorists like Latour (2005) and Law (1992) use ANT as a framework to show how new forms of order are generated through heterogeneous networks. As such, technology plays an integral part in the development of *transitional objects* (such as visual images) that excel in facilitating order through space. Pickering (1995) takes this a step further, drawing attention to what he describes as the “mangle of practice” where material and social agency is “emergently transformed and delineated through the dialectic of resistance and accommodation.” Overwhelmingly, this kind of STS/material work has been focused on the scientific and engineering communities, and the production of “scientific knowledge.” I instead turn this analytical framework towards the INGO realm, and the production of what might be termed “human rights knowledge,” through what could be considered as the ideal transitional

object – the annotated RS image used for advocacy purposes.

The literature surrounding the concept of “vertical geopolitics” also approaches the issue of RS as technology of power. Drawing upon the work of scholars such as Weizman (2003, 2010, 2011), Graham (2004), and Gregory (2011) vertical geopolitics examines the implications that stem from a top down perspective. Pushing back against the supposed objectivity of digital RS data collection, or what Haraway (1988) describes as the false objectivity of the “God trick”, scholars have questioned the pejorative effect that top down representations have on what is represented, and therefore seen, and what is left out, and therefore obscured. In this context, the use of RS to gather data on evolving crises brings up serious epistemological concerns over the process of “Geospatial Intelligence” gathering (or GEOINT). As both a process and a “tradecraft,” GEOINT is designed to create “actionable intelligence” through the manipulation of geographic data, RS imagery, and “human and signals intelligence” (Bacastow and Bellafiore 2009) – or what might be known in the human rights world as ground reports, eye-witness testimony, and social media data. The vertical geopolitics embedded within GEOINT creates a powerful tool designed to influence how situations are perceived, and to constitute an appropriate response. While there have been critiques of RS imagery (Dodge & Perkins 2009, Adey et al 2011) and the notion of top-down “Cartesian perspectivalism” (Tuathail 1996), this form of critical geographic analysis has not been applied to the practice of RS imagery by INGO actors. This dissertation is intended to address this serious gap, both in the academic literature and within the “gray literature” that constitutes the policy and practice exchange between INGO actors at work in the field.

Perhaps the most pressing debate for the academic community engaged in RS analysis for IHR actors revolves around the concept of “witnessing.” This panoptic notion, whereby

surveillance is posited as a means to discipline and control the actions of those observed (Foucault 1979) is a constant theme that appears throughout the literature surrounding RS use. Scholars like Givoni (2011), Levinger (2009), and Kennedy (2009) explore the evolution of witnessing as an ethical and organizational development in the human rights world, from a (generally) positive position of empathy and solidarity, while critics such as Parks (2001, 2009), Herscher (2010), and Hasian (2016) argue that it can serve to reify Western tropes of chaos, “uncivilized” behavior, and dependency in the developing world. In particular, Herscher and Hasian both argue that RS technology facilitates a “distancing” of the observer from the object under observation. They suggest that RS promotes a particular vision of what constitutes evidence of a war crime, centered upon the damage visibly inflicted upon material structures – or what Wiezman calls “forensic architecture” (2010). This serves to remove the human from human rights abuses, and threatens to replace the subjective human experience with “objectively” captured digital data. As such, a primary emphasis of this work is upon addressing this gap in our understanding of the affect of RS technology on the practice of human rights advocacy.

As both Müller and Sandvik argue, there is a clear need for thorough, rigorous analytical research into the internal practices of INGO actors, and the effect that technology is having on their ability to exert pressure in the international arena. Throughout the process of this research I have been fortunate enough to gain access to, and work alongside, many of the individuals who make up the nascent epistemic community of RS oriented IHR actors. As a result, this work is designed to contribute to the evolving debates in the academic literature, while at the same time engaging in a practical and policy oriented conversation with the men and women who embody the IHR community of activists pushing the boundaries of RS use in the field.

1.4 Methodology:

In order to understand how actors use RS to influence debates over non-traditional, emerging, and human rights based threats to security and stability, it is necessary to understand *how* imagery is obtain, *why* it is used, and *when* it is deployed. In keeping with the academic prompts listed above, this dissertation is based upon a qualitative phenomenological approach, emphasizing the significance of first hand interaction with the IHR community. As a result, three significant nodes within the nascent epistemic community of RS oriented IHR actors were chosen as sites that would best afford a broad overview of the adoption of RS as a new technological actant into the human rights network. Several months of participant observation were undertaken in the remote sensing offices of the Signal Program at the Harvard Humanitarian Initiative (HHI), Amnesty International (AI) in Washington DC, and Human Rights Watch (HRW) in Geneva, Switzerland. These locations stand out as pivotal to the adoption of use of RS for advocacy purposes by non-state actors, and represent key translation points for the wider IHR community as a whole. While embedded within the RS analysis offices of these groups, a number of emerging crisis situations were documented from initial requests through to final publication, along with extensive field notes on the operation and integration of RS technology into the everyday practice of IHR advocacy.

At the same time, semi-structured interviews were conducted with a cross-section of senior analysts, researchers, and investigators from the IGO and INGO arenas, as well as representatives from the private corporate satellite industry, the US Dept. of State, and the media. Designed to allow for the free exploration of the individual's own experience with RS as an emerging technology, these interviews were subsequently transcribed and reviewed using

Qualitative Data Analysis software (ATLAS.ti), incorporating a semi-deductive form of qualitative coding to draw out dominant themes and responses from interviewees that cut across departmental and organizational structures.

1.5 Chapter outlines:

This introduction lays out the significance and academic rationale for the overall project of trying to understand the role of RS in modern human rights advocacy. In doing so, it sets up the narrative threads that run through the remaining chapters, emphasizing the importance of RS for crisis narrative creation, and the growing influence that technology has for groups such as AI and HRW as they seek to leverage human rights knowledge in the international arena. The following, substantive chapters engage in key elements of this ideal, intended to isolate and explore important theoretical and practical elements of RS adoption. While they are written as stand-alone papers, they also function as a complimentary and integral whole – moving from the academic and theoretical, to the practical and expositional.

Chapter 2 begins with a review of the critical academic literature that explores RS adoption by IHR actors. It engages with prominent critiques that emerge from the literature, and highlights several areas of concern in their interpretation of the vision of RS that permeates throughout the modern IHR community. Specifically, it identifies three important threads in the critical discourse, and three significant reasons that academics have misjudged the role of RS in IHR investigations.

Chapter 3 explores the everyday practice of RS as a functional tool for organizations such as HRW and AI - framing the technology as considerably more significant than simply publishing images of horror and destruction. Stemming from an STS/ Practice Theory

perspective, this chapter explores the series of distinct yet complementary roles that RS technology supports for major human rights groups. It argues that the development and adoption of RS has had a significant impact on the internal practice of human rights advocacy, and has begun to appreciably change the temporal capacity of IHR actors - both in terms of analytical processes, and in regards to the use of actionable data in the field, in crisis narrative perception, and in leveraging human rights knowledge for the purposes of influencing elite and public opinion at the domestic and international level.

Building upon the work already laid out, Chapter 4 argues that the on-going crisis in Rakhine State, Myanmar has become a watershed moment for the IHR community as it begins to fully embrace the use of RS across multiple levels of Inter and Non-Governmental investigative processes. The application of an inherently geographic process in the co-construction of rights-based narratives provides an opportunity to ground the “view from nowhere” in the context of its use in a compelling and highly significant case study; in terms of how RS is understood by the IHR actors involved, the ways in which it is being utilized on the ground, and the geo-political impact it is having at multiple scales.

Chapter 5 functions in the dual role of summarizing the overall significance of this dissertation, and positing where this research ultimately leads in terms of new questions raised, new technologies identified, and new impacts threatened. With the advent of powerful technological actants such as Artificial Intelligence (AI) and Machine Learning (ML) rapidly altering the world of RS analysis, significant ethical, legal, and practical questions are beginning to surface over the potential impact of automated IHR monitoring and analysis. This chapter explores those implications, with an eye towards identifying what questions need to be asked, and by whom. As Sandvik suggests, the burden of such exploration should not be left to bloggers

and practitioners alone, but must be shared by academics as well, as the role of critique is fundamental to enabling the kind of dialog that such developments demand.

This dissertation is my own attempt to contribute directly to the ongoing conversation about RS adoption, written in the hope that the functionality of this technology is not only better understood, but also more widely utilized for the purposes of documentation, advocacy, and the protection of the most vulnerable among us. In that sense, my research is designed to engage in what Pierre Bourdieu described as “a scholarship with commitment toward building collective structures capable of giving birth to new social movements and new sites for international action.”¹ If, as Haraway posited, the position of the camera is so obscured that the resulting images can be seen as providing a view from nowhere, then this dissertation is an attempt to tether that supposedly omniscient all seeing eye back to earth, and to the terrestrially grounded actors (both human and material) that seek to harness its power.

¹ *Quoted in* Scheper-Hughes, Nancy. 2004. Parts Unknown Undercover Ethnography of the Organs-trafficking Underworld. *Ethnography* 5, no. 1, 2004.

1.6 References:

- Adey, P., M. Whitehead, and A. J. Williams. 2011. Introduction: Air-target distance, reach and the politics of verticality. *Theory, Culture & Society*, 28(7-8), 173-187.
- Adler, E., 2013. Constructivism in international relations: sources, contributions, and debates. *Handbook of international relations*, 2, pp.112-144.
- Adler, E. and V. Pouliot. 2011a. International practices. *International Theory* 3 (1), pp.1–36.
- Adler, E. and V. Pouliot. Eds. 2011b. *International Practices*. Cambridge: Cambridge University Press.
- Bacastow, T., and D. Bellafiore. 2009. Redefining Geospatial Intelligence. *American Intelligence Journal*. National Military Intelligence Association: 38-40.
- Barnett, M.N. 2011. *Empire of humanity: A history of humanitarianism*. Ithaca, NY: Cornell University Press.
- Bueger, C. and F. Gadinger. 2014. *International practice theory. New perspectives*. Basingstoke: Palgrave Macmillan.
- Bueger, C. and F. Gadinger. 2015. The play of international practice: Minimalism, pragmatism and critical theory. *International Studies Quarterly*, doi: 10.1111/isqu.12202.
- De Waal, A. 1995. Humanitarianism unbound: The context of the call for military intervention in Africa. *Trécaire Development Review*: (29-45 excerpts).
- Dodge, M. and C. Perkins. 2009. The ‘view from nowhere’? Spatial politics and cultural significance of high-resolution satellite imagery. *Geoforum*, 40(4), 497-501.
- Fassin, D. 2011. *Humanitarian reason: a moral history of the present*. Univ of California Press.
- Foucault, M. 1979. *Discipline and punish: The birth of the prison*, transl. A. Sheridan. New York: Vintage Books.
- Finnemore, M. 1993. International organizations as teachers of norms: the United Nations Educational, Scientific, and Cultural Organization and science policy. *International Organization*, 47(04), pp.565-597.
- Finnemore, M. 1996. Constructing norms of humanitarian intervention. *The culture of national security: Norms and identity in world politics*, 153.
- Givoni, M. 2011. Beyond the humanitarian/political divide: Witnessing and the making of humanitarian ethics. *Journal of Human Rights* 10 (1): 55–75.

- Graham, S. 2004. Vertical geopolitics: Baghdad and after. *Antipode* 36 (1): 12-23.
- Gregory, D. 2011. From a view to a kill: Drones and late modern war. *Theory, Culture & Society*, 28(7-8), pp.188-215.
- Hardt, M. and A. Negri. 2001. *Empire*. Harvard University Press.
- Haraway, D. 1988. Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist studies*, 14(3), pp.575-599.
- Hasian Jr, M. 2016. *Forensic rhetoric and satellite surveillance: The visualization of war crimes and human rights violations*. Lexington Books.
- Herscher, A. 2010. From target to witness: Architecture, satellite surveillance, human rights. *Architecture and Violence. Actar: Barcelona, 127148*.
- Herscher, A. 2014. Surveillant witnessing: Satellite imagery and the visual politics of human rights. *Public Culture*, 26(3 74), pp.469-500.
- Keck, M.E. and K. Sikkink. 2014. *Activists beyond borders: Advocacy networks in international politics*. Cornell University Press.
- Kennedy, D. 2009. Selling the distant other: Humanitarianism and imagery—Ethical dilemmas of humanitarian action. *The Journal of Humanitarian Assistance*, 28, pp.1-25.
- Latour, B. 2005. *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.
- Law, J. 1992. Notes on the theory of actor-network: Ordering, strategy, and heterogeneity." *Systems Practice* 5:379-93.
- Levinger, M. 2009. Geographical information systems technology as a tool for genocide prevention: The case of Darfur. *Space and Polity*, 13(1), 69-76.
- Müller, M. 2012. Opening the black box of the organization: Socio-material practices of geopolitical ordering. *Political Geography*, 31(6), pp.379-388.
- Nagel, T. 1986. *The view from nowhere*. New York. Oxford University Press.
- Parks, L. 2001. Satellite views of Srebrenica: Tele-visibility and the politics of witnessing. *Social Identities* 7, no. 4, 2001.
- Parks, L. 2009. Digging into Google Earth: An analysis of “crisis in darfur”. *Geoforum*, 40(4), 535-545.
- Perugini, N. and N. Gordon. 2015. *The human right to dominate*. Oxford University Press.

- Pickering, A. 1995. *The Mangle of Practice: Time, Agency and Science*. Chicago: University of Chicago Press.
- Pouliot, V. 2007. "Subjectivism": Toward a Constructivist Methodology. *International Studies Quarterly* 51 (2): 359–384.
- Pouliot, V. 2008. The Logic of Practicality: A Theory of Practice of Security Communities. *International Organization* 62 (2): 257–288.
- Reid-Henry, S.M. 2015. Genealogies of liberal violence: human rights, state violence, and the police. *Environment and Planning D: Society and Space*, 33(4), pp.626-641.
- Sandvik, K. B., M. G. Jumbert, J. Karlsrud, and M. Kaufmann. 2014. Humanitarian technology: A critical research agenda. *International Review of the Red Cross* 1-24.
- Sandvik, K.B., and K. Lohne. 2014. The rise of the humanitarian drone: giving content to an emerging concept. *Millennium-Journal of International Studies* 43.1: 145-164.
- Sahnoun, M. and G. Evans. 2002. The responsibility to protect. *Foreign Affairs*, 81(6), pp.99-110.
- Sikkink, K. 2011. *The Justice Cascade: How Human Rights Prosecutions Are Changing World Politics* (The Norton Series in World Politics). WW Norton & Company.
- Slim, H. 2001. Violence and humanitarianism: Moral paradox and the protection of civilians. *Security Dialogue*, 32(3), pp.325-339.
- Slim, H. 2003. Humanitarianism with borders? NGOs, belligerent military forces and humanitarian action. *The Journal of Humanitarian Assistance*, 311.
- Solvang, O. 2014. Razed to the ground: Syria's unlawful neighborhood demolitions in 2012 - 2013. *Human Rights Watch*.
- Tuathail, G. Ó. 1996. *Critical geopolitics: The politics of writing global space* (Vol. 6). U of Minnesota Press.
- Weiss, T.G. 2011. *Humanitarian intervention*. John Wiley & Sons.
- Weizman, E. 2003. *The Politics of Verticality: The West Bank as an Architectural Construction. KW, Territories: Islands, Camps and Other States of Utopia, Berlin: Institute of Contemporary Art*.
- Weizman, E. 2010. Forensic Architecture: Only the criminal can solve the crime. *Radical Philosophy*.

Weizman, E. 2011. *The least of all possible evils: Humanitarian violence from Arendt to Gaza*. London, UK: Hurst.

Winner, L. 2010. *The whale and the reactor: A search for limits in an age of high technology*. University of Chicago Press.

Chapter 2:

Remote Sensing for International Human Rights Advocacy:

Critiques and Responses

2.1 Introduction:

Satellite images of horror and destruction are becoming ubiquitous in human rights narratives. Within the academic literature concerning the development of “Remote Sensing” (RS) for human rights advocacy, a number of significant critiques have emerged that aim to problematize the adoption of this technology and question the utility and applicability of remotely gathered evidence in international human rights (IHR) dialogs. Focusing specifically on the increasing use of satellite (and to a lesser extent UAV/Drone) imagery² by major international advocacy groups such as Human Rights Watch (HRW) and Amnesty International (AI), this chapter will argue that for all their academic and theoretical rigor, the small but influential collection of papers that make up the critical literature on this emerging field fall short in their understanding of the practical vision of RS that permeates throughout the modern IGO/INGO human rights arena. I identify three primary reasons for this apparent disconnect over the role of RS in IHR advocacy: 1) the oft stated a-priori notion of RS as a source of *prima facie* evidence, 2) an over-reliance on published imagery and analysis, at the expense of direct, first

² Remote Sensing Imagery incorporates the use of bands of electromagnetic energy - captured by digital sensors aboard orbital satellites and/or UAV/Drones – which are combined to make what are known as “true color approximation” (Red, Green, Blue or RGB) images. Other band combinations are increasingly being used in IHR reports (including NDVI, Thermal, and Short Wave Radar) but so far have received limited attention in the literature. Imagery data also comes in different “ground resolutions” depending on the sensor (for example, 3m, 1m, 0.31m) where the numerical value denotes the size of a single pixel of data. The smaller the number, the higher the resolution, and the greater the detail available in the image.

hand interaction with the nexus of IGO/INGO analysts, and 3) a limited exploration of the ways in which the internal practice of RS use continues to evolve.

Inspired by Martin Müller 's (2012) call for critical scholars to look inside the “black box” of international organizations’ structures and practices, this paper draws upon a qualitative phenomenological approach, and is based upon more than 40 hours of in-person semi-structured interviews with analysts, researchers, and other members of the IHR/RS community³. It also incorporates direct participant observation at three significant nodes within the IHR remote sensing network – Human Rights Watch in Geneva, Amnesty International in Washington D.C., and the Signals Program at the Harvard Humanitarian Initiative (HHI) in Cambridge, MA. These three locations were chosen as they embody the nexus of adoption and development of RS practices for the purposes of mass atrocity and war crimes observation and documentation by INGO actors. The processes of analysis and the development of IHR advocacy products and imagery were observed, from initial request through to final publication. Interviews were transcribed and reviewed using Qualitative Data Analysis software (ATLAS.ti), incorporating a semi-deductive form of qualitative coding in order to identify dominant themes and responses. For privacy purposes, and in-keeping with best practices for engaging with a niche community of experts, all direct quotations have been anonymized.

The goal of this chapter is to engage with the most prominent academic critiques of IHR/RS, by juxtaposing how the technology is understood and utilized on the front lines of IHR investigations. The role of academic critique is multi-faceted, and can serve to strengthen both theory and practice through the generation of important questions. However, if the discrepancy

³ In order to take a latitudinal approach to understanding the adoption and use of RS across a broad swath of the community, a total of twenty seven interviews were conducted, drawing from a variety of IHR oriented organizations that incorporate RS as an integral part of their working practices, including NGOs (HRW, AI, HHI, ICRC, IFRC, AAAS) and IGOs (UNHCR, UNOSAT, OHCHR, WFP), as well as the private corporate RS industry, academia, and the U.S. Dept. of State.

between academic analysis and everyday practices is too large, the question of how much value is generated becomes key. It is in this context that I feel the current critiques fall short in their engagement with this emerging field of interest. Therefore, this chapter is designed to help engage the IHR community in a forthright and honest assessment of the role that technology plays in our understanding of human rights in the 21st century.

I begin by outlining the three most significant critical threads that emerge from the small but influential literature on RS use in an IHR context, followed by a brief case study intended to demonstrate the everyday practice of RS integration within a modern INGO setting. Finally, I provide responses to the critiques, and outline the three primary factors that contribute to the apparent disconnect between how IHR/RS is understood from a theoretical perspective, versus how it is understood at the “ground level” of INGO human rights investigations.

2.2 Critiques of the use of RS in IHR advocacy:

The evolution in the use of RS by IHR actors has been documented by a variety of scholars from multiple disciplinary perspectives. Most historical and methodological reviews identify a number of key events in the timeline of RS adoption, including the release of declassified US Military images over Srebrenica, Bosnia in 1995, the use of private corporate satellite imagery over North Korea in 2003, the development of RS as a monitoring tool over Sudan in 2009, the application of RS to document catastrophic destruction in the Syrian conflict starting in 2013, and most recently the reliance on RS imagery over Northern Rakhine State, Myanmar. As this investigative tool has slowly begun to diffuse throughout the IHR community, a corresponding movement has evolved within the academic literature to explore, extoll, and critique its adoption.

While many of the frontline practitioners have enthusiastically embraced RS, the academic community has been more reserved. Some papers have expressed cautious approval (Wang et al 2013, Livingston 2015, Witmer 2015, Raman & Livingston 2018), others have identified clear critiques of the process (Witjes & Olbrich 2017, Olbrich 2019, Rothe & Shim 2018), and a small number have stated unequivocal reservations about the epistemological and practical effects of RS use by IHR actors (Parks 2005, 2009, Herscher 2010, 2014, Hasian 2016). In reviewing the limited number of important, but well recognized critiques in the literature, a number of interlocking questions emerge. How does RS affect the IHR community? What impact does RS have on the process of investigation? Where does the resulting panoptic gaze focus, and on behalf of whom?

2.3 Hegemony, *Surveillant Witnessing* and Shutter Control:

Perhaps the most prominent critique - and the one which tends to inform the development of many of the other critical approaches - is articulated by Andrew Herscher (2010, 2014), who coined the term *surveillant witnessing*. He defines this as:

[A] hybrid visual practice that has emerged at the intersection of satellite surveillance and human rights witnessing. . . . I see satellite imaging not only as “used” by human rights advocates to pursue their ends but also as a refraction of these ends, separating intention from effect, policy from practice, and advocacy’s present from its past. In this process, surveillance states and human rights NGOs have come to collaborate on the production of geopolitical knowledge and the accumulation of geopolitical power through the deployment of satellite imagery (2014, p. 473).

Here, in essence, is a key issue raised by many of the most critical authors; namely the impact on the relationship between the IHR community, RS, and the hegemonic projection of authority.⁴

⁴ It should be noted that in almost every instance the hegemon in question is taken to mean the US, and by extension the Western dominated Westphalian system of geopolitical governance.

The adoption of a military/intelligence technology into the ostensibly civil society realm of counter-hegemonic rights based advocacy has prompted concerns over fundamental shifts in IHR practice, emphasizing the notion that RS (and in effect all of its products) are tainted as “fruits of the poisoned tree.” Connected to the concept of securitization (Watson 2011, Rothe 2017), the use of RS by non-state actors such as INGOs can be seen as integral to the co-opting of such groups (Rothe & Shim 2018). This ties RS in to a prevalent critique of the IHR movement in general; namely the inculcation of a Statist orientation into what was previously considered to be an archetypal subaltern counter-hegemonic force (Weizman 2011, Hopgood 2013, Perugini & Gordon 2015). In a more direct sense, authors such as Parks (2001, 2005, 2009), Perkins & Dodge (2009), Kurgan (2013), and Sandvik (Sandvik et al 2014, Sandvik & Lohne, 2014) emphasize the state oriented epistemological power dynamics that are embedded within the assemblage of the RS technology itself. In essence, the technology of RS is frequently defined by its origins, epistemological provenance, and on-going geopolitical import as a tool of statecraft.

For example, the relationship between the private corporate satellite industry and the U.S. Government (amongst others) is a significant factor, not just in the development and expansion of the commercial RS world, but also in the context of concerns over issues such as “shutter control” - whereby the US Government can impose restrictions on the declassification and distribution of RS imagery - and reliance on a technology that can be seen as filtered through dominant national security concerns or the projection of Western policy ideals. The example of shutter control is frequently posited as a compromising aspect of the relationship between the RS industry and the IHR community, highlighting the un-equal power dynamic between human rights ideals, and the authority and influence of US policy directives, as are the legal restrictions concerning the resolution of imagery available over Israel and the occupied Territories (Parks

2005, Herscher 2014, Hasian 2016, Rothe & Shim 2018). To be clear, such critiques are important, and deserve to be studied thoroughly, but the question of how INGO human rights actors understand the nature of this relationship remains curiously underexplored. As such, many of the most influential critiques of IHR/RS appear to be drawn with limited input from the primary parties concerned; namely the INGO analysts and investigators themselves.

2.4 Truth, Visibility, and *Forensic Architecture*:

This leads to questions concerning the effect RS has on the investigative process. Many critiques suggest that the adoption of remote, digital investigation tools serves to alter the nature of the relationship between the IHR community, and the people on the ground that they advocate on behalf of. For example, both Herscher (2010, 2014) and Hasian (2016) posit a fundamental shift, whereby the application of RS technology heralds the removal of the human from human rights monitoring, reducing (or even eliminating) the role of the eye-witness. Construed as a means of replacing unreliable human testimony, RS is described in techno-fetishistic terms, where the digital data provides questionable “objective” truth from afar. This conception of RS as an evidentiary tool is described in almost dystopian language by Hasian:

Trying to talk about how images “speak for themselves” or how satellite images can be the “primary” or exclusive means of evidencing rhetorical situations, is itself an ideological stance that comes dangerously close to anti-human or “post” –human advocacy. Do future decision makers and their publics really want a situation where human witnesses become superfluous, where the prosopopeia from satellites is treated as unassailable evidence in contentious and volatile situations? (Hasian 2016, p.218).

If Hasian’s projections of RS as a burgeoning form of unassailable, primary evidence is correct, then it is incumbent upon critical scholars to ask the parties involved how they understand such a fundamental shift in IHR practice.

A related critique explores the effect of relying on what can be observed from space. Drawing upon the work of Eyal Weizman (2010, 2011) the concept of *forensic architecture* has become a significant element in critical reviews of RS for human rights. While Weizman's work emphasizes a multi-disciplinary approach to counter-hegemonic applications of technology against state perpetrators of violence, within the critiques of IHR/RS in the literature, the key element taken up has been a focus on the visible architectural effects of that violence. In other words, very specific forms of violence are visible from space, such as arson attacks, building destruction, and impact craters. When used in IHR reports, the prevalence of RS imagery documenting such instances is taken as evidence of an ever increasing reliance on visible architectural impact. This is problematic, in that it projects destruction of the landscape as an essential element of IHR investigations, further minimizing (or even excluding) the non-visible experiences of the people who suffer violations. Taken to the extreme, it suggests that RS no longer simply offers documentation of potential violations, but instead is becoming a means of defining what constitutes a violation in the first place.

There are some very real concerns that stem from the adoption and use of RS technology by IHR actors. The process of data capture and analysis that is so reliant upon a top-down perspective raises legitimate fears over issues of framing, perspective, and the vertical geopolitics associated with the supposedly unmediated "Gods eye view" of the satellite imagery (Harraway 1988, Cosgrove 2001, Adey et al 2011, Warf 2012, Walker 2018). In particular, Dodge & Perkins (2009) identifies a key objectivity issue with digitally captured data, whereby "[I]mages appear to be transparent and offer unmediated viewing; the position of the camera seems to be invisible...Satellite images appear to see more of the world, or at least the viewers

perceive they are seeing much more” (p.2). If, as many of the critics suggest, IHR analysts were to rely solely upon such imagery, it would be a significant and troubling development.

2.5 Selectivity, and the perception of the *Western Gaze*:

The third category of critiques to emerge revolves around *where* the potentially panoptic gaze of RS is pointed. RS adoption, this line of argument suggests, is another example of the *Western gaze*. Associated with Herscher’s *surveillant witnessing*, this framing of IHR/RS use is seen as a way of reifying notions of global Southern dependency, through the selective application of imagery that highlights chaos, lawlessness, and orientalist states of exception. Witjes & Olbrich (2017), for example, highlight the selective, “fragile transparency” of RS advocacy by Western oriented IHR actors. Similarly, Rothe and Shim (2018) highlight the absence of images over contentious sites such as refugee camps in Europe. Consequently, IHR groups can be viewed as complicit in reinforcing the hegemonic projections of orientalism against the global south, while selectively hiding similar incidents of human suffering and potential IHR violations in other regions.

Much of this selective obfuscation is understood to be reliant on the application of a Western technology, by Western trained elites, and in furtherance of Western (Universalist) notions of good governance. Linked to the evolving development of “humanitarian interventionism” and the Responsibility to Protect doctrine (R2P), RS as a war dividend technology can be seen as enhancing the ability of a complicit IHR community in framing crises in terms that call for outside (often military) involvement in instances involving states that are non-compliant with acceptable, Westphalian visions of social order (Herscher 2014, Gordon & Donini 2015, Hasian 2016, Rothe & Shim 2018). In this sense, co-opted IHR actors become

tools of hegemonic domination through the selectively applied use of technology, combined with the rhetoric of the modern human rights ideal.

Conversely, the withholding of RS imagery is construed as the clearest example of the compromising of IHR advocacy groups by the powerful foreign policy agenda of states such as the US. The most direct and explicit case of this is the deliberate exclusion or downgrading of RS imagery above the state of Israel, and in particular over the occupied Palestinian territories and the Golan Heights (Hasian 2016). Prohibited by US law from releasing Very High Resolution (VHR) imagery, companies such as Digital Globe and Airbus Industries are required to downgrade the resolution of their publicly available data, thereby obscuring the panoptic capacity of RS from documenting certain potential forms of violation detection. Here is the classic example of the extension of hegemonic authority to block the “all seeing eye” – a form of built-in shutter control that is designed to thwart the analysis of any forensic architectural damage taking place.

