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Copernicus and crisis management

PSCE Conference

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Product Manager
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Copernicus at a glance – What is it?

A source of information for policymakers, scientists, businesses and the public at large

A European response to global needs to manage the environment, and to ensure civil security

A user-driven programme of

An integrated Earth Observation system of systems (combining space-based and in-situ data with Earth System Models and

opernicus
The European Earth Observation Programme

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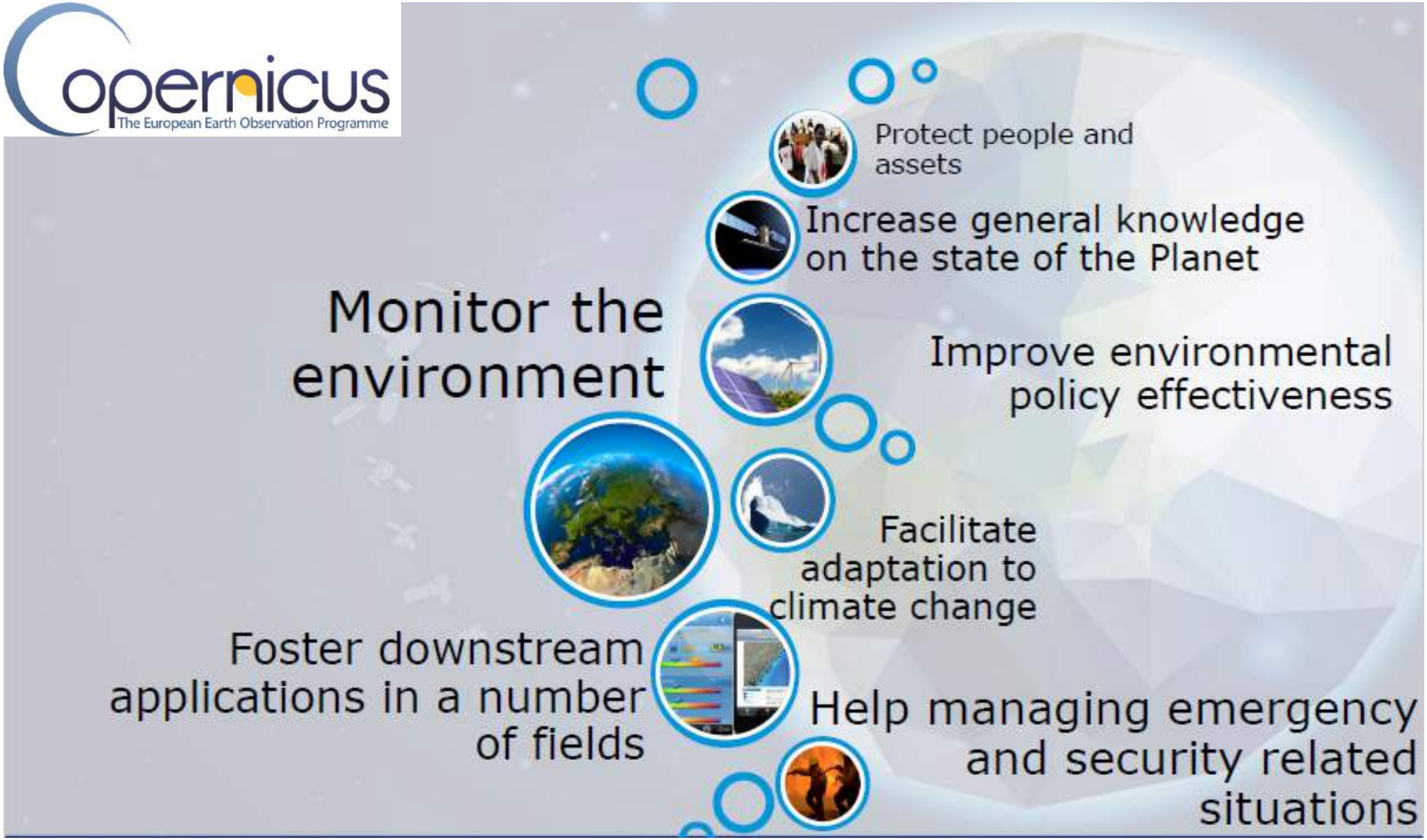
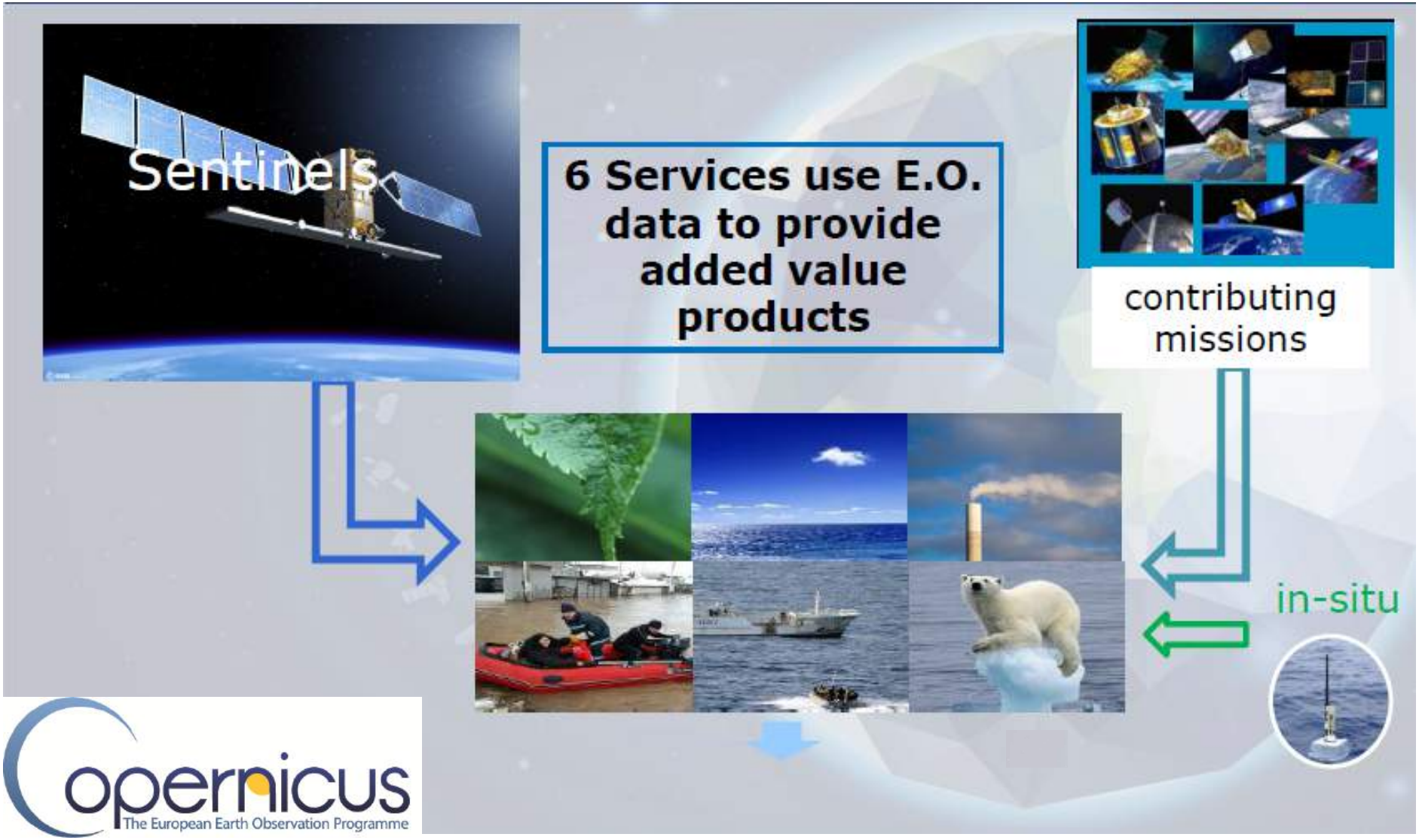
Copernicus at a glance - Objectives



