IMPACT STORIES

UNOSAT Emergency Mapping Service in Myanmar - Thailand Earthquake Response

(March 2025)

unitar United Nations Institute for Training and Research

UNOSAT United Nations Satellite Centre

OCHA

THE UNITED NATIONS SATELLITE CENTRE (UNOSAT)

The United Nations Satellite Centre (UNOSAT), recognized by the Economic and Social Council in its resolution **E/2021/L.221**[1], provides satellite imagery-based analysis, training and capacity development to the United Nations system and Member States across their territories.

EMERGENCY MAPPING SERVICE OF UNITED NATIONS SATELLITE CENTRE (EMS-UNOSAT)

Through its **Emergency Mapping Service (EMS),** UNOSAT provides United Nations agencies, Member States and other international humanitarian organisations with cost-free satellite imagery analysis to support humanitarian assistance in response to major disasters and crises worldwide. With 24/7 year-round availability, the team of experienced analysts ensure timely and tailored delivery of satellite imagery derived maps (both live web and static maps), reports, "and" data ready for direct inclusion in geospatial data for evidence-based decision making and operational planning.

UNOSAT is recognized as a principal partner of the **International Charter Space and Major Disasters** for the benefit of United Nations agencies and the International Federation of Red Cross and Red Crescent Societies (IFRC). In addition, UNOSAT leads the **Satellite Mapping Coordination System (SMCS)**, which is a web-based tool of the **Global Disaster Alert and Coordination System (GDACS)** pertaining to the planning of satellite data acquisition over areas of interest to prevent overlapping mapping efforts, hence facilitating horizontal coordination between different mapping organisations providing satellite analysis and maps during major disaster events.

Released in June 2025 by the United Nations Satellite Centre (UNOSAT), 7 bis, Avenue de la paix, CH-1202, Geneva, Switzerland.

Cover Picture: Network Activities Group Myanmar/Flickr

[1] https://docs.un.org/en/E/2021/L.22

UNOSAT and OCHA partner for the humanitarian response following the Myanmar-Thailand earthquakes (March 2025)

In March 2025, two consecutive ***earthquakes—measuring 7.7 and 6.7 magnitude—struck central Myanmar, causing widespread destruction.*** In the worst-affected areas, the earthquakes left 6.3 million people in urgent need of assistance and protection. Prior to the disaster, 4.3 million people were already in need in these areas. The earthquake pushed an additional 2 million people into crisis.

UNOSAT's Emergency Mapping Service activated rapidly to provide critical satellite imagery analysis that became the first reliable source of information about the impact of the two earthquakes. By May 2025, ***3,791 people had reportedly died, 5,106 had been injured, and 88 remained missing, with estimated economic losses exceeding $1.9 billion USD.***

| *IMG1: UNOSAT-UN Asign Myanmar Earthquake (March 2025)*

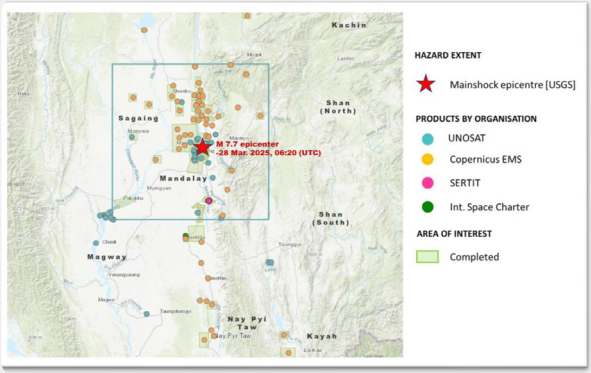
UNOSAT's geospatial capabilities became OCHA's 'eyes from above' in areas with access constraints due to conflict and infrastructure damage. Through interviews with OCHA field and headquarters personnel, as well as a document review, this impact story reveals how UNOSAT contributed to assessment priorities, resource allocation, and humanitarian response planning across sectors.

