



# Leiden-Delft-Erasmus Seminar Report

## Satellite Data in the context of Human Rights and Humanitarian Law: Lessons Learned and Steps to Take

### Editor and Organiser

Wim Ploeg, SEHR

### Rapporteurs

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### Speakers

Molly Quell (Courthouse News Service) and Stephanie van den Berg (Justice Info)

Vincent Cillessen (International Crimes Unit, Dutch Police)

Alexander Gunkel (Space4Good)

Celia Davies (Omanos Analytics)

Hans van 't Woud (Blackshore)

Vasilis Kalogirou (EUSPA)

Dr. Dimitra Stefoudi (IIASL, Leiden University)

Sabrina Rewald (Kalshoven-Gieskes Forum, Leiden University)

Space Thesis Lab Cohort 2024

### **Partnership**

Leiden-Delft-Erasmus Universities programme space for science and society

Leiden University, International Institute of Air and Space Law, and the Kalshoven-Gieskes

Forum on International Humanitarian Law

TU Delft

Erasmus University, Rotterdam School of Management

### **Publisher**

This report is based on the presentations and panel discussion from the seminar ‘Satellite Data in the Context of Human Rights and Humanitarian Law: lesson learned and steps to take’, held on the 21<sup>st</sup> of July 2024. This seminar provided further insight into the business aspects and legal questions connected to this specific use of satellite data and satellite information. This in-depth discussion is made possible by various scientists, technical and legal practitioners, international organisations, representatives of the private sector and the 2024 cohort of students from the above universities. The first result of the cooperative work towards the second seminar is the setup of a dedicated User Consultation Platform by the European Union Agency for the Space Programme (EUSPA). The final responsibility for the content lies with Wim Ploeg who is the main publisher of this report.

## 1. Introduction / Editorial

Satellite data has become a crucial tool in prosecuting violations of international humanitarian law and human rights, transforming evidence collection and presentation in courts. In February 2023, the emerging network Space Evidence for Human Rights (SEHR) in cooperation with the International Institute of Air and Space Law and the Kalshoven-Gieskes Forum for International Humanitarian Law of Leiden University, organised a seminar on the topic of '*The optimisation of the use of satellite information in the humanitarian domain – Legal and space-related developments*' at the Leiden Law School. The 2023 seminar report explored the ways in which satellite data can be optimised to encourage uptake in its use in the humanitarian domain at the same level, if not more actively, than for other use cases such as disaster relief or agriculture.

Building on the findings<sup>1</sup> in the 2023 Seminar Report and seeking to address the necessity for in-depth discussion on the market and a potential data platform, the 2024 Leiden-Delft-Erasmus Space Thesis Lab cohort<sup>2</sup> explored the business opportunities and legal implications of the satellite data market for detecting and proving human rights violations, while highlighting underutilization issues and international law norms that affect its adoption.

This report synthesizes key insights from recent presentations and discussions with reporters, international crimes units, and panel discussions regarding the use of satellite data as evidence in International Humanitarian Law, and for human rights violations (the “Purpose”).



## 2. Programme

The Seminar was organised into two thematic sessions. The first session dealt with the significance of satellite information in supporting news reporting, law enforcement, an analysis of the market for use of satellite data as evidence for the Purpose. The second

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<sup>1</sup> For findings see: <https://www.universiteitleiden.nl/en/news/2023/06/the-optimization-of-the-use-of-satellite-information-in-the-humanitarian-domain---legal-and-space-related-developments>

<sup>2</sup> For the composition of the cohort see Section 6.ii.

session consisted of panel discussions to draw out expert insights on the current use of satellite data for the Purpose, and the foundations required for its future use. Sections 3 sets out the key conclusions arrived at in the course of the Seminar. Section 4 provides the details of each of the sessions, and Section 5 summarizes the panel discussions. The appendices contain further details of the organisation of the seminar, and a copy of the speakers' presentations from the speaker sessions.

### **3. Key Conclusions**

The market for use of satellite data as evidence for the Purpose is currently misaligned and in need of multiple foundational steps to build a supportive environment to encourage and align the market. The following recommendations serve as a basis for the long journey to market maturity, and to bolster sustained market alignment and continued advancement.

#### **3.1. EUSPA Consultation Platform**

In furtherance of the objective to provide '*Satellite data as evidence*' service, a EUSPA Consultation Platform would be a first step. A consultation platform can serve as an interactive and informative platform to make the demand side of the value chain for satellite data as evidence explicit, enhance discoverability of service providers and services and facilitate market alignment. This platform, at the outset, could feature options for stakeholders to register and make information about their services available on a comprehensive, publicly available information directory. The platform can also host user case studies, and interactive user forums for support and knowledge sharing, thereby enabling alignment and overall market development.

#### **3.2. Awareness and Education Activities; Developing Professional Programmes**

Awareness initiatives are vital to educate potential users about the practical applications and benefits of Satellite Data as evidence. Implementing these initiatives through webinars, case studies, and industry collaborations can significantly reduce information asymmetry and create the market for services providers and experts, commercially or under other models. Training can be tailored and leveraged to grow awareness amongst Primary, Secondary, and Tertiary stakeholders<sup>3</sup>, to the extent relevant to their role in the Satellite Data market, for the Purpose.<sup>4</sup> Such training should be multi-disciplinary and

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<sup>3</sup> For the classification see the presentation of the Rotterdam School of Management, Section 6.iii

<sup>4</sup> The Asser Institute, UNITAR and IUSTICOM have already developed an online training course on the use of satellite data as evidence, also retrieved at <https://www.asser.nl/about-the-asser-institute/news/new-course-using-satellite-imagery-as-evidence-in-international-judicial-proceedings/>

cover not only technical skills in data acquisition and analysis, but also touch upon legal and ethical considerations, and best practices for using Satellite Data for the Purpose.

