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'The beauty...is that it speaks for itself': geospatial materials as evidentiary matters

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‘The beauty...is that it speaks for itself’: geospatial materials as evidentiary matters

Abstract

This essay takes up the incorporation of geospatial materials into international criminal law and its institutional locations, focusing on the Hague-based International Criminal Court (ICC). We consider how geospatial materials such as satellite imagery are conscripted as legal materials for international criminal trials, and how these relatively novel forms of evidence require interventions of technical knowledge through expert witness testimony. The assemblage of satellite imagery, expert testimony, and submitted reports are subjected to what we call ‘juridical mediation’ – the vetting of materials through interpretive processes that bring them into a relationship with textual forms, such as statutory principles and the Rules of Procedure and Evidence. What appears on the other side of this mediated process is a complex and composite relationship between textual, technological, and hermeneutic forms, troubling the claim that geospatial material ‘speaks for itself’.

‘The beauty...is that it speaks for itself’: geospatial materials as evidentiary matters

Kamari Maxine Clarke and Sara Kendall



‘I’ll now move to the lower window and zoom in to see the details. We can also go to the right and to the left, and we can even go in a complete circle and see the entire surroundings. Thanks to the panoramic shots and the details we were able to locate a number of places. Geolocation items allowed us to attribute specific locations...’

- Gilles Dutertre, Senior Trial Attorney, International Criminal Court Office of the Prosecutor, 22 August 2016

1 Probative platforms

In his black robes in the clinical space of the courtroom of the International Criminal Court (ICC), a member of the prosecution team presented his audience with a new optic for viewing the terrain of international criminality. Combining geospatial information, satellite imagery, photographs, open source videos, and other forms of site documentation, this ‘interactive digital platform’ offered its viewers a composition of materials in order to demonstrate the responsibility of the accused, Ahmad Al Faqi Al Mahdi, for the destruction of cultural heritage in Timbuktu, Mali in 2012. This was the first time that such a medium had been used at the Hague-based court. Taking his audience through this new visual field, the prosecutor not only presented the contents of the platform but also demonstrated what it is capable of revealing: panoramas wider than the human gaze, details too fine to register from a distance, a scale that can shift from an overview of a scene to its component parts. In re-staging elements of the scene, he guided his audience through a medium that augmented the visual field through geospatial technologies and other means of gathering data – from satellites to mobile phones – that are increasingly used for investigating human rights violations and grave crimes. Because Al Mahdi entered a guilty plea at the start of his trial in August 2016, the digital platform’s gods-eye presentation of his culpability was not weighed and assessed by the judges of the trial chamber for its evidentiary value. Yet its presentation during the prosecution’s opening statement reflects an increasing interest in using geospatial technologies as evidence, which transforms these materials into matters of concern for law.

‘Geospatial technology’ refers to technologies that acquire, manipulate, and store geographic information. The term ‘geospatial’ entered the lexicon during the late 1980s but traces its roots to the early Cold War, where the US and Soviet governments monopolized the early development of satellite-based surveillance technology. Satellite monitoring of the Earth’s surface became privatized and commercialized in the civilian sector, and by 2001 Google Earth

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was among the first platforms to give civilians free access to satellite archives. The term now encompasses a vast array of technologies, from satellite imaging, geographic information systems (GIS), and global positioning systems (GPS) to renderings from LiDAR survey data. These technologies are used in human rights work to uncover and interpret gravesites, and are then incorporated into digital platforms to establish and augment evidence through expert testimony in trials.

The geospatially-driven digital platform presents a novel evidentiary form used by civil society activists and scientific experts alike, as with our opening example from the ICC. Reflecting on the nature of evidence before him, the ICC prosecution team member remarked that ‘the beauty of such a platform is that it speaks for itself’,¹ suggesting that the platform enabled the images and the objects that are captured through them to express the prosecution’s narrative. As a persuasive form, digitized evidence drawn from geospatial technologies may appear to ‘speak for itself’ through its manifest veracity, revealing different scales of data beyond what the human eye can see. The digital platform’s fabricators describe it as ‘an intuitive yet comprehensive spatial and temporal account’, a definitive and irrefutable artefact that enables information to be conveyed more completely in a legal setting.² Yet this framing misses the way in which evidence is a distinctly hermeneutic matter for the law, subject to human interpretation and judgment.

In the context of an international criminal trial, technological forms such as the digital platform are subjected to legal processes that determine what can be shown and how veracity is evaluated; that is, ‘the means by which the event of evidence is itself made manifest’ (Schuppli 2014). When such materials are presented as potential evidence through law’s ‘terribly demanding felicity conditions’ (Latour 2013: 357), they are brought into a relationship with legal categories and ways of knowing that unsettle their claims to an irrefutable truth of what happened. Despite prevailing presumptions about evidence as embodied in objects, evidence must be spoken for: the platform only takes on meaning as evidence through the medium of the prosecutor’s

presentation at trial and through the subsequent legal process of determining its veracity or truth-value.

