

## **Pixels, politics and peace: The forensic use of digital satellite imagery**

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### **Abstract**

High-resolution satellite imagery is no longer accessible to states, governments, and their military and intelligence apparatus only. Increasingly, private users such as individuals, humanitarian non-governmental organizations, academic institutions, the United Nations, and commercial corporations have access to and make use of satellite imagery. The relevance of satellite imagery and forensics for Political Science is evident in the political utility of high-resolution satellite imagery. The military and civilian use and application of space-based technology (hereafter referring to satellite images) for, amongst others, espionage, early warning, disaster monitoring, agricultural crop assessment and forecasting, and land use management is well-known. Satellite imagery provides a useful tool for political decision-makers, and Political Scientists analysing conflicts, conflict resolution and post-conflict reconstruction. This paper focuses on the use of satellite imagery. The rationale is to determine the political utility and significance of the forensic use of satellite imagery. Besides this, the research intends to determine the opportunities, perils and uncertainties for politics and Political Science. The mere act of observation, or gaze, is a significant political act as the observer may hold the view that seeing is believing or beauty/truth lies in the eyes of the beholder.

### **Keywords**

Remote sensing, satellite imagery, technology, forensics, human rights, humanitarian organisations

On 5 February 2003, United States Secretary of State Colin Powell made a presentation on Saddam Hussein's Iraq to the United Nations Security Council (UNSC) to persuade members of the Council to support a UNSC-endorsed intervention in Iraq. Apart from, amongst others, audio recordings, electronic intercepts, and eye witness accounts, Powell presented satellite imagery purportedly showing Iraqi installations related to the country's purported weapons of mass destruction (Powell, 2003). Powell (2003) went on to explain the images identifying munitions facilities, trucks (decontamination vehicles), truck movements, and a ballistic missile site.

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Powell used these images to explain Iraq's ignorance of UN resolutions passed against the country. A UNSC vote on no further military action (*i.e.* intervention) did not succeed resulting in the US' leading a so-called Coalition of the Willing, that invaded Iraq in March 2003. Many years later, Powell admitted that his address to the UNSC was based on a 'great intelligence failure' (PBS, 17 May 2016) and flawed intelligence with dire consequences for the Iraqi people.

More recently, satellite imagery released by the Russian Ministry of Defence on the downing of Malaysian Airlines Flight 17 (MH17) on 17 July 2014 in eastern Ukraine were subsequently found to have been altered to implicate Ukraine and exonerate Russia in respect of the event (Bellingcat, 2015: 1-42). Both the Powell and Malaysian Airlines example constitute a unique form of state violence to redirect or deny state accountability.

These examples were preceded by other usages of satellite images. In 2003, for example, prior to the establishment of open access satellite imagery such as Google Earth and Google Maps, a report, *The Hidden Gulag*, by the Washington-based non-governmental organisation (NGO), the Committee on Human Rights in North Korea, was the first human rights report to include satellite imagery of North Korea's forced labour camps (Hawk, 2017: 2). Fast forward to 2017. In October 2017, the Committee for Human Rights in North Korea released its latest report on North Korea, *The Parallel Gulag*, including 20 high-resolution satellite images showing a previously unknown and more elaborate labour camp system, the so-called *kyo-hwa-so* (Hawk, 2017).

In 2004, Amnesty International commenced with investigations using low-resolution satellite imagery to document atrocities in Sudan (AI, 2004). Since 2007, Amnesty International has dedicated satellite image analysis staff. Explaining its use of satellite imagery in its human rights work, Amnesty International explains

First, it [satellite images] gives us (remote) access to an area that is largely inaccessible to independent observers such as investigators and journalists. The images allow us to cut through the fog of war and help us establishing indisputable facts, such as a damage count and a timeline of events. Additionally, the images provide compelling visual evidence that allow us to shine a much-needed light on an overlooked crisis (AI, 2015).

According to Amnesty International, satellite images can show a number of issues relevant to 'human rights investigations', including people fleeing conflict zones, mass graves, SOS signs, the whereabouts of Joseph Kony and the Lord's Resistance Army, secret or unofficial detention facilities, housing demolitions, the consequences of corporate negligence such as oil spills and gas flares, military deployments, weaponry and roadblocks, and damage to or destruction of cultural heritage sites (AI, 2015).