### **3.3. Legal Basis for Satellite Data Collection and Availability**

To encourage the availability of satellite data for the Purpose, it is imperative to establish a robust legal framework. The ideal state solution is to create a basis in international law for the exchange of satellite data specifically for the Purpose and transpose these requirements on commercial actors through the operation of national legislations. As an illustrative example, the UN Remote Sensing Principles (UN Resolution 41/65) could be developed to require the sharing of satellite data for the Purpose.

The discussions acknowledge the effectiveness of the International Charter Space and Major Disasters, and while acknowledging its efficacy noted that expanding the charter to the Purpose might jeopardise ongoing work and goodwill under the Charter due to the political connotations of using satellite data for the Purpose. Instead, mirroring the Charter or formulating soft law bilateral or multilateral frameworks for similarly structured, collaborative data sharing, is preferable.

A third option is to develop an entirely new framework that serves as a legal basis for sharing satellite data internationally for the Purpose, and encourages voluntary contributions from States, International Organisations (IOs), and commercial stakeholders alike. Such a framework would foster cooperation across the value chain, ensuring that critical satellite data is accessible for the Purpose effectively.

### **3.4. Satellite Data as Evidence Platform and/or Service**

To effectively utilise satellite data for the Purpose, a dedicated platform as a service, or a dedicated service within an existing platform such as the EU Copernicus services, is essential and recommended. For such a platform or service to be effective, it must incorporate the minimum viable features, standards and requirements such as including robust data provenance and chain of custody documentation, comprehensive data security and privacy configurations, the ability for data providers to embed national or organisation-specific requirements into the platform or service, and stringent access and integrity standards. Additionally, the platform or service should provide options to integrate advanced artificial intelligence tools alongside manual processing for analytics and offer options for expedited access in specific cases, such as those involving the International Criminal Court (ICC).

### **3.5. Promotion of Funding Channels**

It is vital for the Purpose, to promote and create robust funding channels tailored to the unique needs of this sector. Promoting and creating funding channels involves developing dedicated financial support mechanisms that can subsidise the high costs associated with acquiring and analysing high-resolution satellite imagery. This could be through securing partnerships with international donors, governmental bodies, and philanthropic organisations willing to support the use of technology for social justice. Additionally, establishing grant programs specifically for legal and humanitarian entities seeking to use Satellite Data as evidence can provide essential financial assistance. These initiatives should also focus on encouraging stakeholders to offer discounted or *pro bono* services for the Purpose.

## **4. Summary of the Sessions**

### **4.1. Session 1 – Molly Quell and Stephanie van den Berg**

Molly Quell is a Dutch American journalist based in The Hague, who covers international law for Courthouse News Service. Stephanie van den Berg is one of Justice info's correspondents in The Hague and is also a freelance journalist covering the various international courts and Dutch news for Reuters news agency and others. They offered a news reporters' and news agencies' perspective on the topic.

The speakers emphasized that when using satellite data as evidence, the focus should be on identifying perpetrators and the chain of command, and not simply on the availability or use of satellite data without placing it in the context of the requirements. Simply recording violations is insufficient; it is crucial to link these violations to specific individuals responsible for the acts. While satellite data appears scientific to the public, it can be doctored. Therefore, rigorous verification processes are necessary to maintain its credibility. Additionally, it was noted that courts often replicate media investigations to ensure accuracy, highlighting the importance of thorough and reliable media investigations.

### **4.2. Session – Vincent Cillessen**

Vincent Cillessen is a Team Leader at the International Crimes Unit of the Dutch Police. He offered a law enforcement perspective on the topic.

The speaker noted that European international crime units face common challenges, particularly the inability to access physical crime scenes. To address this, they prefer using satellite data to reconstruct crime scenes in 3D, making cases more tangible.

Impartiality is crucial for these units; investigating all sides of a conflict helps maintain public trust. The agenda for investigations is collaboratively set by the director and prosecutors, ensuring a balanced approach. Data sharing and collaboration are essential, with EUROPOL mandated to share relevant data among European countries, potentially including satellite data. However, openly accessible satellite data poses risks such as military misuse or endangerment of individuals. Proactively tasking satellites to monitor conflict areas is an interesting but unexplored idea.

#### 4.3. Session 5 – Space Thesis Lab Cohort 2024

The 11 students of the Space Thesis Lab Cohort 2024 presented their findings on the Use of Satellite Data as Evidence in International Humanitarian Law and for Human Rights (the “**Purpose**”), as three distinct themes.

- (i) **Theme I: Market Analysis of Underutilisation of Satellite Data for the Purpose**  
This theme was presented by Tessa Koorevaar, Shashruth Reddy Kethiri, Redouane Acoudad, Pavla Shvetcova, Lora and Subhashree Chowdhury, students of the Rotterdam School of Management, Erasmus University.