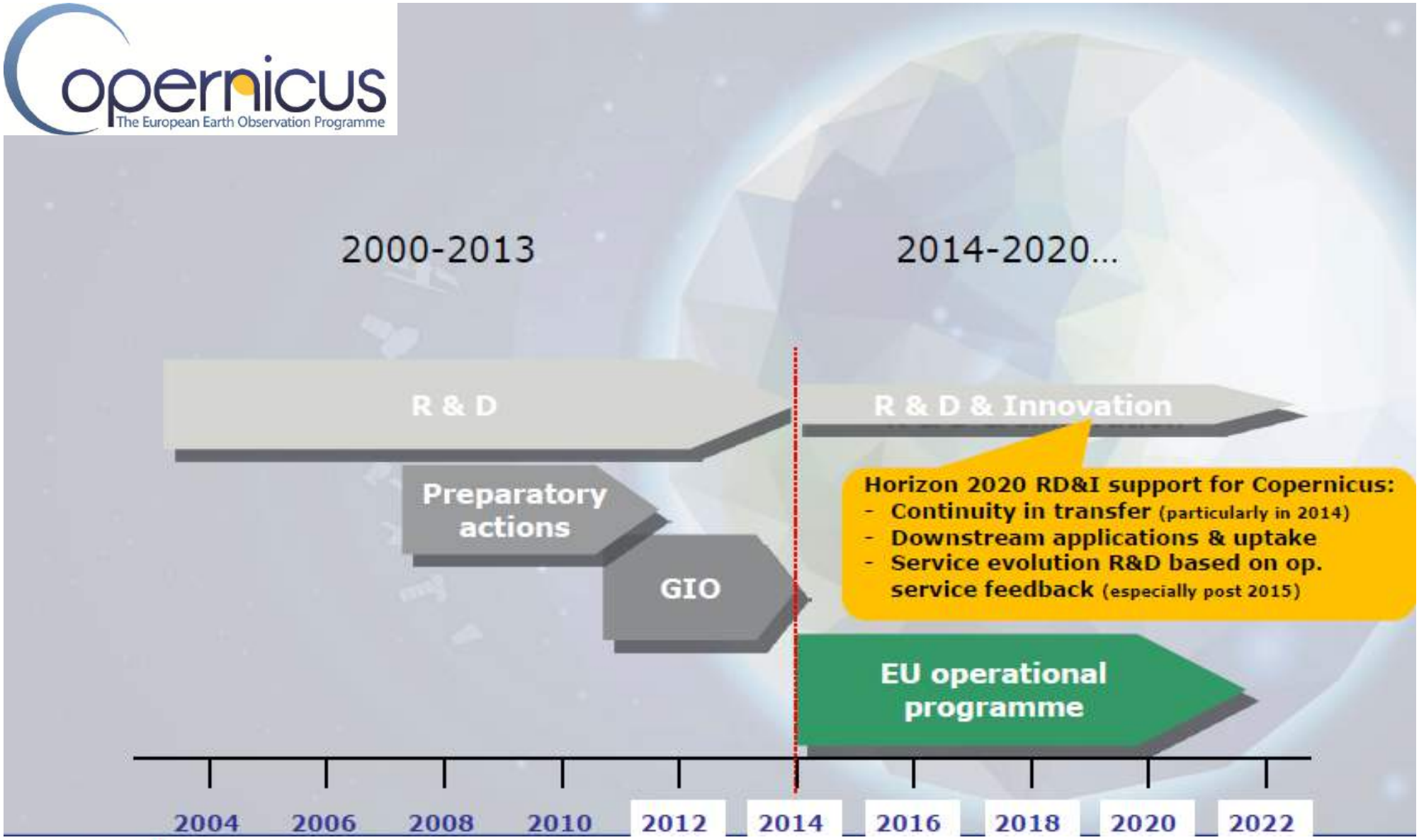
Source: Copernicus Days Rome, 7-8 October 2014

Copernicus at a glance – Components



Source: Copernicus Days Rome, 7-8 October 2014

Copernicus at a glance – From R&D to Operations



Source: Copernicus Days Rome, 7-8 October 2014

Copernicus Services

Services monitoring Earth systems

Land

Marine

Atmosphere

Horizontal services

Emergency

Security

Climate Change

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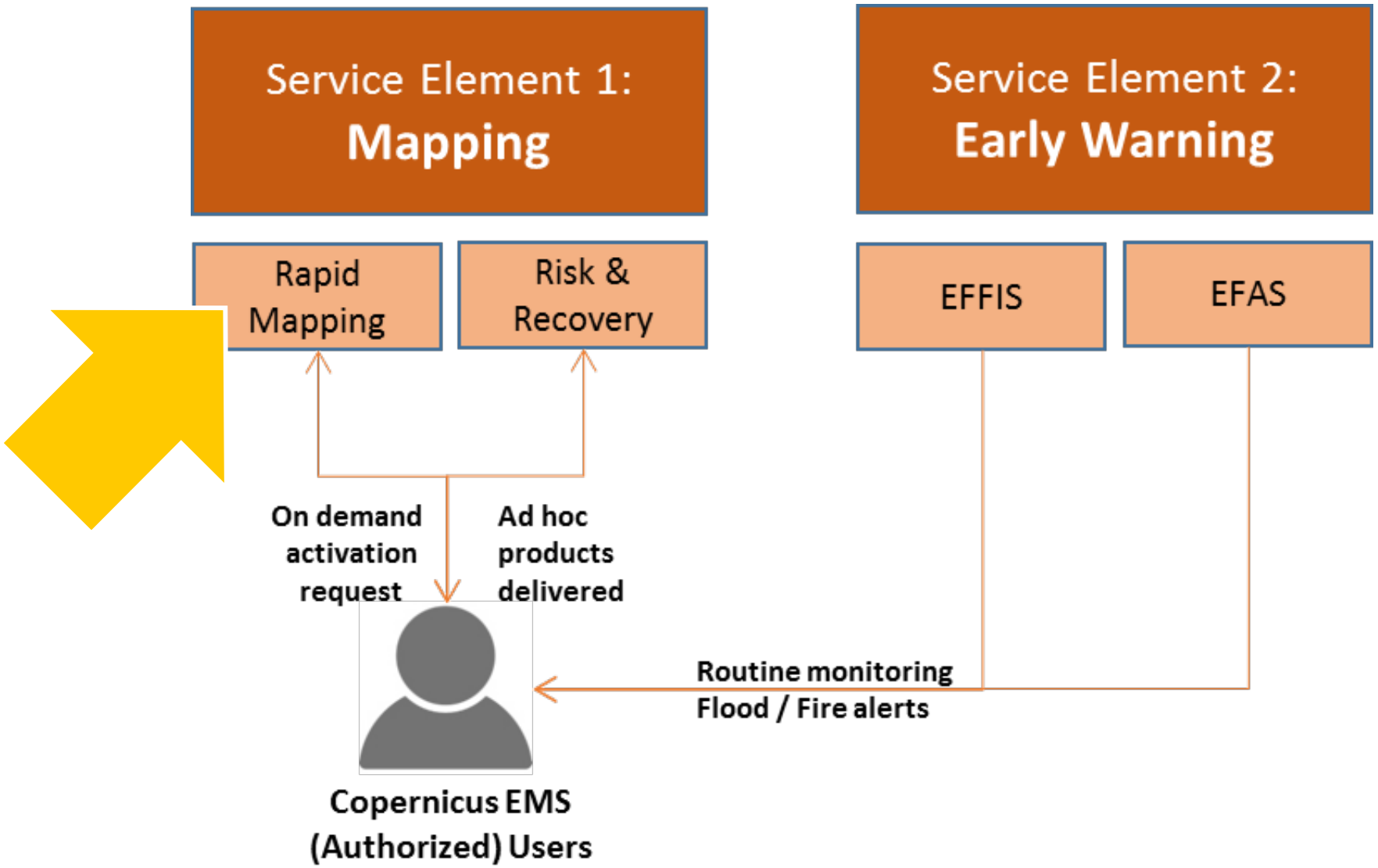
Copernicus EMS - Overview



Copernicus EMS Rapid Mapping - Overview

What: a EU Copernicus Service providing geo-information products (i.e. maps) to support civil protection and humanitarian aid operators in their tasks related to the prevention, preparedness and reaction to natural/man made disasters.

Users: authorities entitled to manage civil security related aspects in the different European Member States as well as international organizations such as the United Nations, the World Bank or other NGOs.

QUICK FACT SHEET	
NAME	**COPERNICUS EMERGENCY MANAGEMENT SERVICE – RAPID MAPPING**
Coordinator	Joint Research Center (European Commission)
Provided info	Several types of maps over crisis area
Area	Worldwide
Source	Satellite data, integrated with other geodata
Delivery	Few hours after satellite acquisition
Service availability	All-year-round 24/7

http://emergency.copernicus.eu

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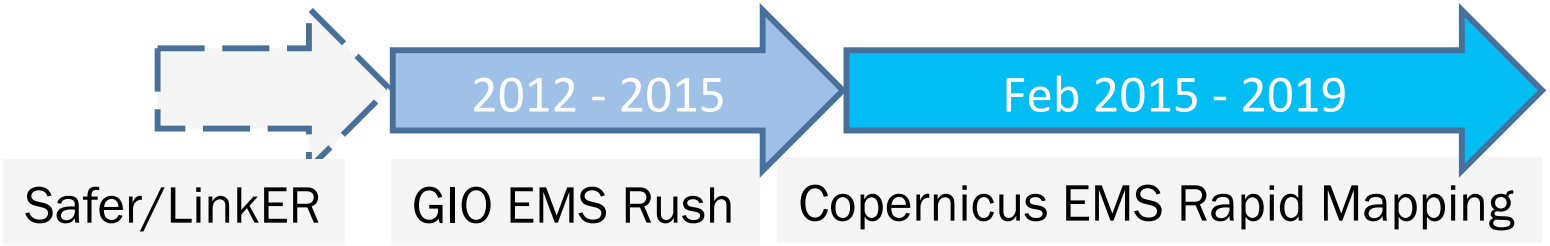
Copernicus EMS Rapid Mapping – Brief history