UNOSAT'S CRUCIAL CONTRIBUTION TO OCHA'S HUMANITARIAN COORDINATION

Within hours of the earthquake, OCHA contacted UNOSAT to initiate emergency mapping support. As Eric Allen Jr. from OCHA headquarters explained: ***"We got in contact with the UNOSAT colleagues just a couple hours after the impact of the earthquake with the aim to get that first initial look of the overall damage severity throughout the affected areas."***

UNOSAT promptly activated its Emergency Mapping Service and triggered the **International Charter Space and Major Disasters**[2] on behalf of UNOCHA and IFRC to rapidly acquire critical satellite imagery. Nominated as project manager of this charter call, UNOSAT coordinated with more than eight national & international mapping entities through the **Global Disasters Alert and Coordination System (GDACS)**[3] and the **Satellite Mapping Coordination System (SMCS)**[4], including the National Remote Sensing Centre/Indian Space Research Organisation (NRSC/ISRO), the European Copernicus EMS, ICube-SERTIT, EMERCOM of Russia, and others.

For OCHA, UNOSAT's analysis was indispensable. Roberto Colombo emphasized: ***"For us, the most relevant part is that they [UNOSAT] are quick to respond in providing the first information of the situation. What we can see from the sky. We know that these are reliable sources of information from highly skilled professionals that will be very rapidly putting something out through their emergency mapping site."***



IMG2: Snapshot of the GDACS-SMCS for the activation related to the Earthquake in Myanmar (28 March 2025). Gives an overview of the extent and the analysis status of each AOI.

[2] https://disasterscharter.org/activations/earthquake-in-myanmar-activation-956-

[3] GDACS is a cooperation framework between the United Nations, the European Commission and disaster managers worldwide to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters. Read more: https://www.gdacs.org/

[4] The GDACS-SMCS provides a communication and coordination platform where organisations may monitor and inform stakeholders of their completed, current and future mapping activities for ongoing emergencies. Read more: https://smcs.unosat.org/home

COMPREHENSIVE SATELLITE-DERIVED DAMAGE ASSESSMENT

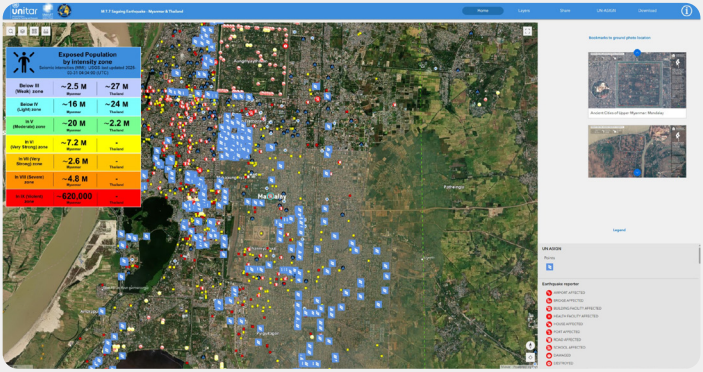
UNOSAT delivered more than 30 geospatial analyses identifying damaged infrastructure across the affected regions, including airports, bridges, health facilities, civilian houses, schools, roads, ports, and cultural heritage sites.

The comprehensive satellite-derived building damage analysis identified a total of ***28,672 buildings and structures with visible damage*** across Magway, Mandalay, Sagaing, Bago (East), Nay Pyi Taw, Shan (North), and Shan (South) States. *To support UNESCO, UNOSAT conducted damage assessments of all World Heritage and Tentative List sites. Additionally, UNOSAT's specialised heritage unit identified, mapped, and conducted damage assessments for all cultural properties within a 1370km2 area around the epicentre of the 7.7 magnitude earthquake. In total, 407 instances of damage and 332 instances of possible damage to cultural heritage were observed.*[5]

28,672
Buildings/structures damages and potentially damages in all analysed areas

314
Damaged and potentially damaged road and bridge

These damage assessments were particularly valuable in areas that were hard to reach for humanitarian actors. As Colombo noted: ***"The main epicentre area of the earthquake had access constraints due to ongoing insecurity and damage to infrastructure. Through the UNOSAT web platform, we could see buildings identified as destroyed."***



Live Web Map
EQ20250328MMR

IMG3: UNOSAT Live Web Map- M. 7.7 - Sagaing earthquake - Myanmar / Thailand[6] analysis status of each AOI.

