

Earth observation for mine action

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Upcoming

- 1. High resolution imagery to detect craters and contaminated areas
- 2. Identifying the use of explosive weapons in populated areas (EWIPA)
- 3. Identifying Environmental Events
- 4. Monitoring the environmental after land release
- 5. Operational Planning

<https://ceobs.org/earth-observation-for-humanitarian-disarmament/>



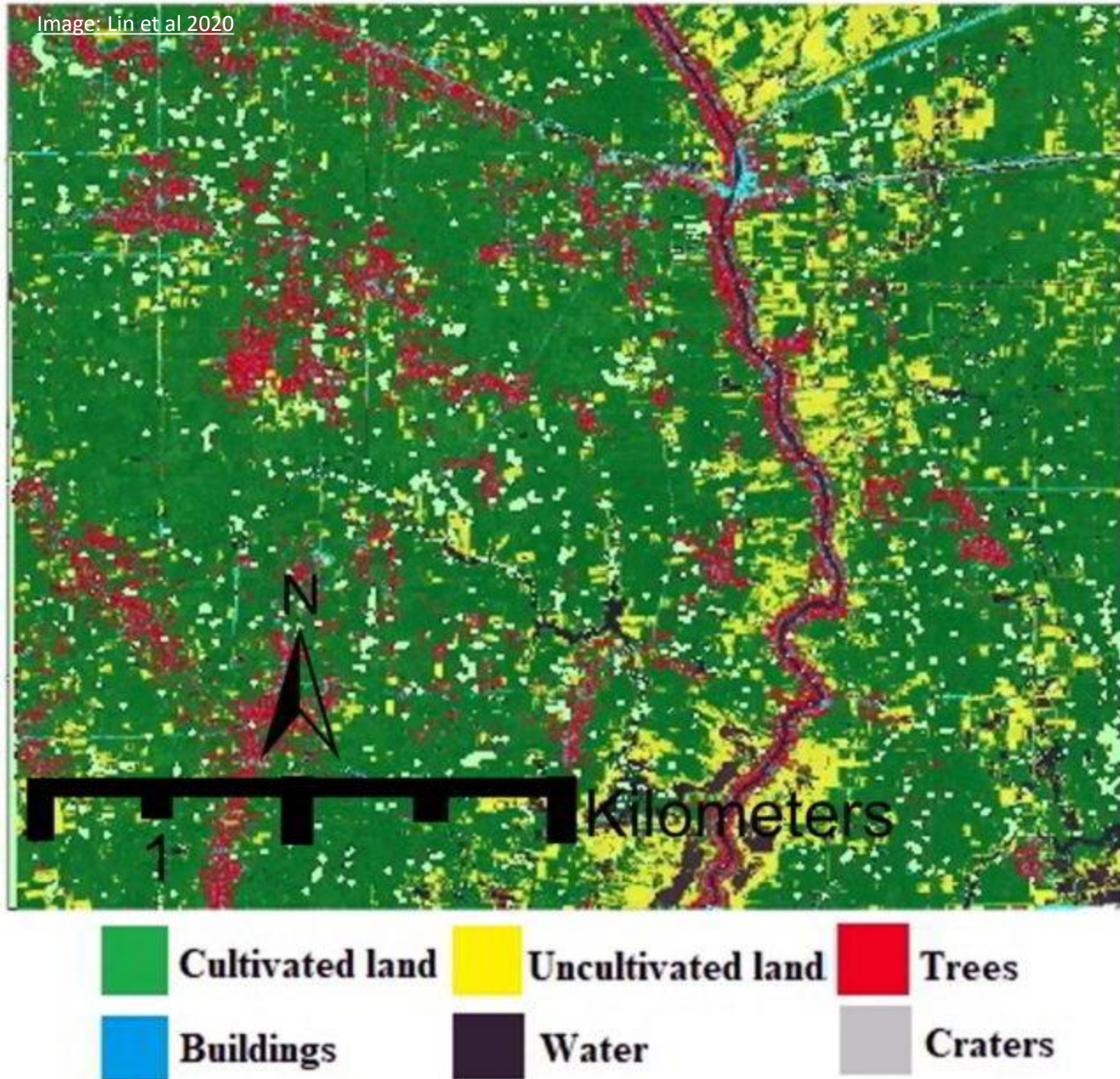
1. Very high resolution imagery

- Crater detection – approximate location of UXO – by combining imagery and multitude of detection algorithms
- Ongoing academic work in Ukraine...
- Recent academic publication of rural areas in Cambodia – found 50% more craters than identified by US Bombing data
- Limitations – expense and accuracy with old UXO...



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1. Very high resolution imagery

- ... an alternative approach is to use historical spy satellite imagery
- This approach being trailed by Philipp Barthelme, a PhD student at the University of Edinburgh – testing how far it can be useful but very promising as:
- Worldwide coverage, high resolution
- Imagery is very cheap, just needs some time for the old film to be scanned in