High-spatial resolution (hereafter high-resolution) satellite imagery is, as indicated, no longer accessible to states, governments, and their military and intelligence apparatus only. Increasingly, private users such as individuals (actor George Clooney's Satellite Sentinel Project (SSP)), humanitarian NGOs (*e.g.* Amnesty International and Human Rights Watch), academic institutions (Harvard University, and the American

Association for the Advancement of Science (AAAS)), the UN, and commercial corporations have access to, and make use of satellite imagery. Whereas governments often do not publish satellite images, humanitarian NGOs often publish these images revealing the extent of human rights abuses, conflicts and political violence. This has direct bearing on Africa and elsewhere where these images have been used for forensic purposes by the Prosecutor of the International Criminal Court (ICC) to, for example, indict Sudanese President Omar al Bashir and others, and to detect mass graves in Rwanda and human rights abuses in Libya during the fall of Muammar Gaddafi.

Satellite imagery is increasingly used to address societal and developmental needs. Satellite early warning systems can determine environmental crises, and determine the damage caused by floods, droughts and fires. Satellite imagery provides a useful tool for political decision-makers, and Political Scientists analysing conflicts, conflict resolution and post-conflict reconstruction. The relevance of satellite imagery and forensics for Political Science is evident in the political utility of high-resolution satellite imagery. The military and civilian use and application of space-based technology (hereafter referring to satellite images) for, amongst others, espionage, early warning, disaster monitoring, agricultural crop assessment and forecasting, and land use management is well-known.

The field of satellite forensics as a form of humanitarian and thus politically-relevant technology, especially in Political Science and International Relations, is relatively new. Similarly, the politics of forensics and the use of satellite imagery remains a neglected area. Unlike scholarly fields such as, for example, Anthropology, Archaeology, Accounting, Architecture, Entomology, Law, Psychology, Psychiatry, Linguistics, Medicine, Nursing and others (Skelton, 2011), Political Science has been slow to develop a forensic sub-field. Therefore, this paper focuses on the use of satellite imagery. The rationale is to determine the political utility and significance of the forensic use of satellite imagery. Besides this, the research intends to determine the opportunities, perils and uncertainties for politics and Political Science.

The paper proceeds as follows. The next section refers to the emergence of the regulation, application and civic access of satellite imagery as a form of remote sensing. It continues to focus on the politics of satellite imagery and the forensic uses thereof. The penultimate section of the paper focuses on the political implications of the use of satellite imagery, and limits to the forensic use of satellite imagery.

### **A panoptic global gaze**

Realising the potential and perils of satellite imagery as a form of remote sensing, the UN General Assembly has, since 1974, adopted various resolutions and principles pertaining to remote sensing (UNGA, 1986). The use of satellite imagery has turned out to be a double-edged sword with its forensic use and significant political implications. Like all forms of technology, satellite images matter. *How* it matters is particularly politically significant. The mere act of observation, or gaze, is a significant political act as the observer may hold the view that seeing is believing, or that beauty (or truth then) lies in the eyes of the beholder.

A satellite image is not only a source of knowledge, but it is also a technique to acquire knowledge; referring to Foucault's distinction between 'technique' and 'technologies of power' (Jacobsen, 2015: 36-44). Hence, there is a difference between the politics of knowledge, the politics of the technology to obtain an image, and the politics of a particular satellite image. Satellite imagery reminds us, amongst other matters, how power is exercised in a particular space and time (domain), even though 'the state' is not necessarily observable in a particular image. Students of Political Science know that borders and maps matter. As cartographic expressions of states' territorial sovereignty and legal authority, maps over time have told the histories and political realities of states and peoples' making and remaking, hence the political reaction when borders, locations and names are incorrect on maps.

