Broadly Accepted Practices Regarding the Use of Geospatial Technologies for Human Rights

Introduction

Human rights advocates are increasingly using Geospatial technologies such as satellite imagery and GIS software as they engage in their work. Due to the highly diverse nature of these technologies, and the many different ways in which they can be applied, however, determining which tools are most effective can be a difficult task, as their capabilities interact with their environment in ways that are not always obvious at first glance, which can give rise to both limitations and opportunities. This document summarizes the results of a survey documenting the various ways that a number of practitioners have used geospatial technologies in a human rights context over the last ten years. While its content may not be applicable to every situation, it is hoped that the information contained herein will be useful to others as they consider the ways in which these very powerful tools may benefit them in their own work.

Individuals based at the following organizations participated in this conversation and contributed to the content of this document:

- American Association for the Advancement of Science
- Amnesty International
- Claremont Graduate University
- United Nations Institute for Training and Research - Operational Satellite Applications Programme

Areas of practice

Respondents reported employing geospatial technologies for human rights documentation in countries on all continents except Australia and Antarctica, a fact that highlights the extreme versatility of geospatial documentation. None of the respondents reported using the full gamut of geospatial technologies in every country they studied. All respondents, however, emphasized the necessity of identifying which technology had the "best fit" for a given situation. For example, one respondent noted, "remote sensing works well in North Korea, while social media analysis is useless." The most frequently cited countries where geospatial technologies were employed were Sudan, South Sudan, and Syria. In each of these countries, 100% of respondents reported making use of these technologies. A second tier of countries, cited by 75% of respondents, included North Korea, Iraq, Eritrea, DRC, Chad, and Burma. All the countries in these two tiers share the property of being difficult to access, either due to violence, geographical remoteness, political isolation, or some combination of these factors. The frequency with which independent analysts selected these countries, therefore, highlights the significant power that geospatial technologies provide in extracting information from inaccessible areas.

Technologies Employed

The types of geospatial technologies that respondents reported employing were diverse, with fifteen different types of geospatial technologies mentioned. The most frequently used of these, employed by 100% of respondents were high-resolution satellite imagery, in both the visible and near-infrared bands. This result likely reflects the fact that many human rights violations take place on very small spatial scales, and therefore require the best possible resolution to be appropriately documented. A majority of respondents (75%) also reported using medium and low-resolution imagery in their work, along with conventional GIS techniques such as basic cartography and spatial statistics. Similarly popular were several less conventional techniques including social media analysis and the use of geotagged ground photos.

Only half of respondents reported using platforms such as unmanned aerial vehicles (UAVs, or colloquially, "drones") to acquire evidence. The use of thermal infrared and radar imagery was likewise used by 50% of respondents, and crowdsourcing was used by only one respondent. Many of these less popular methods are rather new and/or require specialized experience to fully exploit, which may explain some of this observation. More surprising was the finding that only 50% of respondents relied on traditional media reporting to inform their documentation efforts; the reason for this is unclear.
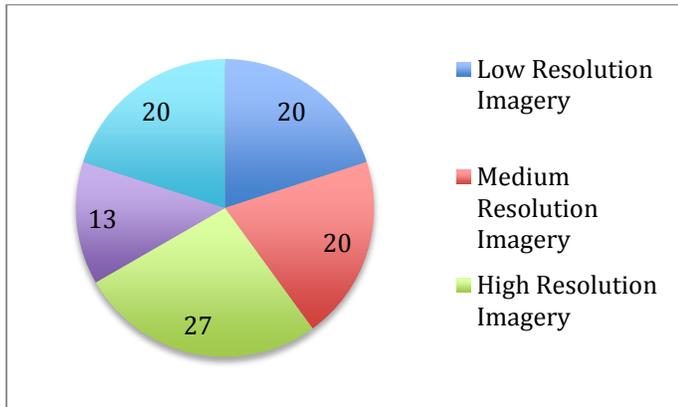
Figure 1. Imagery type as a percentage of use cases across all survey respondents