The Erasmus speakers examined the reasons for underutilisation of satellite data for the Purpose, despite its proven effectiveness in user segments such as disaster management and agriculture fraud detection. Disaster management benefits from international cooperation and established initiatives like the International Charter Space and Major Disasters, which provide free satellite data for timely crisis response. Similarly, agriculture fraud detection utilizes satellites like Sentinel-1 and Sentinel-2 for monitoring land use, supported by organizations like the European Public Prosecutor’s Office (EPPO).

The speakers analysed the market value chain of the Earth Observation (EO) sector, structured into EO data acquisition, processing, and value-added services, and identified key providers of satellite data. The speakers noted that higher resolution requirements for legal evidence often means that data already available through EU Copernicus services may not be used, even if the data is freely available for use for the Purpose.

The supply side of the market shows hesitance among commercial data providers to invest independently in making satellite data available for legal purposes. Concerns range from profitability and market presence to political and legal risks. Many companies prefer discreet involvement, evaluating requests on

a case-by-case basis without seeking recognition. Similarly, commercial value-adders focus on low to mid-risk markets with growing demand, avoiding the sporadic and project-based nature of human rights and IHL violations.

On the demand side, entities like the International Criminal Court (ICC) and the Dutch International Crimes Unit are interested in using satellite data but face challenges such as budget constraints, lack of awareness, and technical expertise. Legal firms, engaged in national courts for human rights cases, also encounter financial limitations and knowledge gaps, making it difficult to utilize Satellite Data effectively.

Addressing these issues involves increasing awareness, improving access to high-resolution data, and fostering collaboration between the stakeholders across the value chain, for the Purpose.

**(ii) Theme II: A Dedicated Satellite Data as Evidence Service for Market Alignment**

This theme builds on Theme I, and was presented by Sindhu Shankar, student of IIASL, Leiden University.

The speaker identified the various legal aspects that must be considered when building a dedicated satellite data as evidence platform or service. Most significantly, establishing clear data provenance and ownership emerged as the most essential aspects of such a service. This involves documenting the data's journey from its satellite capture to its presentation in court, ensuring that ownership and intellectual property rights are well-defined. Privacy concerns was also identified as being paramount, with compliance with privacy regulations, such as the General Data Protection Regulation (GDPR) being a necessary aspect. The speaker noted that techniques like anonymization and pseudonymization that help protect individuals' identities might be useful to encourage data providers who would otherwise not take the risk of providing satellite data for the Purpose, and that while this may reduce the probative value of the data, it would increase the availability of satellite data which can be used as secondary evidence to corroborate other types of evidence that are available.

**(iii) Theme III: International Law Themes Impacting the Use of Satellite Data for the Purpose**

This theme offered a horizontal perspective on the topic from the lens of the space treaties and public international law and was presented by Aleksandra



Spyra and Solène Flambeaux who are students of IIASL, Leiden University, and Feiran Wu and Maëlle Thomas who are students of the Public International Law faculty of Leiden University.

The discussion centred on the *peaceful use* of space as outlined in the Outer Space Treaty (OST), which emphasizes the use of outer space for peaceful purposes and the promotion of international peace and security. However, the term *peaceful* lacks a definitive definition in the OST. The speakers presented the debate on whether *peaceful* use cases would include making satellite data about conflict zones available, and whether the use of satellite data for the Purpose aligns with this definition.

The speakers also addressed the responsibilities of states and international organizations under international law. While the OST and various international treaties set broad obligations for the responsible use of space, specific duties to disclose satellite data for humanitarian purposes are less clear. The speakers highlighted that, although states and organizations have recognized the value of satellite data in for the Purpose, there is no explicit legal obligation in international law to share such satellite data for the Purpose. This gap suggests that current obligations may be driven more by ethical considerations than by formal legal requirements.

In the context of armed conflicts, the speakers emphasized the role of satellite data in upholding international humanitarian law principles. The data can significantly aid in distinguishing between combatants and non-combatants, assessing proportionality of attacks, and ensuring precautions against civilian harm. By providing detailed and accurate information, satellite data supports the application of the *principle of distinction*, *the principle of proportionality*, and *the principle of precautions* in conflict zones, thereby enhancing compliance with international humanitarian law. Overall, the speakers underscored the need for clearer guidelines and obligations regarding the use and sharing of satellite data in conflict and humanitarian contexts, reflecting an ongoing dialogue about the intersection of space law and international responsibility.

## 5. Summary of the Panel Discussions

The panel consisted of the following panellists:

- (i) Alexander Gunkel is the Managing Director and Founder of Space4Good
- (ii) Celia Davies is the Founder and Director of Omanos Analytics

- (iii) Vasilis Kalogirou is the Space Downstream and Innovation Officer at the EU Agency for the Space Programme (EUSPA).
- (iv) Hans van 't Woud is the CEO of Blackshore
- (v) Dr. Dimitra Stefoudi is an Assistant Professor of Space Law at IASL Leiden University
- (vi) Sabrina Rewald is a Research Associate at the Kalshoven-Gieskes Forum, Leiden University

This panel discussion highlighted the need to embed satellite data into the daily practices of users, including legal practitioners and government officials. The panel noted that training at various levels is essential to facilitate this integration. Existing EU Copernicus services, though not originally designed for legal evidence, could provide valuable tools and insights. Developing a unified digital evidence platform is preferable to creating multiple specialized platforms based on the scenarios in which the evidence is used. Extending the disaster relief charter to include human rights evidence might reduce contributions and hamper the existing good work that is being done under the charter.