[5] Read more: https://unosat.org/products/4141

[6] https://experience.arcgis.com/experience/c50e40edd0b14525b250dd2e72acf3fd#data_s=id%3AdataSource_22-195f147aae6-layer-9%3A346

UNOSAT's analysis leveraged advanced remote sensing techniques using multiple satellite imagery sources, enabling systematic mapping of destruction clusters that allowed OCHA and partners to:

1. *Identify areas most severely affected by the earthquake*
2. *Estimate displacement patterns based on building damage*
3. *Prioritize locations for first responders and humanitarian assistance*
4. *Make informed decisions about resource allocation in hard-to-reach areas*

MEASURABLE OUTCOMES: EVIDENCE OF HUMANITARIAN IMPACT

The partnership between UNOSAT and OCHA in Myanmar yielded several significant outcomes that demonstrate the exceptional return on investment that satellite imagery mapping services provide to humanitarian operations:

1. ENHANCED ASSESSMENT PLANNING AND RESOURCE OPTIMIZATION

UNOSAT's damage assessments directly informed OCHA's Multi-Sector Initial Rapid Assessment (MIRA) framework, creating an evidence-based prioritisation system that maximized the efficiency of limited assessment resources:

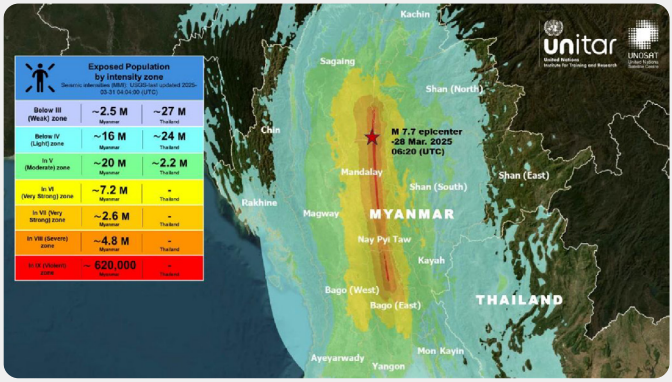
Strategic Prioritisation Framework:

- Priority 1: Areas with visible destruction, but with humanitarian access constraints
- Priority 2: Accessible areas with visible destruction
- Priority 3: Areas with minimal visible damage

Roberto Colombo emphasized the operational impact: ***"It's one of the times that I've used more the UNOSAT mapping product to really help me to define where those locations were. Using the level of destruction what we see from the sky, we can prioritize where to send first responders."***

OCHA faced the challenge of prioritising among over 2,000 potential assessment locations with limited resources. Roberto Colombo explained how UNOSAT's damage analysis became one of several key criteria used alongside security assessments, logistical feasibility assessments, and population density data to select 700 priority sites for field teams.

"Using the level of destruction what we see from the sky, we can prioritise where to send first responders," Colombo noted, emphasizing how satellite derived information helped optimize resource allocation within existing operational constraints.



IMG4: Map illustrating the seismic intensity zones following the Sagaing Earthquake (28 March 2025, M 7.7). A total of about 15 million people are potentially exposed to strong to severe intensity.

2. STRENGTHENED HUMANITARIAN COORDINATION AND INFORMATION SHARING

UNOSAT's damage assessments became a key component of inter-agency coordination, addressing a critical information gap in Myanmar's complex operational environment. OCHA's Field Information Services created a unified web platform that integrated UNOSAT's damage points with other humanitarian data, significantly expanding access to critical intelligence beyond traditional satellite imagery users.

Eric Allen Jr. noted the multiplier effect of integrating UNOSAT products into OCHA's information sharing and planning: *"We use it for planning purposes, for assessment planning... Those situational updates went to the regional office and then the regional office will send it to the Country Office... many of the figures that UNOSAT provided went into those situational updates."*

Additionally, OCHA shared the UNOSAT analysis results and maps in PDF format with colleagues in the field every time something was published. This dual-format approach proved essential when connectivity issues plagued field operations, as Eric noted: *"Myanmar reminded us that we still need accessible formats like PDFs. That was the only way colleagues in the field, including all clusters, were able to access critical information when digital systems failed."*

The UNDP analysis integrated advanced satellite imagery-derived building damage classifications (destroyed, damaged, and possibly damaged) from UNOSAT and Copernicus with Microsoft's building footprint, height, and floor count data from the Global Human Settlement layer[7].