- Continue of GIO EMS Rush Service (2012 – 2015)
- Provision of geo-information in emergency situations so far 162 activations worldwide
- 24/7/365 avaliability
- Standardized products

Flood
Storm
Industrial Accident
Landslides
Fire
Volcano
Earthquake
Huminarian Crisis

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Copernicus

Copernicus EMS - Stakeholders

DG JRC

Technical supervision of operations and Contract management

DG ECHO

24/7 Emergency Response Coordination Centre (ERCC) accepts / denies requests for activation

ESA

EO data via a delegated act from the Commission (GSC-DA Program)

Authorised Users:

National Focal Points, they can submit a request for activation to the ERCC

DG GROW Copernicus Unit

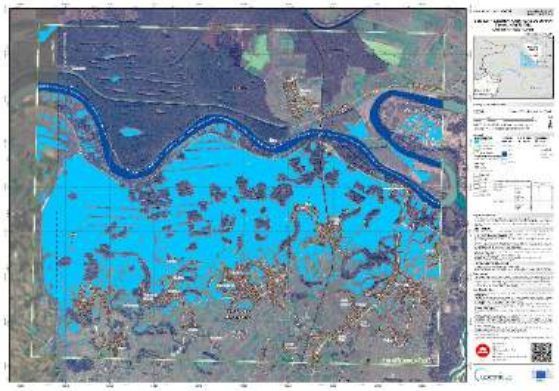
Overall program coordination and political steer

Copernicus EMS - Products

PRODUCT TYPE

Reference Map
Pre event map

Delineation Map
Post event disaster extent



Grading Map
Post event damage extent

PRODUCT FORMAT

- Digital raster data products
  - Full-colour, Format ISO A1
  - Resolution 100 – 200 – 300 dpi
  - JPG + World-File
  - GeoTiff
  - GeoPDF
  - Metadata
- Digital vector data products
  - Depending on the requirements (Crisis Information, administrative boundaries, toponyms, water, settlements, ….)
  - ESRI shape Format
  - Google Earth KML Format

SERVICE LEVEL

Service Level 1 (SL1) delivery time
- Reference maps: 9 hours
- Delineation/Grading maps: 3 hours (FAM), 12 hours (Final)

Service Level 5 (SL5) delivery time
- Reference maps: 5 working days
- Delineation/Grading maps: 5 working days

All times are considered starting from the availability of suitable satellite data

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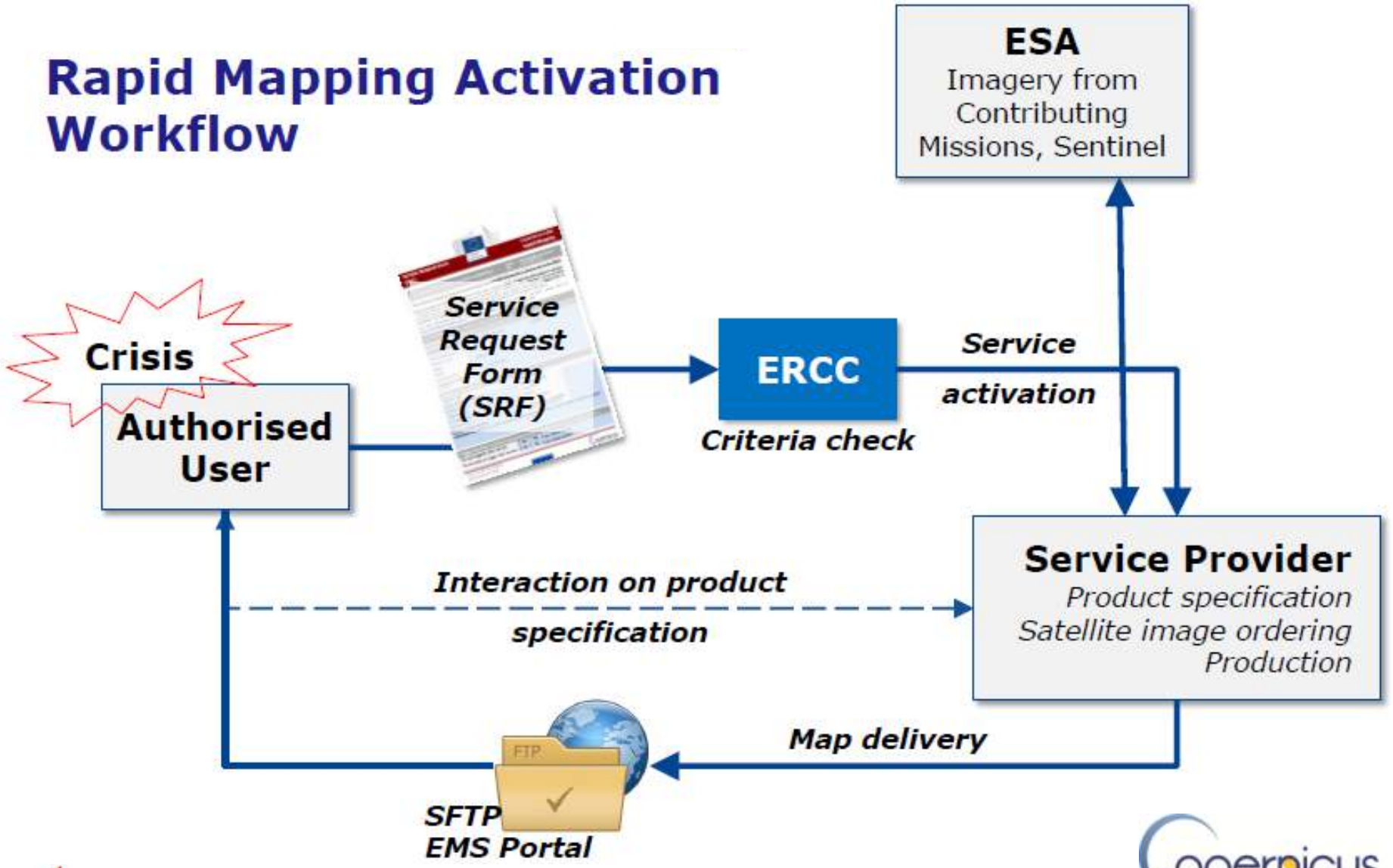
Copernicus EMS Rapid Mapping – Workflow



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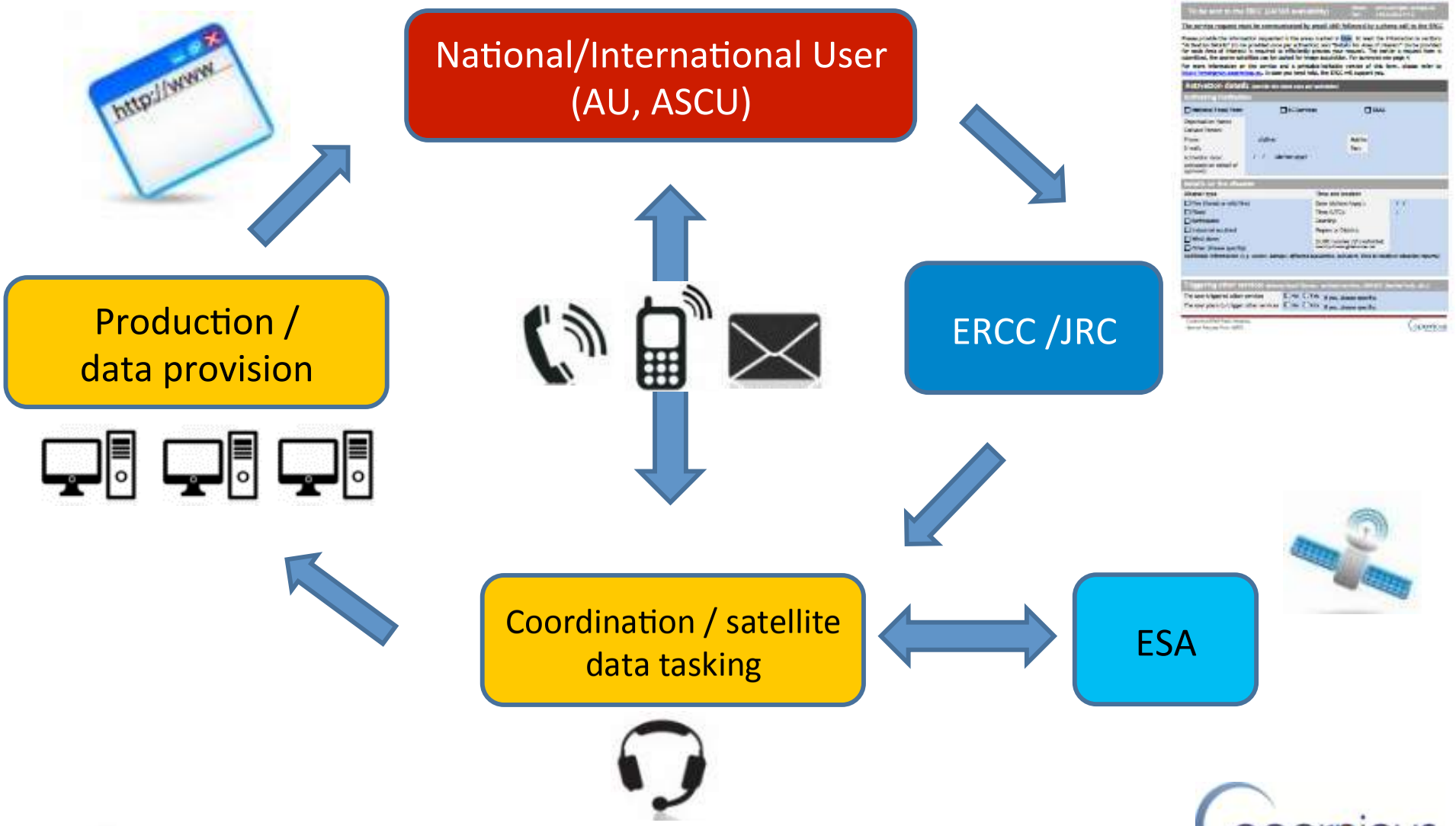
Copernicus
The European Earth Observation Programme

