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Watching North Korea from the Sky: Remote Sensing and documenting human rights in the Democratic People’s Republic of Korea¹

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ABSTRACT

For organisations committed to documenting human rights abuses in North Korea, gathering data is an ongoing challenge. Faced with the lack of access to the country, as well as the problems inherent in verifying testimonies from North Korean escapees, some organisations have turned to hybrid methodologies, including pairing remote sensing (RS) technologies with testimonial data to better understand the people, places and institutions associated with human rights violations. In the case of North Korea, to date, remote sensing has been used primarily to monitor nuclear weapons and missile development sites. This work has at times sparked controversy, given the scope for analytical error and the high stakes associated with flawed analysis. Against this backdrop, this article discusses the application of remote sensing to augment human rights abuse investigations and calls for greater attention to the potential of remote sensing data to both assist in eliciting information in research interviews, and to generate data that may be used to support the pursuit of accountability for alleged violations of international law. Specifically, it considers the work of an ongoing project developed in South Korea using satellite imagery and Geographic Information Systems technology together with witness testimonies to document sites of state-led killings and burials in North Korea. The paper cites advantages to be had from developing hybrid methods of data-gathering in this context and describes some of the key methodological considerations involved, as well as the possible applications of the data in seeking justice and remedy in the future.

INTRODUCTION

Human rights violations in the Democratic People’s Republic of Korea (DPRK, North Korea) have been the subject of increasing international attention since the 1990s when the growing presence of North Korean escapees, primarily in South Korea, began to swell the volume of testimonies about conditions in what is arguably the world’s most repressive regime. These testimonies have captured attention through their publication in research reports by human rights organisations, in the memoirs of North Korean escapees and, more recently, in TV programmes and TED Talks featuring North Korean escapees and watched by millions

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globally, thanks to the power of social media. However, the narratives presented in such testimonies, while useful and important as long as direct access to the country is all but impossible for human rights monitors, have come under increasing scrutiny in recent years. Accusations of exaggeration and even direct misrepresentation have affected several high-profile escapees (Reuters, 2015). Questions have also been raised about the accuracy and currency of information reported about human rights abuses in North Korea, particularly in instances where the international news media has sought to generate and reproduce stories that are either sensationalised or completely untrue (Dalton et al., 2016; Smith, 2000).

Despite these concerns, individual testimonies continue to be gathered by human rights monitoring organisations as often and as in much depth as limited resources allow. Typically, interviews are focused on a specific theme that is the topic of a limited-term project (An & Sim, 2018; Lee, 2009). In the resulting project reports, narrative testimonies are generally used descriptively rather than quantitatively. Direct quotes and anecdotes are used to give colour to specific issues and to provide the media with quotes for re-publication from what are typically text-heavy documents, given the dearth of images or video from North Korea related to the conditions or events described. In other words, consistent with documentation practices in many situations globally, the content of individual testimonies is not often analysed systematically in ways that may reveal patterns of abuse that could prove powerful in addressing rights violations both now and in any potential future mechanisms to hold those responsible for violations to account (Edwards & Koettl, 2011, p. 66). This tendency towards a reliance on individual testimony, while useful in generating public interest in advocacy campaigns, can be rendered less impactful when pursuing accountability for violations because of the persistent tendency of perpetrator governments and other actors to respond by refuting claims of abuse and undermining the credibility of documenters and their sources (Edwards & Koettl, 2011, p. 67). The North Korean state has certainly followed suit by denying and/or minimising claims of abuses, blaming any rights violations it does acknowledge on external forces or causes, or by criticising the available testimonies as false or unreliable (Fahy, 2019).

Despite North Korea's continued rebuffing of accusations surrounding its human rights record, the findings of a United Nations Commission of Inquiry on Human Rights in the DPRK (UN COI) published in 2014 concluded that widespread and systematic human rights abuses are taking place in North Korea, sufficient to claim that crimes against humanity have been committed, "pursuant to policies established at the highest level of the state" (*Questions and Answers on the Report of the United Nations Commission of Inquiry on Human Rights in the Democratic People's Republic of Korea*, 2014). The evidence and recommendations presented prompted an unusually robust response from North Korea, along with an unprecedented level of sudden, if largely token, engagement with the United Nations' human rights review mechanism, the Universal Periodic Review (UPR) (Son, 2018). However, aside from such engagement and sparse evidence of minor progress on the rights of persons with disabilities (*World Report 2018*, 2017), it does not appear that the state institutions and policies responsible for continuing human rights violations have changed their practices significantly in response to the findings and recommendations of the UN COI (*Inquiry into*

Human Rights Violations in North Korea 2014-2020/21, 2021). Meanwhile, NGOs (based mostly in South Korea) documenting North Korean human rights abuses have continued to focus on individual testimony-gathering and reporting as their primary mode of documenting the situation.

Edwards and Koettl have argued that the tendency among human rights NGOs globally to rely on “emotive and illustrative testimony, individual cases and on the concept of ‘sameness’ in order to illicit public interest and action on a particular matter of concern”, steers organisations away from developing competence in collecting and/or collating “statistics, survey data and macro-level measures of abuses” of the kind that are more likely to serve as solid evidence of a widespread and systematic attack (Edwards & Koettl, 2011, p. 68) – two of the key criteria constituting crimes against humanity in international law (Rome Statute of the International Criminal Court, 1998). However, over the last two decades, a number of scientific organisations have sought to lend technical assistance to human rights work to support new forms of data-gathering and analysis. This assistance has included using remote sensing (RS) technologies, such as satellite imagery, to find new ways to discover and document information about human rights abuses, particularly in contexts where direct access to the ground is difficult. The American Association for the Advancement of Science (AAAS) and the United Nations Operational Satellite Applications Program (UNOSAT) made initial progress in this area by applying their expertise to selected human rights documentation projects in partnership with satellite imagery providers, advocacy organisations and funders (*Broadly Accepted Practices Regarding the Use of Geospatial Technologies for Human Rights*, 2016; *Human Rights Applications of Remote Sensing: Case Studies from the Geospatial Technologies and Human Rights Project*, 2014; Witmer, 2015; Wang et. al., 2013). Since that time, the variety of work in this area has expanded considerably and greater expertise has emerged to help carry such work out.

Advances in applications of remote sensing have not escaped the interest of those seeking to monitor the situation in North Korea, where conventional means of access for the purpose of investigating and recording information about anything the state wishes to keep away from critical eyes is virtually impossible. While foreign governments and private organisations have already sought to apply remote sensing to gather insights about North Korea’s nuclear weapons programme, the uptake of such technologies in human rights monitoring has been slower to develop.