This article addresses the making of evidence as a legal matter through digital forms that are increasingly employed in human rights and international criminal litigation. Geospatial technologies, remotely sensed data and social media now supplement more traditional evidentiary forms, such as witness testimony and documentary evidence (Aronson 2016, Wolfenbarger 2016). Individuals and organisations are working with scientific and legal experts in using geospatial and other digital technologies to gather and present evidence to state actors and international justice institutions. Materials such as the digital platform's components become relevant for the law – that is, as *legal* materials – by way of mediation and representation within a broader juridical assemblage that includes advocates, judges, charges, files, locations and procedures, and relationships to markers of space and time. The presumptions built into these digital constructs – erased in their presentation as self-evident expressions of events – are revealed through legal processes that explore the conditions of their production.

Scholarly literature taking up these issues has tended to explore how the reception and production of these mediated forms have shaped the development of new cultural processes. Scholars have questioned the 'objectivity' of seemingly neutral technologies by drawing attention to the assumptions upon which that objectivity is based (Daston and Galison 1992; Feigenson and Dunn 2003; Gilliland 2013). Some illustrate the culturally situated ways of seeing (Goodwin 1994), writing code (Bivens and Haimson 2016; Handel et al 2015; Bivens 2008; Bivens 2014), and writing algorithms (Ananny 2015; Milan 2015; Musik 2018). Others have observed how digital information such as code and remote imagery, as well as the representational practices that also comprise it, enable viewers to experience the object as 'more than itself' (McLahan; Hansen 2004:6; Clarke 2019). A digital image can have a materiality distinct from the 'real' content of what it stands for, leading to significations beyond the object or content's usual form.

Yet in international criminal law, accounts of these mediations

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through technological materials remain relatively underdeveloped. Work on the use of geospatial technologies in international criminal courts has tended to focus on hearsay evidence, such as witness and expert testimony (Irving 2017), with less attention to the role of secondary documentation of crimes, such as video recordings of violent executions and mass arrests that emerge on social media platforms. Little attention has been devoted to the actual production of these new knowledge modalities, the experts involved, and their locations in matrices of global power (Weizman 2017), especially in relation to the apparent democratization of access to scientific knowledge that new technologies and their platforms offer. Legal materials, such as geospatial information enlisted in a legal process, produce legal matter – here, evidence – through a range of representational and indexical practices that are aligned with scientific and legal claims (Chen and Sharp 2014; Haraway 1997; Lentzos and Rose 2009; Masco 2006; Mears et al 2003; Mears et al 2005; Rosenzweig 2008; Samimian-Darash et al 2016). By exploring the interrelationships between geospatial technologies, interpretive practices, and their transformation into legal evidence, we see how these technologies not only carry particular assumptions and histories that exceed the prospect of neutral recording, but also how they allow scientific expertise to inform the fabrication of socio-political realities of criminality and punishment.

As an approach for the fabrication and mediation of evidence, legal materiality can enrich readings of the technological forms that enable evidence procurement as well as the role of expert testimony as sites of authoritative knowledge. Bringing together technology and scientific expertise with the production of legal materials, as with the expert readings of satellite imagery considered here, a legal materialist approach shows how the production of evidence is always mediated and constrained by the forms and speech acts that comprise legal fabrication. Such an approach opens up ways of examining what becomes visible within a scientific frame as well as how we are made to see it. By examining an expert witness’ presentations in two cases before the ICC that involve geospatial technology as an evidentiary form, we consider how these materials are conscripted as legal matter

and how expert testimony seeks to concretize such transformations.

2 Producing evidentiary regimes

As a regime of knowledge-production, the field of international criminal law has developed unevenly through different institutional locations over time. Until the permanent ICC came into force in 2002, these locations of international criminal law's production were mainly temporary institutions developed to address crimes that occurred during particular conflicts, with some jurisprudential developments in domestic criminal justice systems. The post-World War II International Military Tribunal at Nuremberg produced a template for considering evidence as a matter of international criminal law that informed subsequent international and hybrid courts and tribunals, blending civil and common law approaches to include both adversarial and inquisitorial elements. The evidentiary materials catalogued at Nuremberg were textual and extensive: letters between commanders, administrative records, organizational charts, written orders and reports, with the atrocities of the Nazi government and its organs inscribed in meticulous detail by the very actors who carried them out.³ Five decades after Nuremberg, the International Criminal Tribunal for the former Yugoslavia (ICTY) and the International Criminal Tribunal for Rwanda (ICTR) were established to adjudicate war crimes, crimes against humanity, and genocide that occurred in conflicts in the Balkans and Rwanda. Judges of the ICTY and ICTR were mandated to develop the Rules of Procedure and Evidence, which were amended multiple times. Much of the evidence at these tribunals was drawn from documents corroborated with witness testimony, which required additional practices of interpretive mediation beyond the process of authenticating documents.

While the standards and rules of evidence for the permanent ICC were built upon earlier tribunals, they incorporated more civil law elements and substantial judicial discretion than in previous tribunals. Fundamental principles governing evidence were established in the foundational Rome Statute, while the judges and Assembly of State

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Parties (ASP) were left to develop the detailed secondary and subsidiary rules of the Rules of Procedure and Evidence. The ICC’s Rules leave a vast interpretive domain to the discretion of the judges.