Since its establishment as a private commercial entity in 2005, Google Earth has experienced this reaction on several occasions. As a private commercial entity, Google Earth has been criticized by the governments of, for example, Israel, the Palestinian territories, India, China, Vietnam, and Cambodia for including or excluding contested border areas and national security installations (Newsweek, 26 August 2016). On 2 November 2010, for example, what is now known as the Google Maps War erupted when a Nicaragua commander Edén Pastora blamed incorrect Google Maps for his troops' incursion into Costa Rican territory. It eventually turned out that the troops entered into Costa Rica prior to consulting Google Maps. Pastora later admitted that he consulted 19<sup>th</sup> century treaties and thus did not enter Costa Rica, a matter corrected by Google after contacted by the Costa Rican Foreign Ministry to correct the Google Map (Newsweek, 26 August 2016).

Using satellite imagery and aerial photography, Google Earth has somewhat democratized the sky and allowed the global citizenry and humanitarian actors to participate in a Foucauldian panoptic global gaze able to witness (albeit in time delay) events. In 2007, for example, Amnesty International launched its Eyes on Darfur website to 'monitor highly vulnerable villages in war-torn Darfur, Sudan' (AI, 2007). Amnesty International 'invited ordinary people worldwide to monitor 12 villages' by visiting the website and 'put the Sudanese Government on notice that these and other areas in the region are being watched around the clock' (AI, 2007).

This public activist and persuasive power of satellite imagery had several implications. First, inaccessible and large areas and terrain could be observed over time without compromising human lives any further, resulting in a new forensic instrument, namely mass atrocity remote sensing (MARS) (Raymond, Card & Baker, 2014: 33-48). The application of MARS can be useful in retrospective analysis of an event for accountability and advocacy purposes, the detection of possible indicators of the likelihood of mass atrocities, and the collection of data for historical forensic analysis (Raymond, Card & Baker, 2014: 33). This gave rise to so-called 'surveillance witnessing' presupposing access to technology, skilled analysts, and the political will to use, or not to use, the imagery (Hasian, 2016: 16-17) thus creating a new technological and decision-making elite. For states, it added to 'digitalized militarism' in their use of satellite imagery to track opposition forces, and patrol borders. In November 2013, Libya and Italy, for example, cooperated on satellite surveillance for

border protection. Second, it both silenced *and* raised the voices of the victim and the witness. Where victims and witnesses were no longer alive or willing to testify, satellite imagery could be used as additional corroborating evidence. It could also silence victims and witnesses as satellite imagery could be considered to be more 'objective' and thus neglecting human experiences of the perceived crime.

Besides its military and state surveillance application, satellite imagery has also been used or presented as evidence in International Court of Justice proceedings to resolve diplomatic and political disputes such as border disputes between, for example, Mali and Burkina Faso; Namibia and Botswana; Qatar and Bahrain; and Nigeria and Cameroon (Chaturvedi, 2015). Gas flares and piracy have also been monitored with the use of satellite imagery. States also use satellite imagery to track the movements of anti-government militias, and to determine illegal drug trafficking, fishing and mining.

Satellite imagery is also useful in humanitarian and human security situations to determine human rights abuses, the internal displacement of populations, and refugee movements. Since 2000, the UN Operational Satellite Applications Programme (UNOSAT) has provided UN agencies, UN member states, and NGOs access to satellite imagery and analysis for humanitarian assistance, security, crises management and recovery (OHCHR, 2015a). The UN Institute for Training and Research and the UN Operational Satellite Applications Programme (UNITAR/UNOSAT), and the UN Office of the High Commissioner for Human Rights (OHCHR), for example, cooperate in support of the OHCHR's human rights work and responses to humanitarian crises (UNITAR, 2015). On 14 October 2017, when a bomb exploded in a hotel in Mogadishu, Somalia, UNOSAT compared the imagery (resolution: 31 cm) of the bombing collected on 16 October 2017 by the WorldView-3 satellite, with imagery (resolution: 50 cm) collected by the GeoEye-1 satellite on 29 September 2017. In its initial assessment of the bombing, UNOSAT detected at least 60 destroyed and damaged structures (UNITAR, 2017).