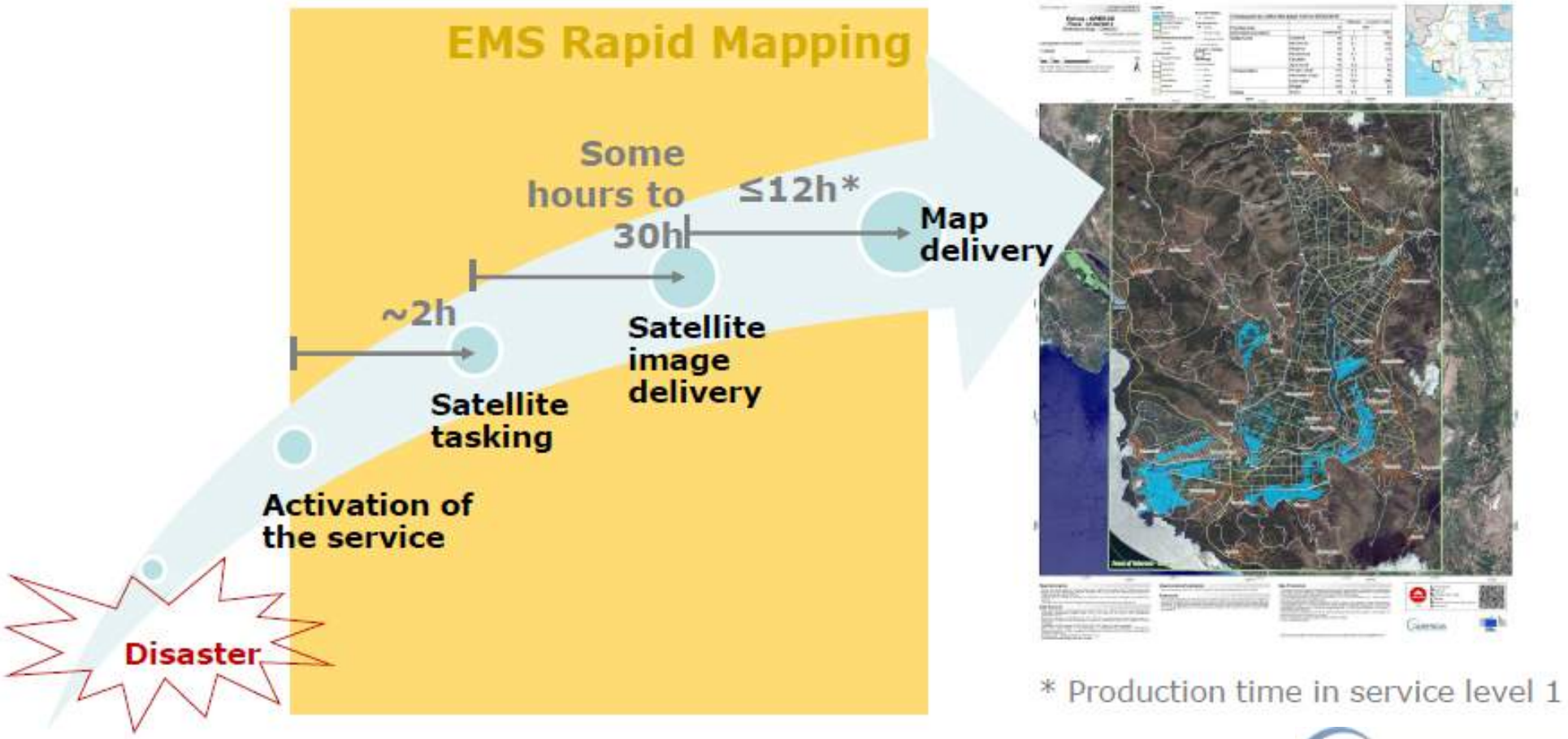
Copernicus EMS Rapid Mapping – Workflow

Activation mechanism and procedure



Copernicus EMS Rapid Mapping – Timeline

Typical Timeline



* Production time in service level 1

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Copernicus EMS Rapid Mapping – Activation

Word or PDF version to be sent as an e-mail attachment and followed by a phone alert to the ERCC.

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European Commission

Copernicus EMS – Mapping
Rush Mode
Service Request Form (SRF)

To be sent to the ERCC (24/365 availability)

Any service request must be communicated by email AND phone call

By email: echo-ercc@ec.europa.eu
Contact tel: +32-2-29-21112

This form is available in printable/editable format: http://emergency.copernicus.eu

To be completed by the Service Requestor:

☐ National Focal Point ☐ EU Focal Point ☐ Other Authorised User
(please tick the pertinent option)

Organisation Name:			
Focal point (if applicable):			
Contact Person:			
Phone (Office):			
Phone (Mobile):			
E-mail:		Fax	
Date (dd/mm/yyyy):	/ /	Time (UTC):	:

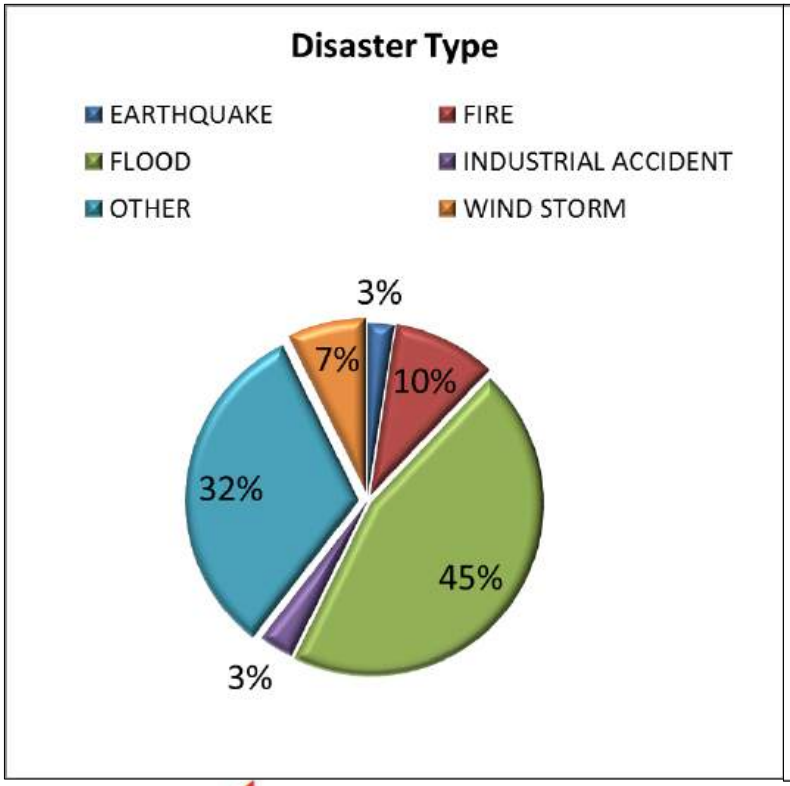
Type of disaster	
☐ Forest fire, wild fire	☐ Earthquake
☐ Flood, tsunami	☐ Industrial accident
☐ Wind storm	☐ Other (Please specify):