Since its work began in 2002, the ICC’s Office of the Prosecutor (OTP) has struggled to collect enough evidence to secure convictions, with nine individuals convicted to date (and one overturned on appeal) as well as one admission of guilt. In many of today’s armed conflicts in Syria, Libya, and elsewhere, ongoing violence occurs far from sites that are readily monitored. Investigators often lack access to locations where mass atrocities occur, and they are increasingly turning to satellite images as well as photos, video, and text messages posted to social media, which in turn may be curated by witnesses using mobile phones. It was not until the early 2000s that geospatial data began to emerge in the prosecution of crimes against humanity (Freeman 2018), especially in regional and international criminal courts such as the ICTY (provided by the US government) and later at the ICC. Today, private companies based primarily in the US, Canada and Europe have made remotely sensed imagery more accessible through satellite data that captures imagery at higher resolutions, and by launching constellations of satellites that are capable of more comprehensive coverage of the Earth with a shorter revisit cycle. Among their many customers are governments and investigators, and the use of such data is dramatically increasing. The expanding roles for these technologies and the relationships developing around their use marks an emerging and consequential shift in the logic and practices of international criminal justice.

A central challenge for investigators and prosecutors in transposing geospatial data into the ICC’s evidentiary regime is that judges must ensure the evidence is relevant to the trial. Documentation of human remains, executions, mass arrests, and even bureaucratic wrongdoing through various media can be presented as evidence only if they are deemed relevant, contain the necessary metadata (such as time and date stamps), and follow the correct chain of custody steps. The chain of custody is expected to chronologically document the sequence of custody, control, transfer, analysis, and disposition of evidence, and it

is critical for maintaining the integrity of the location and condition of a crime scene. In order to establish that video evidence was legitimate, most criminal justice institutions have also required that witness and expert testimony are used to corroborate materials entered into the court record.

The production of evidence as a legal matter in international criminal law takes place within these institutional locations, and through an assemblage of textual and hermeneutic forms: written rules and interpretive practices of judicial discretion that are informed by the domestic legal habitus of tribunal judges, as well as an array of other mediating elements, from how the legal officers working for judges vet potential evidence, apply the rules and draft judgments, to the files and filing systems – such as the commonly used CaseMap software – that classify and categorise materials to be considered. Written rules are brought into a dialogical relationship with oral practices, and legal materialities are produced through the performance of interpreting evidence within conditions of power, such as judicial discretion and claims to scientific expertise.

As Cornelia Vismann has observed, files actively mediate between the oral and the written, between speech acts and their institutional inscriptions, yet unlike the fields of linguistics and sociology reflecting on their own recording devices, ‘the law... has nothing similar to say about files’ (Vismann 2008: 11). These materials become interesting for the law only when they are introduced as evidence: ‘How a file came about determines the degree to which it can be used as evidence. Beyond the immediate context for which they were compiled, the question arises whether their truth claim is justified, whether and in what way they are capable of reliably reproducing past events’ (Vismann 2008: 11). As the examples from the ICC considered below illustrate, the genre of the file takes multiple forms: the trial transcript as a mediation of oral testimony; the electronic files of expert reports that must be interpreted as evidence by the judges; and the satellite images as data files within the expert report files, which are read as forensic documentation of events. Similarly, Susan Schuppli observes

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that the ICTY ‘itself becomes a processing machine that works over the materials that enter its legal infrastructure, and in the process also actively transforms them’ (Schuppli 2014: 282). Knowledge of atrocity crimes is established through textual and interpretive practices that ascribe agency. Such forms of agency involve the application of rules of authoritative documents – relevant statutory provisions and the Rules of Procedure and Evidence – as well as the value ascribed to materials, such as military memoranda, photographs and bullet casings, and utterances such as witness testimony.

In international criminal law settings, witness testimony has been criticised as unreliable due to inconsistencies or concerns with an individual’s credibility (Combs 2010; Combs 2015; Anderson and Twining 2015), or as subject to tampering and coaching (Cryer 2014), and this has begun to diminish aspects of speech-based evidence amongst some actors. Trial chambers have recognised human forms of fallibility resulting from distant memories and the role of courtroom technologies in mediating testimony; for example, ‘reasonable inconsistencies’ recognised by the ICTR judges include ‘the lapse of time, the language used, the questions put to the witness and the accuracy of interpretation and transcription, and the impact of trauma on the witnesses.’⁴ Claims to objectivity through the turn to technological forms raises the issue of what problems it is meant to solve, and ‘subjective’ witness-based evidence has encountered significant challenges before the ICC. Prosecutors pursuing the Kenyan cases considered in the following section faced problems with securing witness testimony, particularly due to security concerns, coercion and fear in highly charged political contexts where state actors were facing judicial processes. The court’s intervention there contributed to an electoral outcome where the country’s president and deputy president faced charges of crimes against humanity (Clarke 2019; Kendall 2014). Charges were withdrawn in the case against Kenyan president Uhuru Kenyatta in 2014 and vacated against deputy president William Ruto and radio broadcaster Joshua Arap Sang in 2016. According to the advocacy organisation Redress, the prosecutor claimed she faced ‘severe challenges’ to investigations, including ‘a steady and relentless

stream of false media reports about the Kenya cases; an unprecedented campaign on social media to expose the identity of protected witnesses in the Kenya cases and a concerted and wide-ranging efforts to harass, intimidate and threaten individuals who would wish to be witnesses.²⁵ In an attempt to respond to what was seen as the limits of human reliability, prosecutors collaborated with technology developers, academics, scientists and civil society organizations to develop geospatial technological tools that could help overcome problems with coercion, bribery and intimidation by producing an objective record of what had transpired. The assumption was that these technologies would not collapse when pressed by an opposing party. Rather, these forms of potential evidence were made to appear apolitical, inert and unchanging, as objective supplements or correctives to a shifting world of human relations.