### **Pixels, politics and punishment**

The link between politics and technology has been established. Pertinent to this paper, the link between politics and satellite imagery is significant for a number of reasons. First, new technologies such as humanitarian technology and satellite images have added to the improvement of human lives (Jacobsen, 2015). Second, and despite the benefits derived from technology, new technologies and their applications have also added new political complexities such as concerns about the agenda of the entity obtaining the image, the rationale for acquiring images, the analysis of images, the communication of analysis, responses to the analysis, and the impact on the affected areas and populations. The mere capturing of satellite images of, for example, suspected human rights abuses or weapons manufacturing presupposes tense political relations, perhaps even government denials of abuses and activities in areas not accessible to humanitarian organisations and the UN.

In the third instance, Jacobsen (2015: 2) warns of the dangers of experimenting with humanitarian technology. If, for example, satellite images, reconfirm human rights abuses confirmed by other sources, and

this is also made public, government abusers may then turn harder on the victims and areas captured in the images. ‘Experimenting’ with these images may then have the unintended consequence of adding to the vulnerability of existing vulnerable groups of people.

Fourth, besides adding new political complexities, satellite imagery, despite its successful uses in, for example, various court proceedings, has been manipulated (altered) and unaltered used to manipulate political agendas. No image - and no satellite image - is value neutral and objective. Its meaning is socially constructed and thus can have constitutive effects of political significance. This provides all images with some *forensic* meaning. Contemporary definitions of forensic science refers to the scientific methods applied to solving crimes for law enforcement purposes (Skelton, 2011: 1). However, the etymology (Latin: *forensis*) of the word forensic has political relevance as it refers to the classic Roman *forum* (or Greek *agora*) where public deliberations between citizens and the state took place from whence the meaning transferred to law (as public argumentation) and later forensic science (as material or non-material evidence).

One of the legacies of one of Politics’ Founding Fathers, Aristotle, is his contribution to understanding rhetoric by presenting us with three modes (deliberative, ceremonial and forensic) of rhetoric, and three types of evidence, or proof, used in rhetoric (*ethos*, *pathos* and *logos*). Hence, political actors’ success in achieving their objectives and advancing their interests depend on their successful application of rhetoric and the three types of evidence. This rhetorical power thus enhances the persuasive power of a political actor to persuade and convince its audience (Uhr, 2014: 254-255).

Satellite imagery thus have rhetorical power and is thus used by state and non-state actors to achieve political objectives. The rhetorical use of satellite images is thus not only limited to the image as text, but also relates to the context of the image, or a series of images. Consider again, for example, US Secretary of State, Colin Powell’s address to the UNSC in February 2003. Powell made use of all three modes of rhetoric and the most common types of proof. He went further and provided, amongst others, satellite imagery to persuade his audience (the members of the UNSC). Powell realized that the form (style, evidence presented) is just as important as the content of his address. Although the UNSC did not endorse an invasion of Iraq, Powell was successful in persuading a significant number of states to join the US as members of its Coalition of the Willing, that invaded Iraq in March 2003.

Finally, satellite imagery has a constitutive effect. The use of satellite imagery in, for example, various court proceedings has constituted the forensic use of these images. Satellite imagery is useful in forensic analysis. In Rwanda, for example, satellite imagery has been used to determine the location of mass graves related to the country’s genocide in the 1990s. The United States’ commercialization of satellite imagery in the 1990s (Raymond, Card & Baker, 2014: 33) coincided with a significant period in international relations. In the wake of the Cold War, for example, Yugoslavia was disintegrating violently and Rwanda’s genocide occurred. Humanitarian organisations used satellite imagery to detect and convince global audiences of the extent of human rights abuses in these and other instances. Since its establishment, the ICC has used satellite imagery

with other evidence to indict and found individuals guilty of crimes against humanity, crimes of aggression, and genocide. The forensic use of MARS-type analysis has been admitted as evidence in the cases before the International Criminal Court, the International Tribunals for the Former Yugoslavia and Rwanda, the Permanent Court of Arbitration, and the International Court of Justice (Raymond, Card & Baker, 2014: 34).