This article discusses the current scope and potential of pairing remote sensing data with individual testimonies as a method of documenting human rights violations in North Korea to serve a variety of objectives linked to the pursuit of accountability. To do this, the article draws on the scholarly literature, NGO reporting and practitioner experience in the field. It first examines the state of the field in terms of applying remote sensing technologies to human rights documentation work and addresses some of the problems and questions that have arisen when attempting to engage in new ways of ‘seeing’ and recording information, both generally and regarding North Korea specifically. The article then discusses the progress of a recent project focused on North Korea to gather and document human rights abuse data

using witness interviews paired with satellite imagery and digital mapping using Geographic Information Systems (GIS) technology. It considers the project's rationale, key methodological considerations, lessons learned in the project's development thus far, and evaluates the contribution of this project to current efforts to pursue accountability for alleged human rights crimes. While acknowledging the risks and challenges to the use of remote sensing in human rights monitoring, it is argued that using new methods to augment and improve the collection and analysis of data, as well as the quantity and quality of data available, can facilitate the creation of a more comprehensive historical record of abuses that may serve future modes of redress for what has occurred in North Korea. This research benefits from the author's years working within the South Korean NGO that developed the project described below, while engaging closely with other NGOs in the field, the UN Seoul Office and a range of other domestic and international stakeholders. Such "insider knowledge" is crucial to responding to some of the academic critiques that have arisen around the use of remote sensing in human rights monitoring, critique that often "falls short in (its) understanding of the practical vision of RS" used at the front line of human rights investigations (Walker, 2020, p. 183).

REMOTE SENSING TECHNOLOGIES IN HUMAN RIGHTS MONITORING

In the last two decades, the application of different information technologies to human rights monitoring work has grown due to their promise in offering information on events in real-time, from remote places, and in connecting this information with other sources of information in ways that provide new perspectives on events. Remote sensing simply refers to the practice of detecting and gathering information remotely. In scientific terms, it involves "detecting electromagnetic energy either reflected or emitted from a surface without making physical contact with that surface" (Koettl, 2017, p. 40) such as through taking photographs from satellites.

Geographic Information Systems technologies are "concerned with data that have an explicit geographic context" (Wolfenbarger, 2016, p. 464) and are "a family of software tools to collect, visualise and analyse spatial data", usually through the creation of maps based on data collected (Gleditsch & Weidmann, 2012, pp. 463–464). When applied to human rights work employing satellite images, using a GIS to create maps that visualise the information gathered in different ways can lead to new empirical insights and widen the applications of the data. First, documenting geographical coordinates related to people, places and events of interest or concern can provide a visible starting point for targeted investigations into human rights abuse incidents (Card & Baker, 2014). Second, a GIS makes it possible to view and analyse those coordinates and their relationships to other variables with relative ease, providing a "macro-level" view of the data (Edwards & Koettl, 2011, p. 68). For instance, a GIS allows adding and removing layers of data by date, event type, parties involved, or information about the credibility of the source of the report. Properly coded data opens up a wide range of possibilities for analysis. Third, geographical mapping of sites connected to

human rights abuses provides critical information related to patterns that are often not visible in interviewee testimonies. Data such as site elevation, relationships to neighbouring sites, proximity to roads and other infrastructure, and natural features in the landscape are all elements of the “spatial thinking” that can help investigators understand behaviours around state-sponsored violence (Congram et al., 2017). Fourth, work to investigate incidents of state violence and their locations can involve preservation of certain sites as crimes scenes. Understanding the surrounding environment may aid in securing protection for such sites before any tampering can take place, while also providing information about on-the-ground limitations to investigations ahead of time, such as access and cost (Lyons, 2012, p. 743; Wolfenbarger, 2016, p. 466). The use of remote sensing in these ways, or “critical cartography” as some have dubbed it (Madden & Ross, 2009, p. 508), therefore holds potential in aiding human rights monitoring, facilitating various forms of intervention, and in supporting potential prosecutions of perpetrators.

Major international projects that first sought to employ remote sensing and that attracted global attention include the “Crisis in Darfur” project formed in 2006 through a partnership between Google Earth and the United States Holocaust Memorial Museum. These organisations worked together with UN Agencies, the US Department of State and NGOs to combine data from a range of locations and in various formats with high resolution satellite imagery of the ground in the Darfur region of Sudan (*United States Holocaust Memorial Museum: Crisis in Darfur*, n.d.). More recently, remote sensing and GIS technology have been used in work to investigate “crimes of international concern” in Northern Uganda by taking qualitative interview data from displaced persons, georeferencing it and transferring it to a geographic database for analysis and visualisation in GIS-generated maps (Madden & Ross, 2009, p. 510). International human rights organisations have also used remote sensing to map attacks and destruction of Rohingya villages in Myanmar to demonstrate that ethnic cleansing was taking place (Walker, quoting Al Hussein, 2020, p. 193; *Mapping Myanmar’s Atrocities Against Rohingya*, n.d.). Amnesty international has mapped and recorded activities at labor camps and detention centers in North Korea (*North Korea prison camps very much in working order*, 2016) and used satellite imagery to look closely at locations of atrocities committed by Boko Haram in Nigeria (Jackson et. al. 2018, p. 184). Further, the ability to monitor large areas and to create imagery timelines of detectable events has proved useful in monitoring the sudden construction of apparent internment camps in the Xinjiang region of China, providing important visual evidence supporting testimonies about the mass detention of ethnic Uighurs and other Muslim minorities in that area (Graham-Harrison, 2020). In addition to geographically-bounded projects such as these, projects providing almost real-time, ongoing monitoring and mapping of violence or terrorism on a global scale have also emerged, namely, the Global Terrorism Database (GTD) and the Armed Conflict Location and Event Dataset (ACLED). Visualised for the global public in the form of a live interactive map online, ACLED’s work in particular has provided helpful precedent for organisations seeking to source and analyse local-level data on events as they unfold (Raleigh & Dowd, 2015, p. 4).

It is true, however, that a satellite image “cannot document torture; it cannot document widespread and systematic rape... genocidal intent or conspiracy; it cannot distinguish between legal and illegal housing demolitions” (Edwards & Koettl, 2011, p. 70). The use of satellite imagery must therefore be “an adjunct to traditional field work” (Edwards & Koettl, 2011, p. 71) and witness testimonies remain central to human rights documentation efforts. However, as one remote sensing expert has noted, “While this observation system is currently nascent and developing, it has obvious long-term potential for supporting human rights around the world” (Bromley, 2009, p. 167). It has also been suggested that the use of satellite imagery by ordinary citizens globally sends a powerful message to leaders, letting them know that “(outsiders), too are watching” (Bromley, 2009, p. 164), with some claiming it has a meaningful deterrent effect (Marx & Goward, 2013).