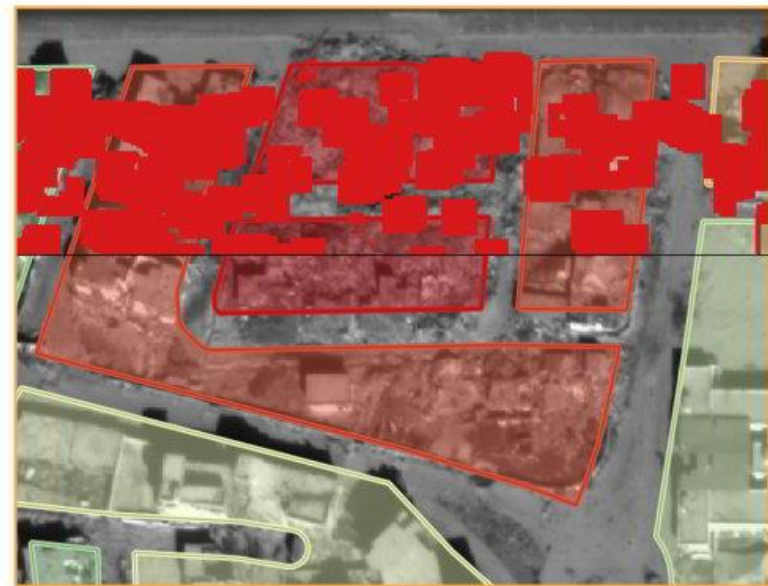


Image: USGS

2. Identifying the use of EWIPA to assess damage and risk sites

- Developing mechanisms to monitor and verify EWIPA use is important to assess the ongoing risks from UXO, as well as the immediate human cost and damage.
- Earth Observation can help by supporting
 - Damage assessments
 - Contextual information
 - Detailed 'forensic' event analysis
- Can help across many of the UNIDIR EWIPA indicators
- Open source data can be relied upon, expensive commercial products not necessary





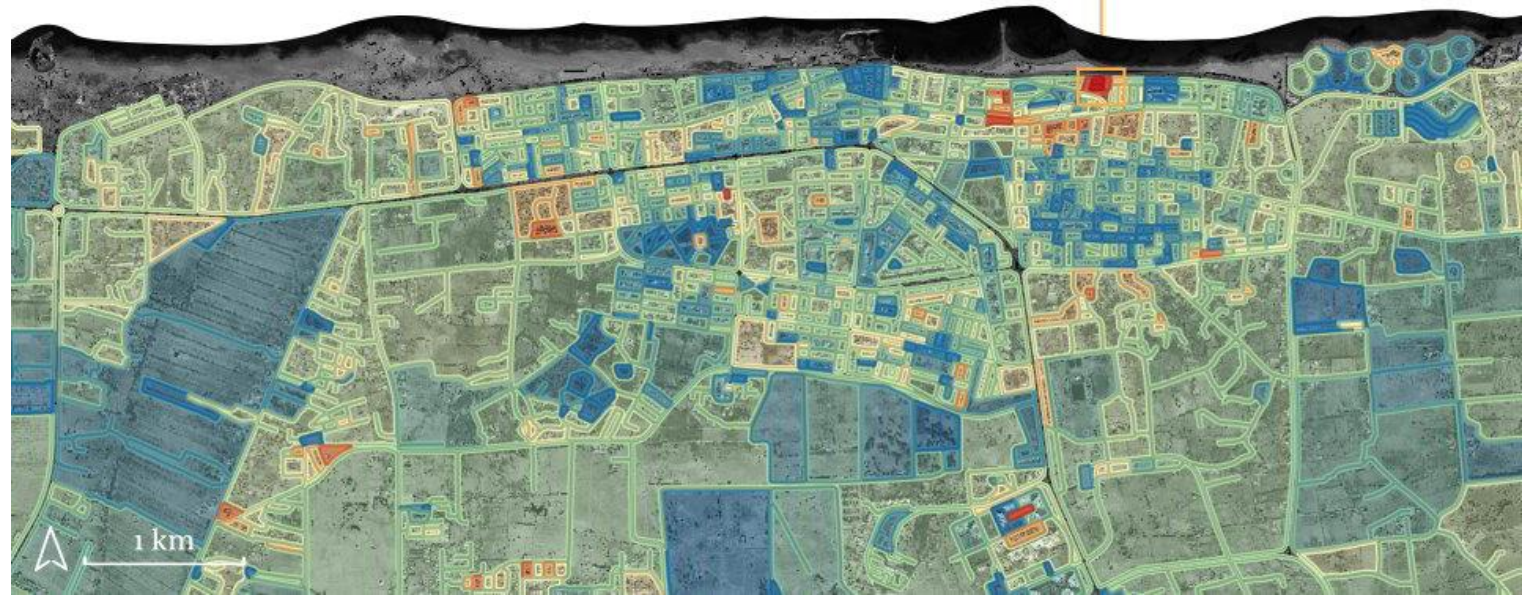
Google maps

- Building detection
- Building cluster

Damage assesment score



- Space4Good example of Sirte
- Change detection using AI with the optical data
- Change detection using radar data



3. Identifying Environmental Events

- Earth observation as part of ‘Open source intelligence’ investigations, combining information from social media, traditional media and monitoring data
- This can later be used to identify particular areas of concern, that are particularly contaminated with UXO
- We have been doing this in Ukraine and hope in time to upscale to other conflict settings



4. Monitoring the environment after land release

- Earth observations can be used to track what happens once mine operators leave, to land use, water, air
- Fairly well established methodologies – what is missing is good mine clearance data
- Emerging area of research – how much tropical forest and carbon is ‘protected’ by UXO
- Earth observation can also help understand or predict future consequences of land release

5. Operational Planning

- Use earth observation data to inform risk assessments
 - Precipitation and flooding
 - Dust storms and air pollution
 - Landscape fire
 - Changes to the built environment
- For general operations, and planning to aid surveys
 - Operating conditions (e.g. temperatures, humidity, rain)
 - Optimal timing for clearance
 - Environmental hazards
 - Historical context – which may uncover unknown risks
 - Climate vulnerability
- The greatest value from satellite data can be exerted when it is combined with local expert knowledge and ground data. This can help prioritise clearance areas – e.g. Cambodia