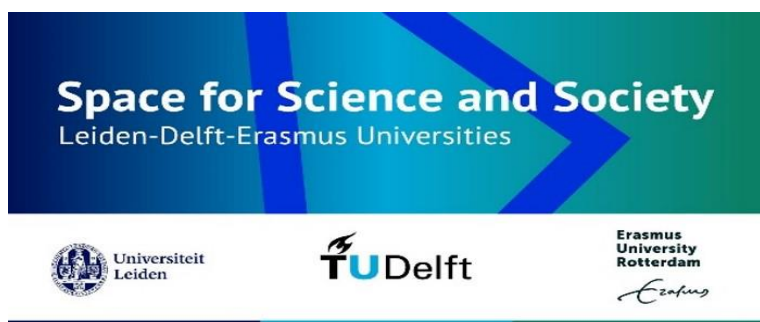
Flexibility is key to accommodate unpredictable future needs. Although satellite data can be fabricated, it is challenging to falsify all channels simultaneously, making additional channels useful for cross-verification. Given the concentration of end-users in Europe, efforts should be prioritized at the European level. Extending the disaster relief charter to include human rights evidence might reduce contributions, so a dedicated charter for the Purpose is suggested, though it requires strong incentives from and for data providers, to ensure their participation and effective contribution.

To enhance impartiality and public trust, international crime units should investigate all sides of a conflict, ensuring a balanced approach. Value-adders should help clients understand the capabilities and limitations of satellite data without speculating on causality or responsibility, minimizing political risks. Facilitating collaboration among European international crimes units through enhanced data sharing and coordination can effectively address common challenges. EUROPOL could serve as an intermediary for satellite data, leveraging shared resources and expertise. Developing a flexible digital evidence platform capable of adapting to unforeseen demands is crucial. Emphasizing efforts at the European level is advisable due to the geographical concentration of end-users. Exploring the potential of existing EU Copernicus services can provide valuable tools for end-users. Although a new Copernicus service for the Purpose is not yet warranted, it may be in the future.

## 6. Appendices

### 6.1. Annex 1: Seminar Overview

#### i. Invitation



## Leiden-Delft-Erasmus Seminar

# Satellite Data in the context of Human Rights and Humanitarian Law: Lessons Learned and Steps to Take

Date/time : 21 June 2024, 12.45 – 17.15 hrs

Location : Leiden University, Campus The Hague, Schouwburgstraat 2, 2511 VA Den Haag

Participants : (LDE)students, academic staff, representatives of the space sector, legal practitioners, NGO's and government officials.

This seminar is organised as part of the Leiden-Delft-Erasmus Thesis lab in the context of human rights and humanitarian law, in cooperation with the network organisation 'Space Evidence for Human Rights, SEHR'. The White Paper written in this context will contribute to the implementation of the conclusions of the seminar on 'The Optimization of the use of Satellite Information in the humanitarian domain' held on 3 February 2023 in Leiden. The paper and the seminar outcome will give input to the further agenda-setting for the subject by the SEHR organisation.

## **Programme and speakers:**

- 12.45 – 13.00 hrs: Walk-in
- 13.00 – 13.15 hrs: Opening remarks:
  - Wim Ploeg, Founder of the network organisation 'Space Evidence for Human Rights' and content advisor for the thesis lab;
  - Peter Batenburg, LDE Project Manager Space for Science and Society and moderator of the Seminar.

- 13.15 – 13.40 hrs: Molly Quell/Stephanie van den Berg:

### **'Satellite Imagery and International Justice'**

**Molly Quell** is a Dutch-American journalist based in The Hague, where she covers international law for Courthouse News Service.

**Stephanie van den Berg** is one of Justice info's correspondents in The Hague. She is freelance journalist covering the various international courts and Dutch news for Reuters news agency and others.

- 13.45 – 14.10 hrs: Vincent Cillessen:

### **'International Crimes and Satellite Imagery'**

**Vincent Cillessen** is Team Leader of the International Crimes Unit of the Dutch Police.

- 14.15 – 15.30 hrs: **Presentation on the Thesis Lab White Paper:**

### **'Lessons Learned and steps to take'**

**The group of 11 LDE Thesis Lab students** will present the outcome of their findings resulting from the interdisciplinary programme implemented under the LDE programme 'Space for Science and Society'

- 15.30 – 15.50 hrs: Break
- 15.50 – 16.10 hrs: Introduction Panel Members  
**Alexander Gunkel** is Managing Director and Founder of Space4Good  
**Celia Davis** is Founder and Director of Omanos Analytics (remote)  
**Hans van 't Woud** is founding Director and CEO of Blackshore  
**Vasilis Kalogirou** is Space Downstream and Innovation Officer, EU Agency for the Space Programme (EUSPA) (Remote).

- 16.10 – 17.00 hrs: Discussion with the Panel and audience on the Lesson Learned and Steps to take  
**Panel members:** Celia Davis, Alexander Gunkel, Vasilis Kalogirou, Hans van 't Woud and LDE representatives.
- 17.00 – 17.15 hrs: Concluding on the Steps to Take.