Challenges to Applying Remote Sensing Technologies

Despite the wide-ranging applications described above, human rights practitioners without remote sensing expertise often overestimate what may be captured in a satellite image, due to variables such as the frequency of image-capture, image resolution, or cloud cover (Koettl, 2017, p. 36; Walker, 2014, pp. 15–16). Another major challenge for smaller human rights organisations is financing the necessary computer infrastructure and high-resolution satellite imagery, as single images can cost thousands of dollars. Imagery from free repositories (such as Google Earth) may lack acquisition dates or may disappear if replaced with newer images (De Vos et al., 2008, p. 462; Witmer, 2015, p. 2328), and does not usually include near infrared (NIR) multispectral imagery, which can be used to detect changes in vegetation as a result of, for example, the creation of a mass grave site (Card & Baker, 2014, p. 50). In addition, the need for qualified, expert analysts to support the research can be prohibitively costly (Witmer, 2015, p. 2344). Although recent years have brought a range of high quality, free and open-source analytical tools, finding in-house or even external competencies to adapt and apply those tools makes it difficult for human rights groups to adopt new technologies (Wolfenbarger, 2016, p. 464). Further, while champions of the use of remote sensing and GIS technology have pointed to their “acceptance within a relevant scientific community” (AAAS quoted in Wolfenbarger, 2016, p. 472) as evidence of the veracity of such methods, mistakes can be made when non-experts are involved. Moreover, connecting analysis with an urgent advocacy agenda “can lead an analyst to discount countervailing possibilities for interpretation or, for example, to over or undercount a phenomenon” (Wolfenbarger, 2016, p. 474; Lyons, 2012, p. 761). Specialists thus insist that analysis of remote sensing data be documented thoroughly to allow replication and verification of results, and that organisations employ expert peer review in the reporting process (Wolfenbarger, 2016, p. 474).

In the context of documenting human rights abuses in North Korea, additional challenges arise. Crowd-sourcing information using mobile phones or an online citizen science platform like Zooniverse (Boyd et al., 2018; Witmer, 2015, p. 2344) to supplement imagery analysis is made impossible by the lack of access to the ground in North Korea, thanks to the closed

nature and considerable surveillance capacity of the North Korean state, as well as the South Korean National Security Act, which prohibits civilian communication with North Korean citizens, presenting an obstacle for South Korea-based organisations.

Beyond gathering the data and generating findings, the use of satellite images and remotely sensed data in accountability processes poses further challenges for the actors involved. NGOs and international organisations have been campaigning since the UN COI report's release for a UN referral of North Korea to the International Criminal Court (ICC), following the recommendation of the UN COI's commissioners. As a result, the extent to which civil society's human rights documentation data may support legal investigations is a question of interest to the North Korean human rights community. The momentum around accountability has led to new projects such as the establishment of the accountability team within the UN Seoul Office, which is tasked with analysing information gathered from North Korean escapees to determine whether incidents may amount to crimes in international law (UN Seoul Office, 2021). However, the use of remote sensing data specifically as evidence of crimes or abuses in legal cases remains limited: few cases internationally have accepted satellite images as legal evidence and judges have so far referred to it only rarely and in vague terms when making judgements (Notley & Webb-Gannon, 2016). Yet although the ICC, tribunal courts and other human rights courts currently have no clear standards for the admissibility of remote sensing data (Wang et.al., 2013, p. 8; Walker, 2014, pp. 19, 22–23), satellite imagery has been admitted in cases at the ICC and the International Court of Justice (ICJ), as well as at the International Tribunal for the Former Yugoslavia (ICTY) and the Permanent Court of Arbitration at the Hague (PCA), often via the provision of data by civil society (Sandalinas, 2015, p. 667). The imagery has been used to corroborate witness testimonies, to establish the geographic configuration of areas where war crimes and crimes against humanity allegedly took place, and to identify potential parties involved (Wang et. al., 2013, p. 10). As a result, the “relevance and probative value of satellite imagery is generally recognized by these courts” and, taken together with the efforts of organisations working to engage with the courts to establish the necessary admissibility standards, it is likely that satellite imagery will play a role in the future of holding perpetrators of gross violations accountable (Wang et. al., 2013, p. 10).

To overcome the above challenges and to improve the utility of data in the pursuit of legal accountability, several North Korean human rights documentation organisations have spent recent years seeking expert technical and legal advice on how best to gather, store and interpret their data, including data gathered using satellite imagery. Moreover, as will be discussed in the section that follows, the work of these organisations builds on precedent from other remote sensing work on North Korea of relevance for research and practice in the human rights field.

LOOKING AT NORTH KOREA FROM THE SKY

Given the rising interest in North Korea as a country of both interest and concern over the last two decades, satellite imagery has become a tool for a range of individuals and organisations to watch North Korea. Applications have included the monitoring of nuclear sites (Centre for Strategic and International Studies; Middlebury Institute of International Studies at Monterey), monitoring of public infrastructure development (NK News), mapping detention centers and prisons and recording locations of human rights abuses (Amnesty International, The Committee for Human Rights in North Korea (HRNK), the Database Center for North Korean Human Rights Digital Atlas, the Transitional Justice Working Group), and academic research using, for example, evidence of light to measure economic activity in North Korea (Ernst & Jurowetzki, 2016). Between these actors there are differences in the level of analysis of the imagery in use, depending on the information sought. Sometimes, satellite photographs are used simply to show the geographical coordinates or general area of the location of an event or institution connected to a witness testimony or news report. In other instances, some imagery analysis is conducted, such as via HRNK's partnership with expertise from AllSource Analysis, Inc. to examine photographs of detention centres or military training areas (Scarlatoiu and Bermudez Jr., 2015).

While this “democratisation of imagery intelligence” could be considered a positive thing, to the extent that it weakens the monopoly of large, well-resourced intelligence agencies over certain forms of knowledge (Dodge & Perkins, 2009, p. 5; Pollack, 2018), experience to date has demonstrated a need to consider carefully how to communicate information about North Korea gleaned from remote sensing analysis to the public. Errors in analysis and reporting can have serious consequences in relation to North Korea – a country that is routinely painted as an unpredictable, dangerous pariah in the international system and the deserving target of one of the harshest sanctions regimes in the world today (Smith, 2000; *Human Costs and Gendered Impact of Sanctions on North Korea*, 2019). Yet there is an additional layer of critique around the use of satellite imagery in looking at North Korea (and other places too), where it is argued that satellite images are not representative of an objective, scientific or uncontested truth and that embedded in their supply and use are “state-oriented epistemological power dynamics” (Walker, 2020, p. 185). Critics have challenged the use of satellite imagery by pointing to the fact that such data always comes from somewhere, and in the case of North Korea, this is most often from US-government or US-based, privately-owned satellites deployed to further US strategic interests (Dodge & Perkins, 2009; Hong, 2013; Rothe & Shim, 2018). Under US law, the US Defense Department has legal power to exercise “shutter control” over civilian satellites launched from the US, to restrict access to sensitive imagery (De Vos et al., 2008, p. 462; Prober, 2003, p. 203). The quality and accuracy of the available imagery has also been called into question. Google Earth, which has argued for the free dissemination of once classified information and resisted state calls for censorship (Myers, 2010, pp. 461–462), has been involved in disputes with governments over the naming and labelling of regions and borders, as well as over revealing secret military and government installations (Farman, 2010, pp. 877–878; Hafner & Rai, 2005). Some governments have been caught red handed altering maps by, for example, photoshopping trees over sensitive sites. There is therefore a degree of valid debate around the impartiality and accuracy of the available imagery.