The processes of actively transforming materials into legal matter involves particular types of agency that enable the fabrication of things that can be rendered visible for the law, as well as the production of a discursive narrative which translates between these things and legal conceptions. Geospatial technologies are deployed in order to supplement witness narratives and to document post-atrocity destruction at different scales. In offering imagery of terrain that is mediated through satellite image capture, GPS markers, and software platforms that facilitate viewing and interpretation, geospatial technologies are forms of mediation that not only produce translations or representations but also fabrications in which expert discourses and their materials take on particular types of agency that ordinary witness testimony does not.

This combination of discourse and materiality assumes new meanings when technoscience is combined with legality. In the ICTY context, the court used documents and forensic materials as well as some geospatial materials, such as satellite images, to supplement witness testimony within its archive of potential evidence. These images were treated as aerial photographs rather than digital materials, however, and were admitted through crime base or expert witnesses as documents

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(Harris et al 2018: 21-26). Used as photographs to support witness claims, geospatial materials were not evaluated as their own distinct and technical evidentiary forms, illustrating how the same material can be indexed and categorised differently and to different effects based upon a combination of the textual rules and their hermeneutic uptake. This changed with the establishment of the ICC, which developed its own distinct evidentiary regime informed by previous *ad hoc* tribunals.

The development of an evidentiary regime of strong judicial discretion at the ICC has meant that acts of interpretation have played a significant role in shaping how evidence is produced – how materials are conscripted into the category of legal evidence – coupled with the role of scientific expertise in granting truth value to materials. These elements are admitted through the trial process and are evaluated and archived as potential incriminating or exculpatory evidence whose status is settled through the written judgment. These materials become matters of concern for law through an assemblage of mediations, which reflect the rules and their interpretations, expert vetting (and the construction of expertise), practices of rendering materials legible, and their relationships to other materials, such as witness testimony. We refer to this process of transformative fabrication as *juridical mediation*. Juridical mediation speaks to the way that discourses and related legal materialities are constituted by processes through which evidence becomes larger than itself and, as a result, produces what Alain Pottage (2012) refers to as an ‘emergent effect’. Through such emergent possibilities, the forces of juridical mediation are mobilized and produce particular effects that enable new agentive ascriptions. In this regard, the following section considers the introduction of geospatial and other new forms of evidence in ICC trials, such as the composite ‘digital platform’ described above, as an illustration of how materials come to matter as evidence for international criminal law. It addresses the way that legal materials gain evidentiary power through juridical mediation.

3 Juridical mediation: reading mediated terrain

Since the early 1990s, developments in geospatial technologies and increased accessibility has led to their use beyond state surveillance and military applications, as with Google Earth and commercial uses of the military satellite-based GPS (Kurgan 2013). Geospatial technologies incorporate location-based data, and include remote sensing through satellites, aircraft or drones, GPS satellite-based location capture, and Geographic Information Systems (GIS) that enable the display and analysis of captured data. Geographical information can be stored in layers of informational density, and the data are incorporated into software programs in order to map spatial information and layer information onto digital files or maps (Kurgan 2013: 52). Use in human rights work can involve very high spatial resolution (VHRS) satellite sensors that acquire multispectral images. The satellite image, along with VHRS information, allows researchers to create a map or visual interpretation of what is captured in order to comparatively assess relationships between structures, how vegetation had been affected by destructive action, and how it may have impacted human life.⁶

As materials that can be conscripted into juridical processes, geospatial technologies provide documentation that allows experts to surpass the capacity of human observation through 'reading' these digital records of the earth's surface and beyond. In international criminal law, it would seem that the turn to geospatial and other forms of technology reflects a prosecutorial 'quest', in the words of one observer, 'for objective sources of evidence to prove the cases brought before the court' (Macauley 2012: 239). The ICC Office of the Prosecutor has entered into a symbiotic relationship with organisations such as the American Association for the Advancement of Science (AAAS), whose 'Scientific Responsibility, Human Rights and Law' programme provides technological support and training to human rights advocates and institutions. An AAAS report's description of the task faced by the ICC is illustrative: the prosecutor confronts 'the burden of proving widespread, systematic patterns of human rights violations repeated over time, documentation of which is difficult

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using traditional methods’, adding that ‘Remotely sensed data offer solutions to some of these most difficult human rights documentation challenges’ (Harris et al 2018: 1).