## ii. **Staff and students Thesis Lab**

- SEHR and Space for Science and Society - Wim Ploeg, Peter Batenburg
- Mentors - Prof. Tanja Masson-Zwaan, Prof. Robert Heinsch, Prof. Ramon Hanssen, Prof. Rene Olie, Dr. Dimitra Stefoudi, Sabrina Rewald
- 2024 cohort of students:
  - Rotterdam School of Management, Erasmus University students - Tessa Koorevaar, Shashruth Reddy Kethiri, Redouane Acoudad, Pavla Shvetcova, Lora and Subhashree Chowdhury
  - International Institute of Air and Space Law, Leiden University students - Aleksandra Spyra, Sindhu Shankar and Solène Flambeaux
  - Public International Law faculty, Leiden University students- Feiran Wu and Maëlle Thomas

## Annex 2: Presentations

### 1. Molly Quell/Stephanie van den Berg

#### Satellite Imagery and International Justice

Molly Quell & Stephanie van den Berg

Who are we:  
Stephanie is the Reuters international justice correspondent based in The Hague with 20+ years of reporting on war crimes trials

Molly has followed international courts in The Hague and Europe courts for Court House News service since 2018



#### War crimes trials evidence basics

War crimes are violations of laws and customs of war, committed in times of internal or international armed conflict, codified since Nuremberg and the Geneva conventions.

Main theme: don't harm civilian population. Evidence relatively straight forward

Crimes against humanity: criminalised acts committed as part of a widespread and systematic attacks against the civilian population as part of a plan or policy (war not needed)

Because of 'widespread and systematic' you need to show patterns and overarching plans. International courts focus on people most responsible for crimes so you need to show a system, a plan AND you need to have evidence that links direct perpetrators (ground level) to higher ups like military or political officials

Genocide: special category with intent being the most important indicator but for evidence purposes mostly aligned with crimes against humanity

#### Satellite images in Srebrenica trials



Used to show locations of mass graves

Used to show the operation of trying to conceal the massacre by digging up mass graves and burying remains in different locations scattered through rough terrain

Less about the fact of the mass killing but used to support testimony about how it was carried out



## MH17

“Obtaining as many satellite images as possible which were as sharp as possible was vital to several parts of the investigation.”

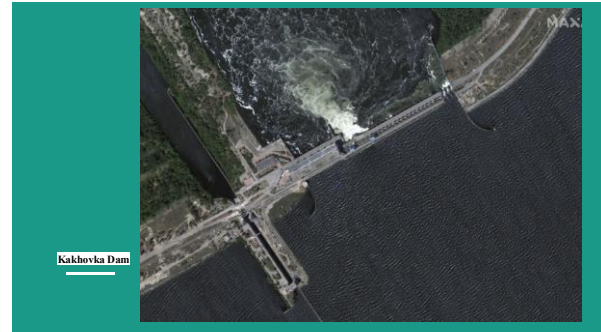
-Dutch public prosecution service



## MH17



## Mariupol



Satellite imagery is a crucial part of most war crimes trials but not always in the way you think. When documenting mass atrocities for accountability mechanisms focus on perpetrators and chain of command, not just bodies and damage

**Thank you for your attention**

Molly and Stef can be reached via [molly.queil@gmail.com](mailto:molly.queil@gmail.com) and [svandenberghgd@gmail.com](mailto:svandenberghgd@gmail.com)



## 2. Vincent Cillessen

**International Crimes & Satellite Imagery**



**POLITIE** 22-06-2024

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**Developments**

- Increasing component of digital investigation & research
- Investigation & prosecution during armed conflicts
- Investigating non-accessible crime-scenes
- Increasing international cooperation (public & private)

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**Questions?**

✉ warcrimes@politie.nl  
☎ +31 (0)88 6625743

✉ vincent.cillessen@politie.nl  
☎ +31 (0)6 11388949

**International Crimes**

- Genocide
- War Crimes
- Crimes Against Humanity
- Torture
- Enforced disappearances
- Crime of Aggression

- Not statute barred!

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**Needs & challenges regarding satellite imagery**

- Accessible
- Affordable
- High quality / resolution
- Centralised hub

- Security
- Judicial aspects
- Mutual understanding between policy makers, satellite specialists, legal specialists, digital investigators



### 3. Thesis Lab 2024

22/08/2024

Leiden-Delft-Erasmus Universities

## Space for Human Rights & International Humanitarian Law

*Satellite Data as Evidence - Overcoming Business Barriers & Bolstering Legal Frameworks*

Thesis Lab 2024

SEAR

Universiteit Leiden, TU Delft, Erasmus University Rotterdam

#### What we will present

- 01  
Context
- 02  
Market Analysis
- 03  
Satellite Data Platforms
- 04  
International Law Themes
- 05  
Questions for Discussion



#### Earliest use of Earth Observation imagery as evidence

*Srebrenica Trials 1995*

- Revealed large areas of dug up soil
- Provided evidence for digging up mass graves
- Led to the prosecution of two generals
- Became primary evidence



## What are the benefits of using Satellite Data as evidence?

SEAR

Leiden-Delft-Erasmus Universities Working together for science and society

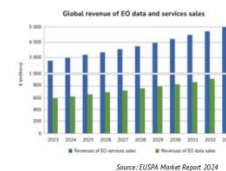
#### Benefits of satellite data as evidence

- ✓ Access to physically inaccessible areas
- ✓ Overview of the physical location
- ✓ Corroborate witness testimonies

#### The wider Earth Observation industry

##### Examples of applications

- Agriculture
- Aviation
- Forestry





## Is the application of Satellite Data as evidence for IHL and Human Rights cases as mature as other applications?

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### Comparison to more mature Humanitarian & Legal applications