However, among the different applications of remote sensing to monitoring North Korea, human rights violations in progress can rarely be detected from satellite photographs, rendering the images more useful as a supporting tool to geographically contextualise and map the locations of human rights violations reported in witness testimonies. As Walker notes in a detailed exploration of the critical academic literature around remote sensing and human rights documentation, the critique often draws primarily on analysis of NGO reports and lacks input from the NGO analysts and investigators themselves, therefore missing crucial insights into how remote sensing data is actually used in the process of analysis (2020, p. 185, 190). In practice, satellite images and maps appearing in reports are typically the end product of “hours of iterative and recursive analysis” involving multiple sources of data, including the testimonies of witnesses, who remain at the center of the work (Walker, 2020, p. 190). As the project described below demonstrates, little imagery used by human rights analysts is ever published as it is “employed as an investigative tool, for the purposes of background and geographic knowledge” (Walker, 2020, p. 190). Rather it is the GIS-generated maps (not the images) published that are the primary tool used to visualise the violations being investigated. Moreover, satellite images obtained via Google Earth can be cross-checked for accuracy using online imagery catalogues often made available by the companies or organisations that captured them (Card & Baker, 2014, p. 58-59). “Shutter control” has not in reality been applied in ways that have impeded investigations using remote sensing to document human rights in numerous geographic contexts, and an increasing number of non-Western actors have expanded into the remote sensing sector (Walker, 2020, p. 191, 194). As this author found while running training workshops with local activists in non-Western contexts, these actors, too, are calling loudly for more support to employ remote sensing in their independent human rights documentation work. In sum, the suggestion levelled by critics that remote sensing imagery is given too much weight or is only used in situations that “project an Orientalist vision of Southern chaos is not only factually incorrect but also ignores the practicality of [international human rights] investigations” (Walker, 2020, p. 193).

MAPPING HUMAN RIGHTS ABUSES IN NORTH KOREA

The “Mapping Project” was designed by a South Korean NGO, the Transitional Justice Working Group (TJWG) when the organisation was established in 2014. The initial interest in geolocating and recording sites of mass graves in North Korea arose from the founder’s decade of interview work with North Korean escapees, during which time they had been manually recording in a paper map book mass grave sites mentioned in passing during human rights documentation interviews. Sensing a need to digitise this information and expand the areas of inquiry to support future efforts to hold perpetrators accountable, the Mapping Project was established. The focus of the research is on three types of sites related to human rights violations in North Korea: 1. state-organised killing sites; 2. sites where the dead are disposed of by the regime, often without the knowledge of kin or local communities; and 3. locations which may house documents or other forms of evidence related to these events. The

project uses GIS software to map the locations in the landscape and records other information gathered in the interviews in a database where it is coded to enable both spatial and other forms of querying. In year three of the project, the researchers also began recording sites of deaths that were not explicitly sanctioned killings or executions, but which resulted from torture, starvation, or illness in state-run facilities, or as a direct result of state mandates.

From its outset, the project intended to generate data that may be used to serve a variety of institutions and objectives in the future, while supporting current advocacy efforts. Its future-oriented objectives include locating sites where victims of the regime have been killed or died and been buried by the state to help piece together past events, to identify perpetrators and victims, and to provide families and communities with knowledge about those killed or disappeared by the state. Future examinations of state-led killing and body disposal sites will likely be a part of North Korea's transition from authoritarianism, if or when a new government may seek to launch investigations into violations of international criminal law, international human rights law, and international humanitarian law. Finding and often exhuming the remains of victims of state violence are core aspects of the "right to know" (Petrig, 2009). It is also the legal responsibility of states to resolve cases of missing persons.² As discussed above, although mapping and testimonial data gathered by human rights organisations does not generally serve as evidence in a criminal law sense, civil society documenters in a range of settings have "advanced accountability through both the provision of trial-ready evidence and non-evidentiary submissions that have helped guide prosecutors and investigators" (Levy and Williams, 2020, p. 456). Moreover, as efforts to provide accountability often face long delays, "it is imperative that the evidence of atrocities is collected, prepared and available for use as soon as an appropriate judicial mechanism emerges" (Levy and Williams, 2020, p. 453).

However, the significance of locating the dead and missing is not limited to criminal procedures and formal record-creation. As post-conflict/post-authoritarian exhumation work done in many settings globally has found, exhumations of grave sites are a central part of the recovery of communities from the trauma and suffering caused by killings and disappearances (Marx & Goward, 2013, pp. 104–105). The scholarship on remembered landscapes, geographies of violence and the socio-psychological impact of killing and mass grave sites has discussed at length the "spatial manifestations of trauma and memory" as a persistent concern in societies transitioning away from conflict or oppression (Colombo & Schindel, 2014, p. 2). For example, the way spaces such as school grounds, stadiums and marketplaces in North Korea have been reconfigured by the violence of public executions may demand attention at a time when the threat of such violence is over. In addition, exhumations of sites where victims of state violence have been buried may be prioritised if such sites become the location of future economic and infrastructural development in North Korea – lessons from Lebanon's struggle to locate mass graves in the midst of postwar

² International humanitarian law outlines the obligations to search for the dead victims of conflict or other violent situations, to maintain their dignity, identify and return remains to families, note the location of gravesites, and facilitate access to victims and gravesites (Guyomarc'h & Congram, 2017, pp. 335–345).

urban development are poignant here (Waddell, 2018). The visual element of the Mapping Project’s research may also come to be relevant in reinforcing the written record in any future transitional justice process in North Korea, given the extent to which North Korean citizens have had extremely limited access to outside information for generations. As Levy and Williams write, a robust historical record of alleged crimes has “individual value for survivors who can learn truths about the trauma they endured, but also societal value in bringing about a public understanding of what occurred” (Levy and Williams, 2020, p. 458). Finally, and as has already been in evidence, for advocacy and awareness-raising, photos and maps provide a visual element to testimonies which are usually unaccompanied by images due to the closed nature of North Korea. In today’s visually-oriented media environment, this can increase the exposure of the accompanying narratives (Notley & Webb-Gannon, 2016; Parks, 2001).