In other words, the social construction of satellite images have gained additional meaning beyond its traditional meaning as an instrument of surveillance by the state. Satellite images have now also gained meaning as a normative instrument to detect and prevent criminality, and protect the vulnerable. In the past few years, satellite imagery has been used to confirm the existence of forced labour camps in North Korea, mass graves in Burundi, Boko Haram activities in Nigeria, human rights abuses in Darfur (Sudan), and forced relocations in the Democratic Republic of the Congo (DRC) and Zimbabwe (The Guardian, 4 April 2016). When the government of Eritrea refused entry of the UN Commission of Inquiry into the Eritrean government's human rights abuses to the country, the Commission invited written submissions, testimonies and interviews via its website. This information was corroborated with satellite imagery provided by UNOSAT (OHCHR, 2015b). A UNOSAT official observed

Often our imagery analysis is a source of objective information during conflicts and other crises, a contribution to protecting the most vulnerable and documenting violations and abuses against those in need of greater assistance (UNITAR, 2015).

In August 2016, for example, the ICC found Al Faqi Al Mahdi (a member of an extremist group with links to Al Qaeda) guilty of the cultural destruction of Timbuktu in Mali. The Prosecutor presented, amongst others, satellite imagery of the destruction caused by al Mahdi and colleagues. Furthermore, the ICC indictment of Sudanese President, Omar al Bashir, relied on satellite imagery of human rights abuses in, amongst other areas, Darfur. The ICC Prosecutor also submitted satellite imagery in the case against Kenyan President, Uhuru Kenyatta. In the case against William Ruto and Joshua Arap Sang, the ICC Prosecutor, and Ruto and Sang's Defence Attorney agreed upon the permissibility of a number of dates and undated satellite images of Google Earth and Maps showing areas of Kenya (ICC, 2012).

This normative constitutive effect has political implications. First, states can use satellite imagery in the name of national security and not have to account for it. Second, satellite imagery used to prevent, detect and protect, may end up serving the oppressor. Finally, satellite images thus get 'constituted as normatively acceptable sources of reliable and politically relevant knowledge' (Jacobsen, 2015: 44). In following Grégoire Chamayou's *Manhunts* (violent acquisition (slavery), violent capture (the first sovereign), and technique of elimination/exclusion (pastoral power)), (in Jacobsen, 2015: 45), satellite imagery represents a new form of 'man-hunting' (à la Chamayou) (*i.e.* image capturing), and thus of power.

### **Political implications of the use of satellite imagery**

One of the political implications of the use of satellite imagery is that it limits state power and state monopoly on space technology. Access to space and space-related technology such as satellite imagery is no longer limited to states only as private, humanitarian and commercial actors are also operating in this area and market. However, states maintain some power as their governments formulate, implement and enforce policies and legislations on access to and the use of technology. Moreover, states maintain their monopoly over the securitisation of certain types of images in the name of national security.

A second political implication is that open access to space technology creates a new (digital) global citizenship and state responses to it. Civilian access to satellite images means that the private monitoring of governments, populations, individuals, and political opponents are possible. This also means that actors can move beyond mere monitoring. Open access sources such as Google Earth has been reported to be used by government agencies. It has also been reportedly used by the Islamic Army in Iraq when, in August 2006, it circulated an instructional video on how to aim rocket at US military installations using Google Earth as it provides the GPS coordinates of these installations. The Pentagon, for example, reported that Google Earth was used in the planning of several terrorist attacks (ABC News, undated).

State responses to civilian access to satellite imagery have varied and included securitizing all images, collusion, buying in, negotiation, bans and evasion. Since the inception of Google Earth, for example, some governments have expressed their national security concerns about Google Earth. In some instances, governments and Google Earth may have colluded to block images exposing what has been termed national security-related sites. Google Earth has been accused of pixelating areas that governments regard as national security installations. China and Bahrain, for example, have banned certain Google Earth services. The governments of China, India and Thailand for example, have joined the commercialization of satellite imagery and have commenced with sales of their surveillance satellite images. Another state response has been to reconsider its physical security architecture by either redesigning and camouflaging installations or putting it underground to avoid detection by Google Earth and others (ABC News, undated).