- Disaster relief as humanitarian application**
  - Established initiatives like the International Charter Space and Major Disasters, with 40 activations annually
  - Intensive international cooperation
  - Free provision of data during crises
- Agriculture fraud detection as legal application**
  - Dedicated satellites (Sentinel-1 and Sentinel-2) designed for monitoring land use
  - Automated and semi-automated processing capabilities
  - Used in court by European Public Prosecutor's Office (EPPU)

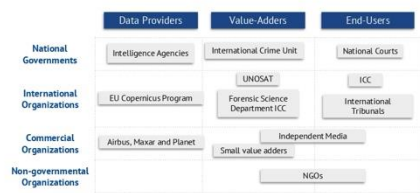


## 02 Market Analysis



What explains the **underutilization** of satellite data as evidence for human rights and international humanitarian law?

### Overview of stakeholders in value chain



### Political and geopolitical context



### Challenges on the supply side

- Commercial data providers**

  - Unpredictable and uncertain demand
  - Potential backlash from customers, prefer discrete involvement

**Commercial value-adders**

  - Focus on product development
  - Prefer projects with lower risk
  - Low visibility of small value-adders

### Challenges of specific users on demand side

- The ICC**

  - Key managers lack awareness of satellite imagery utility
  - Restricted funds for commercial imagery
  - Lawyers/judges lack understanding of satellite imagery

**Lawyers and legal firms**

  - Financial constraints for civilians
  - Lack of familiarity with satellite capabilities and wider market
  - Reliance on external experts

**National crime units**

  - Confidentiality
  - Balancing budget across cases

### Key Market Misalignment Factors



### Sources of market misalignment

- Supply and Demand Imbalance**

  - Sporadic, project-based demand in legal cases
  - Suppliers **prefer** steady markets (disaster relief, environmental monitoring)

**Market Access Issues**

  - **High cost** of high-resolution data
  - **Limited budget** in legal cases
  - **Regulatory barriers** complicate access

### Sources of market misalignment

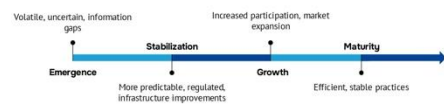
- Information Asymmetry**

  - Legal professionals and NGOs are **unaware** of providers and services
  - Dominance of large players (Airbus, Planet) creates access **barriers for smaller players**
  - Lack of technological awareness among users

**Sector-Specific Issues**

  - Need for **external expertise** adds to the complexity and cost
  - **Political stigma** and potential for backlash deter suppliers from human rights involvement

### Stages of market development: market misalignment in perspective



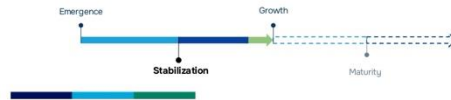
### Recommendations to solve market misalignment

- Increase Awareness & Education
- Expand Expert Training Programs
- Establish the EUSPA Consultation Platform
- Promote/Create Robust Funding Channels



### Recommendations to stabilize the market

- Institute a Human Rights Charter
- Develop Comprehensive Online Platforms
- Establish Path of Professional Development Programs



### Recommendations to grow the market

- Operationalize the Human Rights Charter
- Advance Professional Development in Education
- Establish EO Data from the Copernicus Platform



### Recommendations to reach market maturity

- Establish the Copernicus Service Evidence Platform



What are the features and legal requirements of a **minimum viable satellite data platform**, for evidence in IHL and human rights contexts?

### Towards Market Alignment - Data Platforms

- | Minimum Viable Platform   | International Charter   | EU Copernicus  |
|---|---|--|
| <ul style="list-style-type: none"> <li>Multiple Data Sources</li> <li>Collection, ingestion, quality control</li> <li>Secure Storage</li> <li>Documentation</li> <li>Data authentication</li> <li>Manual and Automated processing</li> <li>Data export and sharing</li> </ul> | <ul style="list-style-type: none"> <li>Members and co-operating bodies</li> <li>QC by parties</li> <li>Design authorities validate technologies</li> <li>Secretariat facilitates</li> </ul> | <ul style="list-style-type: none"> <li>Data Space Ecosystem</li> <li>Free data</li> <li>Traceability for origin and authentication</li> <li>Registration for downloading data</li> <li>Delivery by "Entrusted Entities"</li> </ul> |

### Satellite Data Platforms – Legal Requirements



### Satellite Data Platform - Recommendations



### What international law themes impact the use of satellite data as evidence in IHL and Human Rights contexts?



### Theme 1: Peaceful use of outer space

Is the use of satellite data for HR and IHL as an evidence is in accordance with peaceful use of outer space?