As an anchoring technology that pinpoints locations and dates and offers snapshots of altered terrain, geospatial or remotely sensed data is presented as an objective instrument through which data must be interpreted in order to support witness testimony within a trial process. Yet as Laura Kurgan observes of Google Earth, ‘the political, military, and economic stakes that underwrite the creation and expansion of the database can often disappear. All that’s left are the minimal data: the image has a date, a time stamp, and a series of coordinates in which it has been registered and made available for purchase by others’ (Kurgan 2013: 21). Just as Google Earth is a composite of satellite images from various sources, so too with the imagery presented before the ICC, which is compiled by an expert witness for the prosecution in the form of a report. The work of an expert depends upon a number of other connected and mediating elements, and the juridical process brings the ‘political, military, and economic stakes’ back into the frame if its textual traces are read carefully enough, revealing the process of technological fabrication that is disarticulated through practices of questioning expert witnesses. An examination of two examples from cases before the ICC reflects the development of this technology and the critical practices of presenting, reading and seeing evidence – all forms of mediation through which geospatial material becomes an evidentiary matter for law.

4 Presenting, reading and seeing geospatial materials as evidence

On Wednesday April 9, 2014, Lars Bromley, an expert on satellite imagery working at the operational satellite applications program (UNOSAT) of the UN Institute for Training and Research, was called before the ICC to help the judges of the trial chamber make sense of images documenting widespread burning of buildings during the violence in Kenya’s Rift Valley region after the disputed presidential election of late 2007. Kenya’s deputy president William Ruto and

broadcaster Joshua Arap Sang were on trial for crimes against humanity, including murder, persecution and forcible displacement of people during the two-month long conflict. The prosecution argued that the burned houses belonged to the ethnic Kikuyu people in Kenya's Rift Valley, and that they were deliberately burned in attacks by ethnic Kalenjin who felt that the elections had been set up. Both accused denied their culpability. The ICC prosecutor called upon Bromley to provide evidence that could help to document the number of buildings burned in the Rift Valley county of Uasin Gishu.

Accompanied by four reports submitted to the ICC's Office of the Prosecutor and presented to the court, Bromley's testimony involved a comparison of satellite images of various structures that were captured before the unrest in December 2007 and then again in January 2008, during the height of the post-election violence and destruction. In contrast to how this material was treated at the ICTY, the expert witness' testimony clarified that the satellite imagery is 'not simply a photograph as you would expect from a camera.' (*The Prosecutor v. William Samoei Ruto and Joshua Arap Sang*, 9 April 2014 trial transcript [henceforth *Ruto and Sang*]: 23). He continued,

What these satellites do is they're capturing reflected electromagnetic energy in multiple wavelengths, so another primary difference that we have, using our special software, versus what you see in the PDF, is we are able to access a different wavelength of reflected energy, which is referred to as near-infrared energy... the primary benefit of that extra wavelength of energy is essentially it helps you understand where vegetation is, just due to the properties of how vegetation reflects this energy...[It] is then displayed through the capabilities of the software which, in certain circumstances, helps me understand what a vegetated area might be, what its condition might be, et cetera, et cetera. (*Ruto and Sang*: 23)

Following many hours of testimony, Bromley concluded that approximately 506 buildings were deliberately set ablaze in the Rift Valley between December 2007 and January 2008. As he explained with 'before and after' imagery,

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When you locate an area where structures have essentially disappeared between the after image and the before image, then you of course pause at that location and you try and determine why the structure has disappeared. ...In some cases, they may be abandoned and just otherwise disappeared.... In these particular cases, I would identify the structures as having been burned (*Ruto and Sang*: 36-37).

Bromley proceeded to interpret the geospatial technology he had employed for the courtroom audience:

In the examples on the screen in front of you, where the red dots are, these are locations which in the before image clearly had structures and then in the after image the structures have disappeared, and what you see remaining are essentially artefacts of what I would call or what I would see as burning. So most visible is a lot of white greyish material lying on the ground, which we can – which I would basically identify as ashes. The ash remains of the structures. A little bit less visible, especially in this area but much more visible in other areas, would be blackened charred remains of the structures and surrounding vegetation. So between the disappearance of the structures, their replacement with a white ash-like substance and occasionally blackened remains, I would classify those as burned structures...So it’s an analytical – [an] analytical process where you’re first noting the disappearance of the – of the structure and then identifying characteristics which indicates which it’s likely been burned (*Ruto and Sang*: 37).

This form of mediated reading of the Kenyan landscape reveals particular discursive practices that are deployed by an expert to help translate between the technical and the juridical. Not only are legal materials produced through the process; those materials become matters of concern to the law through discursively coding data and emphasising particular readings of the landscape that fit with legal categories. Materials are presented through discourses of technical certainty and analytical conclusions that follow scientific logics. As Bromley explained, satellites capture ‘reflected electromagnetic energy in multiple wavelengths’. They allow the analyst to ‘access a different wavelength of reflected energy’. Through technocratic interpretation,

Bromley explains that he can turn on an extra wavelength of energy that is not visible to the human eye but that the software helps to reveal, where the mediated terrain enables a hyper-visibility of substances such as ash from burned structures. Discursive practices allow experts to engage in forms of mediation through which knowledge about materials are explained and represented with diagrams, attempts to zoom in and out of frames, and strategies that emphasize the salience of specific images.