Methodological Considerations

Organisations collecting data through interviews with North Korean escapees face a number of challenges in sampling the escapee population, in addition to limits on resources and the sometimes oppositional political and institutional environment (*Promoting Accountability in the Democratic People’s Republic of Korea*, 2019). The data is gathered through one-to-one interviews in the offices of the NGO. The research process involves sourcing interviewees by referral from the North Korean escapee community in South Korea (a snowball, or convenience sample, with some more recent, purposive sampling around specific time frames). Working with a community of escapees, as opposed to being able to access the resident population in North Korea directly raises issues of representation. Over 75 percent of North Koreans settled in South Korea are from two northern provinces, Ryanggang and North Hamgyeong, which account for only 12 percent of the North Korean population (Song & Denney, 2019, p. 453). Additionally, the proportion of female escapees in the South is 72 percent at present (*Policy on North Korean Defectors*, 2019).³ North Korean escapees are accessed by referral from existing contacts, as the government does not share contact information of escapees.⁴ While any research conducted with the escapee community must come with the important caveat that findings cannot be considered representative of the experiences and opinions of the North Korean population as a whole (Kretchun & Kim, 2012, p. 7), the long-running and varied work done by many organisations with this community has established both survey and interview work as valid tools of inquiry into the experiences and views of the North Korean escapee population (Green, 2020).

Information is recorded on the three site types regardless of the time or place of incidents. At the time of the publication of its last report in mid-2019, the project had received

³ The Mapping Project’s interviewees consist of around 8 percent more women than the North Korean escapee population in South Korea (“Policy on North Korean Defectors”, 2019).

⁴ For this research, interviewees were paid around US\$45 to cover the cost of transport and a meal – a participant expectation in this context, given longstanding precedent and the low-income status of many of the interviewees.

testimonies from 610 North Korean escapees over four years. The data-gathering process bears similarities with methods developed in previous projects, such as the Signal Program on Human Security and Technology, in terms of looking to improve knowledge of observables in a “non-permissive” (inaccessible) space at a more granular level and actively involving witnesses in identifying locations, while attempting to corroborate witness testimonies related to mass atrocities (Card & Baker, 2014). The Mapping Project interviewees are first asked to orient themselves by identifying a few general locations (schools, their house) on satellite images from Google Earth within an area where they have resided or spent significant time.⁵ The researcher asks a range of questions about the specific types of sites and events of focus (killings, burials, detention) and may ask the interviewee to sketch from memory the layout of specific sites, adding details such as the position and orientation of people, vehicles and other infrastructure which may not be visible on the satellite photographs, while also asking about the date of the event, to try to find imagery that matches as close as possible to this date. Eliciting the date (or date range) of an incident is very important as over time, buildings may appear or disappear, and natural landmarks may change.

The use of satellite imagery has advanced the interview process in a number of ways. First, as Walker also found in his participant observation work with documentation practitioners, the imagery helps the researcher find a concrete entry point to the story (Roth, 2020, p. 3) and “ask better questions” (interviewee quoted in Walker, 2020, p. 192; Mapping Project researcher, 2021). The photographs also give the witnesses opportunities to confirm or identify key “observables” such as buildings or natural landmarks, helping to contextualise the testimony and establish any links between events and certain infrastructure or landmarks (Wang et. al., 2013, p. 7). Many of the interviewees mention having seen satellite imagery of their hometowns during their entry interviews with the South Korean National Intelligence Service, while others report having used Google Earth themselves to “visit” their hometowns virtually in their own time. Indeed, the researchers on the Mapping Project often mention how enthused the interviewees become when engaging with and sharing knowledge about places very familiar to them. The ability of the interviewer to contextualise the interviewee’s story in a birds’-eye view of the location they are describing often triggers memories that may have been missed and brings forward additional details, comments and reflections that might not otherwise have been mentioned. It can also give the interviewees a sense of control or agency within the interview, as they guide the researcher through the landscape and allow the landscape to prompt the sharing of memories. Interviewees are thus enabled to identify with greater confidence relevant buildings, roads, markets, natural landmarks, and suspected repositories of documentary evidence relevant to the events being investigated, such as police stations, prisons and

⁵ The images shown to interviewees contain only basic information such as town and city names and some railway station names. This information comes from pre-existing, publicly available base maps created by Curtis Melvin: North Korea Uncovered, Version 18, June 25, 2009, <http://www.nkeconwatch.com/north-korea-uncovered-google-earth/>; OpenStreetMap, <https://www.openstreetmap.org/#map=14/41.4089/128.1953>; The 38 North DPRK Digital Atlas, <http://38northdigitalatlas.org/>; and an online map produced by South Korea’s National Geographic Information Institute, <http://map.ngii.go.kr/ms/map/NlipMap.do>.

courts. It also leads to more detailed accounts of events and experiences remembered by the interviewee than is often achievable without the use of imagery.

If the interviewee cannot pinpoint the specific location of an event or site type relevant to the project, no geographical coordinates are recorded; however, descriptive details of the event and its location will be kept for future analysis and interviews, and any identification of general observables will be recorded. Descriptive details are recorded in a database with a large number of fields to disaggregate searchable pieces of data, along with narrative comments and an indication of the reliability of the information, as far as can be estimated at the time of interview. Much like ACLED mentioned earlier, the Mapping Project aims to explore the understudied aspects of violations including the spatial and temporal trends associated with them, as well as the practices of actors involved at the “micro-level” (Raleigh et. al., 2010, p. 652). However, while ACLED and the GTD are tracking events in real time, the Mapping Project’s records are of events that often occurred a number of years previously. This is due to the fact that escaping from North Korea and getting to South Korea is a long and perilous process of transiting third countries illegally,⁶ and that older North Koreans may have witnessed many incidents of state violence and killings over a long time before their eventual escape.

What has been Found?

The analysis undertaken within the Mapping Project falls into two broad categories, both of which have been constrained by the limited personnel, technical skills and funding available to the project. The first is the use of the imagery during interviews, as described above, and afterwards, to corroborate the witness statements and narrow down geographic and temporal information. In some cases, doubt is cast on testimonies, as described below, when the geographic information provided by an interviewee is anomalous to that provided by others referring to a similar incident. In other instances, geographical information from many testimonies of similar events converges on one area and time, suggesting they are all referring to one specific event. The second category of analysis comes when the data is used to “count things”, such as the number of reports of different types of events or sites (killing sites, burial sites) within certain geographical parameters (city, province, nationwide), and the number of times key variables of interest are mentioned, such as perpetrating actors, dates, associated criminal charges, or methods of killing.