A third political implication of the use of satellite imagery is the emergence and establishment of a new form of authority; private authority that questions and opposes state authority and legitimacy. Humanitarian organisations such as Amnesty International, Human Rights Watch and the Atlantic Council's reports (based on satellite imagery) on human rights abuses are internationally accepted as authoritative; irrespective of government responses to their reports. Whereas the al-Assad regime in Syria, and its allies Iran and Russia, regarded the fall of Aleppo in December 2016 as a victory against Syrian government opponents, the Atlantic Council (2017: 20, 28), amongst others, revealed the humanitarian cost of the fall of the city using satellite images of the destruction of the city and attacks on hospitals. The emergence and establishment of the private authority of humanitarian organisations means that not only states have the responsibility to protect, prevent and respond; private actors have this responsibility too. Hence, the need for public and private accountability.

A matter related to the private authority of humanitarian organisations using satellite images is their role and status as agenda setters and norm entrepreneurs. A possible further political implication relates to the international coalitions and cooperation between humanitarian organisations. In 2006, for example, Amnesty International and the Zimbabwe Lawyers for Human Rights cooperated to produce and report on satellite images proving the Mugabe government's forced removal of informal settlements consisting of opposition party supporters in Harare, Zimbabwe's capital (The Washington Post, 7 June 2007).

### **Limitations on the forensic use of satellite imagery**

The forensic use of satellite imagery is limited by various technical, environmental, economic, analysis, legal and political aspects. Technical limitations include the type, quantity and quality of data. The highest resolution publicly available and thus non-classified satellite imagery accessible to non-state actors is 50 cm. This enables the identification of infrastructure such as bridges and roads, and the size of vehicles. Livestock and small groups of individuals are not always reliably identifiable and requires tracking over time (Raymond, Card & Baker, 2014: 40). Further technical aspects that can limit access to and the use of satellite include the position (angle) of the particular satellite when the image was captured. This is related to environmental aspects such as seasonal variability (rain, growth, trees, vegetation), and fires and smoke which affects observables.

The international price regime of data size; time lapses (real time, or historical); data storage; levels of data processing, formatting, and scaling; the development of meta-data; equipment; analysis; management (archiving, cataloguing and processing); storage; and government policies add to the high financial cost of high-resolution imagery (see Table 1). These high costs prevent more access to and the use of satellite imagery to detect, and prevent human rights abuses, and thus the forensic use of these images. High costs often means that historical and longitudinal data is often not available for comparative purposes thus limiting NGOs' access to and advocacy on particularly worrisome situations while suspected human rights abuses continue or escalate.

Although satellite imagery has been used in legal proceedings, the absence of forensic standards, the novelty of MARS, and the use of satellite imagery by humanitarian organisations is often *ad hoc* and limited to incident-specific analyses. In order to use satellite imagery for forensic purposes, a unique and standardized criminalistics (the scientific method to collect and analyse evidence) is required to, for example, categorise the observable objects (or observables) and analysis of an image as constituting evidence of mass atrocities and human rights abuses. For example, what inferences can be drawn between or causal relationships exist between the absence, presence or changes in observable objects and their physical environment (Raymond, Card & Baker, 2014: 35-39)? Thus, in order to determine the forensic nature of observables, sufficient data (imagery) for cross-referencing, technology (access to satellite imagery) and analysts' understanding of MARS-related observables should be available (Raymond, Card & Baker, 2014: 40).

Mindful of these limitations, Amnesty International maintains that satellite imagery is only effective when 'combined with other research methods' (The Guardian, 4 April 2016). The importance of the

triangulation of evidence and the collection of testimonial evidence has also been cited by veteran forensic human rights investigator, Eric Stover of Harvard University (Scientific American, 16 May 2017).