When interpreted within particular speech frameworks, such as ways of describing burned remains as ‘blackened charred remains of structures’, the technology is instrumentalized toward legal ends through analytical sequences of deductive reasoning. These discursive performances produce the terms through which materials such as ‘charred remains’ are transformed into matters of concern to law, appearing as possible crimes against humanity, as they take on a social life that is larger than the sum of its parts. Degrees of certainty were coded in relation to a range of possibilities, from ‘definite clear indications’ of burning to ‘possible’ uncertainty about the nature of the events. Bromley felt that with the evidence available to him and the analytic ability that it afforded him, the uneven patterns of burn indicated that the fire affecting the structures was deliberate. Yet at times when cloud cover or trees interfered with his ability to determine with certainty whether a building had been burned or damaged by other means, the category of ‘possibly burnt’ was used. Under cross-examination, the defence challenged the witness’s account of where arson occurred as well as the possibility that the fires could have been caused by farmers burning crops, which Bromley acknowledged. The defence counsel insisted that the witness was not in a position to know what had caused the fires, just as he had previously suggested that there was no evidence that the burning was tied to the intention to commit arson. As he noted, ‘The witness cannot testify as to the cause of those fires because the witness, as he said, was never present there’ (*Ruto and Sang*: 77).

By calling into doubt Bromley’s reading of the satellite images in line

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with the prosecution’s narrative of deliberate property destruction, the defence sought to undermine the process of fabricating legal materials from these images. The charges were eventually withdrawn due in part to witness intimidation and tampering, illustrating the emergent effects of technological platforms and modalities that contribute to juridical mediation in a broader assemblage that acts upon them, rendering them active (potentially carrying probative value) or dormant (part of the archive of a closed case).

Bromley returned to testify before the ICC in the case against Bosco Ntaganda in the situation of the Democratic Republic of Congo (DRC) over two years later, on 9 and 12 December 2016, consolidating his position as an expert witness and as a broker of the relationship between geospatial technology and international criminal law. According to the prosecution, the accused Bosco Ntaganda, a former operations commander for the Forces Patriotiques pour la Libération du Congo, had committed war crimes and crimes against humanity in the Ituri district of the DRC in 2002–2003. Destruction of property was included among the charged war crimes, and as in the Kenyan cases, the prosecution drew upon satellite imagery as evidence of destroyed structures. Bromley’s courtroom appearance was meant to provide background into the construction of reports submitted to the trial chamber supporting these charges.

While the commissioned expert reports are the formal repository of potential evidence, they cannot speak for themselves; Bromley appeared in the trial chamber to mediate between the geospatial material they contain and its translation into comprehensible terms for legal interpreters, such as the trial chamber judges and their legal officers. Juridical mediation transpires here through an assemblage of actors and actants: Bromley’s reading of what he sees in satellite images as a witness before the court; lawyers leading, contesting, and characterising his testimony in terms that render it legally legible; the digital files and formats through which it is brought into the court’s archive of case materials. In addition to the component elements of juridical mediation, there are also attendant norms and presumptions

that distinguish it from other forms of mediation. While the prospect of error is built into scientific reasoning and analysis, for example, legal thresholds for evidence operate differently: here margins of error are translated into grounds for doubt.

As in the Kenyan case, Bromley's testimony entailed a display and discussion of 'before and after' images that he believed represented evidence of the destruction of property in locations throughout Ituri. This particular genre of visual truth-claim requires an interpretive supplement. As Eyal and Inez Weizman observe, 'before-and-after photographs are used to privilege a direct line of causality between a singular action and a unique effect', yet the event itself is missing, calling for a spatial interpretation that is 'never straightforward' (Weizman and Weizman 2015: 8).

As with photographs, satellite images are also restricted: by orbit times, by the resolution of publicly available images, and by their historical imbrication with Cold War surveillance practices that manifest in contemporary sourcing of satellite data. In an interview several years before testifying at the ICC, Bromley explained the different procurement processes in obtaining 'before' and 'after' images, where 'after' images involve either deliberately directing satellite image capture for a particular location or deliberately selecting images from a bank that had been captured for other purposes. At trial he explained how in some instances he was unable to locate a 'before' image to compare with the 'after' image:

Obviously, when you use the two images, the before and the after, the results are, are much more certain than when you use the one image collected after. With the one image after, you will see in the report that it says it's a speculative method.... I cannot say that structures disappeared if I do not know that there were structures there to begin with (*Ntaganda* 1: 94-95).

Meanwhile, acquiring images from a repository brings in an additional element of contingency beyond weather conditions that might obscure the terrain. Satellite images for particular times and locations are purchased from private vendors, whose coverage of an

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area is tied to commercial factors: ‘For rural areas like Eastern DR Congo, it is really going to be a much more haphazard set of imagery collected ... it is going to go back to what the companies were actually doing at that time, what their priorities and clients were will dictate essentially where they’re collecting imagery’ (*Ntaganda* 1: 88). Private vendors operate according to revenue-based logics rather than regarding documentation as its own end.

Neither Bromley’s expert testimony nor the raw satellite imagery constitutes evidence before the ICC; instead, the expert report filed with the trial chamber serves this purpose, rendering data as an electronic file. In this sense, the report serves as a critical actant in juridical mediation. Bromley’s testimony provides context in addition to demonstrating his approach in assembling the reports: the Office of the Prosecutor would provide location coordinates that he would verify in relation to databases held by a United States defence department organisation, the National Geospatial-Intelligence Agency (NGA), as well as a database from the Congolese government. NGA markets itself as an agency ‘that provides a decisive advantage to policymakers, warfighters, intelligence professionals and first responders’⁷, begging the question of where international criminal courts and tribunals would fall within these categories. Meanwhile, the names of locations corresponding to these coordinates might vary, both across databases and in relation to the names given by the Office of the Prosecutor: Bromley’s testimony explained that ‘[i]f there is different languages or ethnic groups in use, a single town might have multiple names, for example. ... essentially there is no single standard spelling like you would find in developed countries with, you know, a nationwide geospatial database’ (*The Prosecutor v. Bosco Ntaganda*, 9 December 2016 trial transcript [henceforth *Ntaganda* 1]: 83).

