

Introduction

Several recent initiatives have attempted to assess and analyse the current use of satellite-based information in the humanitarian domain.¹ The results of those initiatives shed light on the current struggle to use this relatively new source of information in an optimal way. Notably, at the same time, the uptake of the use of – applications based on – satellite information in other domains such as the environment, agriculture, and transport are growing rapidly. This development poses the challenge of how to bring the use in the humanitarian domain to that same level? And what steps could private, public, and academic institutions take to organise this user domain for satellite information? The results of the first exploration of the subject in this context are noted in the paper: “Beyond Reasonable Doubt; The Quest to Optimise the Suitability of Satellite Data for Monitoring Human Rights and International Criminal Prosecution.”² As a result of this paper, a first step was taken to define a dedicated project aimed to share knowledge and expertise under the participating organisations and individuals in order to define common ground. This materialised in a seminar on “The Optimization of The Use of Satellite Information in The Humanitarian Domain” that took place on 3 February 2023 at the faculty of law of Leiden University.

Programme

The seminar held two thematic sessions. The speakers in Session A dealt with the significance of satellite information in supporting humanitarian initiatives³ and the current challenges prosecutors face when assessing the data’s reliability, credibility, and authenticity as evidence in accountability proceedings before international Courts and Tribunals. Following the break, Session B concentrated on satellite technical optimization, the current use of satellite information in humanitarian contexts, other underutilised satellite capacities, and the potential conflict of sophisticated data collection with privacy regulations.

¹ Leiden Guidelines on the use of Digitally Derived Evidence (DDE); Berkeley Protocol on Digital Open-Source Investigations; The Harvard Signal Code: Ethical Obligations for Humanitarian Information Activities.

² W. Ploeg, Leiden, July 2022.

³ This seminar focussed on the role of satellite information in international legal proceedings, demanding a very high level of trust. The project will also address other use such as inquiries to possible human rights violations.

Conclusions

Discussions with organisations working in the field of international justice, managing space programmes and space infrastructure and applications⁴ led to conclusions below:

General Conclusions

- ❖ All actors acknowledged the value of better interaction between the legal and more technically oriented domains in order to bridge the gap between both disciplines;
- ❖ The sense of urgency and connected willingness to cooperate is broadly shared;
- ❖ It is expected that the main focus of this cooperation should be in preparing the legal and more technically oriented domains for an effective user consultation process;
- ❖ As further research will be needed after the definition of a dedicated project, the universities involved see opportunities for (international) research activities with possibilities for student participation;
- ❖ It's a non-negotiable that we should continue to use space technology, which is why we must address the issues that limit or prohibit access to this data, its use, and the dissemination of this data and its products.

Part A – Conclusions

- ❖ Satellites are an invaluable tool for courts to overcome the constraints imposed by State sovereignty in documenting evidence of international crimes and monitoring human rights violations;
- ❖ To use satellites to document evidence of human rights abuses and international crimes in proceedings before international courts and tribunals, technical operators must make provisions in their data collection, storage, and analysis procedures to assure the Court of the information's reliability, credibility, and authenticity;
- ❖ Agents can employ a practical technique to continuously collect evidence on and monitor a conflict-affected area by processing the data of numerous satellites simultaneously. Notably, the Court will attribute greater evidentiary weight if the data provider stores the original raw data from each satellite into an interface accessible to the Court so that it can confirm whether the incident in question was actually captured by the imaging satellite at the time it was supposed to have happened or to resolve any doubts about whether a malicious actor purposefully altered the data. Should an agent

⁴ International Criminal Court (ICC), European Space Agency (ESA), European Union Agency for the Space Programme (EUSPA), Kalshoven-Gieskes Forum for International Humanitarian Law (KGF), International Institute of Air and Space Law (IIASL), European Union Satellite Centre (SatCen), Geoscience and Remote Sensing Department of Delft University and the Netherlands Space Office (NSO).

not be able to provide access to the raw data due to company policy, security measures, or for any other reason, the Court will attribute the same evidentiary weight to the image if other evidence corroborates the facts in the image, such as ground-based testimony of victims/actors in the affected area, complementary data from other satellites, etc.