"The remote sensing paints a very concerning picture. It's critical that we rapidly verify on the ground this view from on high. We need to get patients and the displaced back under solid roofs and start to repair critical infrastructure," *Titon Mitra, UNDP Resident Representative in Myanmar said from Sagaing, speaking during a mission to the earthquake epicentre.*[8]

3. SUPPORT FOR HUMANITARIAN RESPONSE PLANNING

UNOSAT's satellite analysis contributed to the evidence base that informed the **Humanitarian Needs and Response Plan (HNRP) Earthquake Flash Addendum**[9], which requested **$275 million USD** to reach **1.1 million people with urgent aid**[10], The satellite-based analysis provided critical damage intelligence for areas inaccessible to ground teams, complementing population exposure models and field assessments to build a comprehensive picture of humanitarian needs.

Cluster breakdown	PEOPLE IN NEED HNRP 2025	New people in need	Total people in need in worst EQ affected area	NEW EQ PEOPLE TARGETED 2025 HNRP Outside of Prioritized	EQ REQUIREMENT (US$)
	4.3M	2.0M	6.3M	1.1M	$275M
Education	975K	1.7M	2.7M	111K	7.8M
Food Security	3.6M	248K	3.9M	666K	43.0M
Health	2.1M	658K	2.4M	306K	23.0M
Nutrition	604K	268K	635K	231K	3.6M
Protection	3.0M	2.2M	5.3M	582K	17.0M
Gen. Protection	2.2M	2.2M	4.4M	519K	7.2M
Child Protection	1.9M	169K	2.1M	227K	2.9M
GBV	2.1M	220K	2.3M	221K	3.1M
Mine Action	1.8M	334K	2.1M	347K	3.8M
Shelter/NFIs/CCCM	1.0M	4.2M	5.2M	753K	59.4M
WASH	1.1M	3.2M	4.3M	1.0M	55.3M
Multi-purpose Cash				739K	27.1M
Coordination and Common Services					2.5M
Accountability to Affected People					800K
Coordination					1.3M
Protection from Sexual Exploitation and Abuse					539K
Logistics					2.7M
Early Recovery					33.6M

IMG5: Humanitarian Needs and Response Plan Flash Addendum Myanmar Earthquake, April 2025

[7] https://reliefweb.int/report/myanmar/urgent-removal-least-25-million-tonnes-debris-needed-myanmar-following-earthquake-says-undp

[8] According to https://reliefweb.int/report/myanmar/urgent-removal-least-25-million-tonnes-debris-needed-myanmar-following-earthquake-says-undp

[9] https://www.unocha.org/publications/report/myanmar/myanmar-earthquake-hnrp-flash-addendum-issued-april-2025

[10] As of 16 May, only US$44.2 million has been disbursed.

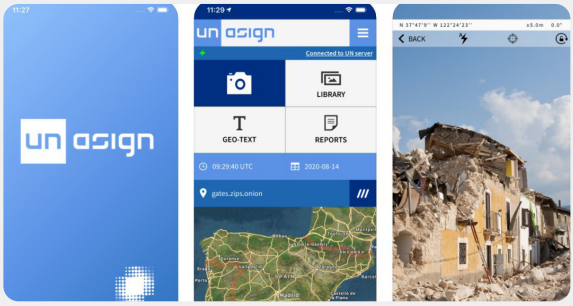
The collaboration extended across multiple UN agencies and operational partners. Roberto Colombo highlighted specific coordination with key actors: ***"We shared this information especially with WFP to help them identify where they could locate warehouses or where they should not be locating warehouses... We guided other partners to say, 'this is what we've done (with UNITAR-UNOSAT), this is a model that we would like you to replicate."***

This systematic information sharing contributed to a common operational picture that helped inform humanitarian funding allocation and helped prevent costly duplication of assessment efforts across the humanitarian community.

4. METHODOLOGICAL IMPROVEMENTS AND FUTURE APPLICATIONS

The Myanmar earthquake response illustrated a combined satellite imagery- and ground-based damage assessment methodology through the integration of UNOSAT's **UN-ASIGN** crowd-sourcing application with satellite imagery analysis. This combined approach significantly enhances both the accuracy and completeness of damage assessments.