Interpreting space is not as straightforward as it might appear. The process of verifying coordinates, acquiring satellite data, and composing the reports reveals the formation of a complex material composition, with discretionary spaces of human judgment and limits to available data. The terrain of the visible is conditioned by the unevenness of

available satellite imagery, which is tied to the vicissitudes of corporate interests and privileging urban over rural locations: images of The Hague will be more common than those of towns and settlements in the eastern DRC, which may have a plurality of place names. Other factors such as cloud cover, the available satellite technology from a particular moment in time, and whether ‘before’ and ‘after’ snapshots were recorded also frame what can be seen and, in turn, read by the expert witness. Bromley notes that satellite imagery is ‘not just a photograph of the ground’ but rather a ‘fairly advanced data product’ (*Ntaganda* 1: 89), yet this product must be first obtained through verification processes and corporate transactions that render it distinct from other forensic approaches in the field of international criminal law.

The nature of Bromley’s own performance in the courtroom also needed to be classified for evidentiary purposes. Was his testimony a piece of potential evidence to be admitted? Or was it rather a ‘visual presentation’ designed to help guide the judges in reading the reports and the satellite imagery they employed, as the prosecution maintained? Were the enhanced images selected as case studies for the presentation meant to serve as additional pieces of evidence, or were the legal materials restricted to the reports themselves? The judges agreed with the prosecution that the purpose of the expert testimony could be ‘instructive’ rather than an additional layer of submitted evidence, but the performance itself demonstrates how the evidence cannot be grasped in its totality; instead it is curated through a process of juridical mediation that makes it legible to law. Bromley’s curation process entailed highlighting specific cases and his reasoning behind finding destruction of property, as with the following examples:

Moving on to Kobu centre. Again, all I have for this location is one image, the 22 May 2003. I don’t have anything previous to compare it to. And so again this--this is where it gets a little bit more speculative but in the yellow arrows, what I have indicated are what could be structural remains, again either the interior walls and the exterior walls and pieces of the structure itself. And then we have a few cleared patches of dirt marked with red arrows, which again may have been structures that had been destroyed but didn’t really leave any remains

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behind (*The Prosecutor v. Bosco Ntaganda*, 12 December 2016 trial transcript [henceforth *Ntaganda 2*]: 10).

...

The final example is Lipri. So this again 22 May 2003, with no previous image to compare this to. Essentially in this area, when we had looked through it, when I had looked through it quite a bit, you basically notice the pattern of how the settlement is laid out and how structures appear alongside roads, in cleared areas, you know, it follows a fairly logical pattern. And then you get to certain portions of the image where you are seeing the cleared areas, you are seeing the roads, but you are not seeing structures in all the locations that you would expect to see them. So here we have multiple rooftops ... but then we have also locations which look like they would be cleared for structures but there are no structures there (*Ntaganda 2*: 11).

The examples of the Kobu and Lipri settlements reveal Bromley’s analytical process in the absence of a ‘before’ image, which partly entails extrapolating from norms about how the built environment ought to appear and then reading in absences from that extrapolation. Without a ‘before’ image his analysis is ‘a bit more speculative’ (*Ntaganda 2*: 10), indicating what ‘may have been’ structures destroyed in the conflict, yet the arrows offer his audience a visual guide of where to look and what they are presumably seeing. Rather than serving as an unmediated recording device for what transpired, then, these geospatial images become sites for critical reading – for reading *in* as much as *from*, of what should have been present. Bromley’s mandate from the prosecution, read out by the defence under cross-examination, indicates his own framework of interpretation structured by a legal process in which he participates:

‘A, Alleged destruction or burning of buildings. If so, indicate to the extent possible, the number of buildings affected and the nature of those buildings (e.g. whether they are residential, hospital, worship or religious buildings) B, Alleged grave sites/soil disturbance. If

so, identify to the extent possible, the location of each area of soil disturbance' (*Ntaganda* 2: 29).

The guidelines' contours of subject-matter jurisdiction leave a legalistic impression upon the terrain of the visible, marking a prosecutorial desire to enlist geospatial images as evidence of grave crimes.

Despite the prospect of materials such as satellite images registering a largely unmediated truth of what transpired, legal processes reveal the centrality of human interpretation and judgment in juridical mediation. The vulnerability of these materials becomes apparent when they are refracted through legal forms, where they may be assigned little or no probative value in relation to other forms of evidence, such as witness testimony. Scientific attention to precision and accuracy may be translated into the legal currency of doubt, as when the geospatial material provided to the Trial Chamber is ultimately discounted in the *Ntaganda* judgment due to lapses in time and unclear causal relations:

While [Bromley] provided credible expert testimony, the Chamber notes the extensive time period between the two photos, the ongoing fighting in Ituri at the relevant time frame and [the witness's] acknowledgment that changes could have happened any time during the relevant time frame... In these circumstances, the Chamber is not in a position to establish beyond reasonable doubt that the destruction of property within this time frame as shown on the 22 May 2003 satellite image occurred during this specific assault (*The Prosecutor v. Bosco Ntaganda*, Judgment, 8 July 2019: 203, fn 293).