- ❖ Relevant data can be used to detect war crimes or to verify witness testimonies. Such data is contemporaneous to the events it purports to depict and is generally collected within a month of the incident's occurrence. Satellite operators should anticipate a need for such images by international courts and tribunals by collecting data in an early stage of a humanitarian crisis;
- ❖ The more information satellite operators and universities provide on the methodology used to generate satellite images, as well as industry standards and procedures for protecting and storing data, the more admissible and valuable the evidence;
- ❖ Forensic imaging experts can provide much needed assistance in image interpretation and ensuring that the maximum evidential value of the images is achieved.
- ❖ Focussed training with assistance of (technical) universities, satellite operators and the processing sector should be offered to Council Judges and other legal personnel so that they can better comprehend such evidence when presented.
- ❖ Methodologies for determining whether hostile actors tampered with the data submitted to them as evidence in proceedings before the Court should be developed;
- ❖ Ingenuity and interdisciplinary collaboration among technical and legal practitioners in developing guidelines for optimizing satellite imagery for human rights and humanitarian purposes should be organized;
- ❖ Linking smaller satellites, such as Cube and Swarm Sats, to collect complementary data is a promising future development that can provide more temporal information than larger satellites at a lower cost. However, adequate archives must be built to overcome the more limited data volumes that individual small Sats can store or process.
- ❖ While the right to privacy does not yet preclude satellite imagery from being used in criminal proceedings, as image resolution increases, general principles should be developed to address privacy rights in light of the need to collect information;
- ❖ We are beginning to encounter privacy concerns on multiple levels as satellite groups and more powerful satellites are deployed. While there are fewer privacy concerns about what we can directly derive from satellite imagery due to resolution limitations, there are more concerns about the information generated by the fusion of multiple data sets (mobile network, financial, and others). This solicits the question of how far the combination of different (satellite) datasets can be justified for humanitarian purposes?
- ❖ Seeing as regulations are difficult to adapt and review as needed, developing guidance material to make data collection more efficient and sensitive to privacy issues would be beneficial to all legal proceedings, including into International Criminal violations.
- ❖ National and EU agencies, such as SatCen, employ skilled image analysts who collect information from credible sources that can prove useful in judicial proceedings or other human rights initiatives. It might be helpful for Courts to assess the possibilities in this

respect. However, investigators must keep the agency's (legal) policy on information sharing with third parties in mind.

Part B – Conclusions

- ❖ The European Union Agency for the Space Programme provides services related to Galileo, EGNOS, and satellite communication to support the delivery of humanitarian aid, including through the EU Space for Ukraine initiative, which brings together innovators and small and medium enterprises to create solutions that can assist NGOs in the field and anticipate a humanitarian crisis;
- ❖ It should be feasible to extend these services to stimulate the delivery of information and products beyond humanitarian aid to human right's needs;
- ❖ International Space Agencies, such as the European Space Agency (ESA), might be institutionally limited due to their mandate as an R&D organization rather than an operational entity for investigating war crimes or crimes against humanity. Nonetheless, ESA can still provide support in other capacities; for example, ESA works closely with various entities, including the ICC, national prosecutors, and UN agencies, to build capabilities for using Earth observation in these investigations and developing methods for integrating information derived from satellite data with other relevant data streams (e.g. mobile network data, commercial media and social media information, financial transaction data, vehicle telemetry data, data collected by NGOs etc);
- ❖ Since satellite Earth observation data alone currently has limited uses, it is crucial to successfully integrate Earth observation data with other data sources, such as witness statements, mobile network data, financial transfer information, social media data, and others, in order to maximize the value of information derived from satellites;
- ❖ Since international crimes are not instantaneous activities but occur in a sequence of activities that take place over an extended period, the integration of Earth observation data with other data sources over an extended period can help to detect the components of criminal activities and put together a picture of how the illegal activity occurred. Such information can help to support the demonstration of connections between different contributing activities.
- ❖ There are two methods for using GNSS to authenticate forensic data. The first involves utilizing Galileo's open-service navigation message authentication, which provides a signal that can be used to prove that the metadata was received at a specific time, thus authenticating the image. The second and most secure method of proving that a signal was collected at a specific time involves creating a Genesis signature using a commercial company's capability of taking short-duration snapshots, around 100 milliseconds.
- ❖ The Netherlands uses satellite data to analyse the spectral profiles of various crops to detect farmers growing unregistered crops. Given that the evidence based on this data is admissible in Dutch courts, it may be worthwhile to investigate the similarities and

differences between using satellite data in international criminal proceedings and data collection for agricultural issues.

- ❖ There is a need for a standardized technique for determining whether a satellite image has been altered, transparency and capacity building, and possibly storing data in blockchain to overcome the major technological obstacles in using images in international criminal justice. Notably, in 2023, ESA will launch a dedicated set of activities to address this issue.
- ❖ Among the most exciting developments in space technology for the humanitarian and criminal justice domain is the possibility of launching swarms of satellites to monitor conflict areas in the future, to which all speakers see opportunities if the management of the data processing and storage is properly organised, and stakeholders and satellite operator are aware of when and where International Crimes might be committed.