As of the publication of the 2019 report, the research had gathered over 300 reports about locations of state-sponsored killings where the interviewee was able to pinpoint the location on the satellite imagery sufficient to record geographical coordinates, and where the information was deemed sufficiently reliable. The research had also gathered a smaller

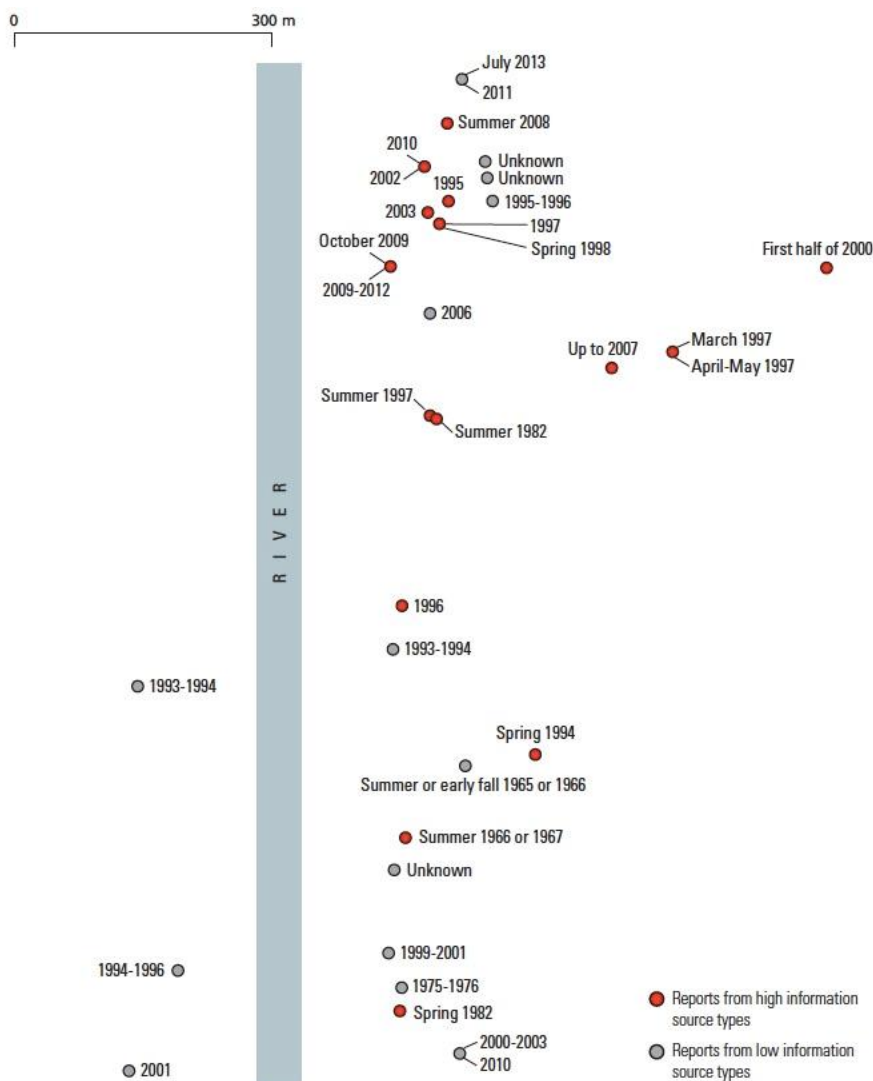
⁶ At the time of the publication of the last report from the Mapping Project, only 13.5% of the research participants had been in South Korea for less than five years, and 73.4% had been in South Korea for between 6 and fifteen years (Son, 2019, p. 19)

number of reports of burial sites of victims of such killings (under 100 at the time of the report's publication) (Son, 2019). This is unsurprising, given that state-sponsored killings (primarily public executions) are often conducted with an audience, while burials take place in secret to prevent relatives or friends of those killed from accessing the dead and practicing customary burial traditions. All site figures published in project reports thus far reflect the gross number of reports recorded from research participants and are not de-duplicated or consolidated at this time. De-duplicating reports of events requires further interviews and site-by-site analysis of both the location data and the recorded testimonies. For example, many of the sites recorded have been used for a large number of public executions over many decades. Memories of executions can be old or confused with other events, resulting in insufficient specificity in the testimony to match them with other testimonies to determine whether multiple informants are referring to the same event at a location. For example, often interviewees may only recall a range of several years and that the weather was hot at the time of an execution. In some cases, though, a significant anniversary (a national holiday) or the interviewee's close relationship with a victim may mean they remember the exact day and time of an event.

While de-duplication of reports is not possible at this stage (and can never be definitive without direct access to North Korea), sometimes certain stories overlap in ways which suggest a high likelihood that multiple participants are referring to the same event. For example, the research team looked closely at eight independent but similar reports about a public criminal trial involving a number of women accused of prostitution, held at a public execution site near a regional town in 2013/14. However, there were a number of discrepancies between one testimony and the remaining seven. By looking at the satellite images and plotting the eight locations provided on a GIS-generated map to measure the distances between them, it was possible to rule out with greater confidence the outlying eighth testimony, given the significant differences in the surroundings and infrastructure described, and the measurable distance of the location cited from the other seven reports. After revisiting all the descriptive data from the remaining seven testimonies, four reports were deemed highly likely to be the same event. Looking at the specific locations on the images and GIS maps therefore provides a dimension which can help clarify suspicions or suggest where further research is needed.

Beyond measuring distances between reports of events and surrounding geographical features, visualising the data in the GIS can also involve adding layers of data showing additional variables that reveal patterns in events and locations over time. Image 1 shows a recorded public execution site beside a river in a regional city where the researchers recorded 35 reports of public executions that allegedly took place in every decade since the 1960s. These reported executions included six hangings, all before the mid-2000s, concurrent with reports that public hangings were banned after this time by the state, and the remainder were executions by firing squad. The location is open and easy for members of the public to access on foot from a nearby market, while also being a short drive from a local prison. The image shows how it is possible to map different variables such as the source types (marked "high" or "low" according to the perceived reliability of the