Taken together, these three critiques are foundational to the ways in which RS is represented in the critically oriented literature surrounding RS adoption in IHR dialogs.

2.6 Case Study: Northern Sinai, Egypt, 2004 & 2018.

In order to clarify the ways in which RS is understood on the front lines of human rights advocacy today it is helpful to provide a short example of current usage. In his important paper on *surveillant witnessing*, Herscher (2014) draws on a number of high profile examples, including Israel, Egypt, and Gaza in the Northern Sinai region. In contrast to the surveillant regime of hegemonic co-option he posits as dominating the modern IHR ideal, Herscher provides this Gaza example in order to demonstrate what he feels was the previous, supplemental vision of RS, wherein “Satellite imagery [] functioned as a complement to testimony; it provided visual

information about the places that testimonies described and was itself informed by those testimonies. Both image and testimony were accorded equal truth-value” (2014, p. 481-2). In this instance, Herscher is drawing upon an a report titled *Razing Rafah; Mass home demolitions in the Gaza Strip* (HRW 2004) which uses a number of RS images, in conjunction with eye-witness testimony, local and international press reports, NGOs and civil society entities, and (where possible) verification and site visits undertaken by HRW researchers. To be clear, in this instance, Herscher is explicitly describing a vision of IHR engagement with RS in which, “satellite imagery was not endowed with a different truth-value than other forms of evidence; rather, it was evidence that augmented those other forms, showing things that were otherwise described in the words of witnesses or that were unavailable to the gaze of witnesses.” (2014, p.840).

During April and May of 2018, I conducted participant observation in the remote sensing office of Human Rights Watch in Geneva, Switzerland. At that time the RS analyst for HRW was engaged in a variety of investigations, including an intensive analysis of the Egyptian/Gazan border in the Northern Sinai region. The resulting report, entitled *Egypt: Army Intensifies Sinai Home Demolitions* (HRW 2018b), also incorporates RS imagery, in conjunction with eye-witness testimony, local and international reportage, civil society activists, and statements by government officials. It does not, however, draw on any site visits, as the Egyptian authorities have created an extensive exclusion zone around the region, and have arrested and prosecuted journalists and others attempting to report on the ongoing land clearances (see CPJ 2013, Egypt Today 2018). The juxtaposition of these two reports allows for an exploration of the evolution in the everyday practice of RS use, and a demonstration of the concept of *value-add* provided by RS. It also highlights some of the more significant flaws in the critical literature.

A review of the 2018 online report highlights a number of prominent elements for critical analysis, including the use of two sets of interactive “before and after” satellite shots, several ground level photos taken from social media, a GIS map documenting waves of destruction, and a short, embedded YouTube video showing RS images of the destruction over multiple locations. The report also quotes extensively from eye-witness and family testimonies concerning the actions taken by the Egyptian Military, along with candid statements by government officials and work done by Egyptian civil society groups. Despite the use of modern presentation techniques, there is little to suggest that the application of RS technology as an investigative tool has fundamentally changed since the 2004 report, which stands at odds with Herscher’s claim that RS is increasingly dominant in the investigative and narrative process. However, the prominence of modern RS representations highlights the importance of capturing the practice of analysis that went into their creation.

RS analysis for the report was undertaken at the behest of HRWs Egyptian specialists, who were prompted by their contacts on the ground in Egypt, and via the exiled community who had fled to other regions.⁵ Once it was apparent that the authorities were engaged in some form of mass expulsion, a request was sent to HRWs primary analyst in Geneva to see if RS imagery could confirm what was happening, and more importantly, the extent. Contrary to the critiques of RS in IHR reporting, the investigation was not driven by the imagery, nor was it used in order to attempt to define whether there were violations of human rights in progress. Rather, it was used because of the perceived *value-add* it would provide in confirming the reports being gathered from the field, and for the ability to understand and quantify the scale of the violations.

⁵ As with many investigations, much of the groundwork for attempting to monitor this closed region is driven by Egyptian civil society groups, who provide localized knowledge, and allow HRW investigators to approach the job of data collection and reporting with an appropriately contextualized understanding.

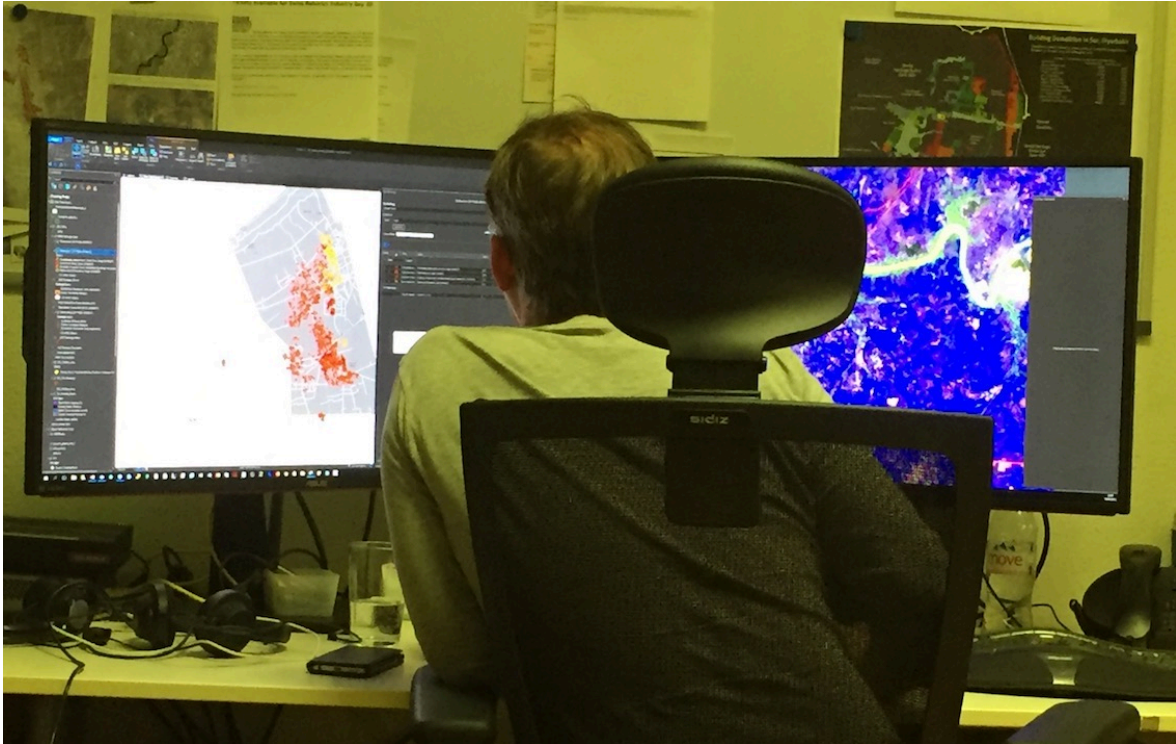


Figure 2.1: An analyst reviewing and annotating RS and GIS data for Northern Sinai.

The applicability of RS as an investigative tool in this area had previously been established, both in the 2004 report, and in another, extensive 70 page report on the same region (HRW 2015b). This area is well suited to RS use as the local geography allows for frequently clear skies, and is often captured by a variety of private corporate RS providers due to the strategic and commercial importance of the Egyptian coastline. However, the regulatory prohibition on Very High Resolution (VHR) imagery over Israel and the occupied territories does add an important qualification. RS providers are concerned with not transgressing US law, and as a result they apply a broad buffer around the prohibited regions in order to ensure compliance. The extent of this buffer can differ significantly depending on the provider, but in all cases adds a level of frustration for analysts who are looking exclusively at the Egyptian side of the border.

With that being said, the process of analysis in this instance relied upon imagery captured by several major private corporate RS providers, including Digital Globe, Airbus Industries, and Planet. Significantly, the use of Planet imagery demonstrates a number of important factors relevant to the changing nature of RS practice. Unlike the severely limited RS imagery available for the 2004 report that Herscher explores, in 2018 HRW was able to call upon High Resolution (3 meter) Planet imagery with a temporal repeat time of only 24 hours. In other words, after having identified a specific temporal window of interest, the analyst was able to look at multiple images taken a day apart, along with the Very High Resolution (less than 2 meter, and down to 31cms) imagery available from other sources. In addition, the means of accessing this imagery has undergone a transformation in the past few years. Unlike previous reports, the analyst was able to quickly review all the available imagery in a variety of online back-catalog portals, and then select and download chosen data sets for the designated area of interest (AOI) in a matter of minutes – in 2004, an image would have taken hours to download (if available) and was more likely to be delivered as a series of multiple DVD disks that would then have to be reprocessed on a local machine for analysis.

Once engaged in looking over the AOI, the HRW analyst began a laborious process of charting changes in the landscape, identifying the destruction of buildings through artillery fire, arson, and the use of high explosives (each of which leave distinctive patterns that are visible within the imagery). Several other indicators were noted, including tank and heavy vehicle tracks, the leveling of orchards and agricultural fields, and other forms of landscape manipulation carried out in a systematic manner. This process of documentation was complicated by both the spatial and temporal distribution of the waves of destruction carried out,

as well as differing levels and availability of RS coverage across areas of the AOI.⁶ Over the course of 10 days, approximately 60 hours of intense examination went into this analysis.

It is significant to note that the workflow required an iterative process of interaction and interpretation between the Geneva office and HRWs primary Egyptian researcher. Several calls a day were observed between colleagues, facilitating a recursive flow of information between what was being observed in the RS imagery, and the contextual information available from the field. Where anomalous issues were identified - such as a series of temporary structures built in fields next door to recently destroyed farms and villages - conversations would revolve around potential reasons and explanations. Where necessary, further information would then be sought from eye-witnesses or local civil society actors in order to better understand what was being observed. This in turn would be fed back into the analysis. At no point was the imagery assumed to be “speaking for itself” beyond the irrefutable demonstration of changes in the landscape. In many instances the catalyst of change (high explosives, vs. arson for example) could be identified with a high degree of certainty, although it is clear that the experience and attention to detail of the analyst is key in such determinations.⁷ In other words, the process of RS documentation was not conducted in isolation, but was an integral part of the overall process of investigation being undertaken by the HRW Egyptian specialist, who was able to call upon the technical capacity and experience of a trained analyst as one of a variety of sources used to

⁶ Several of the most useful VHR images used did not cover the entire region under analysis. As a result, it was not always possible to chart a precise overview of the AOI on a specific date from one image, but required the synthesizing of several images with different resolutions and/or date signatures.

⁷ For example, the HRW analyst would take great pains to identify, to the best of their abilities, how a building had been destroyed. In some circumstances, structures might look like they had been reduced to their foundations, but several key indicators suggested that the roofing materials had simply been removed. While this does not tell you who removed them, it does indicate that some areas had sufficient warning to try and salvage valuable materials. This is a good example of a question that would pass from RS analyst to field specialist for further clarification.

augment their research into the violations underway.

Observation of this iterative process is important for understanding the significance of different images contained in the final online report. The current methodology used by many critical scholars (see Rothe & Shim 2018 for an excellent example) would note the use of several RS images - and in particular the “before and after” slider app employed – as a textbook instance of RS use by an IHR actor. However, what is made clear through participant observation is that the selection of those few RS images was a secondary function of the overall process of employing the technology. In point of fact, the large GIS map (Figure 2.2) represents the overwhelming majority of the RS work engaged in the report, and is the most significant end product of those 60 hours of iterative and recursive analysis.

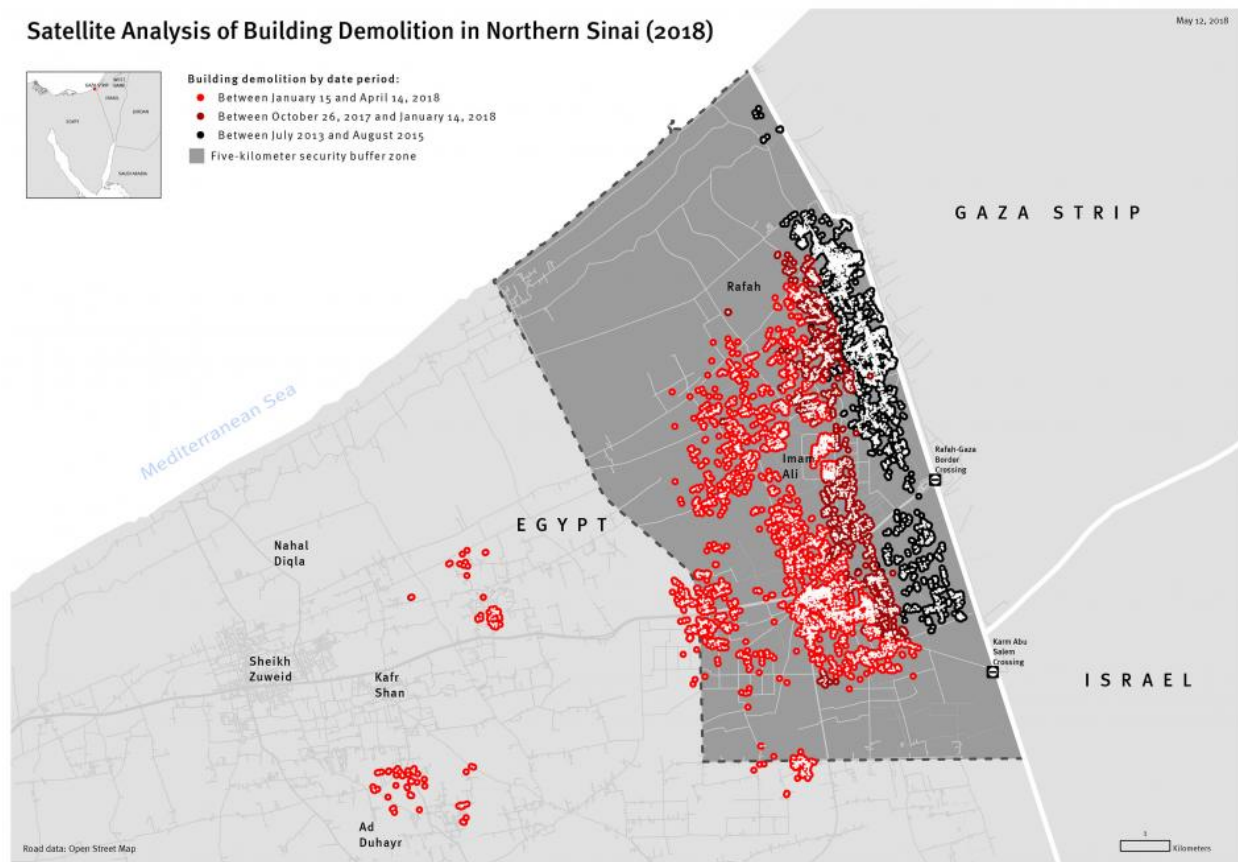


Figure 2.2: GIS map of Northern Sinai - Human Rights Watch.

The map documents three distinct waves of demolition, and was subject to deliberations between the RS analyst, the Egyptian specialist, and HRW's publications office over the level of cartographic and documentary detail it would employ.⁸ By contrast, the RS images used were selected by the analyst as illustrative examples of the overall levels of destruction, and were accepted as such. For the purposes of the report, it is the map (and not the images) that represents the primary visualization of the violations under investigation. Significantly, even with its prominence as a visual aid, the map is still a supplemental heuristic device created to help tie together the witness, civil society, and governmental threads that constitute the basis of the investigation. The technology has not removed the human element, but has instead augmented it by showing things that were otherwise described in the words of witnesses.

Maps like this can be found in many IHR reports, including those that do not explicitly employ RS imagery. As a result, it is easy to overlook the level of RS analysis used in any particular investigation. During multiple interviews, INGO analysts and researchers stated that as little as 10% of the work done with RS imagery was ever directly published. Frequently it was employed as an investigative tool, for the purposes of background and geographic knowledge, as a means of understanding agriculture and infrastructure development, and as supplemental information in the development of initial investigations into emerging crises. Increasingly, RS imagery is employed by research teams directly, through the use of portals such as Google Earth. In such cases, the images themselves may not be current or have limited immediate application, but they can be essential in coordinating disparate teams who are scrambling to get up to speed on a volatile and confused emergency situation. In essence, the role of RS has evolved, as the

⁸ During conversations with multiple RS analyst engaged in this work, the issue of detail vs. impact was frequently brought up as a point of internal contestation. Almost invariably, analysts push for the inclusion of greater geospatial and situational detail, while those individuals charged with impact and publicity look for simpler, more accessible graphics.

technology of access and familiarity with its application has diffused into the wider IHR community. Ultimately, if you are only looking at how many images a report has employed, you are missing the majority of (and perhaps the most significant) applications of the technology.

2.7 Fundamental concerns with the critical literature:

Several important, but questionable, assumptions inform the most prominent critiques of RS usage by IHR practitioners. Specifically, 1) the idea that human rights advocates have accepted RS as a means of establishing verifiable “truth”, 2) that they have come to rely upon such “evidence” to the detriment of other, more traditional investigative tools, and 3) that as a result there is an increasing push to utilize RS as the primary driving factor in human rights investigations. Such a-priori notions comprise the basis of much of the criticism of RS adoption, which tends to focus almost exclusively on visual and textual analyses of published imagery and reports, along with media representations of findings that emphasize the revelatory impact of RS imagery.

The issue with this approach is that it suffers extensively from the “Iceberg effect”, whereby the 10% of RS imagery that is published “above the waterline” draws attention, while the 90% of work done with RS and other geospatial technologies goes unseen, and therefore unremarked. As such, an over-reliance on the limited use of RS as an end product fundamentally misconstrues the utility and investigative function of RS technology for modern human rights investigations. As a result, many of the major critiques draw theoretical conclusions concerning the functional use and epistemological implications of RS without sufficient exposure to how the technology is conceptualized on the frontlines of human rights work.⁹ In essence, it is

⁹ I am grateful to the anonymous reviewer who pointed out the privileged access and positionality necessary for scholars to engage in this kind of qualitative research. I have been fortunate in my access to

problematic that the critiques of RS have largely been drawn in the absence of a latitudinal approach to understanding the role of RS analysis in the IHR community.¹⁰ More importantly, there has been relatively little to no work done on observing the practice of RS analysis in the IHR context. As a result, this has left a significant gap in the academic understanding of the role of RS for human rights in the 21st century.

Lastly, and as a function of the two previously identified flaws, critiques of the use of RS by IHR practitioners are hindered by a limited exploration of the rapidly evolving nature of the technology at play – both in a practical, everyday sense of the changing processes of data capture, analysis, and integration into research, and in terms of what human rights INGOs think that RS provides for them. In other words, scholars are not keeping up with the (r)evolutions in technological capacities or in the relationships between analyst, researchers, and the tools available to them.¹¹

An example of this is shown in how the major critiques emphasize the work done by the Satellite Sentinel Project (SSP) from 2010 to 2012 (Herscher 2014, Hasian 2016, Rothe & Shim 2018). The involvement of George Clooney in “celebrity advocacy” concerning the conflicts in the Sudans has created an impression in the literature that makes the work of SSP appear far more dominant in IHR/RS circles than is actually the case. Specifically, Clooney and SSP were

the disparate (yet connected) network of RS analysts engaged in RS practice in the IHR community, and am grateful for the opportunities provided to me to undertake such work.

¹⁰ An important exception to this is the work done by P. Olbrich and N. Witjes: See Olbrich & Witjes 2015, Witjes & Olbrich 2017, and Olbrich 2019.

¹¹ Once again, I am grateful to the anonymous reviewer who highlighted the significant “time-slippage” between research and publication, as well as the dated nature of some of the major papers in question. Undoubtedly, the technology surrounding access to (and manipulation of) RS imagery is advancing quickly, both for IHR analysts and academics alike. It is important to acknowledge the increasing ease with which scholars are able to engage with this material, along with the opportunities and obligations that therefor ensue.

an outlier in terms of human rights oriented RS analysis at that time - both in terms of how analysis was conducted, how it was publicized, and why RS technology was considered imperative. However, their work is still held up as a cautionary benchmark of mainstream IHR/RS adoption and practice in the literature today. This is not only highly problematic, but indicative of the limited interactions between scholars and practitioners, as for many of the senior RS analysts currently engaged in the broader human rights arena, Clooney's "anti-genocide paparazzi" (Benjamin 2010) were an aberration rather than an inspiration.¹² Pointedly, the processes by which SSP gathered, analyzed, and used imagery in 2010 bears little relation to the ways that its successor, the Signals Program at the Harvard Humanitarian Initiative (HHI) performs their current analyses. Drawing upon the lessons learned from their earlier work, the Signals Program now stands at the forefront of ethical and methodological concerns over the use of geospatial technologies by the humanitarian and rights based communities (see Raymond et al 2014, Sandvik & Raymond 2017, Campo et al 2018), and yet receives significantly less interest from the critical academic community. Apparently, the draw of celebrity casts a long shadow, even for academics.

While *surveillant witnessing* has become a touchstone concept in the academic analysis of RS for IHR, its relevance to the everyday working practice of IHR analysis is debatable. For example, while the literature often raises the notion of shutter control, it is unable to cite any examples of its application, either in an IHR context or any other. In fact, shutter control has never been officially invoked by the US. One of the key reasons for this involves strong protections stemming from the 1st, 4th, and 5th amendments to the U.S. Constitution, that were vigorously asserted by members of the RS and journalistic communities from the outset of the

¹² In interviews, a significant number of the analysts and researchers expressed strong reservations about the nature of the work done by SSP, to the point that one senior analyst suggested if they ever actually met George Clooney they would gladly "punch him in the face" (Interview, Washington DC, 2018).

new commercial satellite era.¹³ The one related instance of “checkbook” shutter control – whereby the U.S. Government purchased exclusive rights to all imagery taken over Afghanistan for a three month period at the beginning of the war in 2001 – is sometimes cited, but in reality this was a strictly temporary exclusion based upon security concerns over an evolving battlefield. Moreover, this didn’t stop major INGOs from reporting on the war, or investigating US military actions in the field (for example HRW 2001, 2002). In other words, while the concept of shutter control is legitimately concerning, the reality of its application over the past two decades holds little relevance in practice. Furthermore, groups such as HRW and AI appear to have no reservations concerning the use of RS to documenting potential violations undertaken or backed by the US Military (for example HRW 2007 2015a, AI 2019). This casts further doubts upon the extent to which the cozy relationship between the state and private corporate satellite providers affects the ability of IHR actors to conduct their investigations, however troubling that relationship may be.¹⁴

Ultimately, the concept of *surveillant witnessing* is a valuable contribution to the critical academic debate, but its applicability in terms of the everyday practice of IHR research and analysis is limited. Clearly, INGOs such as HRW and AI do not consider themselves to be co-opted organs of hegemonic projection, and in particular the analysts and researchers who engage with RS technology do not appear to have any qualms about using that capacity wherever it might prove useful. In essence, from the front line perspective, the reason *why* RS functions for

¹³ The assertion of constitutional protections was bought up by several interviewees with extensive knowledge of the period, and is still included in official presentations on the topic of shutter control - see Heidner 2014.

¹⁴ For a thorough overview of the relationship between the U.S. Government and the private corporate RS industry, see Crampton, et al, 2014.

IHR investigators is that it has immense practical application when used to assist in disputing state orchestrated narratives, rather than for its capacity to re-enforce the geopolitical status-quo.

Turning to the notion of *forensic architecture* and critiques of objective revelations of truth, the assumption that digitally gathered data is both driving investigations and defining what constitutes violations is not supported by the observation of everyday practice. Specifically there is little evidence from the field to support the idea that RS is supplanting traditional investigative methods, suggesting a lack of familiarity from critical authors with how RS is understood as a functional tool in the researcher's arsenal.¹⁵ Furthermore, in dozens of interviews with both analysts and researchers, RS imagery was not imbued with the capacity to "speak for itself," but was instead understood as contextually specific, and dependent upon both geographic and situational knowledge, as is the case with all other forms of IHR evidence - hence the reliance for groups such as AI and HRW on having regional specialists who conduct extensive in-person interviews (wherever possible) with affected populations. As one chief investigator put it, "[satellite imagery] helps me to ask better questions when I'm interviewing people" (Interview, Washington, 2018).

Some investigations do rely more heavily than others on the use of RS imagery; most notably the work done in the documentation of penal camps in the North Korean peninsula (Hawk 2003, AI 2011). In such instances, RS is understood as a primary investigative tool due to the extreme lack of access, and exclusion of IHR investigators from the region. However, even in the case of the North Korean gulags, investigators still attempt to provide verification of their findings through eye-witness testimony gathered from defectors and other relevant parties. In

¹⁵ For example, while RS analysts employed at INGOs are often housed within the international secretariat (or equivalent thereof), for the most part they function as clearly supplemental adjuncts to investigations initiated, orchestrated, and managed by regional specialists.

other words, even in the most extreme instances of access denial, RS is not understood as providing incontrovertible proof, but is instead used as one of several triangulatory methods.

Indeed, the word most frequently used to describe the application of RS evidence for researchers and investigators was as a form of “triangulation”, used to confirm (and in some instances to exclude) information gathered through other, more traditional means. As one head of investigations described it, “people already have a base of information and then, the satellite imagery is the final part of the triangulation” (Interview, Geneva, 2018). In other words, it has become a supplementary weapon in the arsenal of investigation, rather than a “silver bullet.”

One factor that shapes this understanding of RS stems from the backgrounds and training that analysts bring with them into the IHR arena. Many of the critiques focus on the embedding of a statist, military/intelligence mindset (Parks 2005, Hasian 2016, Herscher 2010, Walker 2018). This is exemplified by the adoption of Geospatial Intelligence (GEOINT) tradecraft by non-traditional actors, promoted by organizations such as the U.S Geospatial Intelligence Foundation. However, with the exception of two individuals, every analyst interviewed for this project came from an environmental science background, suggesting that the while issues of scientific objectivity might still be a relevant concern, the focus on calibrating RS data with verifiable “ground truth” wherever possible fundamentally shapes the scientifically oriented “best practices” mindset of those individuals engaged in the actual process of analysis.¹⁶

In a similar vein, there is little evidence to suggest that RS imagery is used to offer dispositive proof of human rights violations. Quite the contrary, in interviews with analysts, program officers, and researchers for both IGO and INGO advocacy groups, RS imagery was

¹⁶ It should be noted that GEOINT training has begun to diffuse into the IHR community. However, while most analysts could remember engaging in a few hours of GEOINT oriented training on vehicle recognition at some point in the past decade, only one had obtained certification as a GEOINT analyst. The vast majority of individuals credited “on the job” experience as the most important factor in developing and refining their image interpretation and investigative skill sets.

always described in terms of secondary verification of primary source material – i.e. witness statements taken by field researchers, and triangulated with other relevant sources such as official statements and responses to investigators questions, local, national, and international reportage, liaison with civil society actors, and on the ground site investigations. Often, RS imagery was used to narrow down both geographic and temporal information (such as the precise date and location of an arson attack) the details of which can be confused or non-specific when taken from a traumatized witness being interviewed in a refugee camp hundreds of miles from their homes, and months after an event occurred. In some circumstances, RS imagery may cast doubt upon certain details – for example, where analysis shows that a village has not been burnt to the ground. In such instances, this prompted researchers to attempt other means of triangulation, in order to ensure that the reports they were gathering had no obviously disprovable errors. To be clear, this does not mean that the absence of RS evidence disproves the allegations of violation, but rather, they cast doubt upon the specific details given. The response from investigators to this kind of input is not unique to RS imagery, but is standard practice with any form of additional information gathered. What is unique about RS, even in terms of other Information & Communication Technologies (ICT) tools (such as social media), is the quantifiable nature of the evidentiary chain. The provenance of an RS image is readily available making it an extremely useful triangulation point, but still just one of many used for the purposes of verification and documentation.

Another area where RS imagery provides a unique benefit to researchers is in its ability to chart the scale of a crisis or potential violation. Meticulous interviewing of eye-witnesses can indicate the severity of what is happening on the ground, but not always the extent of the events taking place. Satellite data used to provide a comprehensive overview of a region is helpful in

understanding the scale (and in some cases the nature) of the violations taking place. For example, the use of RS to provide substantial evidence of the systematic nature of the violence being orchestrated against the Rohingya minority in Northern Rakhine State, Myanmar, enhancing the UNs proposition that the violations were state orchestrated, countering the official narrative of the crisis, and providing clear indications that the authorities were engaged in a “text book example of ethnic cleansing” (Al Hussein 2017, p.1).

The ability of RS to enhance the veracity and scale of an event emphasizes the *value-add* for IHR researchers. The costs of imagery purchase and the limited number of RS analysts mean that the allocation of RS resources are an important institutional consideration. Contrary to the assumption that RS is replacing traditional methods, it is a highly limited resource, and not suitable for use in every investigation. Therefore, requests for RS input are subject to a review of the potential *value-add* available from RS imagery, in terms of outlay, regional constraints (such as weather conditions and cloud cover), and in relation to pending priorities from other projects. As a result, many investigations have limited or no RS imagery. In the examples of both HRW and AI, the determination of *value-add* is taken on a case by case basis and is done in consultation between the field office and the analysis office.