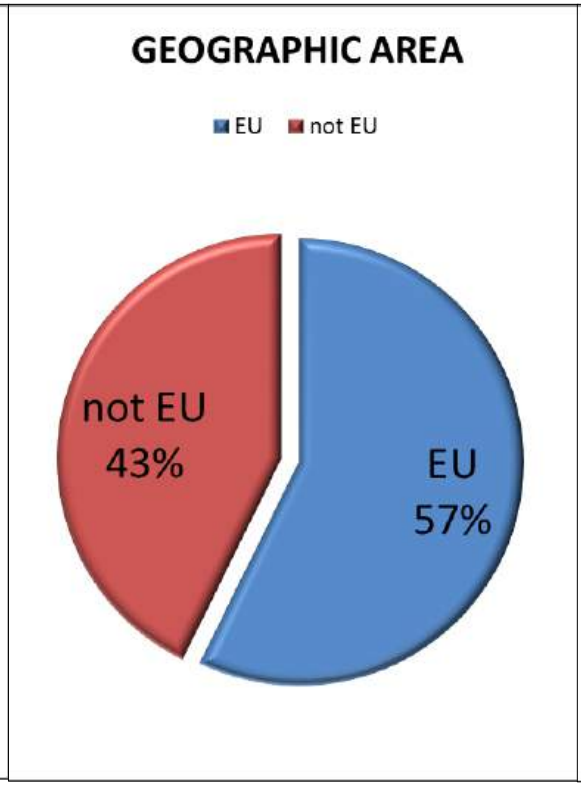
Details on the disaster	
Date (dd/mm/yyyy):	/ /
Time (UTC):	:
Country:	

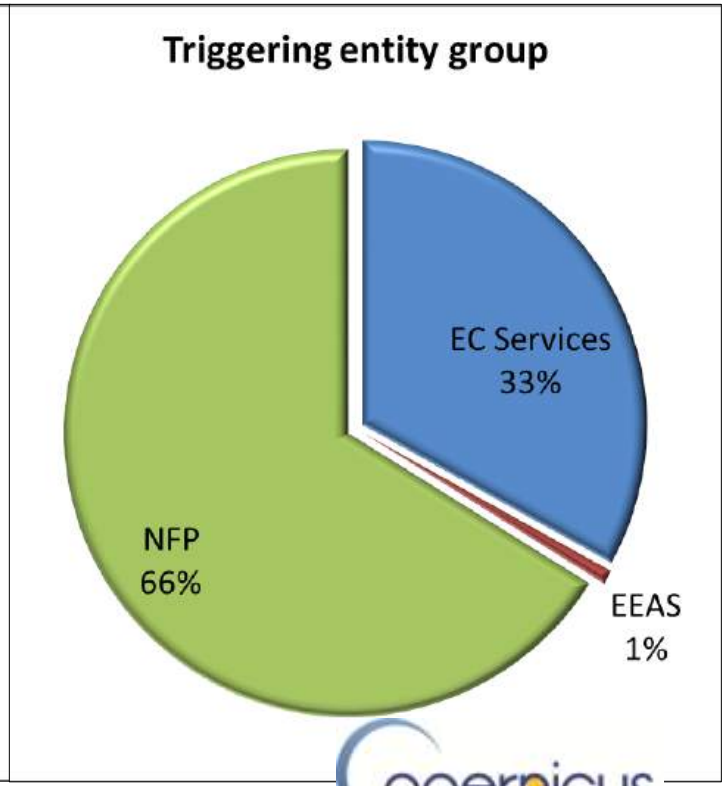
Copernicus EMS Rapid Mapping - Statistics

Summary of the Copernicus EMS RM since April 2012

Service was activated **162** times, more than **1700** maps produced (approx. 40 activations per year). More than **50 countries** worldwide involved, of which **22 EU MS.** Serving more than **40** different Users







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Activation – Earthquake in Nepal

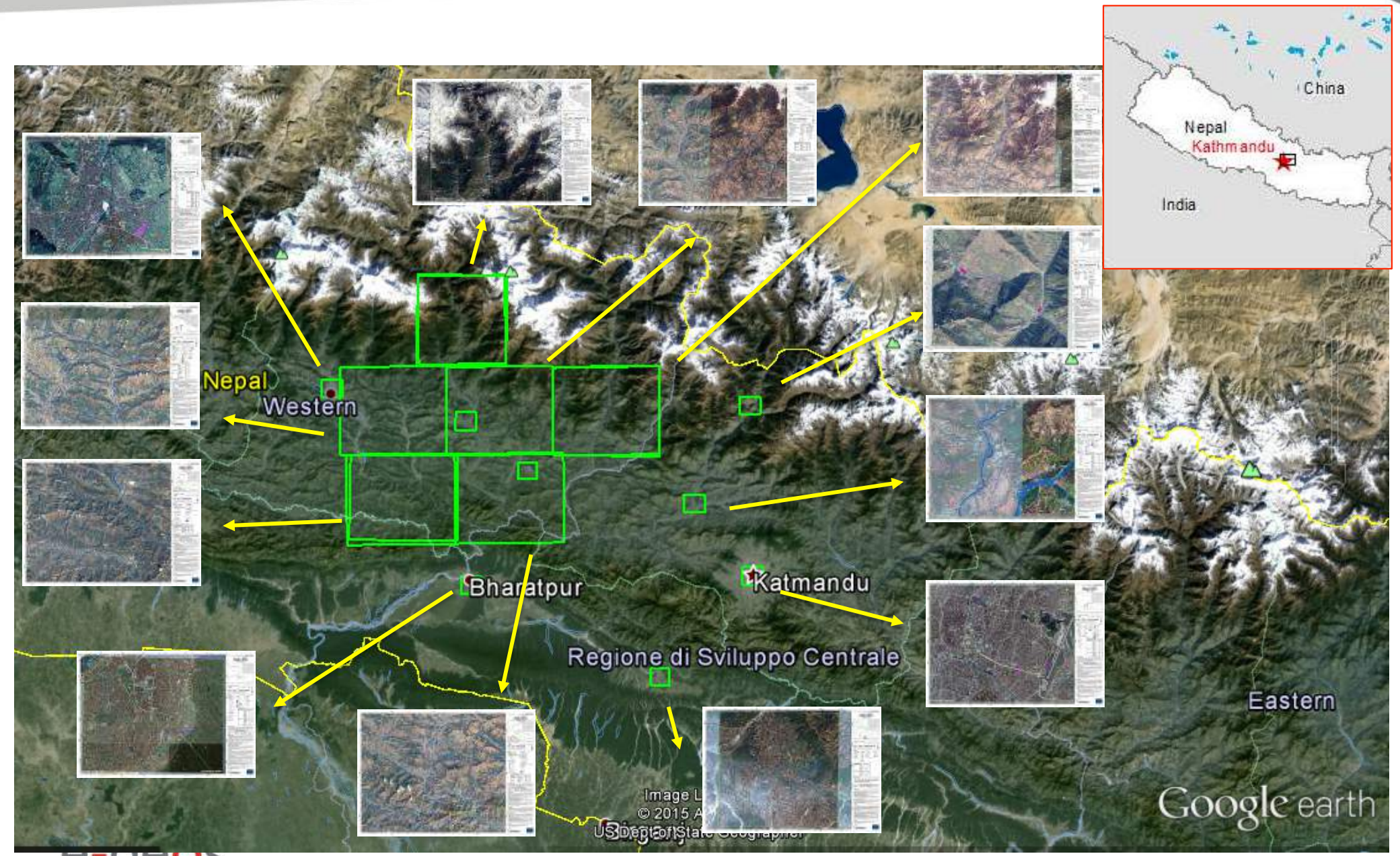
Event description:
A violent earthquake with a magnitude of 7.9M, 10Km depth has hit central Nepal at 6.11
UTC on the 25th of April. The epicenter is located between the capital city Kathmandu and
the city of Pokhara, and the tremor was felt also in several city in the northern parts of India.
Several aftershocks as strong as M7.1 were also recorded.
Extensive damage to buildings and injuries have been reported.