Although *Bosco Ntaganda* was ultimately convicted, it was not through the use of the geospatial evidence provided in Bromley's reports. An expert witness in an international criminal trial can present and explain the data rendered visible through technological forms, with authenticating time stamps, dates and all relevant coordinates, but this material must be entered into a heavily mediated trial record that takes on a life of its own.

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5 Toward a situated optics of seeing

Expert witnessing produces compositions of discourse and materials that enable their transformation into the legal matter of evidence. This extended example of an expert witness engaged in various trial-driven testimonies illustrates how objects and textures, such as ash and charred remains of structures, are rendered visible through these technologies, presented as digital files, and translated into a legal order through forms of juridical mediation. Both the conscription of geospatial materials for law and the performance of evidentiary legitimacy by demonstrating technical expertise illustrate how seeing is mediated through legal logics, and by interpreters who determine the value of evidentiary substance and discursive processes. Judges and legal officers who draw these data and their contextualising testimony into a relationship with the Rules of Procedure and Evidence, forms of analogical reasoning, and assessments of probative value also act as gatekeepers to the juridically mediated narrative of what transpired.

Treating these data as objective forms of knowledge erases the contextual conditions of their production. The data made available for purchase and analysis are detached from their political, social, and economic contexts, yet international criminal tribunals such as the ICC are deeply imbricated with such contexts, from the political will necessary to generate support for individualised forms of punitive justice to the community of donor states and philanthropic organisations that finance and sustain their work. In Kenya, as in the Democratic Republic of Congo, the making of legal cases and the extent to which cases carry viable evidence also concerns the play of domestic, regional, and international politics, and what can be made visible to law in light of these political considerations. The ICC’s experience in Kenya illustrates the vulnerabilities of its institutional design, with no analogue to a police force providing support for investigations. Meanwhile, political and military power falls outside of the evidentiary frame of juridical mediation, and reading state power into objects or their absences

entails a different set of practices. This would involve developing a new domain of seeing and reading geospatial technologies through digital platforms that also allows for situated optics that redirect our lens from materials and their micro-meanings to the dynamic cultural and political processes through which materials take on meanings beyond or outside of themselves. In other words, by under-theorizing the ‘optics of seeing’ – the political conditions against which various circumstances can be rendered legible to law’s evidentiary standards – international legal scholarship has not been able to make sense of the broader backdrop that circumscribes what can be seen as the ‘legal matter’ of evidence. We call for research methodologies that uncover the unintended and surprising consequences of design and engineering tools when they are applied within particular socio-cultural contexts. Such points of departure will enable us to see how new digital platforms, propelled by various geospatial technologies, both produce and delimit social relations and power dynamics in local, national, and transnational contexts. We end by calling for a re-framing of digital objects through an ‘optics of seeing’ which allows us to critically examine how legal materials gain evidentiary power through juridical mediation, and to understand the way that digital platforms expand the assemblage of actants that fall within the ICC’s evidentiary jurisdiction.

Endnotes

1. Stinson L 2016 ‘The Hague Convicts a Tomb-Destroying Extremist With Smart Design’ <<https://www.wired.com/2016/08/hague-convicts-tomb-destroying-terrorist-smart-design/>>
2. The platform was created through the Court’s collaboration with a Brooklyn-based design studio, whose website states that ‘The development of this tool represents a move towards new and increasing applications of digital technologies in judicial proceedings aimed at bringing accountability for atrocity crimes.’ <<http://icc-mali.situplatform.com>>
3. Many of these are documented in the Harvard Law School Library ‘Nuremberg Trials Project’; see <https://nuremberg.law.harvard.edu/>
4. ICTR *Bagilishema* Trial Judgment (2001), para. 24; ICTR *Bagilishema* Appeal Judgment (2002), para. 107

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5. Redress 2014 ‘ICC Prosecutor’s withdrawal of charges against Kenyatta, a blow to victims of the post-election violence In Kenya.’ <<https://redress.org/news/icc-prosecutors-withdrawal-of-charges-against-kenyatta-a-blow-to-victims-of-the-post-election-violence-in-kenya/>>
6. The AAAS report set out the utility of these technologies in supporting international criminal prosecutions: ‘[Remotely sensed data] can illustrate patterns of attacks over a sprawling region, demonstrate destruction, new construction, or military movements in otherwise inaccessible areas, reveal the date and manner in which important cultural resources were demolished or forests were cut down, and provide a baseline and cross-check to knit together witness testimony, online photos and videos, and any other evidence that has a spatial component. Satellite images taken over weeks, months or years can illustrate changes imperceptible to witnesses on the ground and can do so with time, date, and location tags to help assure their veracity. They can corroborate witness testimony, as well as digital evidence such as photographs and videos’ (Harris et al 2018: 1).
7. National Geospatial-Intelligence Agency ‘About NGA’ <<https://www.nga.mil/About/Pages/Default.aspx>>

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