On the surface, *value-add* fits well with the critique of the *Western gaze* in that it demonstrates the prioritization of resources for groups such as AI and HRW. However, the inference that RS imagery is used in situations that serve to project an Orientalist vision of Southern chaos is not only factually incorrect, but also ignores the practicality of IHR investigations. For example, countless images are published by HRW and AI of the appalling conditions within Greek refugee camps from investigators who are on the ground and have direct

access to the communities affected. In such instances, IHR groups must decide what additional *value-add* RS imagery would provide.

On the other hand, the case of Israel and US legal restriction over resolution do provide a clear example of US interference in the application of *value-add* for IHR groups, as the legal prohibition does block some forms of VHR dependent analysis, and up until now has undoubtedly been a hindrance in the unfettered application of the technology for IHR purposes. However, two developments are beginning to make this issue less exclusionary than the literature suggests. The first is the constant (and almost exponential) rise in the number of state and private RS providers. This expansion of the private RS sector over the past two decades has been well documented (Kieth 2016, Dasgupta 2018, Denis et al 2017). Countries such as India and Turkey now have significant VHR capacity, and while their geo-political relationships with the US might well overshadow the open release of <2 meter resolution images, the fact remains that the US legal prohibition (known as the Kyl-Bingaman Amendment to Public Law 104-201, Section 1064) is not defined as a specific resolution, but where such imagery is “no more detailed or precise than satellite imagery that is available from commercial sources.” In other words, as both the capacity and the market for VHR imagery increases, the application of this legal constraint will become subject to ever greater challenges, while simultaneously being made redundant through the availability of alternate (non US controlled) sources. It should also be noted that lobbyists from the journalism and nascent private RS community pushed for this language in the amendment, as it was apparent from the beginning that the market would inevitably develop beyond the constraints envisioned in 1997.¹⁷

¹⁷ This position was asserted during interviews with specialists from within the private corporate RS community, and in archival documents reviewed from the Radio-Television News Directors Association.

While it is undeniable that the law hinders the use of RS data over the region, it in no way inhibits other forms of investigation by groups such as AI or HRW. Both groups continue to exert significant efforts in documenting the destruction of buildings and other potential violations (see HRW 2010, HRW 2012, AI 2009, AI 2014) demonstrating that the supposed compliance between the human rights community and US hegemony is less influential than suggested. Most significantly, IHR advocacy INGOs also still appear perfectly able to access the back-catalogs of the military/industrial complex in other instances. If there is a fear that the US might withdraw or exclude certain actors from accessing RS feeds because of unfavorable reporting it is not apparent, nor does it factor in to the application of the technology wherever the law allows. The threat of exclusion hanging over the heads of IHR groups that is implied in the literature (Hassian 2016, Rothe & Shim 2018) is not evident when looking at the larger picture, nor did it manifest as a concern in any of the interviews conducted with INGO analysts and researchers.

To emphasize this point, it is worth reviewing several instances in which both HRW and AI have employed RS as part of investigations focused on potential violations carried out by Western perpetrators. The simplest examples involve multiple reports focused on the actions of the US Military outside of the United States. INGO groups have released several reports on actions within Somalia (AI 2019), Pakistan (AI 2013), Iraq (HRW 2007) and Syria (AI 2018). More directly, HRW has also relied upon RS imagery to publicize the plight of migrant children separated from their parents at the US border (HRW 2018a). In a clear demonstration of the concept of *value-add*, HRW released RS imagery of a child detention camp in Tornillo, Texas the same week that two sitting US Senators were denied access to tour the site (KRQE 2018). When even the elected representatives of a Western democracy can't get in to see what is

happening, a satellite can still provide data, and HRW appears to have no qualms about using RS as a tool to hold the US government to account for its (ongoing) actions.¹⁸

In regards to the dominance of the *Western gaze*, the second and perhaps the most important development in the RS field has been the expansion of the private space sector in non-Western countries. RS technology is no longer the exclusive purview of the West, and many of the significant innovations taking place are being driven by the new international players, such as China and India. Significantly, within the IHR community there has been a corresponding push to expand RS and GIS access and capacity. Organizations such as the ICRC and AI expend a great deal of effort in promoting and training regional and local field officers in the use of RS products, in-keeping with their institutional emphasis on localized, contextual knowledge. In addition, groups including UNITAR and AAAS provide several courses a year aimed at developing RS and GIS capacity for different local and regional civil society and IGO organizations. In other words, there is a concentrated effort underway within the IHR community to expand access beyond the “Western elites” that previously dominated the field, and this is tapping into an increasingly qualified talent pool drawn from a developing non-Western RS and GIS focused community.

Finally, interviewees expressed strong concerns over the lack of historical context in reference to the *Western gaze* in RS. A variety of senior analysts began their own environmental or humanitarian training in RS use by looking at major catastrophic events in the global North. In particular, the selective technological response to Hurricane Katrina in 2005 was identified as one of the primary inspirations for the development of the observation and monitoring system

¹⁸ In a similar vein, journalist have readily taken up RS imagery as a means of investigating multiple forms of crises and contestations in Western states. For examples of RS being used in this context in France, Germany, Russia, Ukraine, the US, and a variety of other Western states, see www.EarthriseMedia.Org/projects/

employed by the Satellite Sentinel Project over the Sudans in 2010 (Interview, Cambridge 2018). In addition, the development of the International Charter on Space and Major Disasters signed in 2000, was described as resulting from intense lobbying on the part of the global South, in order to ensure that the technological capacity that was readily available to the developed world was also made available to everyone. As one analyst remarked, “rather than being imposed, remote sensing had to be dragged southwards” (Interview, Geneva 2018). In other words, the argument that RS is a means to reify visions of chaos and disaster and thereby projects hegemonic Orientalism excludes its history of use in the global North, and undercuts the agency of the global South. It suggests that RS is passively received rather than understood as a significant tool that can and should be utilized for multiple purposes by actors across the globe.

2.8 Conclusions:

There is no doubt that RS has become a significant tool for the IHR community. While individual analysts and organizations differ in the minutia of everyday RS practice, there are consistent themes that underlie the visions of RS utility for the IHR community in general. In conjunction with both traditional and non-traditional sources - such as social media and other ICTs – RS is understood as capable of providing confirmation of events on the ground, often in places where limited other resources are available. It also has a unique ability over and above other sources, in that while interpretations may be subject to debate, the provenance and veracity of the data used is rarely, if ever, disputed making it an ideal triangulation point for researchers. While it is not applicable for documenting many instances of abuse or violation - particularly where geography, weather or other circumstances prevent clear imagery from being taken - it is still a useful tool when employed by research teams in efforts to understand and contextualize their work. In essence, it is an important factor in the on-going development of our

understanding of human rights advocacy in the 21st century, and as a result it deserves greater attention and understanding from activists and academics alike.

Critics of RS have raised several prominent concerns associated with the ever-expanding role of satellite imagery for IHR purposes. Indeed, interconnected visions of *surveillant witnessing*, *forensic architecture*, and the *Western gaze* dominate critical explorations of RS adoption by human rights groups. This chapter has identified three important factors that contribute to an apparent disconnect between the theoretical and practical visions that permeate the IHR focused communities. The first is an *a-priori* understanding of the role of RS in IHR investigations that does not accurately represent the frontline experience of its use in the day-to-day operation of major INGO human rights groups. Contrary to its presentation in the literature, RS is not understood by human rights analysts as presenting unmediated “truth”, nor is it seen as capable of “speaking for itself.” Instead, it functions as one of a series of complimentary tools, and is necessarily interpreted in the context of specialized analytical *and* localized knowledge. Second, there is an over reliance on the interpretation of published and archival materials by IHR groups, along with the hyperbolic reports of journalists. As such, many of the most prominent critiques suffer from the iceberg effect, wherein they focus predominantly on the visible use of RS that sits “above the waterline.” In addition to overlooking the vast majority of the everyday, practical applications of the technology by INGO actors, they miss the complex and iterative nature of RS analysis that goes into the production of the graphics and imagery used in those publications. Third, as a result of limited first hand interaction, much of the literature does not account for the constantly evolving capacity and access to RS data that is central to the work of IHR analysts, or the ways in which imagery is shared and understood by multiple actors within organizations. As a result, the recursive nature of the relationship between analyst, researcher,

and imagery has remained almost entirely obscured.

Most importantly, this chapter directly refutes the idea that RS technology is replacing the human element in human rights advocacy for major INGOs, either in terms of how investigations are understood, what they look to document, or whom they seek to protect. Clearly, academic critiques have a significant role to play in expanding our understanding of RS as a technology, particularly in regard to its use in documenting potential war crimes, mass atrocities, and other crimes against humanity. However, there are serious concerns that stem from the application of theory that is perhaps (ironically) too distant from the object of analysis. The fact that a broad cross-section of IHR/RS practitioners fail to recognize (or directly refute) a number of the key critical insights posited by the literature strongly suggests the presence of a significant gap which requires bridging. It is vital that academics and activists alike engage in a rigorous debate informed by theory and by practice. In particular, developments in areas such as artificial intelligence for RS hold out tantalizing visions of the future – or alternatively, dystopian, post-human visions in which algorithms come to define the nature of human rights violations. If we are to fruitfully engage in attempts to comprehend the values and pitfalls of our technologically enhanced skies, I believe it must be done from multiple altitudes. As with all RS oriented work, value is revealed through a combination of sound methodology, good analysis, and a necessary dose of “ground truthing.”

2.9 References:

- Adey, P., M. Whitehead, and A. Williams. 2011. Introduction: air-target: distance, reach and the politics of verticality. *Theory, Culture & Society*, 28(7-8), 173-187.
- Al Hussein, Z.R.A. 2017. Darker and more dangerous: High Commissioner updates the Human Rights Council on human rights issues in 40 countries. *Office of the United Nations High Commissioner for Human Rights*. [Online]. Available: <https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=22041> [9 July 2019]
- Amnesty International. 2009. *Operation Cast Lead: 22 days of death and destruction*. [Online]. Available: <https://www.amnesty.org/en/documents/mde15/015/2009/en/> [9 July 2019]
- Amnesty International. 2011. *Images reveal scale of North Korean political prison camps*. [Online]. Available: <https://www.amnesty.org/en/latest/news/2011/05/images-reveal-scale-north-korean-political-prison-camps/> [9 July 2019]
- Amnesty International. 2013. *Will I be next?: US drone strikes in Pakistan*. [Online]. Available: <https://www.amnestyusa.org/reports/will-i-be-next-us-drone-strikes-in-pakistan/> [9 July 2019]
- Amnesty International. 2014. *Nothing is immune: Israel's destruction of landmark buildings in Gaza*. [Online]. Available: <https://www.amnesty.org/en/documents/mde15/0029/2014/en/> [9 July 2019]
- Amnesty International. 2018. *War of Annihilation: Devastating toll on civilians, Raqqa – Syria*. [Online]. Available: <https://www.amnesty.org/en/documents/mde24/8367/2018/en/> [9 July 2019]
- Amnesty International. 2019. *Somalia: The hidden US war in Somalia; civilian casualties from air strikes in Lower Shabelle*. [Online]. Available: <https://www.amnesty.org/download/Documents/AFR5299522019ENGLISH.PDF> [9 July 2019]
- Benjamin, M. 2010. Clooney's 'Antigenocide Paparazzi': Watching Sudan. *Time Magazine*. [Online]. Available: <http://content.time.com/time/magazine/article/0,9171,2040211,00.html> [9 July 2019]
- Cosgrove, D. 2001. *Apollo's Eye: A Cartographic Genealogy of the Earth in the Western Imagination*. Baltimore, MD: Johns Hopkins University Press.

- Campo, S., C. Howarth, N. Raymond, and D. Scarnecchia. 2018. Signal Code: Ethical Obligations for Humanitarian Information Activities. Signal Program - *Harvard Humanitarian Initiative*, Cambridge. [Online]. Available: <http://hhi.harvard.edu/publications/signal-code-ethical-obligations-humanitarian-information-activities> [9 July 2019]
- Committee to Protect Journalists. 2013. *Egypt's imprisonment of journalists is at an all time high*. [Online]. Available: <https://cpj.org/reports/2015/06/egypt-imprisonment-of-journalists-is-at-an-all-time-high.php> [9 July 2019]
- Crampton, J., S. Roberts, and A. Poorthius. 2014. The new political economy of geographical intelligence. *Annals of the Association of American Geographers*, 104(1), 196-214.
- Dasgupta, A. 2018. Who's buying all that satellite imagery? *Geospatial World*. [Online]. Available: <https://www.geospatialworld.net/article/whos-buying-all-that-satellite-imagery/> [8 July 2019]
- Denis, G, A. Claverie, X. Pasco, J. Darnis, B. de Maupeou, M. Lafaye, and E. Morel, 2017. Towards disruptions in Earth observation? New Earth Observation systems and markets evolution: Possible scenarios and impacts. *Acta Astronautica*, 137, 415-433.
- Dodge, M., and C. Perkins. 2009. The 'view from nowhere'? Spatial politics and cultural significance of high-resolution satellite imagery. *Geoforum*, 40(4), 497-501.
- Egypt Today. 2018. *Military court sentences Iskandarani to 10 years in prison*. [Online]. Available: <http://www.egypttoday.com/Article/1/50656/Military-court-sentences-Iskandarani-to-10-years-in-prison> [8 July 2019]
- Gordon, S., and A. Donini. 2015. Romancing principles and human rights: Are humanitarian principles salvageable? *International Review of the Red Cross* 97 (897-898) 77-109.
- Haraway, D. 1988. Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies*, 14(3), 575-599.
- Hasian Jr, M. 2016. *Forensic rhetoric and satellite surveillance: The visualization of war crimes and human rights violations* (Lanham, MD: Lexington Books).
- Hawk, D. 2003. The Hidden Gulag: Exposing North Korea's Prison Camps; Prisoners' Testimonies and Satellite Photographs . Washington, DC: *United States Committee for Human Rights in North Korea*. [Online]. Available: https://www.hrnk.org/uploads/pdfs/The_Hidden_Gulag.pdf [8 July 2019]

- Heidner, R. 2014. Shutter Control: An Approach to Regulating Imagery from Privately - Operated RS Satellites. NOAA presentation to the Advisory Committee on Commercial Remote Sensing (ACCRES). *NOAA*. [Online]. Available: https://www.nesdis.noaa.gov/CRSRA/files/Shutter_Control_ACCRES_rev3_OTR.pdf [8 July 2019]
- Herscher, A. 2010. From target to witness: Architecture, satellite surveillance, human rights. *Architecture and Violence*. Actar: Barcelona, 127148.
- Herscher, A. 2014. Surveillant Witnessing: Satellite Imagery and the Visual Politics of Human Rights. *Public Culture*, 26(3 74), pp.469-500.
- Hopgood, S. 2013. *The Endtimes of Human Rights* (Ithaca, NY: Cornell University Press).
- Human Rights Watch. 2001. *Cluster Bombs in Afghanistan: A Human Rights Watch Backgrounder*. [Online]. Available: <https://www.hrw.org/report/2001/10/31/cluster-bombs-afghanistan> [9 July 2019]
- Human Rights Watch. 2002. *All our hopes are crushed: Violence and repression in Western Afghanistan*. [Online]. Available: <https://www.hrw.org/report/2002/11/05/all-our-hopes-are-crushed/violence-and-repression-western-afghanistan> [9 July 2019]
- Human Rights Watch. 2004. *Razing Rafah: Mass home demolitions in the Gaza Strip*. [Online]. Available: <https://www.hrw.org/report/2004/10/17/razing-rafah/mass-home-demolitions-gaza-strip#> [9 July 2019]
- Human Rights Watch. 2007. *Off Target: The conduct of the war and civilian casualties in Iraq*. [Online]. Available: <https://www.hrw.org/report/2003/12/11/target/conduct-war-and-civilian-casualties-iraq> [9 July 2019]
- Human Rights Watch. 2010. *I lost everything: Israel's unlawful destruction of property during Operation Cast Lead*. [Online]. Available: <https://www.hrw.org/report/2010/05/13/i-lost-everything/israels-unlawful-destruction-property-during-operation-cast-lead#> [9 July 2019]
- Human Rights Watch. 2012. *Forget about him, he's not here: Israel's control of Palestinian residency in the West Bank and Gaza*. [Online]. Available: <https://www.hrw.org/report/2012/02/05/forget-about-him-hes-not-here/israels-control-palestinian-residency-west-bank-and#> [9 July 2019]
- Human Rights Watch. 2015a. *Targeting Saada: Unlawful airstrike on Saada City in Yemen*. [Online]. Available: <https://www.hrw.org/report/2015/06/30/targeting-saada/unlawful-coalition-airstrikes-saada-city-yemen> [9 July 2019]
- Human Rights Watch. 2015b. *Look for another homeland: Forced evictions I Egypt's Rafah*. [Online]. Available: <https://www.hrw.org/report/2015/09/22/look-another-homeland/forced-evictions-egypts-rafah#> [9 July 2019]

- Human Rights Watch. 2018a. *US: Child detention city illustrates crisis*. [Online]. Available: <https://www.hrw.org/news/2018/06/21/us-child-detention-tent-city-image-illustrates-crisis#> [9 July 2019]
- Human Rights Watch. 2018b. *Egypt: Army intensifies Sinai home demolitions*. [Online]. Available: <https://www.hrw.org/news/2018/05/22/egypt-army-intensifies-sinai-home-demolitions#> [9 July 2019]
- Keith, A. 2016. Significant supply expansion for EO industry: Data demand driven by defence and emerging markets. *Earth Imaging Journal*. [Online]. Available: <https://eijournal.com/print/articles/significant-supply-expansion-for-EO-industry-data-demand-driven-by-defense-and-emerging-markets> [8 July 2019]
- KRQE. 2018. New Mexico Senators visit US Mexico border. *KRQE Media*. [Online]. Available: <https://www.krqe.com/news/new-mexico/new-mexico-senators-lead-fact-finding-mission-at-border/1256413972> [8 July 2019]
- Kurgan, L. 2013. *Close up at a distance: Mapping, technology, and politics* (Cambridge MA: MIT Press).
- Livingston, S. 2015 Commercial Remote Sensing Satellites and the Regulation of Violence in Areas of Limited Statehood. *ICTs, Statebuilding and Peacebuilding in Africa*, CGCS Occasional Paper Series #5. [Online]. Available: <https://repository.upenn.edu/africaictresearch/6> [8 July 2019]
- Raman, S., and S. Livingston. 2018. Human rights documentation in limited access areas: The use of technology in war crimes and human rights abuse investigations. *Carr Center for Human Rights Policy*. Cambridge. [Online]. Available: <https://carrcenter.hks.harvard.edu/publications/human-rights-documentation-limited-access-areas-use-technology-war-crimes-and-0> [8 July 2019]
- Müller, M. 2012. Opening the black box of the organization: Socio-material practices of geopolitical ordering. *Political Geography*, 31(6), pp.379-388.
- Olbrich, P., and N. Witjes. 2015. Earth Observation and International Security: The Role of Uncertainty in Satellite Imagery Analysis by Non-State Actors. *ESPI Perspectives* 72, 1-6.
- Olbrich, P. 2019. Technological expectations and global politics: Three waves of enthusiasm in non-governmental remote sensing. *Space Policy*, 47, pp.107-116.
- Parks, L. 2001. Satellite views of Srebrenica: Tele-visibility and the politics of witnessing. *Social Identities* 7, no. 4, 2001.
- Parks, L. 2005. *Cultures in Orbit: Satellites and the Televisual (Console-ing Passions)* (Durham, NC: Duke University Press).

- Parks, L. 2009. Digging into Google earth: An analysis of “crisis in Darfur”. *Geoforum*, 40(4), 535-545.
- Perkins, C., and M. Dodge. 2009. Satellite imagery and the spectacle of secret spaces. *Geoforum*, 40(4), 546–560.
- Perugini, N., and N. Gordon. 2015. *The human right to dominate* (New York NY: Oxford University Press).
- Raymond, N., B. Card, and I. Baker. 2014. A New Forensics: Developing Standard Remote Sensing Methodologies to Detect and Document Mass Atrocities. *Genocide Studies and Prevention: An International Journal*, 8(3), 33-48.
- Rothe, D. 2017. Seeing like a satellite: Remote sensing and the ontological politics of environmental security. *Security Dialogue*, 48(4), 334-353.
- Rothe, D., and D. Shim. 2018. Sensing the ground: On the global politics of satellite-based activism. *Review of International Studies*, 44(3), 414-437.
- Sandvik, K. B., M. G. Jumbert, J. Karlsrud, and M. Kaufmann. 2014. Humanitarian technology: A critical research agenda. *International Review of the Red Cross*, 96(893), 219-242.
- Sandvik, K. B., and K. Lohne. 2014. The rise of the humanitarian drone: Giving content to an emerging concept. *Millennium - Journal of International Studies* 43(1), 145-164.
- Sandvik, K. B., and N. Raymond. 2017. Beyond the Protective Effect: Towards a Theory of Harm for Information Communication Technologies in Mass Atrocity Response. *Genocide Studies and Prevention: An International Journal* 11(1), 9-24.
- Walker, J. R. 2018. The Rise of GEOINT: Technology, Intelligence and Human Rights. In *Visual Imagery and Human Rights Practice - Global Transformations in Media and Communication Research*, Sandra Ristovska and Monroe Price (eds) (Cham, Switzerland: Palgrave Macmillan).
- Wang, B., N. Raymond, G. Gould, and I Baker. 2013. Problems from hell, solution in the heavens?: Identifying obstacles and opportunities for employing geospatial technologies to document and mitigate mass atrocities. *Stability: International Journal of Security and Development* 2 (3), art 53, 1–18.
- Warf, B. 2012. Dethroning the view from above: toward a critical social analysis of satellite ocularcentrism. In *Down to Earth: Satellite Technologies, Industries, and Cultures*, Lisa Parks and James Schwoch (eds) (Piscataway, NJ: Rutgers University Press).
- Watson, S. 2011. The ‘human’ as referent object? Humanitarianism as securitization. *Security Dialogue*, 42(1), 3-20.

- Weizman, E. 2010. *Forensic Architecture: Only the criminal can solve the crime*. Radical Philosophy. [Online] Available: <http://research.gold.ac.uk/4321/> [8 July 2019]
- Weizman, E. 2011. *The least of all possible evils: Humanitarian violence from Arendt to Gaza* (London, UK: Hurst).
- Witmer, F. 2015. Remote sensing of violent conflict: eyes from above. *International Journal of Remote Sensing*, 36(9), 2326-2352.
- Witjes, N., and P. Olbrich. 2017. A fragile transparency: satellite imagery analysis, non-state actors, and visual representations of security. *Science and Public Policy*, 44(4), 524-534.

Chapter 3:

Practice theory and the evolution of remote sensing use by international human rights organizations

3.1 Introduction

Satellite images of horror and destruction are everywhere. In what has now become a familiar sight, newspaper headlines and TV reports of mass atrocities, ethnic cleansing, and other major human rights violations are often accompanied by the unique, top-down perspective of the “God’s eye view” afforded by satellite imagery. Images that document mass atrocities, war crimes, and other major violations of International Human Rights (IHR) law have become significant publicity tools available to advocacy groups active in the human rights and humanitarian fields. However, the everyday practice of Remote Sensing (RS) as a functional tool for organizations such as Human Rights Watch (HRW) and Amnesty International (AI) is considerably more significant than simply publishing images of horror and destruction. While the rise of RS technology – both satellites and drone/UAV platforms – has been previously documented by scholars interested in the relationship between the technology and International Non-Governmental Organizations (INGOs) engaged in the IHR community (Parks 2009, Herscher 2014, Sandvik & Lohne 2014, Livingston 2015, Witmer 2015, Hasian 2016, Witjes & Olbrich 2017, Raman & Livingston 2018, Rothe & Shim 2018, Olbrich 2019), the internal working practices of RS imagery access, annotation, production, and dissemination have received limited attention. Stemming from an STS/ Practice Theory perspective, this chapter

explores the series of distinct yet complementary roles that RS technology supports for major human rights groups. It argues that the development and adoption of RS technology has had a significant impact on the internal practice of human rights advocacy, and has begun to appreciably change the temporal capacity of IHR actors - both in terms of analytical processes, and in regards to the use of actionable data in the field, in crisis narrative perception, and in leveraging human rights knowledge for the purposes of influencing elite and public opinion at the domestic and international level.

It needs to be acknowledged up front that RS technology is a complex and dynamic form of assemblage. From the design and calibration of the digital sensors and their application aboard orbital (satellite) and sub-orbital (planes/UAVs) platforms, to the receiving, processing, and archiving of data sets, the necessary infrastructure for data transmission and accessibility, and the thousand and one other human and technical aspects that make up the heterogeneous network of socio-material elements necessary to deliver a processed RS image to the analyst. However, for the purposes of this chapter, I will focus in on the last stages of that chain – the everyday working practices that go into accessing, analyzing, annotating, and actioning RS imagery for human rights investigations. As a result, the emphasis of this chapter is an exploration of the socio-material impact that RS technology is having on the working processes of INGO groups such as AI and HRW. This project is prompted in part by the work of Martin Müller, and his call for critical theorists (and in particular students of geopolitics) to explore inside the black box of organizational structure, in order to understand the socio-material practices of ordering that inform international organizations (both state and non-state) as geopolitical forces (Müller 2012). Müller calls upon scholars to dive deep into organizational practice, in order to understand the dynamic processes of interaction that constitute the power behind the institution. Müller

approaches this from a Science and Technology Studies (STS) perspective, calling upon Actor Network Theory (ANT) as a lens through which to understand the “processes of ordering” that take place within the network. He argues that only through a clear exploration of the impact and influence that technology has on organizational structure – the socio-material practice – can we understand the constantly evolving dynamic at play. Starting from Müller’s call to arms, this paper proceeds from the position that the recent expansion and adoption of RS by IHR actors provides an ideal opportunity to explore the effect of just such a technology in action.

This chapter is also prompted in part by the works of Kristin Sandvik, and in particular her emphasis on the need for scholars to look at the impact technology is having on the humanitarian world (Sandvik et al 2014, Sandvik & Lohne 2014). Also informed from an STS perspective, Sandvik explores the ways that technologies (particularly communications and UAV tech) are fundamentally altering the humanitarian arena. She calls upon critical theorists to take up the debate over “humanitarian tech” in order to understand “what it does to the humanitarian community, rather than what it does for the humanitarian community” (Sandvik et al 2014, pp 3). While the human rights and humanitarian worlds are separate areas of interest, they are also increasingly intertwined. Pointedly, calls from state and civil society actors for international intervention into crises are often couched in terms of the “Responsibility to Protect” (R2P) doctrine, which is itself based upon international humanitarian *and* international criminal law (Breakey 2012). In this context, Sandvik’s call for critical theorists to take up the challenge of new technology use by INGO actors is both poignant and timely.

Drawing upon interviews conducted with a broad cross section of the IHR/RS community, and relying heavily upon several months of participant observation conducted at the RS offices of the two most recognized INGO human rights actors (AI and HRW), I will argue

that the adoption of RS technology has had a significant impact on the perception, rhetoric, and practice of human rights advocacy. Specifically, I argue that the advent of RS as an investigative tool has begun to significantly change the temporal capacity of the major IHR actors - both in terms of analytical processes, and in regards to their ability to leverage actionable data in the field. In order to understand annotated RS imagery as an ideal transitional object I will draw upon technology focused STS theory (Latour 1990, 2005, Law 1992, Pickering 1993, Muller 2012), and will argue that the production and dissemination of human rights oriented Geospatial Intelligence (GEOINT) provides a lens through which to understand the production of knowledge, albeit a “human rights” rather than “scientific” knowledge most closely associated with an STS perspective.

3.2 Situation the role of remote sensing in international practice theory and STS:

As a starting point, RS systems such as unmanned aerial vehicles and satellites constitute a sub-section of the larger, emerging category of what Sandvik describes as “humanitarian technology” (Sandvik et al 2014). In particular, Sandvik calls attention to the “war dividend” provenance of RS technology, which incorporates a specific set of military and political rationales that must be examined – not for their oft cited “newness” but for the power they represent (Sandvik & Lohne 2014). Similarly, Winner (1980, 2010) argues that technology cannot be seen simply as a tool, but must be understood as actively structuring human activity. He draws a distinction between what he defines as *technical arrangements as forms of order* and *inherently political technologies*. In the first instance there is political direction behind the development and use of a technology that serves to order human activity- either intentionally, or

through unintended consequence.¹⁹ In the second instance, the technology itself is inherently political in nature, as it engenders social shifts towards either democratic or authoritarian outcomes. RS technology can be viewed from either perspective – the ability of RS imagery to shape the practice of INGO actors can be seen as an unintended consequence of the development and dissemination of a military technology, or alternatively its panoptic capacity could be viewed as both an authoritarian nightmare AND a democratizing force used to reign in the dictators of the world. In either case, the technology itself is clearly not neutral, and its adoption by IHR groups demonstrates its political potential.

Turning towards the socio-material effects of technology on the processes of ordering, Law (1992) draws upon the development of ANT to define the ways in which order is an effect generated by heterogeneous tensions. He argues that complex social and technical interactions come to be concealed beneath simplifications, or *punctualized* systems, processes, and routines that are constantly undergoing refinement, and which (if sufficiently successful) serve to obfuscate the constant churning of activity and agency inherent in social structure(s). As he repeatedly states, order and the concept of the “social structure” should be viewed more as a verb than a noun. To highlight this concept, Law emphasizes the need to explore the “local processes of patterning, social orchestration, ordering, and resistance... called *translation* which generates ordering effects such as devices, agents, institutions, or organizations” (1992, pp. 386). In essence, it is the ever evolving process’ of interaction between actants (both human and material) that underlie seemingly stable structures. The use of RS imagery for IHR advocacy contains within it a complex set of relationships ripe for this form of exploration.