Triggering entity: DG ECHO ERCC (European Commission)

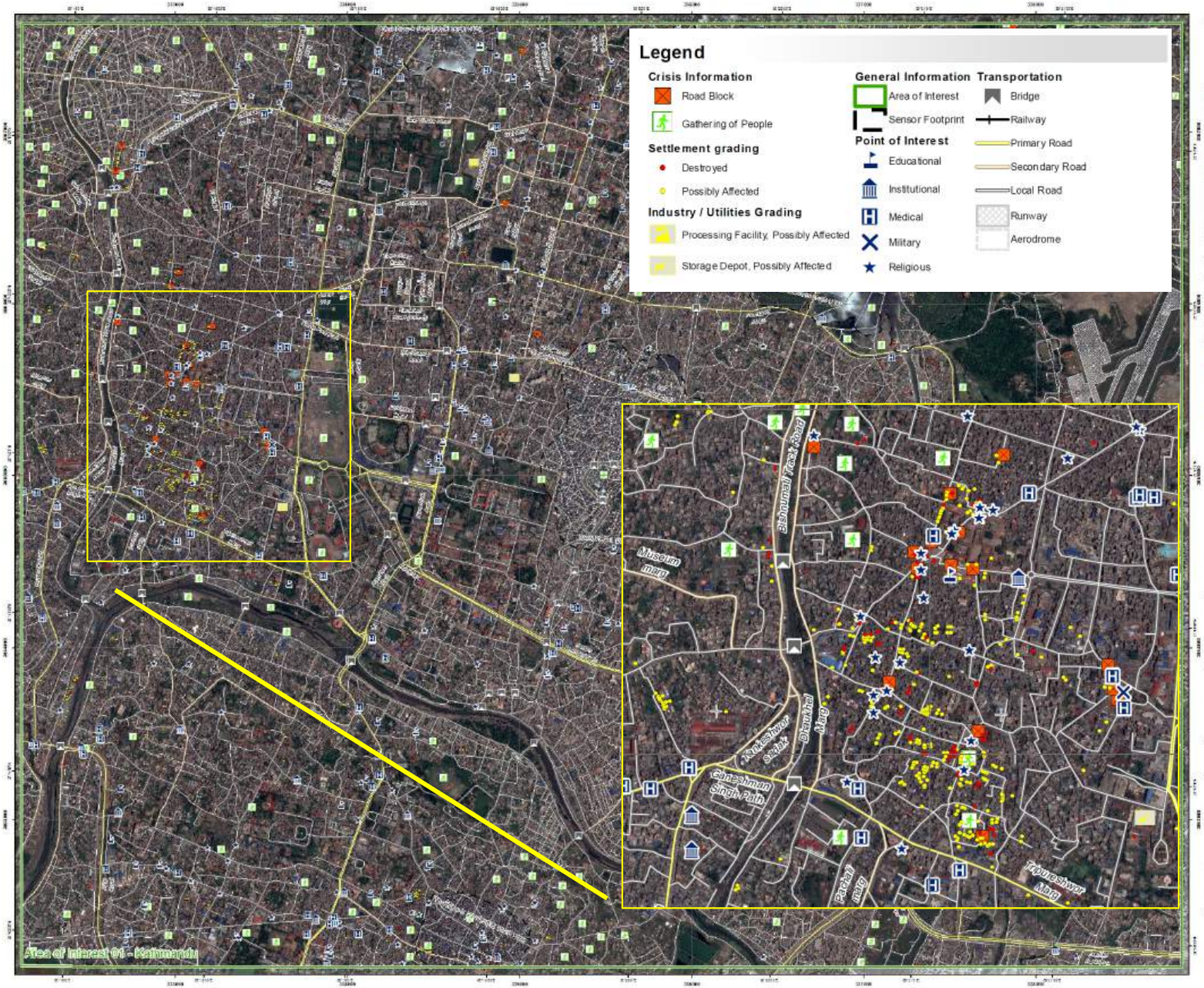
- Copernicus Emergency Management Service in Rapid Mapping mode was activated by the EU Emergency Response Coordination Center (ERCC) on April 25th, 2015 requesting detailed damage assessment over 16 areas of interest spread across the country.

- A wide set of optical very high resolution images were acquired to cover the sparse affected areas, showing damages to buildings, landslides, road blocks and spontaneous gathering areas.

A widespread disaster, 16 Areas Of Interest



Mapping damages and gathering of people in Kathmandu



Earthquakes

Nepal

27

29/04/2015

WorldView-3

Activation examples – UK Floods (2014)

Event description:
Since the end of January 2014 heavy rainfall have caused severe floods in different districts of southern England. Two severe flood warnings remained in place in the Somerset Levels and river levels were expected to continue rising along the Thames.

Triggering entity: UK Cabinet Office

- Copernicus Emergency Management Service was activated on Feb. 10th, 2014 by the UK Cabinet Office to provide satellite based flood maps over 14 Areas Of Interest in Southern and Western UK.
- COSMO-SkyMed and Radarsat-2 data were used to map the flood extent over most affected areas

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Extensive flood mapping activity

The Service was activated over 6 different macro AOI:

- **Maidenhead**
- **Bridgwater**
- **Staines**
- **Worcester**
- **Kenley**
- **Hambledon**

Flood maps were delivered on average within 24 hours after service request

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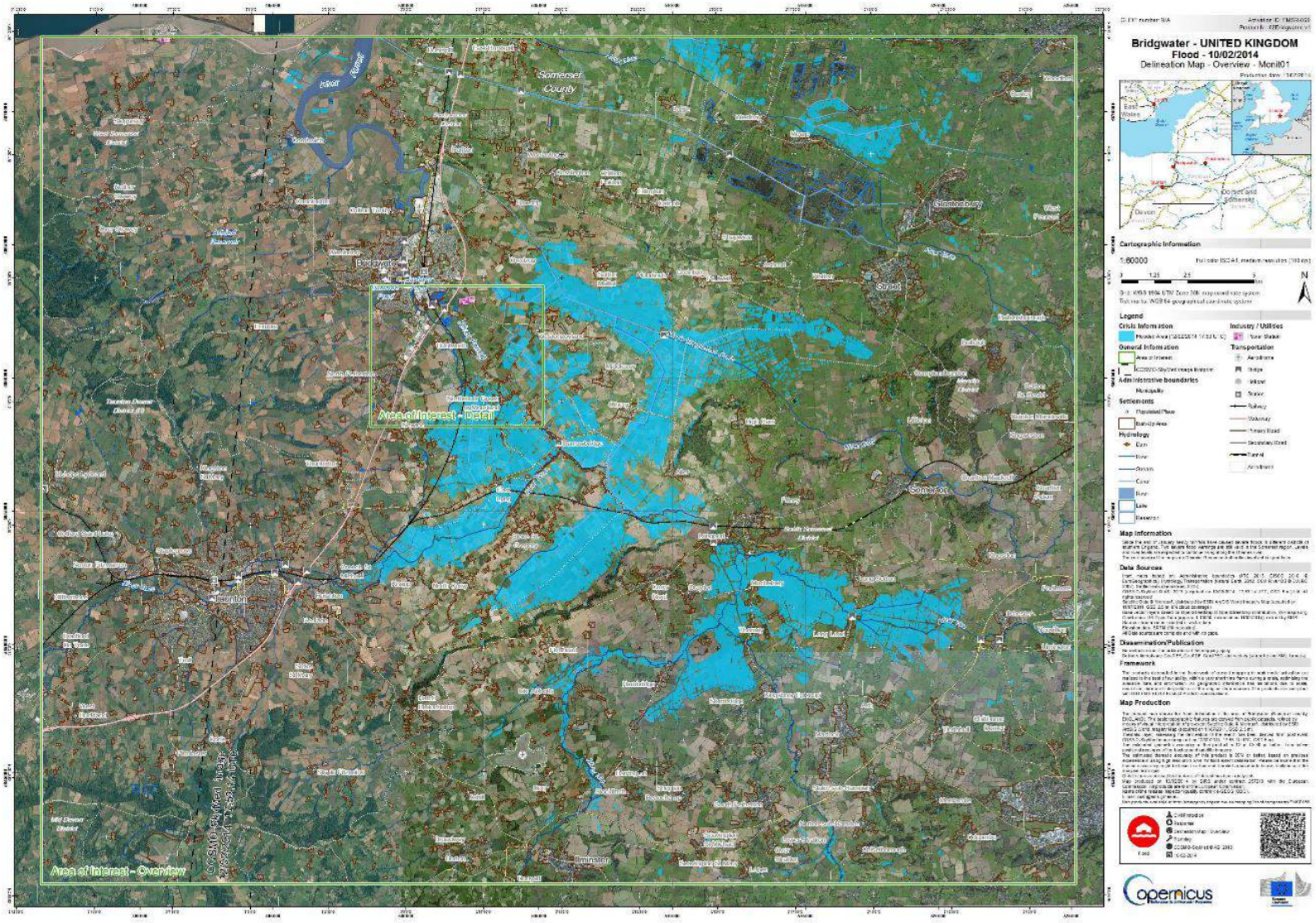
An example – Bridgwater area