**Table 1: Cost of satellite imagery**

Company	Satellite	Minimum Order	Price (Archival) (US\$/km <sup>2</sup> )	Price (New Collection) (US\$/km <sup>2</sup> )
DigitalGlobe	QuickBird	25 km <sup>2</sup>	17	23
DigitalGlobe	WorldView-2	25 km <sup>2</sup>	17	23
DigitalGlobe	WorldView-1	25 km <sup>2</sup>	14	20
GeoEye	GeoEye-1	49 km <sup>2</sup>	12.50 (>90 days old)	25
GeoEye	IKONOS	49 km <sup>2</sup>	10 (>90 days old)	20
ImageSat International	EROS-B	49 km <sup>2</sup>	10	14

Source: AAAS (2017) *High-Resolution Satellite Imagery Ordering and Analysis Handbook*. 20 October.

(<https://www.aaas.org/page/high-resolution-satellite-imagery-ordering-and-analysis-handbook>). Accessed 1 November 2017.

Related to the absence of criminalistics, is the expertise required and the potential subjectivity of analysis. Mindful of this, and before showing the satellite imagery to the UNSC in February 2003, Secretary of State Colin Powell (2003) observed

Let me say a word about satellite images before I show a couple. The photos that I am about to show you are sometimes hard for the average person to interpret, hard for me. The painstaking work of photo analysis takes experts with years and years of experience, pouring for hours and hours over light tables. But as I show you these images, I will try to capture and explain what they mean, what they indicate to our imagery specialists.

Finally, and related to the potential subjectivity of analysis, political issues can limit the usage of satellite imagery. It can also enable the usage of certain images to achieve particular political objectives. Apart from the manipulation of resolutions, access to and the distribution (release or withholding) of satellite imagery are done for political purposes and may have significant political consequences. Recent examples attest to this. A further political and forensic aspect of satellite imagery is the manipulation of imagery by either changing the image, or presenting incorrect or dated imagery, or the select use of imagery. Space powers such as the US, Russia and Israel, for example, have considerable power in respect of satellite imagery as they regulate resolutions due to 'national security' concerns (Hasian, 2016: 5).

### **Conclusion**

The acts of observation and image-making, and analysis are a political acts. Satellite imagery and visualisations are often socially constructed by mutually constitutive ideas, identities, norms and interests that 'form, manage, orient or control' decision-making (Hasian, 2016: 2) as we had seen in Powell's presentation in 2003. To this, Hasian (2016: 6, 10) adds a question, are actors interpreting these imagery warning of, or constructing crises due to this? And why, despite authoritative evidence, are some human rights abuses not addressed? For example, both Amnesty International (2013) and The Resolve (2013), an NGO working for victims of the Lord's Resistance Army, have issued reports and satellite imagery related to the whereabouts of Joseph Kony, leader of the Lord's Resistance Army, that had been indicted by the International Criminal Court.

More recently, in October 2017, Human Rights Watch released satellite images showing the destruction or partial destruction (by fire) of at least 288 structures in ethnic Rohingya villages in Burma since August 2017 when the Burmese government commenced with attacks on so-called opposition forces resulting in large numbers of refugees fleeing into neighbouring Bangladesh (HRW, 2017a). By 1 November 2017, Human Right Watch expressed concerns about the UNSC's inaction on the issue

Two months into one of the most vicious ethnic cleansing campaigns in recent history, the United Nations Security Council is still missing in action. For all its pledges to protect civilians, engage in preventive diplomacy, and never again allow mass atrocities to take place without a rapid response, the council has been a passive bystander while hundreds of villages in Burma were burned to ashes, thousands killed, and more than half a million ethnic Rohingya Muslims fled for their lives... None of the obvious tools to end or mitigate mass atrocities have been used. No Security Council delegation sent to Burma; no resolution demanding an end to the military's abuses; and no threat of targeted sanctions and an arms embargo (HRW, 2017b).

Satellite forensics is an emerging field with significant political implications for states and their subjects; a development we, as Political Scientists neglect at our own peril. Fact-finding by satellite image and analysis thereof, so-called objective satellite images, and satellite images as images representing actual or technologically-

manipulated truth, satellite images raise both epistemological and ontological questions to our field. It also raises questions about global state and civilian accountability when seeing is increasingly global. In conclusion, despite some limitations mentioned, satellite images has rhetorical powers and a constitutive effect, persuading audiences and bestowing this particular technology with forensic utility and status, and its users with significant authority, power and legitimacy.

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