¹⁹ Winner uses the construction of low highway overpasses in New York as an example of the *intentional* deployment of technology, in that they were designed to bar the use of public transportation (buses) as a form of socio-economic segregation. Alternatively, he highlights the lack of disabled ramps and access systems in public buildings as *unintentionally* disenfranchising a portion of the population.

The work of Pickering (1995) exemplifies this ideal, drawing attention to what he describes as the “mangle of practice” whereby material and social agency is emergently transformed and delineated through the dialectic of resistance and accommodation. As with most of the seminal works in STS theory, Pickering is focused upon the development of supposedly objective scientific knowledge, and keys in upon the resistance and accommodation that takes place between the scientist, the instrument, and the elemental object being observed. Using Glasers work on “Bubble Chambers” in particle physics as a lens, Pickering demonstrates the ways in which the technology forced deviations and accommodations from the scientists, participating as an actor within the network, and influencing what ANT theorist consider the “processes of ordering” that are inherent within the network at large. As such, each element of the network – whether human or otherwise - is simultaneously fighting against and collaborating with its counterparts, producing new and unique combinations and outcomes. The adoption of RS technology by INGO actors has clearly had a mediating effect, changing how the role of the technology and the organizations can be understood and defined. It is this incorporation of a significant series of new technological elements within the network that calls out for attention from scholars, and sits at the heart of the current chapter.

Most pointedly, the use of RS technology for the production of annotated “geospatial intelligence” or GEOINT images ties in neatly with the notion of technology as the essential element in the development of transitional objects, or what Latour described as *immutable mobiles* (1990, 2005) that excel in facilitating order through space (or acting at a distance). In particular, Latour demonstrates the significance that such objects hold when imbued with nine identified criteria - *mobility, immutability, flatness, scale, reproduction, recombination, superimposition, inclusion into written texts, and geometry* (Latour 1990). Objects that exhibit

these criteria are essential elements in the codification and inscription of “knowledge” and serve both as vehicles and channels for establishing bottlenecks for authority and translation. Latour insists that “every possible innovation that offers any of these advantages will be selected by eager scientists and engineers” (1990, pp.20). RS, and in particular GEOINT annotation, is intentionally designed to call upon these ideals, and the innovative technology involved in its production, analysis and dissemination is increasingly influential for both state and non-state actors alike. For these very reasons, RS has been enthusiastically adopted by major IHR actors such as AI and HRW.

However, it is important to keep in mind that technology not only influences the nature of “knowledge” but also the relationship between the individual, the network, and the world at large. Far from being neutral, technology when treated with the symmetry inherent in an ANT/STS perspective is understood as serving to redefine the possible, whereby “all technologies incite around them that whirlwind of new worlds. Far from primarily fulfilling a purpose, they start by exploring heterogeneous universes that nothing, up to that point, could have foreseen and behind which trail new functions.” (Latour & Venn 2002, pp.250). RS technologies should be considered as a text-book example of this process in action, particularly in the context of their adoption and usage outside of their original socio-political development as tools for the projection of state and military authority. The constant evolution in the relationship between the material technology of the sensors/platform, the adaptation of its military provenance, and the INGO human analysts and advocates who make up the network are an example of ANT in action. The transitional object at the end of the process of analysis – the actual, notated GEOINT image used for advocacy purposes – is a both a product of this ordering process, and itself an influential tool in further processes of ordering.

In looking to engage with the production of “human rights” knowledge, rather than the “scientific” knowledge more closely associated with the ANT/STS perspective, the development of *International Practice Theory* (IPT) within constructivist IR provides a methodological orientation for exploring the black box of organizational structure that Müller is so concerned with. As Adler defines it, practice constitutes “socially meaningful patterns of action, which, in being performed more or less competently, simultaneously embody, act out, and possibly reify background knowledge and discourse in and on the material world” (Adler & Pouliot 2011 pp. 4). Both Müller and Sandvik call upon researchers to immerse themselves within the everyday environments of international organizations, in order to truly understand the ways in which technology is affecting both the practice and the influence of such groups. In this vein, practice theory as a branch of sociologically oriented political science has made great strides in recent years by looking at a variety of complex issues and concepts. Researchers have explored an array of issues ranging from diplomacy (Pouliot 2008), security communities (Pouliot 2008, Pouliot & Cornut 2015), failed states (Buegar & Bethke 2014), climate change (Mayer 2012), piracy (Buegar 2015), and interventionism (Olsson 2015), to NATO and its relation to the Darfur crisis (Pomarède & Schjødt 2015), down to studies of individual actors such as MSF and their work in the Congo (Cooren, Matte, Taylor & Vasquez 2007). In essence, IPT provides a useful methodological toolbox for exploring the ways in which knowledge is created, disseminated, and legitimized within an IR framework.

While IPT has a strong literature, it is not considered to be a specific school of analysis in the traditional sense, but rather a methodological approach to working with selected groups in order to explore how they see, construct, and function within their everyday environments. In essence, there is no theory of practice, but rather “a variety of theories focused on practices”

(Adler & Pouliot 2011 pp. 1). A number of recent papers have attempted to clarify what constitutes the essential elements that unite IPT work (Adler & Pouliot 2011, Bueger 2014, Bueger & Gadinger 2015, Cornut 2015), and while each has defined IPT in its own way, several consistent threads do emerge. Most significantly, an emphasis is placed on the need to explore “process over stasis” (Bueger & Gadinger 2015). IPT work engages directly with the notion that practice (just as with any other social structure) is constantly in the process of evolving from what it was, into what is it, and on to what it will become – hence the emphasis on immersion into the everyday environment of the practitioner(s) in order to see “the practical work at the “construction” sites in which the social, the material, the factual, or the powerful is produced” (Bueger & Gadinger 2015, pp. 455).

A second major thread revolves around the creation of “communities of knowledge” (Adler & Pouliot 2011) that function as gate-keepers and authoritative “translators” – much as Callon describes the role of scientists in STS (Callon 1984). Pointedly, Buegar (2014, 2015) calls upon Callon and Latour to explicitly demonstrate how international organizations coalesce as epistemic communities. He breaks this notion down into three important and overlapping elements: epistemic infrastructure (the overriding system of knowledge dissemination and use), epistemic practices (the production of such knowledge) and the laboratories wherein practice is refined (Bueger 2015). In this way, IPT theorists bridge the gap between traditional STS/ANT work on scientific knowledge production and “laboratory life,” and the constructivist realm of international IR theory. It is in this context that the current chapter frames the use of RS technology – as an evolving element in the production, dissemination, and reification of rights based narratives, through the creation and use of archetypal *immutable mobiles*, and via the inculcation of new technological actants into the everyday practice of human rights work.

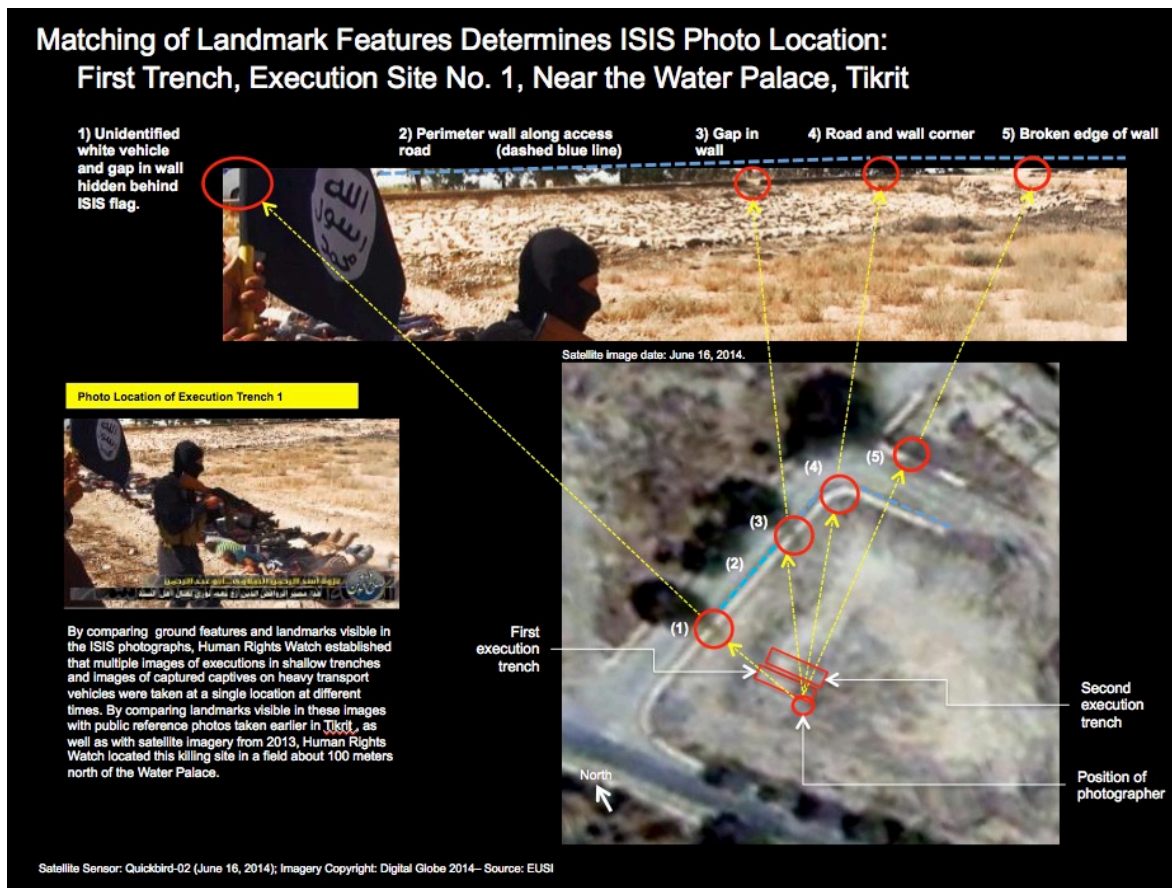


Figure 3.1: Presentation slide demonstrating the use of RS in conjunction with video and social media analysis – Human Rights Watch.

3.3 Functional roles for remote sensing in human rights work:

Much of the outward facing uses of RS in IHR reporting are focused on the expositional impact of satellite shots. As a result, the academic literature has tended to focus almost exclusively on the tip of the IHR/RS iceberg (Herscher 2014, Hasian 2016, Witjes & Olbrich 2017, Rothe & Shim 2018). Designed by IHR actors to engage the viewer with the perceived objective neutrality and veracity associated with digitally captured RS data (Dodge and Perkins 2009), to be picked up by traditional media outlets/journalist, and to go “viral” via social media campaigns, RS images are employed as a means of adding significant “truth” value to investigators claims. However, while this expositional role has drawn the most attention from

academic observers, it is not the primary function of RS for the IHR actors in this study. Instead, *Exposition* functions as the last in a series of complimentary roles that the development of RS technology has expanded over the past two decades, including *Investigation*, *Triangulation*, *Clarification*, *Falsification*, *Verification*, *Documentation*, and (potentially in the future) *Prediction*. Each of these roles may overlap (and in many instances work in tandem) while still serving individual purposes in the working practice of an IHR investigation:

Investigation: RS technology provides an immediate source of independent intelligence for IHR personnel engaged in initial reports of violations, as well as ongoing monitoring programs. Whether in country, or remotely from outside field offices, IHR teams regularly use open access RS platforms (such as Google Earth) in order to organize and coordinate their initial assessments, collate and geo-reference gathered intelligence, media reports, and initial witness accounts, and to gain a better understanding of the “lay of the land in country” (Interview, D.C., 2018). While such platforms may rely on imagery that is several months (or even years) old, it is considered a valuable resource in charting the infrastructure, agriculture, and topographic features of a region. In some instances it can also serve to identify significant social/cultural objects in the landscape that may be very important for later analysis. In fact, the ability for researchers to look through easily accessible back catalogs of RS imagery functions as a rudimentary form of “time machine”, allowing for the creation of effective base-lines from which to try and understand the potential changes taking place in the landscape, and upon the local population. Updated imagery can also be shared in order to geo-locate the disposition of military forces, or other significant developments that might be essential in determining the nature of the crisis under investigation, and the viability of sending in a field team.

Triangulation: As with all forms of data gathered for investigative purposes, IHR analysts take care to ensure that any statements the organization may make are as accurate as possible, because for groups such as AI and HRW “our value is wrapped up in our reputation” (Interview, Geneva 2018). In a similar fashion to journalists who fact-check statements, IHR investigators require triangulation of intel in order to have confidence in the veracity of their findings. This has been a standard practice for 40 years, but the advent of RS has allowed for an extremely useful source of independent confirmation of events. In particular, the clearly identifiable provenance of RS imagery, along with the associated meta-data (which includes both timestamp and geo-referenced location data), provides an important anchor point for the triangulation of other sources.

For example, RS imagery can help investigators to narrow down the time-frame of an event (such as an arson attack) gathered from eye-witnesses, which in turns allows for the apportioning of responsibility to actors. This is particularly useful in fluid but chaotic environments, where the front lines between parties may change frequently. RS is also a valuable triangulation tool for geo-locating visual data gathered from other sources, such as social media, including video and still images. High resolution RS imagery can be used to identify important elements of the landscape captured in such sources (such as buildings, radio towers, or other distinctive elements), and may help to confirm the location of the incident captured. In some circumstances it may also allow investigators to identify the orientation of the original imagery captured. This can be an essential tool in helping to narrow down the exact time of day that an event took place, through the use of shadow analysis, and other forms of complex triangulation of data. Several interviewees have adopted the term “*all source*” investigations to reflect such combined approaches to research and analysis (see Figure 3.1)

Clarification: As part of the investigative process, researchers are often confronted with multiple accounts of events, some of which may be contradictory, and many of which are taken from heavily traumatized individuals located hundreds (if not thousands) of miles from the site of the event, and weeks or months after it occurred. RS provides a valuable tool, both as an investigative aid in the confirmation of specific detail (the identified village was indeed burnt down by a specific date), as well as a visual aid in the field. For example, when talking with victims, RS imagery can be used to clarify the exact location of a village. This can be particularly important in regions where there are not clearly delineated boundaries between housing clusters, multiple villages share the same name, or where there is no standardized spelling for location names. RS images can also help in identifying specific locations within an “area of interest” (AOI) where events took place, such as the probable location of a mass grave, a detention center, or the identification of targeted households within mixed communities. This kind of data can help to clarify patterns of violations, as well as the scale of the events taking place across diverse and difficult regions.

Verification/Falsification: As a corollary to both triangulation and clarification, the use of RS for the purposes of verification and falsification of details, events, and narratives is fundamental to the *value-add* that the technology provides to IHR investigators. The ability of RS to help falsify State orchestrated narratives of events, such as the ongoing ethnic cleansing in Northern Rakhine State, Myanmar, is perhaps the most publicly visible use of the technology – so much so that the Myanmar authorities have been forced to attempted to counter the impact of RS evidence, through the production of their own counter-narrative RS

products.²⁰ Falsification can also be a necessary part of sifting through multiple witness accounts, as it allows investigators to ensure they are building upon the most verifiable of data sets. Significantly, this is not understood as a process of weeding out false statements (although that might be important, depending on the nature of the violations/actors under investigation), but instead as a means of ensuring that those statements that are ultimately published and relied upon in IHR reports are as verifiable as possible. To be clear, the RS imagery itself is not understood as either proving or disproving the nature of an event under investigation - for example, while the fact that a village may have suffered from significant burning may be clearly identifiable, which houses/populations were targeted, who did the targeting, or even if the event in question was deliberately orchestrated, is not revealed through imagery alone. However, RS is capable of discrediting narrative statements from significant parties, calling into question accounts of particular events, and helping to winnow down witness statements and other forms of violation inputs to ensure that IHR actors are making valid claims about crisis situations.

Documentation: While the larger INGO human rights groups such as HRW and AI have different agendas, structures, and philosophies (Stroup 2012), they do share certain fundamental practices. The most obvious of these is the emphasis on investigation and publication of reports that aim to document the violation of human rights. While the purposes of such documentation may vary – from emphasizing grass roots public responses, to attempting to influence elite decision makers, to providing evidence of violations and

²⁰ In 2016 the Military authorities released a set of aerial photographs that purported to demonstrate the inaccuracies of RS oriented reports from HRW and AI. This back-fired spectacularly when further analysis of the new images by IHR actors went on to not only confirm the original details, but to actually increase the area of devastation visible.

culpability to legal investigations – the functional utility of RS as a source of independent and verifiable data is paramount. While interpretations of RS imagery are clearly subjective in nature, the quantifiable provenance of the data source itself is rarely (if ever) disputed, making it an ideal anchor point for the documentation of gross violations. Investigators might not have an image that shows a village on fire, for example, but they will probably be able to document a narrow window between a “before” and “after” shot that clearly demonstrates the significant change in the landscape. Similarly, they might be able to identify the build up of military forces within an AOI over a period of time, the creation of a large area of disturbed earth that is indicative of a mass grave, or the clear patterns of destruction left by artillery shells and high explosives. In essence, RS performs as a significant element in the documentation of events, particularly in places where ground access is difficult and/or dangerous.²¹

Prediction: With the advent of ever increasing RS capacity provided by the private corporate satellite industry, the development of artificial intelligence and Machine Learning (ML) algorithms has spurred an increasing interest in the predictive potential of RS monitoring. The ability of ML systems to wade through the information/data deluge afforded by increased capacity is tantalizing – but not practicable yet. In effect, while key figures in IHR/RS community are already attempting to train ML systems to automatically flag variables (such as night light change, agricultural indicators, or even smoke plume detection models), in order to identify emerging crisis situations, the current state of the art is not sufficient to the task.

However, considerable efforts are underway in partnership between academics, ML

²¹ It is important to note, however, that the use of RS for this kind of documentation is not ubiquitous across all IHR investigations. Some regions are not suitable for RS analysis because of topography, weather conditions, or other factors that obscure the imagery.

developers, and INGO actors, to explore the idea of creating a more pro-active approach to crisis monitoring (as opposed to the current re-active model that dominates the IHR community). This is predicated in part by the desire to help expose and tamp down on emerging situations “like trying to contain the sparks of a wildfire before they spread to larger communities of vulnerable people” (Interview, Geneva 2018). It should be noted that while many of the analysts interviewed express strong interest in this kind of automated processes, they were not seen as replacing traditional monitoring methods. Rather, they were described as a means of alerting researchers to potential crises, or as one senior executive at HRW put it, “What we're hoping to be able to do is program the computer to identify significant changes on the ground that then warrant a person taking over” (Interview, Geneva 2018). In addition, during interviews the ethical challenges associated with automated monitoring were given equal weight to the practical challenges associated with creating effective predictive systems. In other words, the epistemic community of RS/IHR analysts appear cautiously optimistic about the potential of predictive RS monitoring, but skeptical of its deployment in the near future. This is an area that would greatly benefit from further critical academic interest.

3.4 Everyday Practices of RS work:

Having laid out the background, theory, and methodological approach for the chapter, we now turn to the everyday working practices for RS analysts engaged in human rights advocacy. Participant observation of analysts in the performance of their duties was undertaken at three significant nodes in the RS/IHR network – Amnesty International’s office in Washington DC, the Signals Program at the Harvard Humanitarian Initiative in Cambridge MA, and Human Rights Watch in Geneva, Switzerland. The last site was of particular importance, and will

constitute the main subject of the following analysis, although many of the observations are relevant to each of the sites identified. Where significant differences do exist between these nodes, they will serve to illustrate important aspects of the heterogeneous nature of the nascent epistemic community that has evolved around the incorporation of RS into rights based advocacy. Fieldwork was conducted in HRWs offices during April and May of 2018, and across the other sites over the course of that year. In addition, semi-structured interviews were conducted with analysts, investigators, researchers, and advocates across a broad swath of the human rights and humanitarian RS oriented community, including IGO, INGO, and State oriented actors, as well as representatives from the private corporate satellite industry.

3.4.1 Practice of RS use in office:

Human Rights Watch is considered to be a large human rights oriented INGO, with around 400 employees worldwide. During the time of this study, they employed only one RS analysts (recently increased to two) based in Geneva, but available to work on projects originating from any of the HRW regional and field offices across the globe.²² All of HRWs RS analysis is performed in Geneva, from an office shared among three researchers, each of whom have their own portfolio of interests and responsibilities. This environment provides an open space for personal interaction – a significant element for researchers who are engaged in a relentless and often highly individualized process of investigation into disturbing and ongoing crisis situations. Contrary to the ways in which RS can be seen as abstracting the individual from

²² While HRW and AI have very different internal structures, in both instances the RS analysts have been situated within a central or shared division that is available to all areas of the organization. There are historical reasons for the placement of these offices that differ between the organizations, but the rationale is quite similar – RS is considered to be a limited, and still somewhat novel, resource. Centralization allows for quality control and optimal use of the analyst’s time, as well as providing a platform for the gradual diffusion of RS knowledge/utility throughout the organization.

the reality of events “on the ground” the effects of constant engagement with the “scopic regime” (Gregory 2011) of RS analysis – especially in conjunction with an *all source* approach to the use of video, social media and other Information and Communication Technologies (ICT) inputs – means that RS analysts are subjected to an onslaught of highly traumatic material. Interaction with fellow investigators and co-workers is therefore an important grounding structure, on a personal as well as a professional basis.



Figure 3.2: An analyst for HRW engaged in the “mangle of practice”.

RS analysis requires an iterative relationship not only with the imagery, but also with the technical arrangement necessary for its display – the material actants that form the immediate connection between the analyst and the network. In the HRW office, this consists of a constantly

evolving assemblage of computer equipment, along with associated software components (both locally on the analyst's machine, in a secured cloud system, and in terms of internet connectivity itself). By far the most complex system observed for this study, the HRW analyst's setup included a high end desktop unit with advanced "pro-gamer" video graphics processing and 120GB of RAM.²³ During my time in office they also received an NVIDIA DGX unit designed specifically for artificial intelligence and deep learning – a highly specialized piece of advanced computing equipment. Given that the Geneva office does not have a dedicated IT specialist, the task of designing and maintaining the varied and complex technical network of actants (both hardware and software) falls to the analyst, who spent a considerable amount of time troubleshooting the various components. In scenes highly reminiscent of Pickering's descriptions of the "mangle of practice" HRWs analyst was intermittently engaged in a "battle" with the material components of the network, fighting to gain control over expected performance outcomes (such as hardware/software compatibility), functionality (including internet connectivity and necessary download speeds), and the incorporation of novel or unique software components. In essence, getting to the point of actual RS analysis requires a constant engagement with the material elements necessary for the display and annotation of the imagery.

A good example of this process in action concerned the verification of a short video that purported to identify the site of a suspected execution and burial in Myanmar.²⁴ While accessing

²³ By comparison, the other RS specialists in this study used anything from standard desktop units to a simple lap-top. While individual analysts clearly worked with the resources available to them, one area of similarity between setups was the ubiquitous use of dual screen displays.

²⁴ Reports had suggested that the local military authorities were engaged in covering up the scene through the use of bulldozing/construction. The video had been taken on a cell phone, and showed several individuals walking through an abandoned village, towards a blue tarp that was half buried in the earth. The task for the HRW analyst was to try and geo-locate the exact area of the suspected burial ground, in order to see if it was being sanitized or destroyed by the authorities. RS imagery of the AOI taken within the last few days showed some excavation and leveling of the ground surrounding a military outpost close

relevant RS imagery over the area of interest (AOI) was a fairly simple task, the analysis of the shaky video footage was a complex process that required several hours of effort just to open. Once the video was received from the field office, along with the request to provide accurate geo-location of the contents, a string of contested outcomes began between the analyst and the technical assemblage of hardware and software necessary for analysis. The format of the video was unusual, and required the downloading of a specialized analytical program. Installation of this program took several full reboots of the entire system to accomplish, and even when up and running, the video was frustratingly difficult to analyze, due to frequent system freezes. Eventually, after two hours of irritation, HRWs analyst was able to effectively confirm the exact co-ordinates for the possible burial ground, and confirm those results (using annotated screen capture from both the video and the RS imagery) to the main researcher. While the hardware/software interactions from the material actants were essential to the task at hand, they required what the analyst described as “constant coaxing to give me what I need” (Interview, Geneva 2018) Throughout this process it was clear that the analyst maintained a complex, negotiated relationship with the technology at his disposal, in which he had to adjust expectations and projected outcomes based upon the technical limitations imposed by the hardware/software interface.

This dependence on technical elements is especially true in regards to external components that sit outside the control of the individual. In the case of Geneva, due to the extremely heavy data flows associated with RS imagery, the office has a separate secure internet connection for the RS analyst. When the system is functioning as designed, this allows for an

to the site, and ultimately the conclusion of the investigators was that the construction under way was not intended to destroy evidence, but was instead focused on military line of sight and security of operations for the camp. RS imagery was essential to the determination that the construction did not, in fact, go over the location indicated in the video.

important, independent source of access and communication. However, as observed on several occasions, when the system fails there is very little that can be done from the office itself. Once this essential life-line “goes down” it effectively isolates the analyst from performing their work for the rest of the organization, and more importantly from the essential sources of RS imagery- the online portals that are the modern delivery vehicles for the private corporate satellite industry.

Unlike other forms of data which can be effectively routed through alternative means, RS imagery is cumbersome. The revolution in ICT developments over the past 10 years have alleviated many of the problems associated with the enormous size of RS data files, and in particular the bottleneck issues of timely access and delivery. Until quite recently, very high resolution (VHR)²⁵ imagery from companies such as Digital Globe (DG) or Airbus Industries would have been delivered on a series of DVDs, which would then have to be reprocessed on a local machine in order to be analyzed.²⁶ For example, one of the chief analysts for the Satellite Sentinel Project (SSP) at HHI recounted how in 2010 he would have to get up at 3am to send in a request for immediate processing of the latest imagery captured by DG over southern Sudan, even though there was no guarantee that it would provide clear visuals over the AOI. Once ordered, it was easier and more time efficient for the analyst to fly from Harvard to the DG

²⁵ Imagery resolution is determined by the size of a single pixel of data at ground level. The higher the resolution, the greater the detail visible in the imagery, and the lower the number. Medium resolution imagery is generally understood as being under 10m (such as the European Space Agency Sentinel II data). High resolution is under 5m (such as Planet data at 3m). Very high resolution is under 2m (such as DGs Worldview 3 data at 0.31cm). The trade off for orbital systems is often in terms of temporal coverage – for example, DG generally requires three days notice to ensure their highest resolution sensors can capture imagery over a specified AOI, while Planet captures 3m resolution imagery of everywhere on earth, once a day.

²⁶ As an example, I noted a 2015 image from Digital Globe burned across a collection of 15 individual disks, amongst the pile of DVDs stacked on a bookshelf in HRWs office.

processing center in Denver, CO in order to pick up the enormous stack of disks directly, rather than wait for them to be processed and then sent out (Interview, Cambridge 2018).

The modern equivalent to the analog ordering and delivery of data has been the development of online portals. Major RS providers like DG, Planet, and Airbus Industries all maintain online back catalogs of available data sets which can be accessed via secured online portal logins. Although they vary to some degree in their user interface, these catalogues all offer similar functionality, in that they allow users to browse through the available “coverage” – both geographically and temporally. This allows the user to select only those images that provide sufficiently clear visuals over their specified AOI, as this may be particularly important over regions that suffer from frequently overcast or cloudy skies. In certain instances (for example in the case of the DG online platform) there are clearly restricted data sets that are not available without appropriate security clearances, or alternatively data sets that have simply not yet been processed, cleared, and uploaded to the catalogue. In addition, not all regions of the globe have equal coverage, particularly in terms of VHR imagery, which tends to be more “spotty” than medium or low resolution coverage in general. In other words, either due to processing delays, security concerns, or just a lack of targeted data capture, there is no guarantee that suitable VHR imagery will be available for the analyst’s needs. In some instances, if the NGO has sufficient warning (and available funds) a request can be made to target a specific location for data capture by a VHR system such as DGs Worldview 3 platform. However, this is an expensive process, and for the most part the analysts observed in this study relied on the data sets made visible within the catalogs. The major game changer in this regard is the recent development of the small (or cube) sat phenomenon from start-ups like San Francisco’s Planet. Currently fielding a “flock” of over 100 low earth orbiting “Dove Sats”, Planet provides high-resolution (circa 3m)

imagery in four bands (Red, Green, Blue, and Infrared) across the entire world, every 24 hours. In other words, researchers can access imagery of anywhere on earth, at a good resolution, taken within the last day or so. This temporal shift is clearly significant, and when combined with the ability to quickly access and download imagery, highlights the ways in which RS is altering the temporal and investigatory nature of human rights analysis.