Floods

United Kingdom

27

12/02/2014

COSMO-SkyMed

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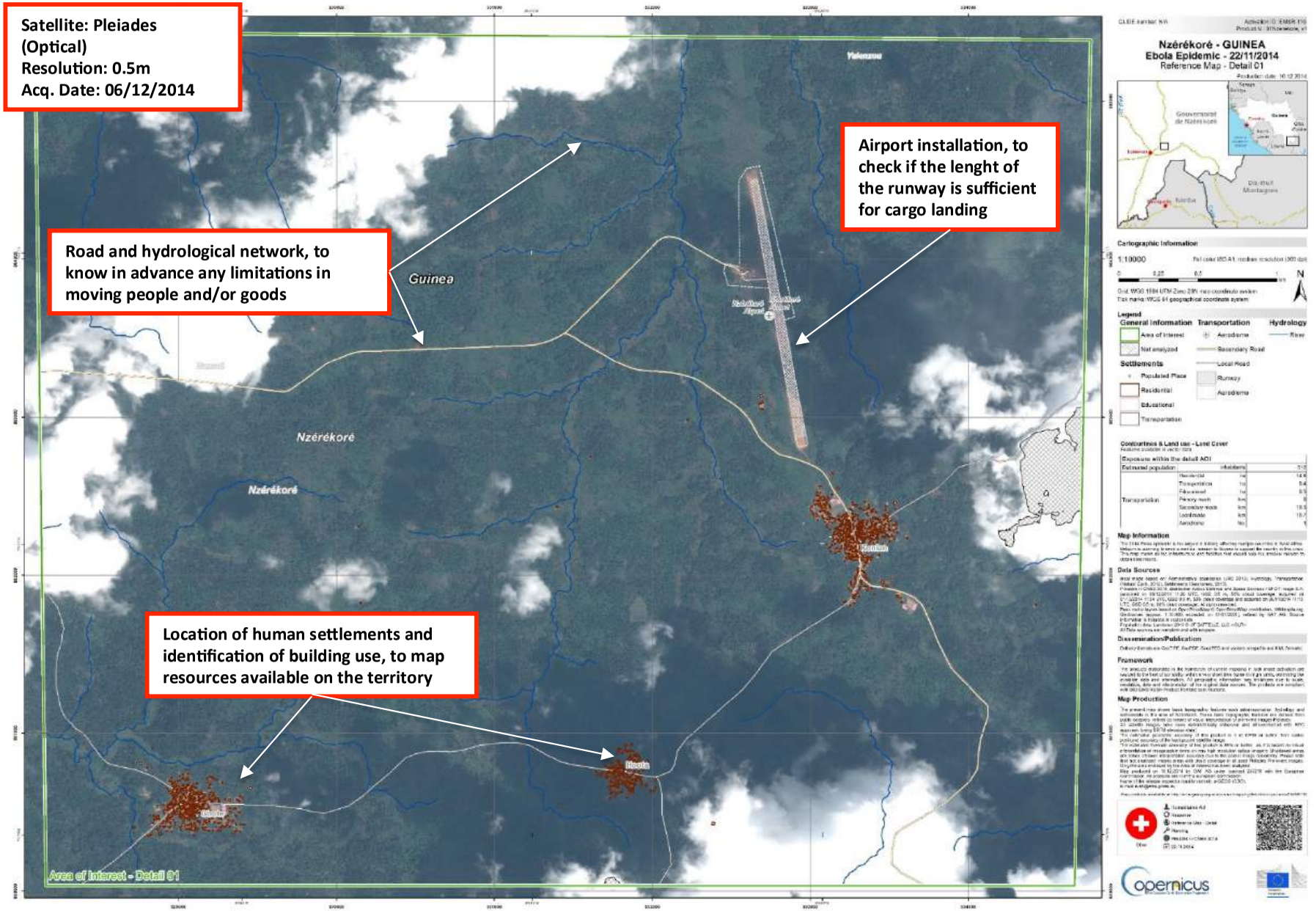
Activation – Guinea Ebola epidemy

Event description:
2014 Ebola epidemy is the largest in history, affecting multiple countries in West Africa.
Several European countries are actively contributing to relief operations, providing in situ medical support.

Triggering entity: Civil Security - Belgium

➢ Copernicus Emergency Management Service in RUSH mode was activated by the Belgian Civil Security Agency on 22nd November, 2014 in order to provide an updated cartography of the area in Guinea where the Belgian medical support unit is going to be deployed in the near future.

Satellite: Pleiades
(Optical)
Resolution: 0.5m
Acq. Date: 06/12/2014



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Activation – Typhoon in The Philippines

Event description:
In the early morning of Friday November 8th, 2013 typhoon Haiyan made landfall over Guiuan in Eastern Samar. It continued its route over the Philippines causing severe flash floods, destruction and casualties in several areas.

Triggering entity: EU Emergency Response Coordination Center

- Copernicus Emergency Management Service in RUSH mode was activated by the EU Emergency Response Coordination Center (ERCC) on November 8th, 2013 requesting detailed damage assessment over 10 areas of interest spread across the typhoon track.

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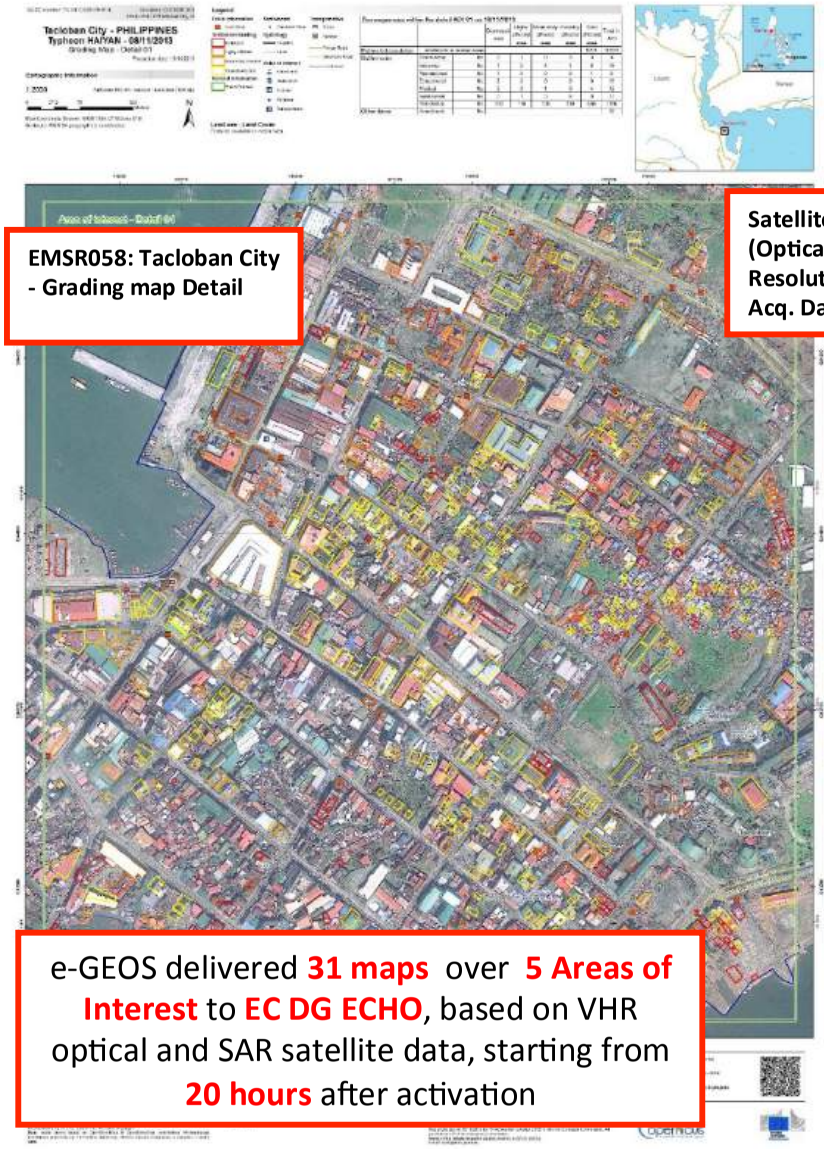
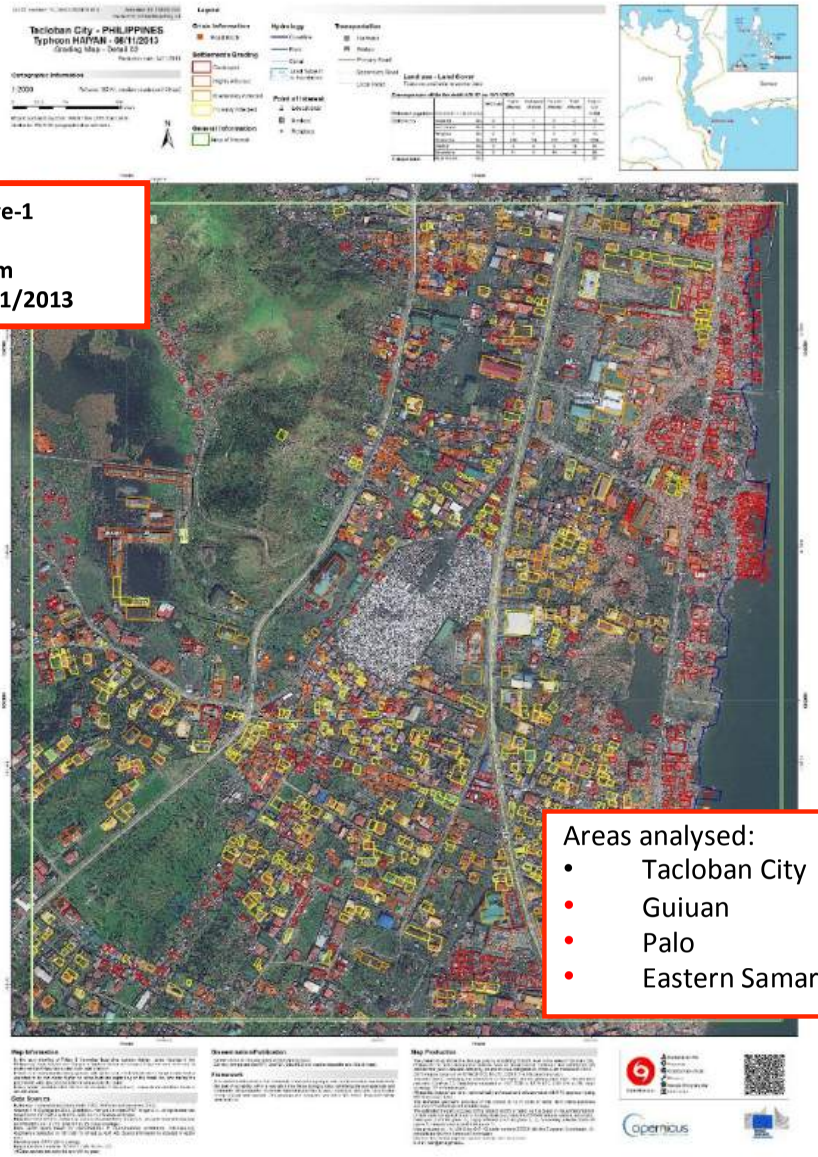
Damage assessment maps



