Application of UAV in Emergency Response

Trainer
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Contents

- UNITAR-UNOSAT
- UAV for ER (UN-ASIGN, UAV-ASIGN)
- Spatial Decision Support System (SDSS)
The United Nations Institute for Training and Research (UNITAR) is a principal training arm of the United Nations, working in every region of the world to empower individuals, governments and organizations through knowledge and learning to effectively overcome contemporary global challenges.

Mission

“To develop capacities to enhance global decision-making and to support translation of those decisions into action at country level”
The Institute Core Functions

- Design and deliver innovative training
- Facilitate knowledge- and experience-sharing
- Conduct research on and pilot innovative learning strategies
- Advise and support governments, UN and other partners with technology-based knowledge-related services
- 9 Programmes that deliver training and capacity development in specific focus areas

Thematic Areas

- Capacity for the 2030 Agenda
- Strengthening multilateralism
- Advancing environmental sustainability and green development
- Improving resilience and humanitarian assistance
- Promoting sustainable peace
- Promoting economic development and social inclusion
UNOSAT: UNITAR Satellite Applications Programme

• An operational programme of UNITAR serving the UN, international organizations and governments

• Fully dedicated to satellite imagery analysis, applications of geospatial information technologies, training and capacity development

• Operational since 2001

• Currently 30 employees
UNOSAT’s Activities

ANALYSIS & MAPPING
Satellite Analysis, Climate Service, Applied Research and Innovation

TRAINING AND CAPACITY DEVELOPMENT
Hands on, National and Regional level, Technical Backstopping

Support services & Knowledge Transfer

https://www.youtube.com/watch?v=FkR3N5ktt4U
Training and Capacity Development
UNOSAT is implementing capacity development projects in collaboration with:

- Intergovernmental Authority on Development (IGAD) (Horn of Africa)
- the Asian Disaster Preparedness Centre (ADPC) (South East Asia)
- Government of Chad (Reseau Project): [https://reseau-tchad.org/](https://reseau-tchad.org/)

**Target Audience**

- Decision makers and professionals from national and international organizations
The collaboration between ADPC and UNOSAT combines training held annually in Bangkok.

Training of 200+ disaster management professionals working in Asia.

In-country technical assistance and training programmes implemented each year in different South East Asian countries:

- Vietnam 2011
- Myanmar 2012, 2016
- Bangladesh 2013, 2015
- Cambodia 2014
Beneficiary Infographic

UNOSAT Training and Capacity Building Beneficiaries (2006 – 2016)

Organisational Affiliation
47% National authorities
23% Academic
15% NGOs
8% Regional organisations
7% UN system

Activities
- Master level training
- Basic & advanced courses
- In-country capacity building programmes
- Workshops and information sharing

Beneficiaries
- 989 Learning events
- 8000+ Knowledge sharing events

Beneficiaries by Region
- Europe 38%
- Africa 25%
- M. East 6%
- Asia 25%
- S. A 6%

Region
- Europe
- Africa
- M. East
- Asia
- S. A
Our Training Partners...
UNOSAT Analysis & Mapping Support to Humanitarian Emergencies & Post Disaster Recovery

www.unitar.org/unosat/rapid-mapping
Mapping Activities

Floods
Earthquakes
Cyclones
Landslides
Refugee and Internally Displaced Persons Mapping
Cultural Heritage Sites
Conflict Damage Assessment
Etc.
Mapping Activities

Floods
Earthquakes
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Etc.

OVERVIEW OF FLOOD WATERS, N’DJAMENA, CHAD

Analysis with HRSP-SAT Data Acquired on 14 October 2012 & AVNIR-2 Data Acquired on 24 January 2010

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Cultural Heritage Sites
Conflict Damage Assessment
Etc.

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Mapping Activities

Floods

Earthquakes

Cyclones

Landslides

Refugee and Internally Displaced Persons Mapping

Cultural Heritage Sites

Conflict Damage Assessment

Etc.

This map presents an interpolated building damage intensity surface as assessed from both satellite and aerial survey imagery covering downtown Port-au-Prince, Haiti. Damaged buildings were classified according to visually-assessed damage levels.
Category 5 Tropical Cyclone Pam was the most intense tropical cyclone in the southern hemisphere in 2015 and regarded as one of the worst natural disasters in the history of Vanuatu: 166,600 people affected, 75,000 people in need of shelter, 110,000 people without access to safe drinking water, US$29.9 million required.
Mapping Activities

Floods

Earthquakes

Cyclones

**Landslides**

Refugee and Internally Displaced Persons Mapping

Cultural Heritage Sites

Conflict Damage Assessment

Etc.