Once a request for RS analysis has come in and been assessed, and after the appropriate imagery has been sourced online and downloaded, the practice of reviewing and annotating the data sets begins. This process is a surprisingly heterogeneous ideal, involving different software and analytical practices across the epistemic community of IHR/RS analysts.²⁷ The use of the finished product – the annotated GEOINT product used in reports, for example – often obfuscates the churning, mangle of practices involved, hidden within the punctualized routine of standardized imagery use and presentation that cuts across the IHR community. In HRW's office, the chosen system is ArcMap, using an online platform (ArcGIS Online) and a desktop variant (ArcGIS Pro). Both versions are necessary as the functionality between the two varies, and therefore requires that the analyst is able to switch assignments between them both, depending on the task at hand. A typical request from the field might involve assessing the impact of deliberate building destruction in a given neighborhood of a city in a conflict region (from bombardment, arson, or other means). The analyst begins by defining the AOI, and then looking for identifiable changes in the landscape. For the HRW analyst, this involves the use of a “blink” function, whereby two RS images (a before and after shot) are overlaid, and the screen flickers

²⁷ Each individual analyst approaches this process in their own preferred manner, and with the use of a small set of GIS and RS visualization software packages. By far the most ubiquitous program for analysis is some variant of the ArcMap platform from ESRI. The less popular but well established ERDAS system, and the robust ENVI Geospatial Analytics program were also used. As with many aspects of RS analysis, it is the individual preferences of the analyst that determine the components best suited to their work-flow process.

back and forth between the two, highlighting changes in the imagery. Other analysts interviewed prefer to use different tools, such as a “slider” function to achieve a similar effect. Likewise, there are different approaches to the annotation of suspected “damage.” For many analysts, a systematic approach is preferred, separating the AOI into a series of squares in a grid pattern, and then methodically assessing every building within each square. HRWs analyst, on the other hand, prefers to allow his eye to “follow the patterns of destruction”, moving through the AOI in a more fluid manner. This is a deliberate choice to avoid the rigidity of the grid approach which he describes as seriously flawed due to a tendency to “focus in on the square too much. I can tell when someone has done this, as you can see the pattern of the squares in their final output” (Interview, Geneva 2018).

Another major factor is the manner in which damage is annotated. For HRW, this involves a detailed process of color-coded markers, categorized by means of destruction (arson vs. shelling, for example), and more importantly by timeframe. In many instances the selected AOI will have a temporal window of interest, stretching from a matter of a few days to several months. As a result, it is unlikely that one or two RS images will be sufficient to understand the nature and progression of the suspected violation underway. Instead, analysts must work with imagery sourced from several different providers, captured over a variety of dates, and at differing ground resolutions. Part of the necessary skill set of an analyst is the ability to juggle these sources in a thorough manner, keeping track of the various levels of stacked imagery they are working with at any one time. In order to capture the necessary meta-data for each element, HRWs analyst uses a system of detailed notes assigned as properties to each specified category of marker within ArcGIS. This allows researchers to understand the progression and extent of an event, and can provide a useful “timeline” as part of their overall triangulation of other sources

and data points – even when such details are not included within the RS imagery used for expositional purposes in final reports.

Importantly, the work of RS analysis is not undertaken in isolation. While the analyst may be working remotely from the situation at hand, as well as remotely from the chief investigator or field office from which the request originated, they are not separated from the overall process of investigation and analysis. The process of analysis and annotation is one that is consistently informed through dialog with the main investigative officer or team for the project. This contact often involves not just written communications, but sometimes several calls a day between colleagues to clarify what is being seen in the imagery, and to inform the analyst about significant localized knowledge necessary to understand and interpret the landscape under observation (see Walker 2020). Feedback from the field is considered an essential element in the process of analysis, determining the utility of the process to a certain extent, and feeding in to the overall *value-add* that RS imagery provides to an investigation. As such, the relationship between investigator(s) and analyst is a recursive process, allowing the field to access the technical, specialized knowledge and experience of the analyst, while simultaneously providing the localized context and specificity needed for the analysis to be effective.

This process has been enhanced by a growing recognition internally within HRW and AI of the effectiveness and *value-add* of RS inputs into investigations. Amnesty, for example, heavily promotes the potential uses of RS as part of their orientation process for new employees. Several interviewees within AI mentioned that RS acceptance was getting significantly easier, due to a general familiarity with satellite and drone imagery from younger employees. Many of the next generation of activists are already familiar with the use of products such as Google Earth, and have seen the impact afforded by the use of RS imagery in crisis situations such as

Darfur, Syria, and Myanmar. For HRW, the process of dissemination functions more laterally, often predicated on word of mouth across the different silos of the organization in order to promote the use of the Geneva office as a resource. For both organizations, the placement of the RS analysis unit within a central core of the organizational structure (the International Secretariat for AI, and the Program/E-Team for HRW) allows researchers to contact the office directly, thereby making integration into individual investigations an easier, more fluid process across the board, and maximizing the potential utility of a relatively limited resource for the widest possible base of users.

Whether by word of mouth, via published reports, or through institutional training, once an investigator learns about RS as an available resource and reaches out to the analysis office, a conversation begins over the applicability and potential *value-add* that RS might provide. Depending upon the nature of the violation under investigation RS might not be a suitable input, or alternatively local seasonal cloud cover might simply obscure the landscape, rendering RS useless. As such, part of the analyst's job is to educate and manage the expectations of colleagues within the organization, many of who might have unrealistic ideas of what can be seen "from space." As a result, the question of potential *value-add* afforded by RS imagery is negotiated between the analyst, the technology, and the investigative team. Each successful application helps to entrench the concept of RS as an available supplemental investigative aid and tool set – an enhancement of the existing structures of ordering within the organization that determine how investigations are both understood and undertaken.

As an example of this process in action, during my time in the Geneva office I observed a brief introduction, negotiation, and preliminary analysis conducted in person with a visiting HRW researcher. Having just returned from several weeks in Cameroon, the researcher was

interested in finding out whether RS imagery would be a useful tool for the clarification and/or verification of a number of eyewitness statements taken in the field. Direct access to the purported sites of a series of arson attacks was severely limited due to an evolving crisis situation in the Anglophone region of the country. This meant that the investigation on the ground was hampered in its efforts to establish the nature of the incidents, their scope, and the date ranges involved. After reviewing extensive field notes, and particular geographic identifiers (such as multiple variants of village names, and their described proximity to specific towns, roads, and junctions) the RS analyst quickly called up a series of VHR images in the DG online portal to check for visibility and cloud coverage. After downloading appropriate imagery over the AOI, they were then able to clearly identify a number of the locations mentioned by eyewitnesses, and to verify the presence of burned structures. Significantly, the imagery was also able to demonstrate the targeted nature of the attacks, showing the selective manner in which some buildings had been burnt, while others were left intact. This confirmed details contained in the witness statements, and also allowed the researcher to narrow down the temporal window for the attacks, as in several instances there were clear before and after comparison shots available. From the initial consultation to the preliminary confirmation of the researcher's selected events, the process of preliminary RS analysis took approximately half an hour. The impact on the researcher was significant, as this brief consultation had allowed them to flesh out a number of reports that had been frustratingly out of reach due to the travel restrictions in country. In a matter of minutes, the two colleagues had been able to significantly advance the foundations of the overall investigation, and establish that there was credible independent evidence to support the reports of a widespread human rights violation underway.²⁸

²⁸ Subsequent to this brief session, the investigation engaged in a more thorough process of RS analysis. In conjunction with dozens of eye-witness accounts and video sourced from social media, the RS imagery

3.4.2 Practice of RS use in the field:

Having looked at the manner in which RS imagery is understood as an input, a process, and a potential form of value-add into investigations at the site of production, I now turn to the ways in which the annotated GEOINT image functions as an *immutable mobile* in the field. Once produced through the recursive process of analysis, consultation, and annotation between the research team and the analyst, the imagery product becomes a functional tool in the further codification of knowledge as part of the ongoing process of investigation.

As previously mentioned, RS imagery and the GIS analysis derived from it can be fundamental to understanding the scope of the violations under investigation, as well as their structure and potentially systemic application. This is particularly significant in regions where access is restricted, or where it is simply too dangerous to send in team members. An example of the temporal impact of RS data in restricted environments is evident in the nature of its use by investigators researching Northern Rakhine State, Myanmar. While large amounts of important data were sourced through eyewitness testimony taken from displaced populations, they could often only tell interviewers about incidents that happened weeks and possibly months previously. This allowed for strong documentation of the nature of the violations that had already taken place, but left serious concerns about the immediacy of the ongoing situation in country. For Amnesty's Myanmar research team, the availability of RS data allowed them not only to confirm many of the details gathered from refugees interviewed in Bangladesh, but also to document additional violations currently taking place, such as the systematic bulldozing of Rohingya

became a major element in the final published report on Cameroon titled "These killings can be stopped", published in June of that year (HRW 2018). It also featured prominently in HRW's media reporting, and via videos and slider apps on the HRW web page. - see <https://www.hrw.org/report/2018/07/19/these-killings-can-be-stopped/abuses-government-and-separatist-groups-camerouns>.

villages, and the construction of government and military infrastructure over the top of them. As one of the Myanmar researchers put it, RS imagery provides “an ability to do research on issues that we wouldn't be able to do at all otherwise” (Interview, Washington 2018).

Imagery is also an important tool in the gathering of witness testimony itself. Researchers use RS platforms (such as Google Earth) as orientation tools in order to be able to visualize the environment and landscape under investigation, prior to starting the process of taking statements. In addition, several researchers spoke about their interviewing process, in which they would take down the individual's testimony, and then subsequently ask them to go back through the narrative with the use of physical RS imagery print-outs. Explained as a way to clarify details given in statements (such as the location of specific households, the direction of militia movements, or where the ethnic divisions within a community were geographically located), this was presented as an important factor in isolating geographic data from different perspectives. As one senior investigator put it, “I would walk them through those [geographic] questions in detail first to try to not bias them by presenting an image, but then once we've walked through that, to present an image and then say, "Okay, can you label which area is which?" (Interview, Washington 2018). In this manner, the material element of the print-out becomes an actant in the investigative process, serving to clarify and re-frame information, both for the witness and the investigator. As a member of HRWs E-Team described it, “it's reassuring in the sense that it gives credence to the testimonies that one gathers in the field, if you're not able to verify it with your own eye at least having those images, it's settling... the data you've gathered, yeah, it makes you more convinced as well, potentially, and therefore makes you a better advocate” (Interview, Skype 2018).

In a more direct sense of RS as an *immutable mobile*, imagery can also function as an authoritative codification of human rights “knowledge” for investigators in the field. Several interviewees explained their experience of using the imagery in confrontations with local authorities and suspected perpetrators. The notion of revealed truth and omniscience afforded by the “God’s eye view” of digitally captured RS imagery, in combination with the research, analysis, and annotation of the imagery by the investigative team, was held up as a powerful element in re-enforcing the narratives provided by victim communities. Dismissed by authorities as uneducated, ignorant, or simply untrustworthy, victim narratives are often deliberately undermined or devalued by military officers and government officials during formal interviews. However, as described by Latour (1990) in his exploration of the codification of knowledge through the act of inscription, while a map of geographical knowledge produced by a European explorer holds no inherently greater value than the same geographic knowledge held by an indigenous fisherman, once that knowledge is codified, it is transferable in a way that greatly enhances its perceived value. In this instance, the GEOINT imagery becomes a form of supplemental representation that fundamentally re-enforces the victim community’s narrative, adding authority to the voice of the voiceless, in a manner that is exponentially more difficult to dismiss, refute, or deny.²⁹ It becomes a significant element in the processes of ordering that define the overall narrative of the crisis or conflict situation in question.

3.4.3 Practice of RS use in advocacy:

²⁹ It should be noted that this can be a double edged sword. In one particularly notorious incident, a senior member of HRWs E-Team directly confronted a militia leader in the D.R.C. with RS imagery evidence of human rights violations perpetrated by troops under his command. This led to serious concerns over the immediate safety of the team, and the event is now used as a cautionary tale for researchers going into the field (Interview, Geneva 2018).

The idea of RS imagery as irrefutable, or at the very least as difficult to discount, transfers over from its use in the investigative process, into its application for advocacy purposes. The broad, public expositional value afforded to RS imagery is well documented elsewhere (Herscher 2014, Witjes & Olbrich 2017, Rothe & Shim 2018) and is clearly a central factor in its inclusion by IHR groups into briefing documents, press releases, investigative reports, and dedicated web pages. What is less well explored in the literature are the ways in which RS functions for IHR investigations outside of general public consumption. Increasingly, groups such as AI and HRW are able to leverage RS analysis to directly contradict state orchestrated narratives, placing pressure on actors on both the domestic and international plane. For example, in early 2018, HRW leveraged their imagery and analysis directly in interviews with the military leadership in Myanmar. According to a senior member of the HRW executive team, this resulted in severe consternation on the part of the state authorities, who struggled to respond to the evidence presented. This was described as an example of the power of RS to fundamentally shape how HRW was positioned in regards to a hostile state, as:

[G]overnments get away with misconduct by hiding it...if they think they're doing it in the closet they're more likely to misbehave. The remote imagery enables us to be able to peer into the closet... [a] government or a security force pays a price for misconduct. And the price can be stigmatization and embarrassment, it can be denial of various forms of international assistance, it can be prosecution. But a lot of what the human rights movement does is to try to effect the cost benefit analysis of governments or security forces, that are contemplating human rights abuses (Interview, Geneva 2018).

RS imagery is also called upon to help prompt responses from powerful state actors, the international community, and any relevant intergovernmental organizations in the IHR community. Although some institutions (such as the UN) do not include imagery in their internal documentation, reports furnished by INGO actors such as AI and HRW often use the visual

impact afforded by such elements to help sway – and sometimes shame – actors into responding. In interviews for this study, multiple researchers commented on the way that the inclusion of an RS image during presentations to legislators, diplomats, security briefings, or foreign ministries would provoke stronger reactions than the dozens of eyewitness testimonies or other forms of meticulous analysis that made up the bulk of the presentation. This can be frustrating, even as it proves to be significant in capturing the interest of participants. As one researcher described it, “It's actually really maddening to me at times because it's like, "I've interviewed 30 people from this village. They've all told a highly consistent account, and the only thing that really registers with them is the [RS] image." (Interview, Washington 2018). In effect, even in the context of an engaged, IHR literate community of experts and policy makers, the ability of RS imagery to perform as an *immutable mobile* in the codification of rights oriented “knowledge” is a powerful element for INGO actors hoping to influence how a crisis or conflict narrative is understood. As is the case with re-enforcing victim community testimonies during the investigative processes, RS imagery has often proved to be pivotal in meetings with policy makers and others, as the visceral nature of the top down perspective has “broken through the distrust of testimonies” (Interview, Washington 2018).

In an even more direct sense, groups such as AI and HRW are able to leverage their reputations for meticulous research in order to place RS products in the hands of important international actors, as forms of independent geo-spatial analysis. For example, during the early participant observation phase of this research, the crisis in Rakhine State had reached almost unimaginable proportions, with hundreds of thousands of refugees overwhelming Cox’s Bazar in Bangladesh, constant reports of ongoing efforts at ethnic cleansing within Rakhine State, and the development of the “reconstruction” phase of the State’s response to the crisis - simultaneously

discussing the return of the Rohingya population, while actively destroying their communities and effacing the notion of having any “home” to return to.

During this period, the UN Security Council (UNSC) sent a delegation to the region in order to have a first hand view of the conditions, both in Bangladesh and within Myanmar itself. During their visit to Rakhine State, the delegates were directed to a variety of resettlement locations by the military authorities, including transit centers and a reception camp. They were also escorted to meetings with pre-selected individuals, described in the press as “members of different groups affected by the violence, including Rakhine Buddhists, Hindus and some Muslims who did not flee” (AP News 2018). Throughout this process the delegates were shepherded by military handlers, keen on demonstrating the efforts of the state to facilitate an orderly return.

For the research team at HRW, the sending of a UNSC delegation presented an opportunity to directly influence important individuals within the international community, in part through the use of RS analysis produced by the Geneva office. Having already expended a significant amount of time and effort at producing a comprehensive overview of the situation in Rakhine state, the chief analyst at HRW had a substantial dataset of imagery and locations to call upon. Aside from the multitude of publicly released assessments used in previous reports, this data-set included detailed analysis of thousands of individual villages and locations within the region, as well as a continuously evolving series of identified reconstruction locations. This data had already proved important in providing materials for senior HRW officers during their interactions with military and government authorities in Myanmar, and the arrival of the delegation afforded an ideal opportunity to extend the use of this material, in near real time.

In the days leading up to UNSC group's arrival in Rakhine state, a significant increase in the level of inter-office communication (via email, SMS, and direct telephone contact) took place between the various members engaged with the Myanmar team. This included individuals in Berlin, New York, and Bangkok, as well as in those in the field in Bangladesh. As the RS specialists for HRW, the Geneva office became a pivotal element in the strategic planning for the delegation's arrival in country, as it was decided that HRW should produce a series of analytical products focusing on likely locations for the UN delegates to be shown. These RS "maps" were intended to provide clear examples of the ethnic cleansing, village destruction, and other forms of erasure taking place within the immediate geographic vicinity of the "sanitized" camps prepared for viewing by the Tatmadaw.

Through the use of long established back channel contacts between senior investigators and members of the UNSC team, these locational analysis maps were then forwarded to delegation members for use as print-outs on the ground. These documents were deliberately designed to allow delegates to refute Tatmadaw talking points and obfuscation. As the analyst in charge of production described it, "when they are smiling, and telling you to come look at this pristine village, you can turn around and ask about this other one, five kilometers down the road, and ask to see that one as well." (Interview, Geneva 2018).

An intense debate took place within the team concerning the level of detail, forms of annotation, and the acknowledgement of authorship to be included on these maps. The visual styling of the documents, including the use of cartographic elements and font types, were all given close consideration, as it was ultimately decided that they should not be directly recognizable as HRW products. In other words, the function of these maps was not to promote HRW's particular research agenda, or to extend the organization's influence

with the UNSC team. Instead, there were designed to provide an informational lever for UNSC delegates during their limited time in the field, and while interacting with state authorities. Despite the intense level of effort and co-ordination that went into their creation (including frequent re-evaluations, and multiple requests for new locations during the delegation's time on the ground) none of this analysis was intended for public consumption. These products drew on the diverse expertise of members of the research team at all levels of the organization, and required the leveraging of personal connections along side the organization's reputation for RS oriented analysis. As a result, this example demonstrates the ways in which RS had become fully integrated into every aspect of HRW's approach to monitoring, documentation, and advocacy for emerging crisis situations.

3.5 Conclusions:

Remote sensing as a technological ideal is constantly shifting. The development of new sensors, new platforms, new processes for public access and dissemination, all serve to remind us that this is a technology emerging from its infancy. Its adoption by the IHR community, and in particular the non-state realm of INGO advocacy, demonstrates the enormous potential effect that an emergent technology can have. RS provides groups such as Amnesty International and Human Rights Watch with an independent and verifiable source of geographic intelligence – a capacity that until a few short years ago was the sole purview of major geo-political actors. It also provides a solid triangulation point (both geographically and temporally) for other, more traditionally sourced information. From the perspective of an IHR researcher, investigator or advocate, it is pretty impressive.

However, it is not a ‘silver bullet’, is not applicable for all forms of violation, and its application is geographically contingent on both coverage and visibility. Nor is it understood within the IHR advocacy community as a replacement for traditional investigative methods – rather, it facilitates a new set of investigative and analytical tools that enhance the process of investigation, and can serve to re-enforce the weight afforded to the voices of vulnerable and disenfranchised communities. Most significantly, it enables researchers to explore the scale of some forms of violations, as well as the immediacy of ongoing processes. This is especially important in situations where ground access is denied, restricted, or simply just too dangerous.

The ubiquitous use of satellite (and increasingly drone /UAV) imagery in news reporting and popular media on crisis or conflict situations has prompted scholars to look at the impact RS imagery is having on Western oriented IHR actors. However, the routinized use of such images obscures the mangle of practice inherent in their production. RS analysis can be a messy, contested process, undertaken in a variety of ways, and with distinct working practices even within the relatively small epistemic community of IHR analysts. Different workflows, different software, different hardware, and in some cases fundamentally different approaches towards the role of IHR advocacy all contribute to the heterogeneous manner in which RS technology is understood. However, the ability of annotated RS products to function as *immutable mobiles* for the purposes of establishing human rights “knowledge” is key to their adoption and utility. The God’s eye view is a powerful concept, and when combined with other sources of IHR information can provide significant leverage for non-state actors in the pursuit of their goals.

While the shift in geographical reach is the most prominent geopolitical effect of INGO access to RS technology – particularly when used against state actors – I would argue it is the temporal shift in the capacity of IHR actors to investigate ongoing violations that is more

significant. Researchers are increasingly able to access imagery taken within days (if not hours) of an event taking place. Modern delivery systems, online portals of imagery, and the ability for teams to rapidly share data means that groups such as AI and HRW can be supporting initial investigations and validating eye-witness statements within minutes of receiving the request. Even in cases where extensive analysis of a situation is required, taking several days or even weeks to accomplish, GEOINT analysis allows for impactful advocacy and intervention into the framing of crises situations as they develop. This can take the form of explicit refutation of state orchestrated narratives, or attempts to directly influence elite decision makers and policy analysts within the international community.

The fact that RS imagery tells a powerful story also serves to obfuscate the complex, recursive processes that go into its production and use. As the technology evolves so too will the mangle of practice involved in its exploitation. The promise of advanced machine learning and automated monitoring/warning systems is an obvious case in point, but it is not the only major shift underway. The mangle of practice involved in RS analysis is not only a function of the relationship between the analyst and the hardware/software components at her disposal, but also between the expectations of the research team and the analyst, the investigator and the vulnerable community at risk, and the organization and the perpetrators under observation. Each successful application of RS imagery (either internally, or as part of external publications) helps to inculcate RS as a supplemental, specialized tool set available to help investigations move forward. It is not a static ideal, but one that is in constant flux - advancing from what it is, into what it will become - and while it is neither a perfect nor a universally applicable tool, it has clear value for non-state IHR actors as they seek to exert geo-political pressure on states and intergovernmental institutions alike.

3.6 References:

- Adler, E. 2013. Constructivism in international relations: sources, contributions, and debates. *Handbook of international relations*, 2, pp.112-144.
- Adler, E. and V. Pouliot. 2011a. International practices. *International Theory* 3 (1): 1–36.
- Adler, E. and V. Pouliot, V. 2011b. *International Practices*. Cambridge: Cambridge University Press.
- AP News. 2018. UN Security Council delegation seeks Rohingya's safe return. Associated Press, March 1. Web. Available: <https://apnews.com/article/35a21a87a29747699d6fbc057c2e4307> [8 July 2019]
- Breakey, H. 2012. The responsibility to protect and the protection of civilians in armed conflict: overlap and contrast. *Norms of protection: Responsibility to protect, protection of civilians and their interaction*, edited by C. Sampford, A. Francis and V. Popovski, (pp.62-81). Geneva: United Nations University.
- Bueger, C. 2014. From expert communities to epistemic arrangements: situating expertise in international relations. In *The Global Politics of Science and Technology-Vol. 1* (pp. 39-54). Springer Berlin Heidelberg.
- Bueger, C. 2015. Making things known: epistemic practices, the United Nations, and the translation of piracy. *International political sociology*, 9(1), pp.1-18.
- Bueger, C. and F. Bethke. 2014. Actor-networking the 'failed state'—an enquiry into the life of concepts. *Journal of International Relations and Development*, 17(1), pp.30-60.
- Bueger, C. and F. Gadinger. 2014. *International practice theory. New perspectives*. Basingstoke: Palgrave Macmillan.
- Bueger, C. and F. Gadinger. 2015. The play of international practice: Minimalism, pragmatism and critical theory. *International Studies Quarterly*, doi: 10.1111/isqu.12202
- Callon, M. 1984. Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. *The Sociological Review*, 32(1_suppl), pp.196-233.
- Cooren, F., F. Matte, J. R. Taylor, and C. Vasquez. 2007. A humanitarian organization in action. *Discourse & Communication*, 1(2), pp.153-190.
- Cornut, J., 2015. The Practice Turn in International Relations Theory. *The International Studies Encyclopedia, International Studies Association Online*.
- Dodge, M., & C. Perkins. 2009. The 'view from nowhere'? Spatial politics and cultural significance of high-resolution satellite imagery. *Geoforum*, 40(4), 497-501.

- Gregory, D. 2011. From a view to a kill: Drones and late modern war. *Theory, Culture & Society*, 28(7-8), pp.188-215.
- Hasian Jr, M., 2016. *Forensic rhetoric and satellite surveillance: The visualization of war crimes and human rights violations* (Lanham, MD: Lexington Books).
- Harris, G. et al, 2017. Syrian crematory is hiding mass killings of prisoners, U.S. says. *New York Times*, May 15th.
- Herscher, A. 2014. Surveillant Witnessing: Satellite Imagery and the Visual Politics of Human Rights. *Public Culture*, 26(3 74), pp.469-500.
- Human Rights Watch. 2018. 'These Killings Can Be Stopped': Abuses by government and separatist groups in Cameroon's anglophone regions. Available: www.hrw.org/report/2018/07/19/these-killings-can-be-stopped/abuses-government-and-separatist-groups-camerrooms [8 July 2019]
- Latour, B. 1990. Visualisation and cognition: Drawing things together. *Representation in scientific practice*, pp.19-68.
- Latour, B. and C. Venn. 2002. Morality and technology. *Theory, culture & society*, 19(5-6), pp.247-260
- Latour, B. 2005. *Reassembling the social: An introduction to actor-network-theory*. Oxford university press.
- Law, J. 1992. Notes on the theory of actor-network: Ordering, strategy, and heterogeneity. *Systems Practice* 5:379-93.
- Livingston, S. 2015. Commercial Remote Sensing Satellites and the Regulation of Violence in Areas of Limited Statehood. *ICTs, Statebuilding and Peacebuilding in Africa*, CGCS Occasional Paper Series #5. [Online]. Available: <https://repository.upenn.edu/africaictresearch/6> [8 July 2019]
- Mayer, M. 2012. Chaotic climate change and security. *International Political Sociology*, 6(2), pp.165-185.
- Müller, M. 2012. Opening the black box of the organization: Socio-material practices of geopolitical ordering. *Political Geography*, 31(6), pp.379-388.
- Olbrich, P. 2019. Technological expectations and global politics: Three waves of enthusiasm in non-governmental remote sensing. *Space Policy*, 47, pp.107-116
- Olsson, C. 2015. Interventionism as Practice: On 'ordinary transgressions' and their routinization. *Journal of Intervention and Statebuilding*, 9(4), pp.425-441.

- Parks, L. 2009. Digging into Google earth: An analysis of “crisis in Darfur”. *Geoforum*, 40(4), 535-545.
- Pickering, A. 1995. *The Mangle of Practice*. Chicago: University of Chicago Press.
- Pomarède, J., and T. Schjødt. 2015. Security Identities and ‘No More, No Less’ Operations. *Journal of Intervention and Statebuilding* 9 (4).
- Pouliot, V. 2007. “Subjectivism”: Toward a Constructivist Methodology. *International Studies Quarterly* 51 (2): 359–384.
- Pouliot, V. 2008. The Logic of Practicality: A Theory of Practice of Security Communities. *International Organization* 62 (2): 257–288.
- Pouliot, V. and J. Cornut, J. 2015. Practice theory and the study of diplomacy: A research agenda. *Cooperation and conflict*, 50(3), pp.297-315.
- Raman, S., and S. Livingston. 2018. Human rights documentation in limited access areas: The use of technology in war crimes and human rights abuse investigations. *Carr Center for Human Rights Policy*. Cambridge.
- Rothe, D, and D. Shim. 2018. Sensing the ground: On the global politics of satellite-based activism. *Review of International Studies*, 44(3), 414-437.
- Sandvik, K. B., et al. 2014. Humanitarian technology: A critical research agenda. *International Review of the Red Cross* 1-24
- Sandvik, K.B., and K. Lohne, 2014. The rise of the humanitarian drone: giving content to an emerging concept. *Millennium-Journal of International Studies* 43.1: 145-164.
- Stroup, S.S. 2012. *Borders among activists: international NGOs in the United States, Britain, and France*. [Cornell University Press: Ithaca New York.]
- Walker, J. 2020. Remote sensing for international human rights advocacy: Critiques and responses. *Journal of Human Rights*, 19(2): 183-200.
- Winner, L. 1980. Do artifacts have politics? *Daedalus*, 121–136.
- Winner, L. 2010. *The Whale and the Reactor: A Search for Limits in an Age of High Technology*. University Of Chicago Press.
- Witmer, F., 2015. Remote sensing of violent conflict: eyes from above. *International Journal of Remote Sensing*, 36(9), 2326-2352.
- Witjes, N. and P. Olbrich. 2017. A fragile transparency: satellite imagery analysis, non-state actors, and visual representations of security. *Science and Public Policy*, 44(4), 524-534.

Chapter 4.