- | Article III OST  | Article IV (2) OST:  |
|--|--|
| <ul style="list-style-type: none"> <li>States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding.</li> </ul> | <p>...The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes...</p> |

The attempt to define "peaceful purposes"

Non-military approach	Non-aggressive approach
<ul style="list-style-type: none"> <li>The prohibition of use outer space for <b>ANY military purpose</b></li> <li>The Antarctic Treaty from 1959</li> <li>What about States' practice?</li> </ul>	<ul style="list-style-type: none"> <li>Article 2(4) of the UN Charter: Prohibition of <b>threat or use of force</b> against the territorial integrity or political independence</li> <li>Article 51 of the UN Charter: <b>A right to self-defence</b></li> </ul>

Peaceful vs non-peaceful use of satellite data

**Peaceful uses**

- Proving human rights and humanitarian law violations
- Resolution of armed conflict
- Preventing armed conflict
- Act of a self-defence

**Non-peaceful uses**

- Using EO for attacking assets
- Interference with satellite data on the step of processed data and analysed information



Theme 2: Responsibility of States and international organizations (IO) for the use of satellite data for International Humanitarian Law purposes (IHL)

International Law	Space Law
<ul style="list-style-type: none"> <li><b>Article III Articles on State Responsibility for Internationally Wrongful Act:</b> Breach of an obligation attributable and incumbent to the State (action or omission)</li> <li><b>Article III Draft Articles on Responsibility of International Organizations:</b> Breach of an obligation attributable and incumbent to the IO (action or omission)</li> </ul> <p>riddled with exceptions and special rules</p>	<ul style="list-style-type: none"> <li><b>Article VI of the Outer Space Treaty</b> (compliance with the Treaty for States + obligation to authorize and continuously supervise for States)</li> <li><b>Article VI OST of the Outer Space Treaty</b> (compliance with the Treaty for IO)</li> </ul>

THE PARTICULAR CASE OF THE EUROPEAN UNION



- Unique structure and functions:** significant supranational elements and EU Law
- Legal Personality:** granted by The Treaty of Lisbon (2009), enable the EU to sign international treaties and join international organizations
- Principle of speciality**
- Particular link with its Member States**

no legal instrument explicitly obligating the EU to use satellite data for IHL

**BUT several initiatives**

- EU Satellite Centre (SatCen)
- Copernicus Program
- European Union Civil Protection Mechanism
- EU Humanitarian Aid Policy
- EU Space Strategy for Security and Defence
- New EU Space Law?

Despite its uniqueness as a sui generis supranational organisation, the EU remains an international organization with a non-traditional degree of integration

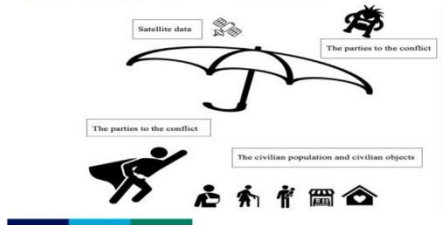
Could the use and sharing of satellite data for IHL purposes be interpreted as an international obligation? If not under space law, perhaps under international law?

Identification of international obligations	Difficulties encountered
<ul style="list-style-type: none"> <li><b>Customary International Law</b></li> <li><b>International treaties and agreements:</b> example of the Geneva Convention and its Protocols, ICC Rome Statute</li> <li>Article I OST: use of outer space [...] shall be carried out for the <b>benefit and in the interests of all countries</b> [...] and in accordance with <b>international law</b></li> </ul>	<ul style="list-style-type: none"> <li>Characterization of an internationally wrongful act and more precisely the omission</li> <li>Identification of international obligations and limited availability of pertinent practice by international organizations</li> <li>Legal framework of the International Responsibility of international organizations</li> </ul>

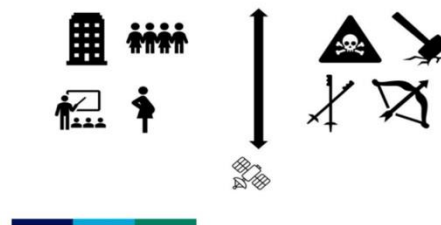
Theme 3a: Three principles of IHL AND satellite data

- Principle of Distinction**
  - Article 48 and 51 of the Additional Protocol I of 1977.
  - Identification of personal or geographical characteristics.
- Principle of Proportionality**
  - Minimal collateral damage to protected entities (civilians, civilian objects, wounded ...)
  - Article 51 of the Additional Protocol.
  - Use of satellite data in the assessment of proportionality.
- Principle of Precaution**
  - Article 58 of the Additional Protocol I
  - Assistance in preventive measures.

**The principle of proportionality and principle of precautions against the effect of attacks**



**The principle of distinction**



**Theme 3b: State Responsibility for the misuse of satellite data in armed conflict**

- Need a wrongful act attributable to the State
- Violation of A2(4) of the UN Charter
  - Aid or assistance to the violation
  - Form of attribution for a third State
  - Condition of knowledge
  - Higher threshold of impact for the concepts of indirect use of force and of co-party.
- Violation of IHL
  - Same form of attribution through aid or assistance

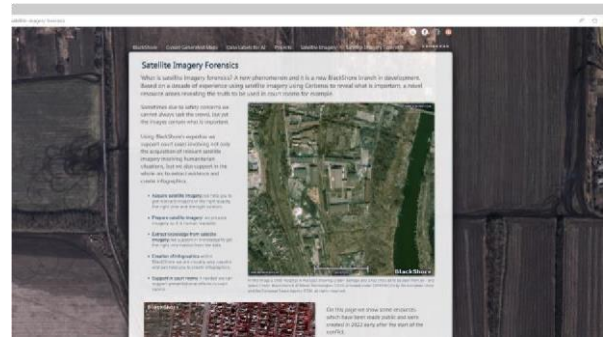
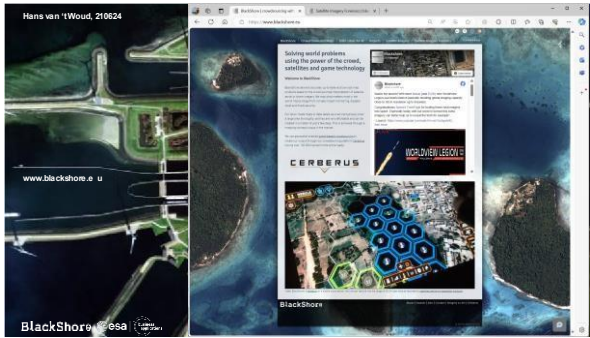
**Recommendations - International Law**