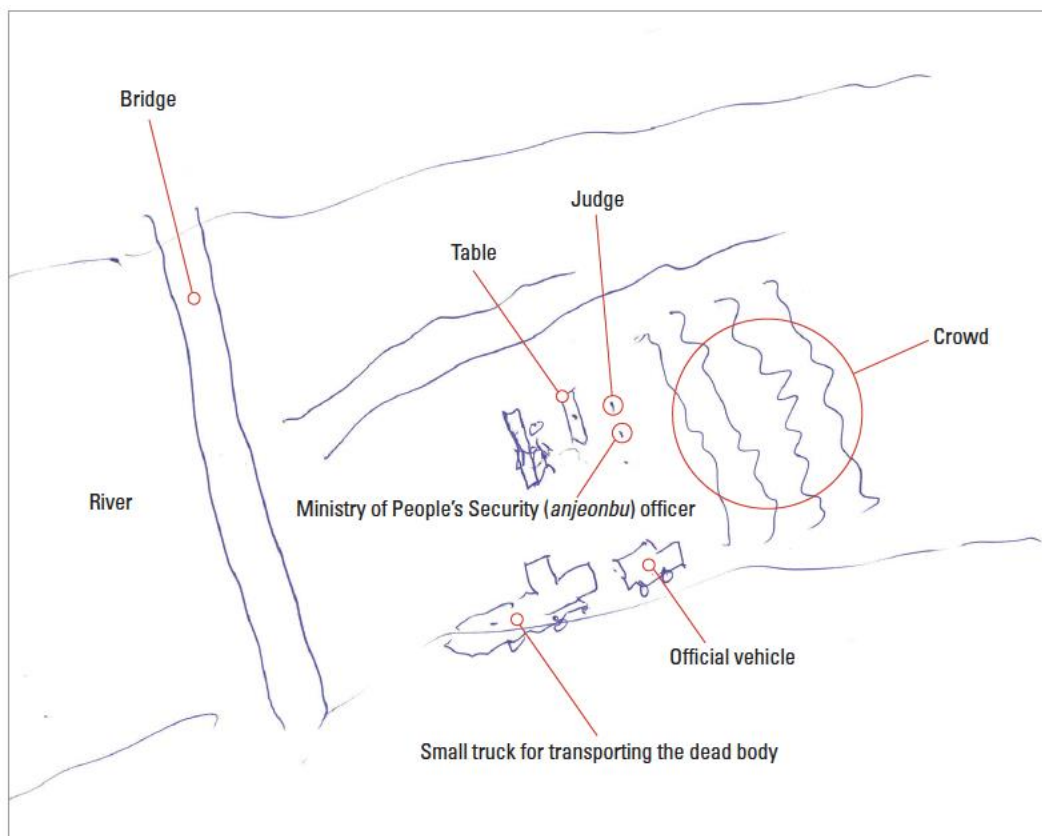
information at the time of interview), the date of the execution and the proximity of reports to each other. Although not shown here, layers showing the method of killing and proximity to buildings can also be added or removed. This image alone points to the systematic use of public executions by the state as a punitive measure against alleged criminals over a long period of time. These executions were carried out as punishment for a wide range of alleged crimes including stealing state property and disseminating foreign media, challenging the government’s claim that “public executions only occur in exceptional cases where the crime committed was exceptionally grave” (*Report of the Working Group on the Universal Periodic Review, 2014*).



<Image 1: Riverbank public execution reports>

Identifying even more detail in the geospatial features of public executions may be useful if access to more specifically-timed imagery becomes possible, to allow sourcing visual evidence of an execution in progress. As described above, the practice of asking interviewees to sketch the locations of public executions they have witnessed *before* asking them to locate the site on the imagery can help check the accuracy of claims about the layout of a site, as well as the site’s position in the surrounding landscape. The sketch in

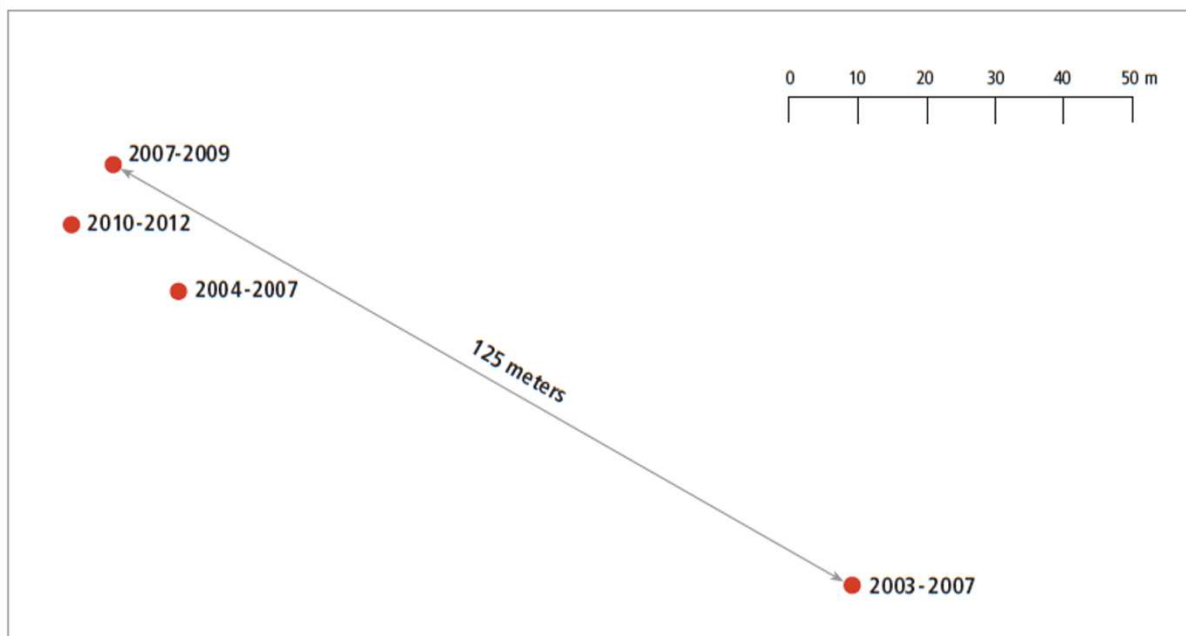
Image 2 shows a riverbank where an interviewee saw six public executions over a period of five years in the late 1970s and early 1980s. The sketch drawn by the interviewee shows the layout of the scene as it typically occurred in each of these instances. According to the interviewee, all those executed were miners charged with murder. There is a table shown in the centre, which was typically where one Ministry of People's Security officer and one judge sat during a short trial. A crowd of 100-400 people typically stood behind. The interviewee recalled two vehicles usually being present: one regular official vehicle and a small truck for transporting the dead. The executions tended to occur at lunchtime, during the summer months. The sketch was drawn before the interviewee was shown the satellite imagery; however, when subsequently compared with the photographs, the sketch matched the layout of the area with a high degree of accuracy, including the relative positions of the railway bridge and river. In subsequent analysis of the imagery, a mine was found to be clearly visible not far from the execution site, which supported the interviewee's claim about the executed individuals being workers from the mine. Sourcing images of such events in action would require considerable investigative work with the requisite imagery, but geospatial and descriptive details such as these would be central to the discovery process.