Rakhine Skies:

Remote Sensing, Human Rights, and the Rohingya Crisis

4.1 Introduction:

In December of 2019, Aung San Suu Kyi addressed the International Court of Justice (ICJ) in the Hague. Responding to a case brought by the Republic of the Gambia which accused the Myanmar authorities of engaging in mass atrocities and genocide against the Rohingya minority community of Rakhine State, she struck a defiant tone, accusing the international community of misrepresenting the crisis, and placing the blame squarely on the shoulders of “terrorist” groups intent on civil disruption. Pointedly, while she would not use the term Rohingya, she did single out groups she felt were engaging in “hate narratives” – namely:

Leaders of States and relevant inter-governmental and non-governmental organisations [who] should also be cognisant of their responsibility to express and affirm fundamental values. Feeding the flames of an extreme polarisation in the context of Rakhine, for example, can harm the values of peace and harmony in Myanmar. Aggravating the wounds of conflict can undermine unity in Rakhine. (Myanmar Times 2019)

The highlighting of both inter and non-governmental organizations by a head of state standing before a United Nations (UN) tribunal is telling. It demonstrates the impact such groups can have as geo-political actors when reporting on crisis situations. In the case of Myanmar, which has engaged in a deliberate strategy of non-cooperation and exclusion of inter-governmental and civil society actors, many of the most important efforts to understand the crimes in Rakhine State

have emphasized the role of Remote Sensing (RS) technology as an integral part of the investigative and evidentiary process. More so than in any previous crisis, non-governmental International Human Rights (IHR) actors such as Human Rights Watch (HRW) and Amnesty International (AI) have employed RS data (satellite imagery and analysis) as pivotal elements in their reporting on the plight of the Rohingya. In essence, when Aung San Suu Kyi argued that IHR actors were misrepresenting the situation and “feeding the flames of an extreme polarization” she was attempting to undermine the visceral and horrifying impact of thousands of witness statements and testimony gathered from victims and survivors - testimonies which had been heavily substantiated through the use of RS technology.

This chapter argues that the crisis in Rakhine State has become a watershed moment for the IHR community as it starts to fully embrace the use of RS technology across multiple levels of both inter-governmental and non-governmental investigative processes. From traditional investigators in the field, to research teams in Bangkok, Geneva, and Washington D.C., to UN orchestrated “fact finding missions” and “commission of inquiry”, up to the international courtrooms of the Hague, RS imagery has been central to cutting through the dis-information and obfuscation of the state while simultaneously helping to amplify the voices of the victimized, forcing the world to acknowledge what Myanmar’s shield of territorial sovereignty can no longer hide.

While a number of papers have explored technical applications of RS use in documenting the Rohingya crisis (Hassan et al 2018; Marx, Windisch, and Kim 2019; Braun, Fakhri, and Hochschild 2019), in focusing on the intersection between geo-politics and the use of an explicitly geographic technology, I am responding to Carmalt’s (2018, 2019) call for scholars to engage with critical geographies of human rights – especially in terms of practice, contestation,

and multi-scalar processes. Likewise, following Müller's (2012) call for political geographers to explore the socio-material practices of geopolitical ordering, the qualitative analysis incorporated into this case study is derived from several months of participant observation undertaken with the remote sensing specialists at HRW and AI in 2018. In addition, several rounds of initial and follow-up (both in-person and online) interviews were conducted with a broad cross section of analysts and investigators from the IGO and INGO communities throughout 2018 – 2020. This chapter also draws on an extensive catalog of published reports focused on the crisis in Rakhine State, as well as internal working documents produced during the investigative processes involved.³⁰

4.2 Background on RS terminology:

Satellite images of warfare and destruction have become a staple part of international reporting on crises situations. They are often presented in the media as demonstrating a form of objective, digitally captured “truth,” - an idea that has drawn considerable critique from scholars exploring the adoption of the technology, including by INGOs and other activist communities (Dodge and Perkins 2009; Herscher 2014; Witmer 2015; Hasian 2016; Witjes and Olbrich 2017; Rothe and Shim 2018; Walker 2020). As a result, it is important to understand the mechanics behind the capture and creation of RS imagery.

Remote sensing (also known as Earth Observation, or EO) relies upon the capture of electromagnetic energy into “bands” (such as the red, blue, green, or thermal wavelengths) by sensors aboard orbital (satellite) and sub-orbital (planes and UAV) platforms. Selected bands are

³⁰ It is important to acknowledge how privileged I've been to have unfettered access to the people, documents, and working processes involved in this study. As is appropriate when dealing with a small, niche community of experts (such as is the case with RS analysts in the IHR community), all direct quotations have been anonymized.

then combined to create composite images for analysis. The most commonly used combinations in IHR publications are RGB, or “true color approximation” images. Occasionally, organizations such as AI will release Near Infrared or NDVI images which highlight burn-scars and/or the relative health of plants and ground cover. Although not often used for direct visualization purposes, analytical products derived from thermal bands often inform analysis, as does the use of Synthetic Aperture Radar (SAR).

Imagery data also comes in different “ground resolutions” - the smaller the number, the higher the resolution, and the greater the detail available in the image (for example, 3m, 1m, and 0.31m). Most IHR reports rely on the use of <2m, or “Very High Resolution” (VHR) imagery, although the recent advent of high resolution (3 to 5m) constellations of “Small-Sat” flocks has begun to make a significant impression on monitoring programs, due to their effect on temporal repeat time. A company like Planet, for example, has a constellation of “Dove” sensors in low earth orbit, which take an image of everywhere on Earth once a day, in four bands (R,G,B, and thermal), and at a resolution of circa 3m.

4.3 Prior instances of RS in IHR investigations:

In order to understand the significance of RS usage over Rakhine State, it is helpful to review the ways in which it has previously manifested in major IHR investigations. As is always the case in the adaptation of an emerging technology into a new environment, the practice of RS usage by IHR teams has developed over time. With a technology that stems from a distinctive epistemological background in military intelligence and aerial targeting (Dodge and Perkins 2009; Sandvik and Lohne 2014), but embraced by an epistemic community of human rights remote sensing practitioners predominantly trained in environmental science (Walker 2020), the application of RS has had a unique trajectory – in essence, the technology has been selectively

utilized by a scientifically oriented community of analysts for use in IHR investigations. It should also be emphasized that the following examples are not exhaustive, but indicative of developments taking place across a broad swath of groups engaged in IHR analysis.

The first significant public use of RS imagery in an IHR context dates from the Balkan conflicts of the mid-1990s. A series of declassified military images released by the Clinton administration in 1995 purported to show evidence of a series of mass graves outside of Srebrenica, Bosnia. The effect of these rather grainy black and white images was profound, helping to spur a strong sense of public outrage, and ultimately having a direct (and clearly intentional) impact on the international response to the Bosnian crisis (Parks 2001). In this instance, RS functioned in its traditional capacity as a tool of military statecraft, wielded by a major geo-political actor, but in the context of illuminating a gross violation of human rights.³¹

Following on from the Bosnian crisis, another milestone for RS adoption came in 2000, with the first uses of commercial RS imagery over North Korea (Broad 2000). The impact of commercially available satellite images of a suspected nuclear missile site helped spur interest from activist groups engaged in monitoring the human rights conditions inside the state. This culminated in the release of *The Hidden Gulag: Exposing North Korea's Prison Camps* by the U.S. Committee for Human Rights in North Korea (Hawk 2003) – a report which emphasized personal testimonies in conjunction with RS imagery. In terms of IHR acceptance, the

³¹ It is interesting to note that, stemming from this period, the international community began to develop the “Responsibility to Protect” doctrine (Evans and Sahnoun 2002), as well as establishing the International Criminal Court (ICC) – both expressions of a developing Westphalian understanding of IHR. These developments were taking place as the nascent private corporate RS industry was beginning to expand, allowing for a parallel development in both RS capacity and the desire to use it for IHR purposes.

tremendous public interest in this publication helped to solidify the perception of satellite imagery as a means to circumvent traditional notions of sovereign territorial exclusion.³²

By 2007, the public perception of RS as a form of the “all seeing eye” became central to efforts to publicize the catastrophic events taking place in the Sudan. The “Crisis in Darfur” project orchestrated by the US Holocaust Memorial Museum emphasized the role of Google Earth, and the direct participation of online activists to “monitor” the Darfur region. Although the effectiveness and intent of the process has been criticized (see Parks 2009), it was wildly popular with both the public and the press, serving to raise the profile of the crisis significantly. By 2010 the Satellite Sentinel Project (SSP) was taking a distinctly more targeted approach to satellite monitoring. Described by reporters as George Clooney’s “anti-genocide paparazzi” (Benjamin 2010) SSP actively engaged in crisis monitoring in an attempt to provide proactive assessments of developments on the ground – a form of “early warning” system more akin to traditional geo-spatial intelligence gathering, albeit funded and organized by a non-state actor, and utilizing corporate RS products.³³

By the time that the Syrian war began to envelop the country in 2011, the role of RS had already started to be deeply embedded into the working practices of IHR monitoring. Public perceptions of the crisis were again shaped by press pick-up of RS analysis, particularly in 2012 during the Assad offensives against the cities of Homs and Hama (see Howard 2012), and into 2013 with the shelling of Aleppo. The near total devastation of neighbourhoods in the city was documented by a variety of non-state groups, including both HRW and AI, along with the

³² For an comprehensive analysis of the geopolitical role of RS over North Korea, please see Shim 2014.

³³ While the SSP process has also been the subject of debate - particularly over the potential effectiveness for an *Ambient Protective Effect* (APE) afforded by satellite monitoring, one of the key founders of SSP, N. Raymond, along with PIRO researcher K. Sandvik provide an important exploration of the implications (and limitations) of technology for mass atrocity and APE in Sandvik & Raymond 2017.

American Association for the Advancement of Science (AAAS). The resulting images highlighted the almost apocalyptic landscape of the city, compared by journalists to the aftermath of war in Dresden and Grozny (Laub 2016).

As the world was coming to terms with the visual evidence of mass horror and destruction afforded by RS imagery, the IHR community was settling into a new paradigm of investigation and documentation for major human rights violations. The quickly escalating situation in Rakhine State, Myanmar, stood at the confluence of several important threads in RS adoption – the development and maturation of the private corporate RS world, a remarkable increase in data capture, accessibility, and coverage, a growing public familiarity with RS imagery, and an established community of IHR analysts and field researchers keen to use whatever tools they had available to expose the actions of the state against the Rohingya people.

4.4 Background to the Conflict:

While there is insufficient space available to review the historical, social, and cultural factors that are central to the crisis in Rakhine State, it is important to recognize that the on-going persecution directed towards the Rohingya ethnic minority is just the latest in a long series of state orchestrated efforts to oppress and disenfranchise Myanmar’s Muslim ‘other’ (Wade 2019).³⁴ This chapter will engage with a series of distinct waves of Rohingya persecution that have precipitated the use of RS as an emerging investigative tool by IGO and INGO groups – namely, events in 2012, 2016, and the current “textbook case of ethnic cleansing” (Al Hussein 2017) that

³⁴ A number of important papers have explored the historical context of Rohingya persecution (see Zarni and Cowley 2014; Brooten and Verbruggen 2017; Cheesman 2017) and in particular, the work of Mahmood et al (2017) provides a comprehensive timeline of the Rohingya people in the region from 1785 through 2016. In addition, the Transnational Institute has an extensive report on the complex history of Rohingya political organization (see Smith 2019), while Carmalt (2019) explores the significance of the Rohingya plight in terms of international law, geo-politics, and the importance of critical geographies of human rights.

began in 2017 and continues to this day. To be clear, while a review of the history of the region demonstrates the interconnectivity of these “waves,” the current chapter separates them out for the purposes of illustrating the increasingly significant role of RS as an element of documentation, and an essential investigative toolset.

2012:

In May of 2012 the reported rape of a Buddhist woman by three Muslim men set off a firestorm of anti-Muslim violence across Myanmar. While much of the resulting loss of life and displacement was reported at the time (particularly in regards to Rakhine State) as the result of “inter-ethnic tensions”, many sources now emphasize the orchestrated, State led violence. The development of ideal “Buddhist Villages” by the central government are a prime example of the exacerbation of existing tensions within the region, as was the explicit promotion of radical Buddhist propaganda by politically oriented religious leaders (Wade 2019). Despite this orchestration, much of the initial outside reporting focused on the ground-level interactions and violence between Buddhist and Muslim communities. This had changed by 2013, when HRW published their first major report on the crisis (HRW 2013a), which blamed the on-going violence on the Myanmar authorities.

Several incidents in 2012 prompted the use of RS imagery over Rakhine state.³⁵ One of the first major sets of analysis focused on another Muslim minority group, the Kaman. Through the use of VHR imagery from Digital Globe, HRW highlighted the complete destruction of Kaman areas of the coastal city of Kyauk Pyu (HRW 2012). This was followed by a number of releases using RS to document mass house burnings and the eradication of Muslim enclaves across Rakhine state (for a prime example, see HRW 2013b). While RS imagery contributed to

³⁵ It should be noted that the earliest use of RS for IHR purposes over Myanmar as a whole date from a 2007 to 2009 offensive in Karen and Shan states in Eastern Myanmar - See Pinholster 2010.

the visual impact of the reports from this period, it was not extensive, nor systematically applied. Non-the-less, it did have an impact, and in conversations with several INGO researchers who worked on Myanmar at that time, its presence was particularly profound when viewed by the local military authorities. This was the first time the Tatmadaw (the Myanmar military) would be directly confronted with RS evidence over Rakhine State that clearly falsified the official narrative of events on the ground.

As the levels of violence began to subside (but not disappear entirely), the situation for the minority populations in the region became increasingly dire. The social “othering” of groups such as the Rohingya became the *de facto* state policy, as they were forcibly relocated to internment camps, or fenced into ethnically proscribed areas of previously intermingled towns and villages - setting the stage for the next major wave of events.

2016:

By August of 2016 the appalling situation in Rakhine State had prompted significant calls for redress from the international community. As a result, Amnesty International’s lauded “Ambassador of Conscience”³⁶ and recently elected Head of Government, Aung San Suu Kyi, formed the “Advisory Commission on Rakhine State”, headed by former UN Secretary General Kofi Annan. Just over a month later assailants described by the Tatmadaw as “Bengali” terrorists launched a series of assaults against several Northern Rakhine Police stations, killing 9 officers. The effect was immediate and horrific.

Within hours reprisal attacks were launched across the area, resulting in massacres of Rohingya villagers in multiple locations. Within days it became apparent this violence was being directed by the military. Within weeks INGOs were releasing RS imagery of burnt villages,

³⁶ Amnesty International rescinded Suu Kyi’s title in 2018, during the ongoing aftermath of the 2017 military campaign against the Rohingya, and one year before her appearance before the ICJ.

while reporters were detailing eye-witness accounts of men, women, and children being gunned down by border guards (Quarid and Wa 2016), and helicopter gunships decimating entire Rohingya villages (BBC 2016). The clearly orchestrated nature of the events taking place made the use of RS analysis by groups such as AI, HRW and UNOSAT at the UN significantly more important in understanding the scope of the atrocities underway.

Both AI and HRW released several reports on the 2016 wave of violence, many of which contained analysis derived from RS imagery, and most of which contained direct RS visualizations (see fig.1). These releases had a profound effect on the international public perceptions of the crisis and were heavily quoted by journalists reporting on the situation. As in 2012, the Tatmadaw took particular notice of the use of RS. In a response to HRW's post *Burma: Massive Destruction of Rohingya Villages* (2016c) a Government spokesman gave a press conference in November of 2016 to call out the false reporting and exaggerated claims of village destruction from foreign investigators (Zaw Htay 2016). Using images taken from what appeared to be helicopter reconnaissance of Maungdaw District, the government analysis attempted to refute the HRW report through the production of their own imagery. While the veracity of the government position was debatable at best³⁷, for the purposes of this paper, the fact that the Myanmar authorities felt compelled to attempt to discredit RS analysis produced by a foreign IHR actor is highly significant. From the position of HRW's Myanmar team, this was an important admission of the impact their analysis was having.

³⁷ In fact, the senior analyst for HRW was able to reconstruct the "analysis" done on the aerial images provided by the Myanmar authorities. As became quickly apparent through the use of high-resolution satellite imagery, not only did the photographs not prove any inaccuracies in the original HRW reporting; they actually highlighted previously unknown areas of destruction.

2017 Onwards:

In March of 2017 the UN Human Rights Council (UNHRC) founded the Independent International Fact-Finding Mission on Myanmar (IIFMM) to investigate events in the region stemming from 2011 onwards. The situation on the ground continued to be tense, with sporadic violence and thousands of Rohingya refugees fleeing into Bangladesh, while the rest of the population was increasingly isolated into ethnic enclaves and camps.

Large scale violence erupted again after an August 25th attack by the Arakan Rohingya Salvation Army (ARSA) against a number of government facilities in Northern Rakhine State, resulting in the death of 12 members of the Security Forces. As in 2016, the response from the Tatmadaw was swift, horrific, and indiscriminate, but on a much wider scale than before. Within a matter of days HRW and AI began releasing a flurry of press reports that utilized RS imagery to document the destruction (see HRW 2017a, 2017b; AI 2017a, 2017b). By mid September, the Office of the High Commissioner for Human Rights (OHCHR) had sent a delegation to review in person the exploding “Cox’s Bazar” refugee camp across the border in Bangladesh, and the High Commissioner himself was referring to the crisis as a “textbook example of ethnic cleansing” (Al Hussein 2017). Significantly, he highlighted the evidence provided by RS imagery of the on-going crimes being perpetrated against the Rohingya. Shortly thereafter the UN extended its “fact finding mandate”, and UNOSAT released their own RS assessment of destruction in Muangdaw & Buthingduan Townships (UNOSAT 2017).

By 2018 the constant stream of IHR reports being generated (by both INGO and IGO organizations) were gaining significant attention from international media, with major news organizations heavily quoting HRW and AI reports on the crisis, as well as publishing multiple RS images demonstrating the “before and after” effects of ethnic cleansing. By March, Amnesty was using RS to detail an additional crime taking place in Rakhine; the bulldozing and

eradication of Rohingya villages, in what they described as an orchestrated plan to remake Rakhine State and stop the repatriation of refugees from Bangladesh (AI 2018a).

In September of 2018 the IIFFMM released its report on the situation in Rakhine. The report identified several important figures within the Tatmadaw as personally responsible for the atrocities committed and recommended that they be tried before an international criminal tribunal (IIFFMM 2018). The report included analysis of more than 50 images produced by UNOSAT, to substantiate its claims. The inclusion of so many RS products in a UNHRC report is very significant. While most previous fact finding reports on other regions contain some reference to the use of RS as an investigative tool, very few include the imagery itself, and when they do it is rarely more than a few shots. In the case of the IIFFMM report, the RS imagery is a central element, rather than a footnote to the findings. Shortly thereafter the UN established the Independent Investigative Mechanism for Myanmar (IIMM) with the express mandate to "collect evidence of the most serious international crimes and violations of international law and prepare files for criminal prosecution" (IIMM 2020).

After another attack against government forces killed 14 security personnel in January of 2019, there was a further surge in violence across the region. Familiar patterns of indiscriminate violence, burnings, and destruction were documented by IHR actors, once again utilizing RS imagery as important elements in the investigative and documentary process (for a comprehensive example, see *No One Can Protect Us*, AI 2019a). The placement of security compounds, the positioning of artillery and heavy weapons groups, and other forms of military deployment were clearly identified and analyzed as evidence of the systematic displacement of the Rohingya population.

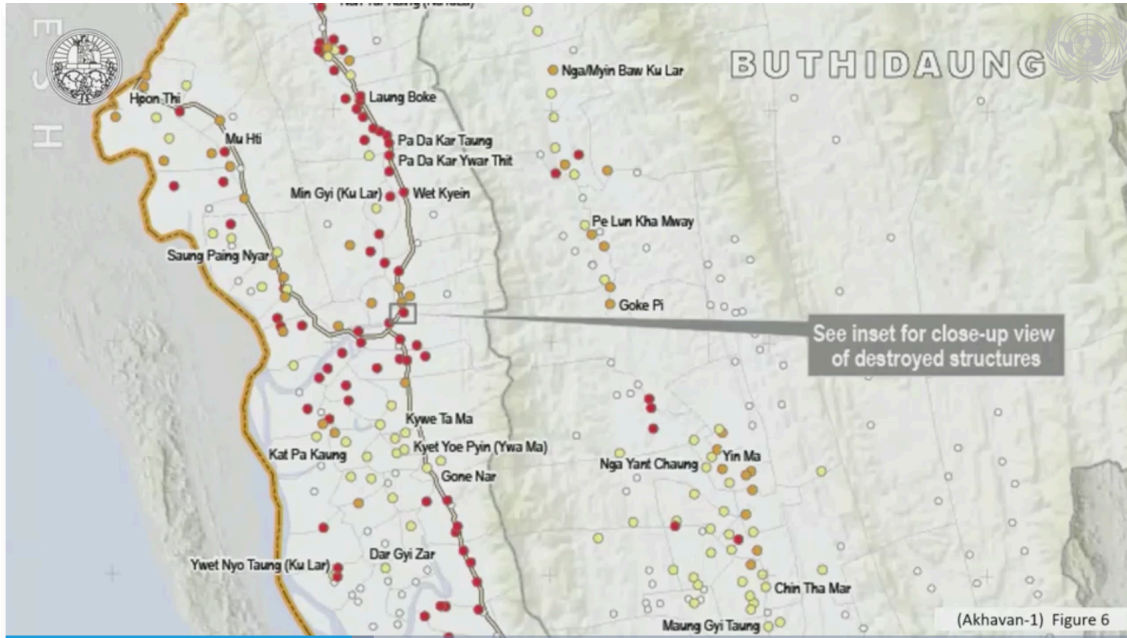


Figure 4.1: Slide presented to the ICJ by Counsel for the Gambia, December 10th 2019.

In June of 2019, the International Criminal Court (ICC) Office of the Prosecutor opened an investigation request into the situation in Rakhine State, which was formally authorized in November. A few days later, a case against Myanmar was brought before the International Court of Justice (ICJ) by the Gambia. Opening statements in the ICJ case began on December 10th, with Council for the Gambia, Payam Akhavan explicitly drawing the Court’s attention to UNOSAT analysis and imagery as elements of the case against the Myanmar authorities (ICJ 2019 – see Figure 4.1). A few days later Ann San Suu Kyi addressed the court on behalf of the state, to decry the efforts of outside activists and to ask that the internal investigations underway be allowed to continue without outside interference.

On January 23rd, 2020 the ICJ imposed emergency “provisional measures” on Myanmar, requiring the state to actively ensure that government forces did not commit genocide, preserve evidence of genocidal acts, and report back to the court on the state’s compliance with the 1984

Genocide Convention. This order was widely received as a direct repudiation of Suu Kyi's defence of the state, as well as a validation of the plight of the Rohingya community - those still inside Rakhine state, those refugees who had fled across the border into Bangladesh, and the wider diaspora at large (Bowcott and Ratcliffe 2020).

Throughout this process, the use of RS imagery was fundamental to the visualization and documentation of the crimes underway. Starting in 2012 and gaining in significance over the following years of atrocities, the inculcation of RS technology into the workflow of IHR investigation and documentation over Rakhine State has become an integral part of exposing this crisis. Having established the significance of RS as a part of the IHR response, the question remains as to why the rights based community should so enthusiastically adopt the technology now, for this specific crisis; a question I take up in the next section of the chapter.

4.5 The convergence of elements over Rakhine State:

From an investigative standpoint, the most consistent reason for expanding the use of RS stemmed from the contradictory geopolitical tensions embedded in the idea of “accessibility.” While the state has done everything in its power to make the region (and people) inaccessible, the technology of remote sensing has fundamentally reduced the state's capacity to control knowledge of its actions. As a result, RS has rendered aspects of the region accessible to inspection from anywhere, and by anyone with the appropriate skills.³⁸ As a senior executive from HRW put it, “It's pretty straightforward. You want to be able to see things that are

³⁸ Clearly, the costs associated with access to and use of timely RS products (along with the resulting professional analysis derived from them), still function as barriers to many groups that might want to perform their own investigations. However, the advent of digital RS platforms (such as Google Earth) allows even the smallest of organizations to review and utilize imagery. In essence, the realm of RS imagery has now rapidly transferred from the exclusive purview of the State, into the varied levels and capacities of a broad cross section of civil society actors.

happening even if the government keeps us out, or if it's too dangerous to get there. It's as simple as that” (Interview, Geneva 2018).

This notion of RS as an exploitable window into the exclusion zone of Rakhine State is fundamental to the idea that IHR actors require direct information from a crisis region, as part of their efforts to establish the reality of emerging situations on the ground. As a result, the temporal ability of RS to provide quick, reliable data combined with testimonies take from survivors, refugees, and other affected individuals, means that RS becomes a direct prompt, as well as a vital “anchor point” for investigative teams who are struggling to come to grips with confusing (and sometimes remarkably fluid) crises events.

RS also offered several significant advantages over Rakhine State. Despite the inherent problems with monsoon cloud cover in the region, which can serve to obscure large areas under investigation, the application of non-visual bandwidths - in particular thermal anomaly/fire detection analysis - played an important role in establishing the extent of the events taking place. For both HRW and AI, the availability of high-quality fire detection products was key, as the sudden increased frequency and presence of such events during monsoon months was a compelling indicator of what was happening on the ground. Similarly, for the analysts at UNOSAT, the sudden increase in unseasonal fires was an important factor in their internal reporting within the UN system.

There were some interesting things that we saw immediately. The one that I say often is, if you look at the full record of fire detections back to 2000 or 2001, there had never been fire detections in the month of August in Rakhine State, ever. And then all of a sudden [in 2017] you were seeing fire detections because of the amount of burning of towns and homes that were going on. It's the end of the monsoon season so there were no naturally occurring fires... I do remember that once we saw that we knew it was a very big event... And then to have it happen in such wet conditions, we knew right away that that was going to be an issue for a while. (Interview, WhatsApp 2020)

Despite the presence of extensive cloud cover during the monsoon months, traditional RGB oriented analysis did still take place, with researchers searching through images for “keyholes” in the clouds: “[M]aybe a 2000 square kilometer strip was collected and of that 1800 square kilometers was just pure clouds, right, and so we were looking at kind of the little gaps” (Interview, WhatsApp 2020). These small windows of ground visibility, while limited and extremely frustrating for the investigative teams, did allow for the confirmation of events, and ultimately provided important anchor points for the larger “wall to wall” analysis that evolved over time. The increased capacity of private RS providers such as Digital Globe and Planet was essential to this process.

The growing use of RS imagery as part of the expository strategy was also due in part to the increasing number of imagery providers, which in turn affected both the available coverage, and (most importantly) the decreasing costs of imagery access. For AI’s imagery team, the cost factor went hand in hand with public acceptance:

I'd say it's new because pixels are cheaper. The public sees more imagery..., So, it's a more universal language. There's more comfort in it, in newsrooms and others who might be receiving it. (Interview, Skype 2020)

In turn, the increased use of RS by IHR actors provided greater opportunities for the international press to utilize those visuals in their reporting. This was particularly true in the case of Myanmar, where RS imagery was utilized in almost every public release on the crisis by AI. As a result, the highlighting of satellite imagery was described as having:

...as much to do with increased access to remote sensing data as anything. And obviously that's partially driven by events on the ground and reporting about those events, so it's kind of a virtuous cycle. (Interview, Skype 2020)

This is a key reason why the Rohingya genocide has become such an important factor in the

wide scale adoption of RS for IHR advocacy - at the same time that IHR groups were focusing the world's attention on a horrifying site of inaccessibility and obfuscation, the private corporate RS industry was surging in both capacity and accessibility.

The issue of cost was also an important factor in the UN's engagement with RS. The steady rise in the use of RS by rights investigations at the UN is not only apparent in the increasing frequency of imagery in final reports, but also in the inclusion of RS support as a standard budgetary line in funding applications. For UNOSAT, this is important as each project is reliant on obtaining sufficient funding to cover the costs of analysis. According to interviewees familiar with the process, the funding for the majority of UNOSATs work on Myanmar came from the Government of Canada, who had allocated a substantial amount in preparation for monitoring the collapse of the Islamic State Caliphate in late 2017. When the expected fierce resistance failed to materialize at the same time that the genocide in Myanmar was escalating, the Canadian's generously switched the funds over, allowing UNOSAT to proceed with their analysis. In a more general sense, as UN Commissions of Inquiry become more reliant on RS, its value to the process is being slowly baked into the financial side from the beginning. As one UNOSAT analyst put it:

[W]hen you're seeing lots of imagery - and it comes from us in particular - what you're seeing is the result of funding... that budget template is started to include, not a lot of money, but some money for satellite imagery. (Interview, Skype 2020)

From the perspective of AI and HRW, the ability of RS images to capture the imagination of the public and engage their interest is self-evident. For the research team at AI, this was intentionally incorporated into the overall strategy of advocacy. The conscious effort to include RS into publications allowed for a much stronger representation of the crisis, as “[We] could've done the documentation of the crimes committed against the Rohingya without satellite imagery, [but] it

wouldn't have been as strong” (Interview, Washington DC 2018). In fact, some of the crimes in Rakhine state might not have been so clearly documented without direct RS input. The scale of the events underway, along with the systematic nature of the village burnings, the bulldozing of communities, and the building of new state security infrastructure were all reliant on RS inputs. In a similar vein, a senior member of HRW described the press “pick up” of RS imagery over Rakhine state in 2016/17 as pivotal to the strategy employed:

So you know, the newspapers loved running with these photos because they demonstrated very clearly what was happening. And often the visual is more persuasive to people than reading accounts of something. [It] shouldn't be that way, but that's what it is. (Interview, Geneva 2018)

While RS had previously been used over Myanmar on several occasions by HRW, by 2016 the speed of analysis and distribution had begun to significantly increase. HRW's first major RS oriented press release on the aftermath of the October 9th attacks took just over a month to produce. By contrast, their response to the aftermath of the August 25th, 2017 events was released within two weeks. Between them, HRW and AI produced and distributed 10 major reports or press releases that included substantial RS inputs in the last three months of 2017 alone. RS oriented products like these were sufficiently visceral to prompt the UN High Commissioner for Human Rights to include them in his assessment of the crisis:

We have received multiple reports and satellite imagery of security forces and local militia burning Rohingya villages, and consistent accounts of extrajudicial killings, including shooting fleeing civilians... [B]ecause Myanmar has refused access to human rights investigators the situation cannot yet be fully assessed, but the situation seems a textbook example of ethnic cleansing. (Al-Hussein 2017)

The applicability of RS to the documentation of systematic abuses also played an important role in monitoring the evolution of human rights abuses in Rakhine State. In contrast to the initial forms of ethnic cleansing taking place on a large scale in late 2017, by early 2018

the Myanmar authorities had established a process of “reconstruction” across the region. In many instances, this involved the bulldozing of Rohingya villages and other ethnically cleansed areas, and the construction of military and police installations over the top of them. For AI investigators, this constituted an element of a continuing criminal act, as:

[T]he physical change was inseparable from the elements of the, at that time, still on-going crime. Which - though I don't know if we use the language so excuse me for using it shorthand - which goes to the destruction of a people in whole or part, or at least the widespread and systematic targeting of people that requires, since there were so many displaced, the physical destruction of physical space. (Interview, Skype 2020)

In other words, for the AI team the evidence provided by RS allowed for the visualization and documentation of a new phase in the on-going genocide - the physical destruction of Rohingya living space, and the eradication of a land to return to. For field investigators this was of paramount importance, as the total exclusion from the region meant that they were unable to confirm the rumours they were hearing from the ground:

In some of these areas, there were no Rohingya left, and so I don't know how you'd even begin to really pin that down in any meaningful way in the absence of [RS] as a tool. (Interview, Washington DC 2018)

This combination of RS analysis and on the ground field research demonstrates a clear example of the ways in which the technology has become fully integrated into the investigative process.