**Questions for Panel Discussion**

1. How can private players be incentivised to provide satellite data for IHL and human rights use cases?
2. Is using satellite data cost-effective as compared to other forms of evidence?
3. How could robust funding channels be created, to subsidize acquisition and processing costs of satellite data?
4. How can the technical challenges in using satellite data as evidence (e.g., resolution requirements) be addressed?
5. What aspects of satellite data platforms are most useful for market alignment?
6. How can States preserve sovereignty while supporting the pursuit of justice in the international sphere?

## 4. Blackshore

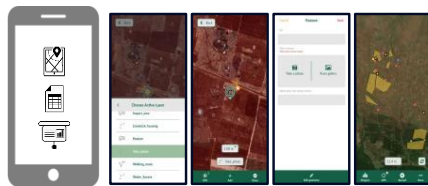




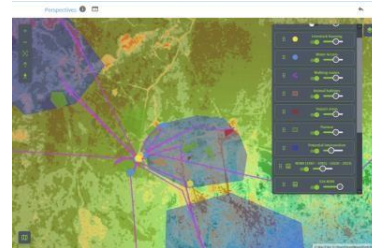
## 5. Omanos



**QuickBeam app**  
Empowering community groundtruthing



**Askri**  
Data visualisation dashboard



Accessible, interactive exploration of landscape scale satellite insights & community situational awareness

**Community displacement**  
Guinea



Harms to local environment and community livelihood through gold mining operations

No proper Environmental and Social Impact Assessment

Conflicting accounts

Legal recourse available via IFC

## 6. Space for Good

**Company Presentation**

**Alexander Gunkel**  
 Founder & Managing Director  
[alex@space4good.com](mailto:alex@space4good.com)

*"Geospatial Solutions for Environmental & Social Impact"*

**About Us**

Providing geospatial solutions to unlock, accelerate and scale social and environmental impact for good

- Remote Sensing
- Geoinformation
- Artificial Intelligence

**Earth Observation**

- Global coverage
- Scalability
- Multispectral sensors
- Data fusion
- Digital Integrity
- Historical & near real-time data
- Cost-effectiveness
- Evidence-based transparency

Source: Airbus

**Our Journey**

2017: ESA, ESA-EC, European Space Agency BIC

2018: ASCENT: Open Innovation & Co-Creation

2020: B-CERTIFIED: Social enterprise (B Corp certified) Projects & Consultancy

2024: +20 Team members Services & Products

THE WORLD: The most trusted geospatial solution partner for impact leaders worldwide

**Offerings**

- Remote sensing data
- Geospatial data analytics
- Models & Predictions
- Monitoring & Reporting
- Products & Bespoke Solutions
- Platforms & APIs
- Capacity Building

**Sectors**

- Agriculture & Forestry
- Conservation & Biodiversity
- Peace & Justice
- Climate & Infrastructure

**Projects**

**Forest Conservation**

Solution: Primary and Old Growth Forest Classification

Context: 7 countries of Western Balkans

Data & Tech: Satellite-based products and machine learning algorithms

Output: Forest maps, historical deforestation, networking local authorities

**Deforestation**

Solution: Illegal logging detection & prediction

Context: Mixed tropical agroforestry

Data & Tech: Radar & Optical Satellite Data with machine learning

Output: Near real-time alerts & predictions

**Carbon Assessment**


Solution: Biomass and deforestation assessments

Context: Great green wall policy and program development

Data & Tech: Radar & Optical Satellite Data with machine learning

Output: Biomass and carbon intelligence on jurisdictional level


## Pest & Disease



**Solution:** Early warning system for pest and disease in rice  
**Context:** Rice yields falling due to drought and damaged, leaf blast  
**Data & Tech:** Satellite data with the inclusion of weather models  
**Output:** Infestation risk map

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## Paved/Unpaved



**Solution:** Paved/Unpaved mapping  
**Context:** City streets in Germany  
**Data & Tech:** High resolution aerial imagery and vegetation indices thresholding  
**Output:** Binary Map and statistics for each property

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## Infrastructure detection



**Solution:** Lattices detection and counting  
**Context:** Facilitation of health infrastructure programmes and development  
**Data & Tech:** UAV data and deep learning-based algorithm  
**Output:** Lattices maps, heatmaps and predictions

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## UXO Detection



**Solution:** Unexploded Ordnance (UXO) Detection  
**Context:** Post conflict assessments via proxy detection  
**Data & Tech:** High resolution and open source satellite data (Sentinel-1)  
**Output:** Change detectors due to explosions for removal

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## Emission Monitoring



**Solution:** NDVI Monitoring Platform  
**Context:** Socio-economics development indicator pre and post Covid-19  
**Data & Tech:** Sentinel-2, -3, -1, -2 with GDP data  
**Output:** Statistics at different spatial and temporal scales

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**SPACE4GOOD**

*"Earth Observation for Environmental & Social Impact"*

## Reach Us

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