Preliminary Co-seismic Landslide Inventory Map of Bahia de Caraquez, Ecuador (2016)
Mapping Activities

Floods

Earthquakes

Cyclones

Landslides

Refugee and Internally Displaced Persons Mapping

Cultural Heritage Sites

Conflict Damage Assessment

Etc.

IDP shelters in UN house compound, Juba, Central Equatoria, South Sudan (2016)
Mapping Activities

- Floods
- Earthquakes
- Cyclones
- Landslides
- Refugee and Internally Displaced Persons Mapping
- Cultural Heritage Sites
- Conflict Damage Assessment
- Etc.

Damage assessment of the Temple of Bel, Palmyra, Syria (2015)
Integrated solutions for fleet management, field data collection and crowdsourcing including web mapping applications

Cost-efficient solutions for geo-positioning and mapping of photos, videos and text (Android+, iphone, etc..)

First UN to use UAV technology in humanitarian operations
Application of UAV for Emergency Response
Observation is the First Step in Effective Decision Making

During emergencies crucial decisions must be made in relatively short time span. Effectivity of those decisions largely depend on the situational awareness shaped by integration of various reliable sources real time data and analysis.
Advantages

• Can operate more or less irrespective of cloud/weather conditions (fly under clouds)
• Rapid deployment
• Ease of use
• Reusability
• Low initial cost
• Very high detail (~3-4cm/px)
## Normal vs Emergency UAV mapping

<table>
<thead>
<tr>
<th></th>
<th>Normal Mapping</th>
<th>Emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Scope</td>
<td>Proper Flight Plan to capture the required information</td>
<td>None, Ad-hoc</td>
</tr>
<tr>
<td>Production time</td>
<td>Possibility to play with results, come up with results in days</td>
<td>Within hours if not real-time</td>
</tr>
<tr>
<td>Required Location Accuracy</td>
<td>High</td>
<td>Low (Acceptable)</td>
</tr>
<tr>
<td>Possibility of Complementary mission</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Band-width constraints</td>
<td>Offline upload acceptable</td>
<td>Online preferable</td>
</tr>
<tr>
<td>Availability of damage assessment experts in the field</td>
<td>Often available</td>
<td>Scarce</td>
</tr>
<tr>
<td>Focus</td>
<td>Whole regions</td>
<td>Damage Zones</td>
</tr>
</tbody>
</table>
Mobile Data Collection using UN-ASIGN

UN-ASIGN is a free mobile app
- Offline mode, automatic
- Extremely bandwidth efficient, fast, cheap interaction
- Tool for taking and sharing geo-tagged photos
- Photos, messages and other data are displayed on the UNOSAT LIVE map

https://asign.cern.ch
How does it save data? (Interactive Communication Model)
Open UAV Camera on Smartphone
  • While drone is flying
One button touch
  • Takes photo from drone
  • Downloads full size to smartphone
  • Sends preview to server
  • Allows pulling full details for regions
Just the App is needed
  • Works like ASIGN crowd
See who is flying UAV, and Status Interact.
Case Study: UrbanDRR Sri Lanka

Pilot was flying the UAV and a co-pilot was continuously in-touch with remote expert team in Geneva. Based on the guidance from remote experts a more reliable and comprehensive aerial survey was performed.

Real-time Communication using Skype (Co-Pilot <> Remote Expert)
First Observation

Revision Request

We are ready
Can you try the road about 200 m to your east for oblique view?

Screen shot please
Big highway?

Done

Revised Observation in Real-time
Observation Revision: Higher detail REGION request

Only the requested area is pulled from device in Hi-Res
Realtime field survey monitoring - UAV
Gorkha Earthquake – Desktop App for Emergency Operation Center

This live dashboard combines multiple analysis products from UNOSAT, Copernicus and other sources.

It is intended to provide an ongoing platform to view response activities in the aftermath of the earthquake with magnitude 7.5 that occurred near Pokhara, Nepal at 05:11:25:00 UTC on Apr 25.

Data Sources
- Epicenters
- UN-Assign Photos
- Damaged Buildings
  - Destroyed
  - Severe Damage
  - Moderate Damage
  - Possible Damage
- MM2

Damage Analysis: Damage Severity
- 1,947 (20%) Severe Damage
- 2,834 (42.1%) Destroyed
- 2,439 (36.5%) Moderate Damage

Damage Statistics in the Current Extent
- 115 (25.1%) Destroyed
- 170 (37.1%) Severe Damage
- 173 (37.8%) Moderate Damage

Total number of UN-assign Photos: 493

https://unosat.maps.arcgis.com/apps/webappviewer/index.html?id=ba2a7f6b20f64c589004aa4477e6a0c0
Training on National Geodatabase and Geoportal for DRR and Sustainable Development

AIT, Thailand
February 2017

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