4.6 Adoption of RS “on the ground” for the Rakhine Crisis:

A primary function of RS for field researchers came in the form of imagery as a proxy for immediate geographic knowledge. For example, INGO researchers conducting interviews with survivors in refugee camps in Bangladesh were able to establish their own base line of the regional geography through the use of platforms such as Google Earth. This was important, as it

allowed them to refine and hone their interactions with witnesses. As a lead investigator for AI stated:

I think the particular project in Myanmar..., it's not unique - there are other places where we may not get access - but from my experience of working on conflicts and major crises, I have always had some measure of access to the places that I was investigating, and so not having that forced me to try to think more creatively about how can I - what's the best facsimile of that that I can find?... [RS] helps me then to ask better questions when I'm interviewing people... Especially because I haven't been able to physically get to X village, being able to visualize it through Google Earth has been really helpful in terms of forming my questions and in probing at people to better assess whether their testimony is accurate. (Interview, Washington D.C. 2018)

This idea of satellite imagery as a proxy form of grounding for researchers carries over into the interactions between the members of the research teams. This requires a flexible and recursive communication flow between the individuals engaged on any particular project - for example, HRWs team on Myanmar is organized out of their Bangkok, Thailand offices, with individuals in the field in Bangladesh, and with RS support from analysts based in Geneva, Switzerland. Such disparate teams use RS imagery (often in the form of shared Google Earth files and collaborative mapping efforts) to help orient the team and ensure that they are all working from the same baseline of geographic data.

Organizations such as AI and HRW have invested into building their own RS analysis capacity over the past decade. As a result, their field personnel show a high degree of familiarity with imagery products, and both organizations incorporate RS into their training and development curriculums. As a result, when out in the field researchers would use RS imagery directly with witnesses and survivors housed in the Cox's Bazaar refugee camp in Bangladesh:

[O]ne of the ways it came up a lot was people would describe this part of the village is where the Rohingya live, this part of the village is where the ethnic Rakhine live, so I would walk them through those questions in detail first to try to not bias them by

presenting an image, but then once we've walked through that, to present an image and then say, "Okay, can you label which area is which?" So trying to get it from several different ways. (Interview, Washington DC 2018)

The utility of RS visualizations for researchers in the field has also begun to spread to organizations that do not necessarily have their own internal RS capacity. For the crisis in Rakhine state, groups such as Fortify Rights (Fortify 2018) and Physicians for Human Rights (PHR 2018) also incorporated the use of RS imagery in their field investigations, as evidenced by the inclusion of photos into published reports and press releases, where survivors and investigators reference RS print outs.



Figure 4.2: Rohingya witnesses using RS images to identify key locations in their testimonies. Left photo: Salahuddin Ahmed for Physicians for Human Rights. Right photo: Physicians for Human Rights.

Images such as the ones published by PHR in Figure 4.2 have the dual effect of demonstrating the hands-on use of RS print-outs within refugee camps, as well as highlighting

the very personal and singular nature of witness accounts, and the utility of associating personal narratives with identifiable locations. The fact that RS imagery has become so ubiquitous as a research tool for investigators working on Rakhine State is important. It speaks to the growing familiarity and acceptance of RS across the IHR community in general. The inclusion of photos documenting its use in interviews highlights the way in which RS has become normalized into the investigative process and best practices for researchers in the field.

To be clear, for INGO researchers engaged in the documentation of heinous crimes, the visceral impact of hundreds of survivor testimonies constitutes the substantive proofs of abuse and horror. That is why both AI and HRW strongly emphasize the use of in-person interviews and eye-witness accounts in the methodology sections of their major reports. The Rohingya people should not require additional evidence to support the truth of their narratives - particularly in the case of genocide at the hands of the state - but the fact remains that RS imagery can serve to amplify the voices of the displaced and the disenfranchised. As such, its use in the documentation of the Rohingya genocide has had a major impact.

4.7 Impacts of RS at multiple scales:

The court of public opinion was an important battleground for human rights advocates to garner support for the Rohingya and press for greater international attention to the emerging genocide. At the same time, groups such as AI and HRW were actively engaged in efforts to directly influence individuals in positions of authority on the international and state levels. For HRW, this involved direct appeals to senior members of the Myanmar government, including attempts to try and meet with Aung San Suu Kyi in person. When meeting with military officers or government officials, the role of RS took on an important characteristic - that of a direct counter to the secrecy afforded to the state by the rules of international sovereignty. The idea that

RS imagery could be used as a fulcrum against state obfuscation, and directly challenge narratives emanating from a closed region, was central to the prominence of this technology in IHR reporting. For the AI research team, RS played a pivotal role in forcing the powerful to acknowledge the reality of events on the ground.

[RS] has been a tool to force people to take note of things that they could otherwise cast aside. And I think there are still plenty of times in which we don't have satellite imagery to rely on, and what we see is the ease with which things are dismissed. So, I think it's a tool we use in order to try to make it harder for governments, whether it be the government of the country we're focusing on or other governments who could put pressure on that government, to force them to not be able to look away from a situation. (Interview, Washington DC 2018)

To be clear, there is a distinct difference between the presentation of compelling evidence of human rights abuses, and the contested notion of the panoptic capacity of remote sensing to create an ambient protective effect for vulnerable populations. However, for IHR actors, one of the key functions of their “name and shame” strategy of public advocacy has always been the desire to make the costs of conducting major abuses high enough that governments will be forced to calculate how much they are willing to pay to pursue their goals. In the case of Myanmar, RS became a pivotal element in INGO efforts to force a re-evaluation of the government’s “cost calculation.”

This vision of RS as a way to force attention from the international community made the role of satellite imagery all the more significant as the situation in Rakhine state continued to deteriorate. After the initial waves of ethnic cleansing transitioned into the bulldozing of Rohingya villages, and the “reconstruction” of the region, the presence of RS analysis that clearly demonstrated the construction of camps, security posts, and other forms of infrastructure proved to be compelling.

I was in Paris [in September of 2018] and did several meetings with the Ministry of Foreign Affairs there, and again brought my computer. And specifically, no one contests the destruction at this stage, but I brought it to show the construction that's happening right now, and particularly where we picked up the building of border guard police bases on top of villages. And once again, I had a 30-minute spiel, and [RS] was like 5 minutes of it. And at the end of it, the person was just like, "Wow, those images. We had no idea"...., At times, it's painful for me to reckon with this truth, but in so many meetings that I have with policy makers in the US and Europe, at the UN, this resonates with them far more than me talking about the 200 testimonies I've taken and what I've heard. (Interview, Washington DC 2018)

The impact of RS as a powerful representation of the situation “on the ground” was not restricted to directed presentations but can be traced back to media pick up of press releases, and the extensive use of RS analysis in news reporting. The public attention garnered through this process served to highlight the depth of the analysis underway from INGO actors. Members of the IIFFMM research team at the UN specifically mentioned the publicity surrounding the publication of reports by HRW and AI as prompts to request their own independent analysis from the specialists at UNOSAT:

[W]hat was happening is that maybe Human Rights Watch was able to provide some results. And then the fact finding mission was asking us to corroborate those results to see if what we were getting was matching with them, or if it was something different. (Interview, Skype 2020)

A similar kind of prompting was also taking place within the US Department of State. In an interview with an RS specialist for the Bureau of Crisis and Stabilization Operations, the press use of INGO satellite imagery was described as central to the internal dialog among colleagues working to stay up-to-date on multiple emerging crises, including Myanmar:

Since I've been at the State Department and since I know all these people [at Amnesty International], there's been several instances where these situations were evolving and people in the State Department wanted to know what was going on. I was able to call people and be like, "Hey, I know you guys are doing something on this. What's the latest. What's going on?" And then I was able to feed that into the different discussions that were happening at the State Department. It was nice

because everybody was like, "Well, we'll figure out who to ask at Amnesty, because we saw this thing in the news. (Interview, Washington DC 2018)

In tandem with their desire to prompt a response from the international community, both HRW and AI were also focused on RS for evidentiary purposes. At the same time as interviewing hundreds of eye-witnesses, survivors, community leaders, and members of the Tatmadaw, research teams were engaged in the systematic documentation of a catalogue of abuses, for the purposes of facilitating any potential national or international accountability mechanisms. As with other types of inputs, RS requires verification and cross-referencing. However, unlike many forms of evidence, the provenance of RS imagery is very rarely questioned in a legal context, even when the interpretation of what is shown might be disputed. In essence, the raw data that RS is drawn from has clearly definable meta data attached, in the form of exact geographic and temporal identifiers. As a result, RS has become a powerful anchor point for other forms of evidence and analysis. In this context, research teams were aware of the impact that RS imagery would add at later stages of their campaigns and incorporated that into their publication strategies. A senior member of the AI analyses team described the significance of including RS imagery into their most comprehensive report on the crisis, *We Will Destroy Everything* (AI 2018b):

[S]eeing where the conflict was going and the pace of things, you know, the next battle, so to speak, was ultimately going to be securing justice and that means organizing the evidence for uses, for those purposes....I wouldn't be exceptionally surprised if the ICC as part of their preliminary work hasn't been looking very closely at all of this. This is exactly the kind of data evidence that they'd be collecting in order to make certain determinations. (Interview, Skype 2020)

For the analysts at UNOSAT, the inclusion of so many RS images into the two major reports from the IFFMM validated the significant effort involved in their production. The *Report of the detailed findings of the Independent International Fact-Finding Mission on*

Myanmar (IIFMM 2018) contained more than 50 annotated RS images - an order of magnitude beyond any other report produced by a UN Commission of Inquiry. In what was described as “kind of a beautiful moment for us” (Interview, Skype 2020) the analysts who worked on the Rakhine crisis were moved to see Counsel for the Gambia, Dr. Payam Akhavan directly reference their analysis in his opening statement to the ICJ in 2019. The weight afforded to RS imagery in international proceedings such as those brought by the Gambia has not been clearly articulated in the literature, but organizations such as AAAS are attempting to facilitate the expansion of its use in the prosecution of major human rights abuses and mass atrocities (see Harris et al 2018), while AI and HRW continue to promote the “irrefutable” nature of RS products as supplemental evidence of horror, abuse, and ultimately, criminal culpability.

4.8 Conclusions:

Since the US civil rights movement in the 1960s, the phrase “the world is watching” has become something of a staple for groups like HRW and AI. Ironically, over the years it was often employed by journalists and IHR activists when talking about Aung San Suu Kyi. In 2009, during the 15 years she initially suffered under house arrest, Vaclav Havel remarked “I know from my own experience that international attention can, to a certain extent, protect the unjustly persecuted from punishments that would otherwise be imposed” (AI 2009). For many of the individuals interviewed in this study, the advent of easily accessible, high resolution, and increasingly affordable remote sensing data exemplifies that ideal in action - and often in near real time.³⁹

³⁹ A case in point, after the Tatmadaw overthrew Suu Kyi’s government in February of 2021 and placed her once again under house arrest, within days CNN ran a pointed piece titled “Satellite images reveal defiance in Myanmar streets” (Walsh 2021) covering the growing protest movement calling for her release and the return of a democratically elected government.

In attempting to demonstrate the significance of RS over Myanmar, this paper has referenced the use of imagery products and analysis at multiple levels - on the ground, within research teams, when confronting perpetrators, as a means of influencing international elites, and as a form of wider public perception and narrative creation. This multi-level approach to RS is not limited to the INGO world, but is also increasingly present in UN investigations and Commissions of Inquiry, as described by a senior administrator for UNOSAT:

We support directly the whole spectrum of users, from the one junior officer on the ground that needs to know what has happened in a village she cannot access because it's too dangerous, to Steffan de Mistura, [who] goes to the Security Council with a map in his inside pocket and he holds it up like this and he says, 'This is Aleppo right now. And this has to stop!' (Interview, Geneva 2018)

The capacity of RS to provide accurate and (most importantly) timely information about complex, fluid crises such as the one taking place in Rakhine State, allows a variety of rights based actors to engage in advocacy and documentation - even when the power and authority of the state excludes them from the region and limits their access to the scene of the crime. While some larger INGO's have invested in the capacity to produce their own analytical products, the development of digital RS platforms has meant that even smaller organizations are able to integrate RS imagery into their workflows - in person with vulnerable and victimized communities, and when coordinating across organizations, across borders, and across time-zones.

For groups such as AI and HRW, the utility of RS as an investigative tool and a reliable anchor-point from which to triangulate other forms of primary evidence is becoming increasingly significant. When asked about the value of including RS in an investigation, a senior researcher at AI succinctly described the shift:

If it were a widespread systematic conflict where we're talking about the destruction of villages over the course of years I might ask, well, you know, did you check the satellite imagery? And if you didn't, I think you probably want to explain why, in the methodology section just as you want to explain why you didn't talk to a single witness. And maybe it's because you didn't have access. Maybe it's because it was cloudy [in] every single satellite image...., [But] long term widespread and systematic scarring of the earth in the nature that it occurs in places like Darfur, and in parts of Syria and in Myanmar - that level of systematization requires systematic documentation and systematic evidence collection. (Interview, Skype 2020)

In the case of Myanmar, the impact of RS analysis when used to supplement witness statements has had a profound effect upon the attitudes and awareness of those being presented with clear documentation of horrific abuses. The visceral ability of RS to engage with the viewer helps to pierce the complacency of the audience, but its primary role is to enhance and amplify the voices of the vulnerable and dispossessed - that is how RS is understood by almost every individual interviewed for this chapter; not as a substitute for testimony, but as a supplementary tool that serves to enhance the work being done on the ground. Increased coverage and access to imagery, combined with decreased costs of acquisition meant that the authorities were forced to contend with a constant barrage of evidence that directly refuted the official narrative coming out of the region. Despite efforts to produce their own RS analysis, the Tatmadaw were unable to effectively counter the work done by HRW and others, and UN teams (when finally allowed to tour the region) were able to see beyond the carefully selected villages, towards the evidence of horror and abuse sitting just beyond the tree-line.

Ultimately, the importance of RS in the (on-going) monitoring of the persecution of the Rohingya people stands out as pivotal to the wider adoption of this technology across the international human rights community. While RS imagery has been used to great effect for some time, the level of integration into the working practices of IHR actors has been steadily increasing. For those individuals working on the front lines of IHR work, RS has become an

important, complementary tool in their advocacy arsenal. Its integration into workflow processes at multiple levels, and the increasing familiarity of both public and elite audiences with the top-down perspective that RS affords also means that the role of RS is likely to become ever more significant, as cost decline and coverage expands. In making this statement, I return to Carmalt's emphasis on the important role for geographers in forging new understandings of critical geographies of human rights. If, as she states, "The immediate injustices in Rakhine State therefore illustrate the coconstitutive nature of human rights, law, and geography because they provide material form to myriad violations of human rights law" (2019, p 1838), then the role of RS in illustrating those injustices has been paramount. Remote sensing of ethnic cleansing and genocide provides both an opportunity and an obligation for geographers to engage in an explicit and critical analysis of human rights practice. At the end of the day, RS is inherently geographic, and its application in a human rights context requires the kind of normative and descriptive analysis that Carmalt identifies.

In my last week embedded with Human Rights Watch, I had a meeting with Ken Roth, the Executive Director of the organization. As we discussed the situation in Rakhine state, I asked him why, in his opinion, RS had proved to be so significant? His answer was simple: "Because there's always a political advantage to violating human rights, and our job is to raise the cost of that, so that they decide not to do it in the end." This idea - that INGOs might be able to shift the needle, and act as a lever against the sovereign authority of the state - could well be seen as merely aspirational, and part of the utopian idealism of the human rights community at large. However, the words of Ann Sang Suu Kyi in her address to the ICJ might suggest otherwise. The researchers, analysts, and investigators engaged in advocating for the Rohingya people not only acknowledge that they should be "cognisant of their responsibility to express and

affirm fundamental values” - they use every tool at their disposal to ensure others are required to do the same.

4.9 References:

- Al Hussein, Z.R.A. 2017. Darker and more dangerous: High Commissioner updates the Human Rights Council on human rights issues in 40 countries. *Office of the United Nations High Commissioner for Human Rights*, September 11. Accessed January 8, 2021. <https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=22041>
- Amnesty International. 2009. *Daw Aung San Suu Kyi named Amnesty International's Ambassador of Conscience*. Accessed January 8, 2021. <https://www.amnesty.org/en/latest/news/2009/07/daw-aung-san-suu-kyi-named-amnesty-international039s-ambassador-conscience-20090/>
- Amnesty International. 2017a. *Scorched-earth campaign fuels ethnic cleansing of Rohingya from Rakhine State*. London, England, Amnesty International Publications.
- Amnesty International. 2017b. *Video and satellite evidence shows new fires still torching Rohingya villages*. London, England, Amnesty International Publications.
- Amnesty International. 2018a. *Remaking Rakhine State*. London, England, Amnesty International Publications.
- Amnesty International. 2018b. *We will destroy everything*. London, England, Amnesty International Publications.
- Amnesty International. 2019a. *No one can protect us*. London, England, Amnesty International Publications.
- BBC News. 2016. *Myanmar army fires on Rohingya villages in Rakhine region*. Accessed December 10, 2020. <https://www.bbc.com/news/world-asia-37968090>
- Benjamin, M. 2010. Clooney's 'antigenocide paparazzi': Watching Sudan. *Time Magazine*. Accessed January 8, 2021. <http://content.time.com/time/magazine/article/0,9171,2040211,00.html>
- Bowcott, O. and R. Ratcliffe. 2020. UN's top court orders Myanmar to protect Rohingya from genocide: Momentous pronouncement at Hague rejects Aung San Suu Kyi's defence of her country's military. *The Guardian*, January 23. Accessed December 10, 2020. <https://www.theguardian.com/world/2020/jan/23/international-court-to-rule-on-rohingya-genocide-safeguards>.
- Broad, W. 2000. Spy Photos of Korea Missile Site Bring Dispute. *The New York Times*, January 11. Accessed March 9, 2021. <https://www.nytimes.com/2000/01/11/world/spy-photos-of-korea-missile-site-bring-dispute.html>
- Brooten, L. and Y. Verbruggen. 2017. Producing the news: Reporting on Myanmar's Rohingya crisis. *Journal of Contemporary Asia*, 47(3): 440-460.

- Braun, A., F. Fakhri, and V. Hochschild. 2019. Refugee camp monitoring and environmental change assessment of Kutupalong, Bangladesh, based on radar imagery of sentinel-1 and ALOS-2. *Remote Sensing*, 11(17): 2047.
- Carmalt, J.C. 2018. For critical geographies of human rights1. *Progress in Human Geography*, 42(6): 847-861.
- Carmalt, J. C. 2019. Critical Geographies of Human Rights and the Spatial Dimensions of International Law Violations in Rakhine State, Myanmar. *Annals of the American Association of Geographers*, 109(6): 1829-1844.
- Cheesman, N. 2017. How in Myanmar “national races” came to surpass citizenship and exclude Rohingya. *Journal of Contemporary Asia*, 47(3): 461-483.
- Dodge, M. and C. Perkins. 2009. The view from nowhere? Spatial politics and cultural significance of high-resolution satellite imagery. Themed issue. *Geoforum*, 40(4): 497-560.
- Evans, G. and M. Sahnoun. 2002. The Responsibility to Protect. *Foreign Affairs*, 81(6): 99-110.
- Fortify Rights. 2018. UN Security Council: Refer Myanmar to the International Criminal Court. [FortifyRights.org](http://www.fortifyrights.org), February 13. Accessed January 10, 2021. <http://www.fortifyrights.org/publication-20180213.html>
- Harris, T., J. Drake, J. Wyndham, S. Wolfinbarger, S. Lott, and M. Lerner. 2018. *Geospatial Evidence in International Human Rights Litigation: Technical and legal considerations*. Report prepared under the auspices of the AAAS Scientific Responsibility, Human Rights, and Law Program. *American Association for the Advancement of Science*. doi:10.1126/srhrl.aau6090
- Hasian Jr, M. 2016. *Forensic rhetorics and satellite surveillance: The visualization of war crimes and human rights violations*. Lexington Books.
- Hassan, M.M., A. Smith, K. Walker, M. Rahman, and J. Southworth. 2018. Rohingya refugee crisis and forest cover change in Teknaf, Bangladesh. *Remote Sensing*, 10(5): 689.
- Hawk, D. 2003. *The Hidden Gulag: Exposing North Korea's Prison Camps*. US Committee for Human Rights in North Korea.
- Herscher, A. 2014. Surveillant witnessing: Satellite imagery and the visual politics of human rights. *Public Culture*, 26(3 (74)): 469-500.
- Howard, H. 2012. Satellite Images from Syria. On the Ground – Nikolas Kristoff Blog, *The New York Times*, March 2. Accessed January 10, 2021. <https://kristof.blogs.nytimes.com/2012/03/02/satellite-images-from-syria/>

- Human Rights Watch. 2012. *Damage assessment summary for Kyaukpyu*. New York, NY: Human Rights Watch.
- Human Rights Watch. 2013a. *All you can do is pray*. New York, NY: Human Rights Watch.
- Human Rights Watch. 2013b. *Burma: Satellite Images Detail Destruction in Meiktila*. New York, NY: Human Rights Watch.
- Human Rights Watch. 2016c. *Burma: Massive Destruction of Rohingya Villages*. New York, NY: Human Rights Watch.
- Human Rights Watch. 2017a. *Burma: Satellite imagery shows mass destruction*. New York, NY: Human Rights Watch.
- Human Rights Watch. 2017b. *Burma: Military commits crimes against humanity*. New York, NY: Human Rights Watch.
- IIMM. 2020. *Independent Investigative Mechanism for Myanmar Portal*. iimm.un.org, Geneva. Accessed December 10, 2021. <https://iimm.un.org/what-is-the-independent-investigative-mechanism-for-myanmar/>
- IIFMM. 2018. Report of the Detailed Findings of the Independent International Fact-Finding Mission on Myanmar. *United Nations Human Rights Council*. Accessed December 10, 2021. https://www.ohchr.org/Documents/HRBodies/HRCouncil/FFM-Myanmar/A_HRC_39_CRP.2.pdf.
- International Court of Justice. 2019. Verbatim Record for December 10th in the case concerning Application of the Convention on the Prevention and Punishment of the Crime of Genocide (The Gambia v. Myanmar). ICJ-CIJ.org, The Hague. Accessed December 10, 2021. <https://www.icj-cij.org/public/files/case-related/178/178-20191210-ORA-01-00-BI.pdf>
- Laub, k. 2016. Aleppo Confronts Vast Destruction Left by 4 Years of War. *AP News*, December 23, 2016. Accessed March 10, 2021. <https://apnews.com/article/00640d3a1566472cb7c176aadb065f81>
- Mahmood, S., E. Wroe, A. Fuller, and J. Leaning. 2017. The Rohingya people of Myanmar: health, human rights, and identity. *The Lancet*, 389(10081): 1841-1850.
- Marx, A., R. Windisch, and J. Kim. 2019. Detecting village burnings with high-cadence smallsats: A case-study in the Rakhine State of Myanmar. *Remote Sensing Applications: Society and Environment*, 14: 119-125.
- Myanmar Times. 2019. Daw Aung San Suu Kyi's ICJ speech in full. *The Myanmar Times*, 11 December 2019. Accessed January 8, 2021. <https://www.mmmtimes.com/news/daw-aung-san-suu-kyis-icj-speech-full.html>

- Müller, M. 2012. Opening the black box of the organization: Socio-material practices of geopolitical ordering. *Political Geography*, 31(6): 379-388.
- Parks, L. 2001. Satellite views of Srebrenica: Tele-visibility and the politics of witnessing. *Social Identities*, 7(4): 585-611.
- Parks, L. 2009. Digging into Google earth: An analysis of “crisis in Darfur”. *Geoforum*, 40(4): 535-545.
- Physicians for Human Rights. 2018. “Please Tell the World What They Have Done to Us.” *The Chut Pyin Massacre: Forensic Evidence of Violence against the Rohingya in Myanmar*. New York, NY: Physicians for Human Rights.
- Pinholster, G. 2010. Satellite Images Reveal More Evidence of Destruction in Burma. *American Association for the Advancement of Science*. Accessed December 10, 2020. <https://www.aaas.org/news/satellite-images-reveal-more-evidence-destruction-burma>
- Quarid S. and L. Wa. 2016. Hundreds of Rohingya flee Myanmar army crackdown to Bangladesh. *Reuters*, November 16. Accessed January 8, 2021. <https://www.reuters.com/article/uk-myanmar-rohingya-idUKKBN13B1UF>
- Rothe, D. and D. Shim. 2018. Sensing the ground: On the global politics of satellite-based activism. *Review of International Studies*, 44(3): 414-437.
- Sandvik, K., and K. Lohne. 2014. The rise of the humanitarian drone: Giving content to an emerging concept. *Millennium: Journal of International Studies*, 43(1): 145–164.
- Sandvik, K. and N. Raymond. 2017. Beyond the protective effect: Towards a theory of harm for information communication technologies in mass atrocity response. *Genocide Studies and Prevention: An International Journal*, 11(1): 9-24.
- Shim, D. 2014. Remote sensing place: Satellite images as visual spatial imaginaries. *Geoforum*, 51: 152-160.
- Smith, M. 2019. Arakan (Rakhine State): A Land in Conflict on Myanmar’s Western Frontier. *Transnational Institute (TNI)*, Amsterdam.
- UNOSAT. 2017. *Destroyed buildings in Maungdaw and Buthindaung townships, Maungdaw District, Myanmar*. United Nations Institute for Training and Research (UNITAR). Geneva. Accessed December 10, 2021. <https://www.unitar.org/maps/map/2688>
- Wade, F. 2017. *Myanmar’s Enemy Within: Buddhist Violence and the Making of a Muslim ‘Other’*. London: Zed Books, xv + 280 pp. ISBN 9781783605279
- Walker, J. 2020. Remote sensing for international human rights advocacy: Critiques and responses. *Journal of Human Rights*, 19(2): 183-200.

- Walsh, N. 2021. Satellite images reveal defiance in Myanmar's streets. *CNN*, February 16. Accessed December 10, 2021. <https://www.cnn.com/2021/02/16/world/gallery/satellite-photos-myanmar-protests/index.html>
- Witjes, N. and P. Olbrich. 2017. A fragile transparency: satellite imagery analysis, non-state actors, and visual representations of security. *Science and Public Policy*, 44(4): 524-534.
- Witmer, F. 2015. Remote sensing of violent conflict: eyes from above. *International Journal of Remote Sensing*, 36(9): 2326-235.
- Zarni, M. and A. Cowley. 2014. The slow-burning genocide of Myanmar's Rohingya. *Pac. Rim L. & Pol'y J.*, 23: 683.
- Zaw Htay. 2016. Government Refutes Rights Group Report on Rakhine. *Office of the State Councilor, Republic of the Union of Myanmar*. Accessed December 10, 2021. <https://www.statecounsellor.gov.mm/en/news?page=171>

Chapter 5.