The discrepancy in popularity between the use of social media analysis (75%) and crowdsourcing (25%) was one of the more striking insights that resulted from this survey. In considering its implications, it is important to recognize the differences between these two methods, which are often confused with each-other. Social media analysis involves the processing of information that users have posted to publically accessible platforms such as Twitter and Facebook, often for reasons not connected to a human rights investigation. Crowdsourcing is distinct from this in that it relies on the active participation of volunteers, often but not always non-experts, who contribute their time and effort to help solve a specific problem. The difference in popularity between the two may be related to the specialized nature of modern geospatial analysis, and the significant investment in digital infrastructure necessary to create a robust crowdsourcing platform.

Analysis Tools

To perform their analysis, respondents described a broad array of hardware and software tools, however there was a substantial degree of overlap between them. All practitioners, for example, employed ESRI's ArcGIS software, and the imagery vendors identified by most respondents were largely the same (DigitalGlobe, Airbus, etc.). Internet-enabled tools such as Google Earth and ArcGIS Online were also popular. Only one respondent reported using open source software such as QGis and CartoDB. Companies

such as Garmin and Trimble manufactured most of the GPS hardware reported by the respondents. Among practitioners who used social media analytics, Twitter and Facebook were the most popular platforms. In certain areas of the world, these platforms are blocked or unpopular, with users favoring local alternatives for social media use. Examples of these include vKontakte (VK) in Russia, and Sina Weibo in China. No practitioners surveyed mentioned performing analytics on these platforms, which may be the result of language, technical, and/or censorship issues.

Challenges

The most common challenges identified by practitioners using geospatial technologies included the availability of funding, seasonal cloud cover, and the ability to acquire reliable ground-based information about an area, all of which were mentioned by 50% of respondents. The availability of skilled analysts was also an issue; one respondent noted that "imagery acquisition is relatively easy, but we are not always fully staffed when workload is greatest." These challenges, it was noted, vary significantly from country to country. While cloud cover is a major issue in many tropical areas of the world, for example, in more arid regions it is frequently absent. Finally, the scale of the events themselves was noted as a challenge, as many human rights violations are "simply not visible in satellite imagery." Examples of these would include violations that take place indoors, under dense tree cover, or at an individual, rather than village or citywide, scale.

Conclusion

Currently, there is no "one size fits all" solution for using geospatial technology in a human rights context. Rather, the available technologies represent components of a toolkit that should be selected for maximum impact in a location-specific context. Resources to help organizations chose which of these technologies best fit their objectives in a particular instance include country-specific case studies published by AAAS, UNOSAT, and other organizations that can guide practitioners considering the use of geospatial technologies in similar locations and contexts. In addition, a number of guides have been published that attempt to explain the benefits

and challenges of these technologies in considerable detail. Finally, a number of audiovisual training materials have been assembled that describe how geospatial technologies can be employed to maximum effect.

Resources

Human Rights Case Studies (AAAS):
http://www.aaas.org/geotech/humanrights#HR_cases

Webinars on the applications of geospatial technologies to human rights (AAAS):
https://www.aaas.org/geotech/humanrights#Media

Maps and data (UNOSAT):
http://www.unitar.org/unosat/maps

Offline Training Courses (UNOSAT):
http://www.unitar.org/unosat/portfolio-projects/3260

Border Conflict Case Studies (AAAS):
http://www.aaas.org/page/hostile-territory-revealing-trends-cross-border-conflict-using-satellite-imagery#CaseStudies

Monitoring Border Conflicts with Satellite Imagery: A Handbook for Practitioners (AAAS):
http://www.aaas.org/report/monitoring-border-conflicts-satellite-imagery-handbook-practitioners

Introduction to Remote Sensing of Cross Border Conflicts: A Guide for Analysts (AAAS):
http://www.aaas.org/report/introduction-remote-sensing-cross-border-conflicts-guide-analysts