Over 1,000 geolocated photos were uploaded through UN-ASIGN during the response, creating a robust ground-based validation system that complemented UNOSAT's satellite analysis Roberto Colombo explained the operational integration: ***"We use UN-ASIGN, which is also one of the tools supported by UNOSAT, to validate the damage building destruction maps. We'll go to locations where there were clusters and using UN-ASIGN we'll take pictures that would be represented on the UNOSAT website."***



| *IMG6: UN-ASIGN application interface for download on both respectively Apple and Android devices.*

This integration between satellite imagery - and ground-based validation was made possible by UN-ASIGN's technical capabilities specifically designed for challenging operational environments. The mobile application allows humanitarian workers to upload geotagged photos with annotations that integrate directly into UNOSAT's live mapping products in near real-time -- even over low bandwidthe connections -- a critical feature in Myanmar's compromised connectivity environment. This capability enabled field teams to systematically validate satellite-identified damage clusters, effectively ground checking results and further enhancing the reliability and credibility of UNOSAT's live mapping products.

Ground-truthing or ground-checking is the stage that comes after satellite imagery analysis. It involves conducting a formal field survey to check the accuracy of the satellite imagery analysis results. Ground-checking is the current term that is favoured.

5. RETURN ON INVESTMENT

When asked about operating without UNOSAT's services, Eric Allen Jr. highlighted the operational advantages: ***"We would have to leverage other organizations outside the UN system, which becomes tricky because they have their own mandates. This could delay our initial damage assessment by 3-7 days."*** While alternative satellite providers exist, UNOSAT's 20 years of experience serving humanitarian operations and 24/7 availability provide operational efficiencies that translate to faster initial response coordination.

UNOSAT's Competitive Advantages:

- **UN System Integration:** Direct mandate to serve humanitarian operations
- **24/7 Mapping Service:** Delivered initial assessments within 24-72 hours at no cost
- **Coordination Leadership:** Central role in international mapping coordination through International Charter Space and Major Disasters, and GDACS-SMCS

- **Adaptability:** Results available in multiple data formats to maximise accessibility
- **Predictability:** Two decades of consistent service delivery has established UNOSAT as a partner that humanitarian organizations know they can rely on to respond to crisis

Cost-Effectiveness Analysis

UNOSAT's analysis contributed to more effective humanitarian resource allocation through several mechanisms:

- **Enhanced Assessment Efficiency:** Reduced field team deployment time by weeks through improved site prioritisation capabilities
- **Improved Resource Targeting:** Provided valuable information that contributed to humanitarian funding reaching priority areas more effectively
- **Accelerated Decision-making:** Contributed to faster initial coordination by providing rapid damage overview
- **Reduced Coordination Complexity:** Helped eliminate overlapping efforts across multiple agencies through centralized mapping coordination

LOOKING AHEAD: BUILDING ON SUCCESS

The Myanmar earthquake response demonstrated once more how time how **UNOSAT's satellite imagery analysis enhances humanitarian operations,** and how UNOSAT's collaboration with UNOCHA measurably improves better emergency coordination.

Recommendations:

- Enhanced SAR change detection for rapid damage hotspot identification
- Building footprint integration for advanced infrastructure damage assessment
- API access improvements for real-time data integration with humanitarian partners

This impact story provides concrete evidence that UNOSAT's Emergency Mapping Service contributes to measurable improvements in humanitarian coordination: enhanced response efficiency, improved resource allocation and decision-making, strengthened inter-agency coordination, and, ultimately, more effective delivery of life-saving assistance to vulnerable populations.

As humanitarian needs continue to grow globally while funding remains constrained, UNOSAT's satellite- capabilities represent a critical multiplier for humanitarian effectiveness— helping ensure that humanitarian resources achieve maximum impact for those who need it most.

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Find out about our work

United Nations Satellite centre (UNOSAT), United Nations Institute for Training and Research (UNITAR)
7 bis, Avenue de la paix, CH-1202 Geneve 2, Switzerland

www.unosat.org | unosat@unitar.org