RS for Human Rights:

What is was, what it is, and what it will become

5.1 Introduction:

In early 2021, the San Francisco based RS provider Planet launched an additional 48 “Dove” cube-sats into low earth orbit, taking their current array of sensors up to more than 150. These new “Super Doves” were the 4th generation of platforms produced in-house in the company’s downtown offices, taking the number of successfully deployed Planet satellites to over 360 (Safyan 2021). The launch of so many small Earth Observation satellites at the same time serves to demonstrate the ways in which the RS world is rapidly changing. At the dawn of the commercial RS era, companies like Digital Globe were investing hundreds of millions of dollars into developing very high-resolution satellites, and getting spectacular (but expensive) imagery in return. In the second decade of the 21st century, Planet can produce a cube-sat that has a much shorter operational life-span, but produces high-resolution imagery with up to eight bands of data, and at a cost counted in the tens of thousands of dollars. When combined with hundreds of other quasi-disposable satellites in the Dove Flock, Planet can offer inexpensive RS coverage of everywhere on Earth, with a temporal repeat time of only 24 hours – a near continuously updated visual database of life on earth. In a little more than twenty years, RS has transformed from a god-like, clandestine power available only to the most technologically advanced states, to a commercially available product used by extraction industries, financial

institutions, shipping companies, futures traders, and a multitude of other commercial entities – notwithstanding its continued significance for military and intelligence operations. Likewise, civil society groups, both domestic organizations and INGOs, have embraced RS as a functional and even necessary tool. In particular, the environmental community was an early adopter, having quickly realized the impact on analysis (and exposition) that RS could provide when attempting to understand and document the major environmental changes taking place. From LandSat imagery that demonstrated the horrifying impact of deforestation in the Amazon, to compelling illustrations of ice-shrinkage in the Arctic regions, RS imagery has been front and center in attempts to frame the Anthropocene for public, elite, and academic audiences.

For INGOs engaged in the most politically charged of arenas – the fraught, contested, realm of international human rights advocacy – the take-up of RS has been slower, and for good reason. Contrary to the ways in which rights based RS is often portrayed in the press (as a form of revelatory “truth”) or within academia (as a form of digitally fetishized, and dubiously objective “truth”), for the nascent community of specialists who work in IHR advocacy there has been a cautious approach to expanding the role of RS as a functional tool. Rather than being seen as a technological “silver bullet” that could step in and solve their problems, RS has been quietly integrated into an increasingly significant role as an investigative tool and support mechanism for traditional, well-established best practices in the field.

As a result, and despite the excellent theoretical critiques of RS that permeate through the literature on RS adoption by IHR actors, there has been a significant gap between what RS does for groups such as HRW and AI, and how it is perceived from the outside – an ironic example of a phenomenon being observed from too great a distance, perhaps. This dissertation has attempted to correct for that oversight, by engaging with the community, analysts, and field investigators

who use RS imagery on a daily basis in their advocacy work. In doing so, it has sought to answer several key, interlocking questions concerning the impact of RS on IHR actors.

5.2 Research questions – and answers:

Primarily, the question of how RS technology helps INGOs affect the perception of (and response to) crisis situations was explored in Chapter 2. Despite how the technology is represented in the literature, rather than becoming an overwhelming and impersonal visual representation of material effects on the landscape – the forensic architectural damage afforded by impact craters, arson, and other types of highly visible changes in the AOI - the role of RS has largely remained “below the waterline” of internal practices, impacting investigations through a recursive process of engagement that in many instances is never publically acknowledged through the use of actual, annotated RS imagery. Despite the intense impression that the top-down, digitally capture perspective can impart – tricking the viewer into believing that they see more than they actually do, as Dodge & Perkins (2009) point out – IHR actors are remarkable cautious about simply applying visually stunning RS imagery as a key part of their narrative framing of crisis situations. Instead, the vast majority of RS work (estimation by several of my interviewees at more than 90%) is never intended for any form of public consumption. Rather, it operates and is operationalized in the background of investigations, and is most commonly represented in publications through the use of stylized, heuristic infographics and maps. However, where direct imagery is used to emphasize the findings of an investigation, its role is primarily understood as supportive of the investigative process, rather than as the direct, driving factor in the articulation of a suspected war-crime or horrifying abuse. In some instances it might be the best available evidence of systematic actions “on the ground”, but it is never presented in

isolation, and IHR actors do not perceive RS as either definitive proof, or as capable of standing alone. For the individuals interviewed and observed for this dissertation, RS is always seen as part of a complex, iterative, and multi-level approach to understanding the complexity and scale of a crisis. It might make for an excellent visual aid, but at heart it is a practical tool that may underlie much of the substantive work included in press reports and publications.

The significance of RS integration into the working practices of groups such as AI and HRW speaks to the second question raised; namely, how the application of a new technology like RS shapes its own context and usage in the human rights world. Drawing upon the twin threads of Science and Technology Studies and International Practice Theory, and using the methodological tools afforded by Actor Network Theory, Chapter 3 explored the role of RS in the everyday practice of investigation and advocacy. With the inherent assumption of symmetry between actants that is so fundamental to the ANT approach, the role of both human and material/technological elements in the IHR/RS network provides insight into how RS functions in the production of “human rights knowledge.” In particular, the concept of annotated RS imagery as an archetypal immutable mobile (Latour 1990, 2005) serving both as a codification of existing knowledge, and as a transitional element in the construction of further knowledge (when used in the field with victim communities, for example) helps to explain the role that the technology has played in integrating into (and developing new iterations of) existing advocacy practices. Building upon the widely acknowledged role of RS as an *expositionary* tool, Chapter 3 identifies six other important overlapping functions in modern human rights practice – *investigation, triangulation, clarification, verification, documentation*, and the potential for an expanding role in *prediction* through the advent of machine learning and artificial intelligence. Over the past two decades RS has begun to substantially alter these ideals in two important ways;

firstly, the value-add of independently sourced evidence that has clearly defined meta-data associated with it (both temporal and geographic), and which cannot be excluded by sovereign territorial actors, and secondly the speed with which such information can be obtained, processed, and operationalized. This operationalization speaks to the question of the impact of RS on the rhetoric of human rights activism and documentation, in that it demonstrates the ways in which the technology functions as an aid in the development, understanding, and application of advocacy goals, and the subsequent efforts to apply pressure in the public and elite arenas.

The idea of the technology itself as an actant, working both in collaboration and as a form of contestation with the human investigators is important as it helps to demystify the view from nowhere by stripping away the vision of RS as omniscient. Instead, the constant struggle between what an investigator might want the satellite imagery to reveal, and the limitations inherent within the technology and its interaction with the physical world (cloud cover, temporal overview, reflectance, band-widths, and other such fundamental inputs) helps us to understand how the various elements of the network combine to define what questions can be asked, and which can be answered successfully. It is this constant “mangle of practice” (Pickering 1995) that demonstrates the transitional ideal of RS in relation to human rights advocacy – from what it was, into what it is, and on into what it will become. Each technological development adds input to the formula – the increasing ease of access to data, the almost exponential rise in global coverage and imagery capture, the creation of ever expanding back catalogues of imagery that act as rudimentary time machines, affording unparalleled views into the past – all afford new opportunities (and challenges) for investigative teams, and will clearly continue to do so moving forward.

This process of integration, affecting as it does the working practices of investigation at multiple levels within IHR organizations, was explored more intimately in Chapter 4. Through the lens of an extended case study, the application of RS imagery in the ongoing catastrophic genocide of the Rohingya people of Northern Myanmar helped to illustrate the variety of ways that RS is being utilized by IHR actors in modern crises. From the application of RS imagery in the field as a visual aid with victim communities and survivors, to the visceral impact afforded by images of burnt out villages and “reconstruction” efforts when talking with international elites and decision makers, RS has become firmly embedded into the best practices associated with multiple roles in advocacy and documentation.

Relying heavily on direct, ethnographic examples, Chapter 4 laid out how RS is understood by the individuals charged with fighting on behalf of one of the most vulnerable and marginalized communities on Earth. Most importantly, it reaffirmed the commitment of IHR investigators to the human element in human rights monitoring, by demonstrating the multiple ways in which the technology was used to enhance (rather than replace) the individual and collective experiences of Rohingya survivors and refugees. Ultimately, Chapter 4 argues that the crisis in Rakhine State has become a watershed moment for the IHR community, as the functional utility of RS has become intimately integrated into every level of the advocacy process – not just in the INGO community of non-state actors attempting to influence the geopolitical realm, but also in terms of acceptance within the IGO community as well. As such, State funded international actors, institutions, and even justice mechanisms have begun to embrace RS as an essential element in the development of the new Westphalian order of international security, including the shared obligations inherent in protecting the citizens, rather than just the sovereignty of the state. As one senior INGO interviewee described it, the lack of

RS imagery in a modern report would be cause for concern at this stage – not because it is absolutely necessary in every investigation, but because it is so useful and so fully integrated into the process that it would be akin to having no witness statements. There might be a good reason for the omission, but at this point you would want to explain that fact up-front.

Ultimately, what this dissertation has explored is the ongoing and evolving impact of RS on the working practices of IHR advocacy in the 21st century. In following the dual prompts of Sandvik and Müller, this research has attempted to go inside the black box of the organization, in order to explore the socio-material processes of ordering that serve to co-constitute the geopolitical reach of groups like HRW and AI. In focusing in on RS as a new and dynamic material actant within the IHR network, it has shown the ways in which the technology not only functions *for* IHR actors, but also how it functions *on* them too, redefining what is possible and helping to create new approaches to best practices in ways that “..nothing, up to that point, could have foreseen and behind which trail new functions.” (Latour & Venn 2002, pp.250). Which brings us to the topic of Artificial Intelligence and Machine Learning (AI/ML).

5.3 The Artificial Intelligence revolution:

Following on from the understanding that an IPT approach should focus on “process over stasis” (Bueger & Gadinger 2015), it is impossible to end an exploration of the role of RS in IHR advocacy without speculating on where the community is heading. As previously detailed, the amazing increase in data capture, the variety of available resolutions, the drop in acquisition costs, and the overall accessibility of RS imagery have all had a profound effect on the IHR community. The sheer weight of available data is incredibly appealing for groups like AI and HRW, who are attempting to monitor a constantly changing array of emerging and ongoing crises, along with the aftermath of natural disasters, environmental impacts, flows of IDP and

refugee communities, and a wealth of other potential situations in which the rights of the vulnerable are subject to abuse. However, the deluge of data is also fundamentally overwhelming.

As the two most recognizable INGO human rights actors in the world, AI and HRW have just a handful of trained RS analysts between them. The entire UN system (via UNOSAT) has a few dozen individuals dedicated to RS analysis – focused mainly on supporting natural disaster preparation and response, while groups like the World Food Program (WFP) also have small, dedicated RS teams – but taken together, there are more individuals in the UCLA Geography department than the total number of people working globally in the INGO world on RS for human rights. What is needed (and what both AI and HRW have begun to explore) is the prospect of artificial intelligence and machine learning algorithms to help do the heavy lifting. However, as with the implementation of every new technology, the gulf between what is desired, and what can be achieved - what questions you want AI/ML to answer, and what answers AI/ML can give - is fraught with complexity.

To be clear, the concepts of AI and ML are incredibly complex and diverse. I do not intend to try and comprehensively explore them in the conclusion of this dissertation, but instead will lay out some of the ways in which my interview pool have described the potential benefits, obstacles, and pitfalls associated with AI/ML in relation to RS imagery. This is because, even within IHR organizations that have embraced the concept of artificial intelligence as an essential tool moving forward, there have been no concrete applications to date – only speculation, and a desire to try and lay the groundwork for implementation at some point in the near future.

To begin with, it worth considering what a variety of interviewees hoped AI/ML might be able to accomplish. Perhaps the most consistent desire was for automatic monitoring of

potential and emerging crisis regions – or what is known in military and intelligence circles as a “tip and cue” model, designed to place analysts on a fast, predictive footing, rather than the more traditional (and slow) reactive idea of monitoring. This GEOINT terminology has filtered through to the epistemic community of INGO activists, probably due to its extensive adoption within the private corporate RS world – both satellite imagery providers, and dedicated AI/ML service providers. Here, for example, is how Planet describes their tip and cue capacity:

Planet’s imagery and analytics enable analysts to focus their attention on areas with significant activity and use limited resources more effectively, reducing inefficiencies and de-risking decision-making. (Planet 2021)

For groups such as AI and HRW, scrambling to get up to speed on an emerging flash-point is a difficult and time-sensitive process. While not every interviewee understood AI/ML in such a distinctly militaristic fashion, they all agreed that the major benefit to RS oriented monitoring algorithms would be to allow for faster, more effective responses. Ideally, systems could be designed that would permit the limited number of trained specialist to be alerted to potential, emerging crisis situations early enough that the organization could then attempt to help “put out the flames before they begin to spread” (Interview, Geneva 2018). In such a scenario, the AI/ML system would alert the analyst to take a close look at the flagged anomalies, and then direct attention (if warranted) to the regional/country specialists charged with covering the identified risk zone. This was described by multiple people as a distinct potential advantage, as for many investigators the first indications of a major event often come too late to try and intervene in outbreaks of mass violence, or other grave abuses.

Aside from the idea of AI/ML as a source of time-sensitive notification, the other consistent theme to emerge was the systematic process of attribution and documentation – in

essence, the ability to wade through the wealth of data captured and identify where, when, and (hopefully) how events unfolded within specified AOIs, over both short and long-term time periods. This kind of in-depth analysis can be done by dedicated trained specialists in a manual fashion - as demonstrated in Chapter 2 - but it is incredibly laborious. For organizations that have limited resources (and very few analysts) the ability to conduct this kind of work is severely limited. The idea of automated, algorithmic systems that could produce initial overviews, and hone in on high probability time-frames and geographic locations for further manual assessment is very appealing.

5.4 Why Artificial Intelligence models are so difficult for IHR analysis:

Obviously, the IHR community is not alone in its desire to use AI/ML for these kinds of purposes, but as a potential user base it suffers from a number of distinct disadvantages, the most obvious of which is a lack of resources. In essence, whereas the military, intelligence, and corporate worlds have the money to develop case-use specific processes, the humanitarian and human rights community is (at best) seen by the major players in the AI/ML industry as little more than good PR material – or at least, that is how the individuals interviewed for this project described it.

To be fair, the development of a new RS detection algorithm requires hundreds of thousands of pieces of training data, and countless man-hours of refinement and testing to complete. This is one important reason why the application of AI/ML systems in the INGO community is so much harder than say, the adoption of RS imagery was a few years ago. For example, vehicle detection models have begun to proliferate within the commercial AI/ML field (mainly with a focus on both military and civilian airplanes, helicopters, submarines, tanks, and ships, etc.) due to the large, wealthy pool of potential clients. Infrastructure development and

airfield detection models are similarly popular, but many of the use-case ideals that groups like HRW and AI are interested in developing do not have the same commercial viability. As a result, there is limited enthusiasm from within the industry to develop appropriate models, and extremely limited capacity outside of industry to try and do the same. Even the academy is finding it hard to recruit and maintain AI/ML faculty and students, due to the brain drain of Silicon Valley (Kwok 2019), pointing to another fundamental difference between how the IHR community was able to embrace RS, and how it is struggling to do the same for AI/ML. As the state of the field currently stands, the skill sets necessary to start developing unique convoluted neural network (CNN) training models for ML applications are simply too great, meaning that the hurdles necessary to develop in-house expertise (and have in-house champions pushing for further resources) are too high for most groups to get over.

Even with the limitations mentioned, there is still a concerted effort underway to try and edge the IHR community into the AI/ML field.⁴⁰ Not limited to RS only approaches, AI/ML models are seen as integral to the ongoing development of “all source” investigative practices, including the compilation and assessment of social media data, still imagery, and the tremendous rise in video footage being uploaded to the web from crisis zones. A good example of this is the desire to build an AI/ML tool that would be able to interpolate the path of a video, through geo-location of identifiable waypoints in the footage. Another video oriented process might include the interpolation of auditory elements from video footage, in an attempt to determine directional data for gunshots or artillery fire. In both of these examples, RS would function as part of the grounding mechanism for extrapolating useful data.

⁴⁰ The details in this section are taken from interviews, and a cache of internal working documents shared with me by one of the analysts at Human Rights Watch. In particular, I am expressly grateful for the opportunity to see how AI/ML has been envisioned and pitched between colleagues advocating for the adoption of a new and powerful technology.

In a more direct sense, RS imagery is central to the potential development of AI/ML systems, like Thermal Anomaly Detection models (which utilize existing data products such as those produced by NOAA and the ESA) that are calibrated specifically to detect conflict related fire incidents, SAR Coherence Change models that could be used to detect building destruction and land cover use in urban environments, Night-time Light Variance models that could indicate conflict related changes to power consumption and economic development, and Burn Scar Detection models used in the aftermath of arson attacks and the deliberate ethnic cleansing of rural populations.

Probably the clearest example of the immense potential – and even greater challenges – of developing IHR specific AI/ML systems is shown in the complexity of developing a Smoke Plume Detection model. The team at HRW have been pitching this concept internally since at least 2016, with an emphasis on the idea that such a model could theoretically “provide both historic time stamp on exact date and time of attack, and near-real-time alert [via] machine learning” (Internal Doc – “System Design” 2016). However, the implementation of such a system would require the development of a substantial CNN model, capable of identifying smoke plumes from RS imagery at multiple ground resolutions, from multiple sources, and in the contexts of complex atmospheric conditions, geographic landscape factors, and other variables. To create such a model, the CNN would require a massive amount of training data, numbering in the hundreds of thousands of images (if not more). One way to address the input requirements would be through the development of VR simulated imagery – itself a highly complex and time consuming process, but one that has been actively pitched by individuals in the IHR/RS community:

Anything in the future here is the synthetic training data. This was another proposal... having a closed virtual reality 3d modeling engine, a graphics engine where authorized users could go in and simulate specific types of things that we would want to detect in social media and aerial photography and drones and satellite imagery... You know the problem with the sat imagery is that there's always a new sensor. Yeah, and it's always quite a different type, it's collecting at different times, the shadows are always different, the resolution is different. Everything about it is different - Just enough to fog things up. And that will be a perpetual and unending problem that we will never fix, unless we have dynamic ways to continuously update and retrain the models, The only real solution to any of this is synthetic training data generation. That is a future that's without doubt. I mean, I could have a million people I would need to manually find enough smoke plume clouds to represent the full diversity of the way in which smoking [occurs]. I did a very detailed breakdown of all the different variabilities... I mean, you know we're talking, 1000s and 1000s of permutations. And I can't possibly find all of those variations. (Interview – WhatsApp 2021)

Obviously, the creation of such a VR engine would require a substantial investment; not only in terms of money but also expertise. To that end, IHR actors have attempted to tap into the talent-pool in the corporate AI/ML world, but so far have little to show for it. This failure is ascribed to the fact that IHR projects offer little in the way of return on investment for such companies, as the resulting models would have limited commercial application.

The other major source of talent in AI/ML development is in academia, but here too there have been complications in the attempts to establish collaborations. A recent project designed to analyze the tens of thousands of images contained in the “Caesar photos” smuggled out of Syria in 2013/14, failed to move forward with researchers at a major US university due to the fact that the expected efficacy outcomes from the models were projected to be too low by academic standards of confidence. But for the people at HRW, that level of confidence was not a requirement, as even much lower levels could still provide “a multitude of ways in which we would heuristically and innovatively, dynamically, use the existing models” (Interview – Whatsapp 2021). In essence, there is a disconnect between the ways in which IHR actors and academia understand the functionality of AI/ML modeling.

5.5 A new set of research questions:

Clearly, the advent of the machine learning age is beginning to have an effect on how IHR actors see the role of technology in advocacy, just as the development and expansion of commercially available RS imagery has done for the past two decades. While the barriers to entry appear to be considerably steeper, that may change substantially as the technology of AI/ML systems become more ubiquitous. At the same time, the potential ethical and moral concerns that artificial intelligence is beginning to evoke strongly suggest that its application in the human rights arena demand serious attention – not just from bloggers, journalists, or IHR actors as Sandvik has stated, but also from critically oriented academics. In other areas of AI/ML development scholars have sought to define and problematize the ethical considerations and frameworks involved (for example Char et al 2018, Gianfrancesco et al 2018, Leavey 2018, Jobin et al 2019), while in the human rights arena there have been several important papers designed to bring attention to the opportunities – and risks – that AI/ML developments will enhance (Aaronson 2018, Risse 2018, Dwivedi et al 2019, Livingston & Risse 2019).

From my perspective, the most significant and consistent issue that emerges from the literature across the gamut of AI/ML critiques, is the inherent lack of transparency built into the complex convolutional neural networks that sit at the heart of so many AI/ML systems – the tightly locked “black box” of CNN layering that, while abstractly understood by the engineers and visionaries who create the networks, is still opaque in terms of concrete actions taking place. In essence, it is hard to understand exactly what is happening within the model as it seeks to extract useful information from the deluge of data it is being fed. However, in terms of AI/ML applications in a human rights context, the most prominent critiques revolve around inherent biases built into the data itself, the application of value biases in the interpretation of results, and

even the potential power effects of using such a dominating technology to enforce western, universalist notions of governance, and what exactly constitutes human rights in the first place.

There are no easy answers to such concerns, and many of them speak to a macro level overview of the field of AI/ML and human rights in general – or to use an analogy from the RS world, they are orbital shots that look across a broad swath of the landscape. From a more narrow, ground level view of the challenges associated with potential AI/ML use by the analysts, investigators, and activists who make up the epistemic community of RS users in the IHR world, a different (but nonetheless important) set of questions arise: Does the creation of AI/ML models produce new forms of vulnerability for marginalized communities, and if so, how can that vulnerability be minimized? Who should have access to the data – either raw before analysis, or as the end result of a model – and how do you ensure the security of the data involved? Can the models developed for analysis be maintained in isolation, or will they be subject to redeployment by partners (such as the corporate AI/ML companies who are necessary for their development, but who are also driven to financially exploit their output)? Once created and functional, how might the models (either in application, or in terms of final product) be abused by other parties?

As an example of the types of concerns raised, imagine a model that could quickly identify the presence of swimming pools in suburban back-yards. Running such a process might be useful in understanding the socio-economic indexing for specific neighborhoods, but it might also be used to identify home-owners who had illegally built their pools without proper planning permissions. Now take that concept and apply it to illegal settlements, shanty-towns, or kampungs across the globe, but instead of looking for pools, it is construction materials used for roofing, the building of foundations, the development of vegetable gardens, or the presence of vehicles. All of those elements might indicate important socio-economic development factors,

but they might also be used to target wealth, permanency, or the positionality of community members and leaders, not to mention the privacy and legal implications for citizens living in states with negative or abusive community relationships. As this simple example demonstrates, the power of AI/ML systems creates not only high level socio-political concerns about bias and dominance, but also more granular, immediate potential impacts on the ground. In essence, there is a lot to explore.

5.6 Conclusions:

When Dennis Cosgrove posited the idea of Apollo's Eye (2001) – a vision of the globe as a unified whole that served to create and reify a vision of Western dominance and universality – he might very well have been describing the advent of IHR based remote sensing. The development of satellite imagery clearly plays a part in Cosgrove's analysis of the modern globalized ideal, and has been integral to many other scholar's understanding of the projection of hegemonic and military authority in the 20th century, continuing on into the present day. For the small number of influential champions of RS adoption in the IGO and INGO communities, the ability of orbital sensors to capture and make visible the most heinous atrocities, war crimes, and state orchestrated ethnic cleansing has been fundamental to its adoption. For better or worse, the legal pillars upon which the international right regime stands defines specific actions as violations of the most basic human rights, some of which can be clearly identified from space. As such, RS dependent reporting by groups such as Amnesty International and Human Right's Watch stand at the forefront of the international civil society response to those crimes, even though they approach rights based advocacy from opposite ends of the spectrum; the first as a bottom-up, grass roots membership organization that focuses on mass lobbying, and the second as a top-down crisis reporting group that focuses on direct influence mechanisms. Both

organizations conduct in-depth analysis of crises, and both understand that much of their influence stems from a reputation for impartial, rigorous analysis. The potential for RS to aid in the process of investigation – especially in those places that are too dangerous, too isolated, or too restricted to send in field personnel – was quickly recognized, and has grown in tandem with the expansion of the commercial RS industry over the past two decades. As RS data is becoming cheaper coverage is getting more comprehensive, and the quality, spectral composition, and resolution of the imagery is expanding rapidly, meaning that investigators today are able to download satellite images within hours of events taking place, almost anywhere on Earth. In my opinion, this is a good thing.

Contrary to the ways in which previous scholars have problematized from above the role of RS in rights based advocacy, this dissertation has attempted to understand how the technology is viewed from the ground up – by the men and women who use it everyday. I feel this has been important work, because even though there is a strong and necessary role for academic critique, even the most dense theory should always be tethered back to the concrete world - as a form of ground-truthing, to borrow a term from remote sensing science.

The idea that something as complex and potentially dominating as remote sensing should be approached with caution is well founded. Many of the most important scholars I have leaned upon in my research have viewed the digital fetishism and world creating capacity of RS as inherently suspicious, in and of itself. I named my dissertation after the intriguing challenge of combining both the subjective and objective viewpoints that Thomas Nagel so eloquently posited – along with the stark admonition of Donna Haraway, and her insistence that scholars needed to reject the distant, supposedly objective God trick of obscured positionality that is so powerfully manifested in the view from nowhere – choosing instead to deliberately try and ground that view

as situated knowledge. Situated not only in terms of the wide, heterogeneous, and complex human and material network of actants that construct the immutable mobiles of human rights knowledge, but also in terms of the practices through which RS has come to be incorporated into the modern human rights ideal. As Doge and Perkins suggest, such work is intended to “explore the subjectivity alluded to by Nagel, by showing how positioned the view from nowhere really is!” (2009, p.501)

As such, it is with a profound sense of gratitude that I reflect back upon the two most significant academic prompts that have guided this project from the very beginning; Martin Müller’s call for researchers to enter inside the black box of the organization as geo-political actor, and Kristin Sandvik’s warning that technology in civil society contexts must be understood both as a tool and an actant. It is perhaps fitting that at the end of my dissertation, I should find myself contemplating another technology whose impact on the human rights field has yet to be charted. Particularly so, as the very essence of AI/ML systems are embedded within the black-box of algorithmic structures – opaque, complex, and incredibly powerful. I have no doubt that the community of researchers, analysts, investigators, lawyers, academics, and activists that make up the international human rights community will fully embrace the challenges that such technologies will present them with. For my part, I look forward to joining them in that endeavor.

5.7 References:

- Aronson, J.D. 2018. Computer vision and machine learning for human rights video analysis: Case studies, possibilities, concerns, and limitations. *Law & Social Inquiry*, 43(4), pp.1188-1209.
- Bueger, C. and F. Gadinger. 2015. The play of international practice: Minimalism, pragmatism and critical theory. *International Studies Quarterly*, doi: 10.1111/isqu.12202
- Char, D.S., N. H. Shah, and D. Magnus. 2018. Implementing machine learning in health care—addressing ethical challenges. *The New England journal of medicine*, 378(11), p.981.
- Cosgrove, D.E. 2001. *Apollo's eye: a cartographic genealogy of the earth in the western imagination*. John Hopkins University Press. Baltimore, MA.
- Dodge, M. and C. Perkins. 2009. The view from nowhere? Spatial politics and cultural significance of high-resolution satellite imagery. Themed issue. *Geoforum*, 40(4): 497-560.
- Dwivedi, Y.K., L. Hughes, E. Ismagilova, G. Aarts, C. Coombs, T. Crick, Y. Duan, R. Dwivedi, J. Edwards, A. Eirug, and V. Galanos. 2019. Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, p.101994.
- Gianfrancesco, M.A., S. Tamang, J. Yazdany, and G. Schmajuk. 2018. Potential biases in machine learning algorithms using electronic health record data. *JAMA internal medicine*, 178(11), pp.1544-1547.
- Jobin, A., M. Ienca, and E. Vayena. 2019. The global landscape of AI ethics guidelines. *Nature Machine Intelligence*, 1(9), pp.389-399.
- Kwok, R. 2019. Junior AI researchers are in demand by universities and industry Opportunities for moving between academia and business are expanding for scientists as companies step up recruitment. *Nature*, April 23. Accessed May 10 2021: <https://www.nature.com/articles/d41586-019-01248-w>
- Latour, B. 1990. Visualisation and cognition: Drawing things together. *Representation in scientific practice*, pp.19-68.
- Latour, B. and Venn, C. 2002. Morality and technology. *Theory, culture & society*, 19(5-6), pp.247-260
- Latour, B. 2005. *Reassembling the social: An introduction to actor-network-theory*. Oxford university press.
- Leavy, S. 2018, May. Gender bias in artificial intelligence: The need for diversity and gender theory in machine learning. In *Proceedings of the 1st international workshop on gender equality in software engineering* (pp. 14-16).

Livingston, S. and M. Risse. 2019. The future impact of artificial intelligence on humans and human rights. *Ethics & international affairs*, 33(2), pp.141-158.

Pickering, A. 1995. *The Mangle of Practice: Time, Agency and Science*. Chicago: University of Chicago Press.

Planet. 2021. *Defense & Intelligence: Fill intelligence gaps, prioritize resources, and act decisively*. Planet.com. Accessed May 10th 2021: <https://www.planet.com/markets/defense-and-intelligence/>

Risse, M. 2019. Human rights and artificial intelligence: An urgently needed agenda. *Human Rights Quarterly*, 41(1), pp.1-16.

Safyan, M. 2021. *New Year, new launches: 48 Superdoves to launch with SpaceX*. Planet.com. Accessed May 10th 2021: <https://www.planet.com/pulse/new-year-new-launches-48-superdoves-to-launch-with-spacex/>