<Image 2: Sketch of a public execution site on a riverbank>

Regarding burial sites of victims of state-sponsored killings, cases where the researchers have elicited multiple accounts about a single site are few, and those that do exist in the data have come with discrepancies at times. However, certain patterns have emerged in

accounts of burial sites located, for example, within the grounds of political prison camps, which describe common methods of burial or cremation at a single location, sometimes over many years. Image 3 shows the relative locations of an often-mentioned site within the boundaries of the Jeongeori Correctional Labour Camp, where the bodies of prisoners who have either been executed or died were routinely cremated over a long period of time. Despite the area being wooded and relatively non-descript, showing only a narrow road, four former prisoners (the dates show their years of imprisonment) separately pointed to a location within a 125 metre range. The database holds an additional three descriptive testimonies about the site but where the witnesses could not point to a location on the satellite imagery, resulting in no associated coordinates. However, six of the seven total testimonies describe having seen or smelled the cremation of human remains in or near this location, or having witnessed bodies being moved for disposal. The combined geographical and descriptive information gathered should prove useful if and when it becomes possible to investigate this site in the future.



<Image 3: Cremation site at the Jeongeori Correctional Labour Camp>

Another testimony provided information about a burial site for public execution victims used multiple times between 1995 and 2000 (and possibly beyond), located within a short drive of a commonly used public execution ground near a regional town, which, when viewed on the satellite imagery, is barely off a main road. This is consistent with the hypothesis that longstanding fuel shortages and North Korea's mountainous terrain mean that body disposal sites are rarely far from the location of killings. Ideally, access to older images of areas such as this would be helpful for analysing changes to the terrain over time, which may signify more specifically when burials took place; however, at present the freely available Google Earth images for this location only go back as far as 2003, showing limited change to the area other than that it is a clearing at the end of a dirt road, becoming clearer in winter when the surrounding trees lose their leaves. Access to higher-quality or

multispectral imagery over a longer period and at more frequent intervals would improve the possibility of detecting evidence of burials here.

To date, the project has been cautious not to publish satellite images of sites out of concern that sites such as mass graves may be moved or concealed in some way. Interviewees for the project have described how the North Korean leadership ordered citizens in the early 2010s to clear burial sites seen to be “peppering the mountains” (Koreans traditionally mark ordinary graves with a 1-2m² burial mound), saying the sites were a “national disgrace”, likely because the burial mounds highlighted starkly the terrible toll of the North Korean famine that occurred in the mid-late 1990s. To minimise the likelihood of site clearing prompted by NGO reporting, published reports have instead used visualisations (maps) of the data generated by the GIS and sketches, most of which do not identify the exact geographic locations of the sites presented. As the project progresses, this decision may be revisited, in check with the organisation’s commitment to ‘do no harm’ (Jackson et. al., 2018, p. 173). It is worth mentioning also that the project has come under pressure at times, particularly from the media, to publish more images and to over-extrapolate what can be shown through the analysis of the data gathered. However, the project team has been cautious not to publish any data or make any claims that compromise either their confidence in the accuracy of their claims, or the safety of North Korean escapees or citizens. Aware of the limits to in-house expertise, it is important that the project resists the pressure imposed by advocacy and public policy objectives and only presents findings that are an accurate representation of both the data and the level of analytical expertise available to the project at any point in time (Wang et.al. 2013, p. 8). Nevertheless, the maps that are presented in the reports published to date are arguably more persuasive than a written testimony alone, given they situate events “somewhere” (Roth, 2020, p. 3) and make it possible to see multiple events at certain locations over time, highlighting the scope of state-led violence over many decades.

CONCLUSION: FUTURE DIRECTIONS

Despite being six years in, this project is currently only in its infancy in terms of subjecting the data to more sophisticated analysis. The team has a range of avenues they hope to explore with the support of the requisite expertise in the fields of GIS technology, data science, international law and human geography. It is hoped that in the future, following a transition in North Korea of the kind that would make it possible to investigate these sites, remote sensing work done now holds the potential to complement work investigating violations of international human rights and humanitarian law, as well as to locate those who have been victims of state-sponsored killings.

This article has shown that witness testimonies remain vital in the process of investigating killing and burial sites. It is anticipated that in the future, in addition to actual witnesses of “last seen” locations of the missing and dead, local knowledge about language, culture and institutional practices that might be related to these sites and events will prove crucial to

painting a comprehensive picture of what happened, where, why and how (Congram et al., 2017, p. 262). Yet experts working with remote sensing in human rights, and particularly those mapping locations of killings and burials, do encourage human rights documentation groups to “think spatially... and consider how people understand and use space with respect to the treatment of bodies” (Congram et al., 2017, p. 262). This demands making adjustments to traditional interview questionnaires to consider spatial factors such as distance, elevation, relevant natural and man-made landmarks, as well as sounds or smells which may provide clues as to the environment surrounding a site of concern. Instead of relying exclusively on witness testimony, mixed methods using remote sensing and GIS visualisations can examine common patterns or characteristics of sites of interest (Congram et al., 2017, p. 262). As the project progresses, the team intends to advance the application of GIS analysis such as by digitising site information to enable the researchers to conduct new forms of analysis of spatial relationships and to compare site information between digital maps created by different researchers globally. Further, making digital maps with labelled observables (schools, hospitals and prisons, for example) publicly available online is another key contribution this project can make. Such efforts are vital in the process of narrowing the gap between the “hyper-local” knowledge of witnesses from the ground, and that of analysts who are often far removed from the context (Card & Baker, 2014, p. 50). To achieve all the above, the project hopes to continue to draw on outside expertise where resources allow, and to build sufficient flexibility into the project to allow for its ongoing improvement via strategic adjustments to methods employed.

Advances in the technologies available will also contribute to changes in this work. Commercial satellite providers, such as Planet, are expanding the availability of small satellites, which, due to their smaller size and reduced cost of operation, are capable of collecting a vast amount of data for global coverage, with greater flexibility than large scale, singular and expensive satellites (Jackson et. al., 2018, p. 185; *New Satellite Imagery Partnership*, 2017; *Small Sats, Big Shift*, 2017). Accessibility to new technological advances appears to be heading in a positive direction, through initiatives such as the Human Rights Documentation Solutions Project (*Human Rights Documentation by Civil Society*, 2020), which aims to improve consistency across human rights documentation practices and develop open-source tools to meet existing needs. TJWG participated in the initial needs assessment consultations of this project and looks forward to improvements in the availability of solutions available to documenters.

It goes without saying that any party using satellite imagery or interview testimony to report on events and developments in North Korea should exercise extreme care and caution for the reasons discussed above. However, it is argued that this should not preclude efforts today to document and record information on human rights abuses using new methods and tools as they become available, to the extent that doing so might move us closer to an accurate picture of events for use as and when the opportunity may come to develop modes of redress.

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