EMSR058: Tacloban City - Grading map Detail

Satellite: GeoEye-1 (Optical)
Resolution: 0.5m
Acq. Date: 10/11/2013



e-GEOS delivered **31 maps** over **5 Areas of Interest** to **EC DG ECHO**, based on VHR optical and SAR satellite data, starting from **20 hours** after activation

Areas analysed:
- Tacloban City
- Guiuan
- Palo
- Eastern Samar

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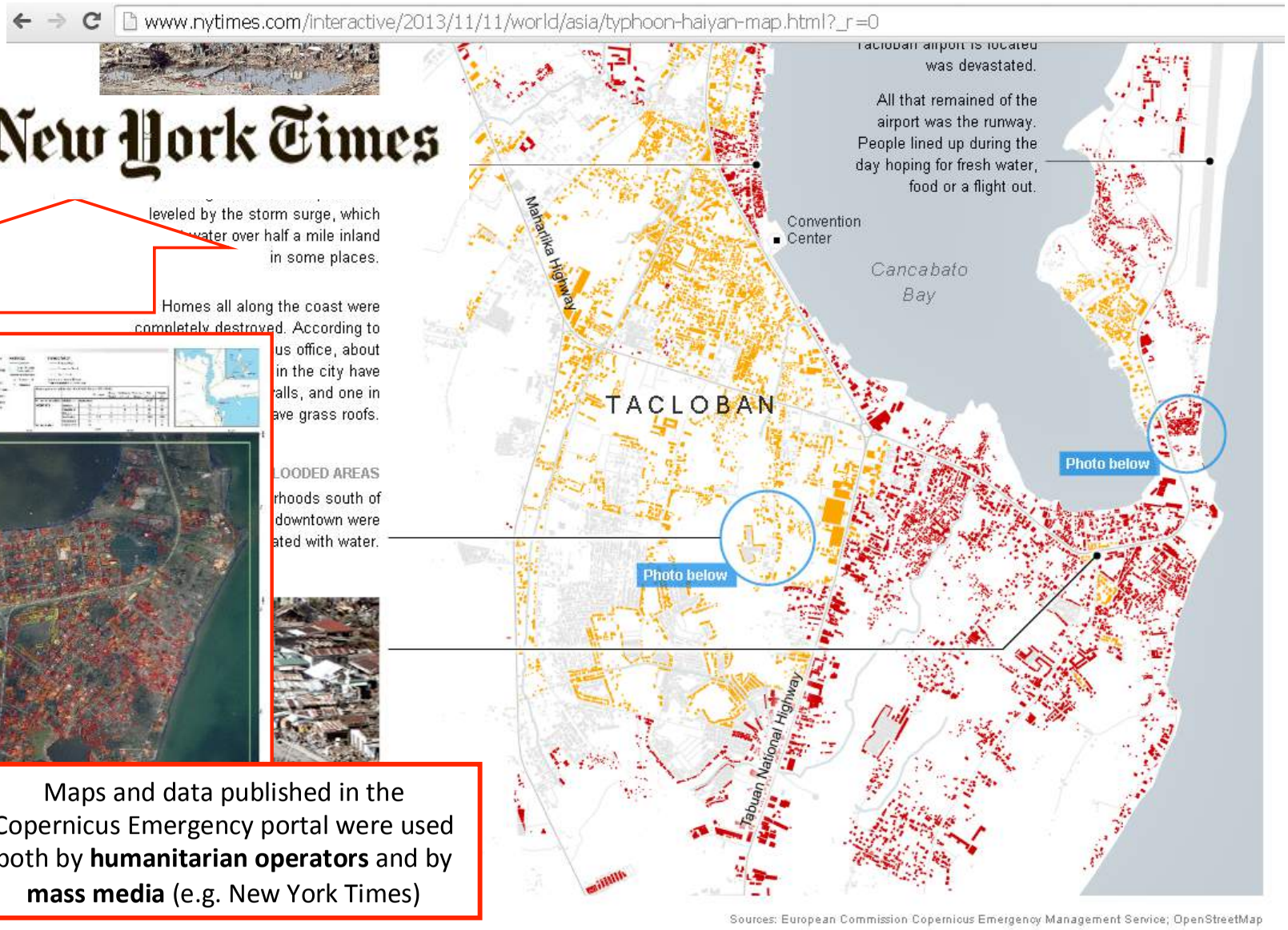
Wide distribution of results



Maps and data published in the Copernicus Emergency portal were used both by **humanitarian operators** and by **mass media** (e.g. New York Times)

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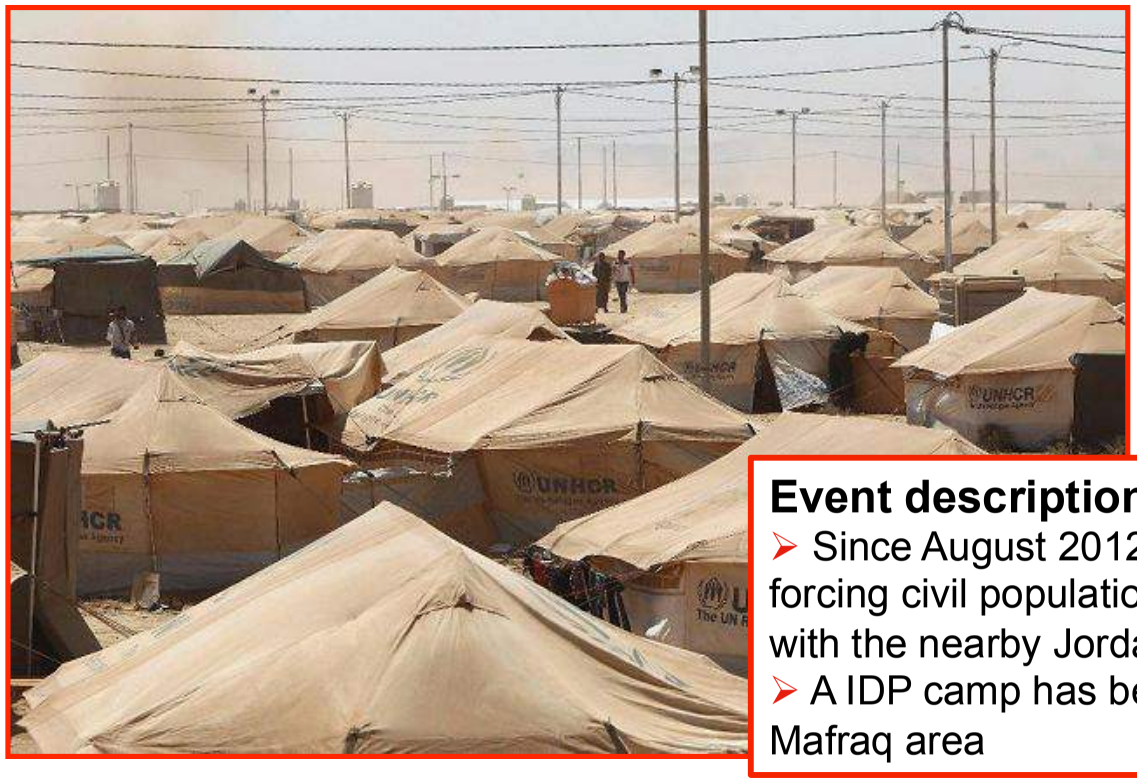
Activations – Refugees in Jordan



Event description:

- Since August 2012 the conflict in Syria has been forcing civil population to migrate towards the border with the nearby Jordan
- A IDP camp has been set up by UNHCR in Al Mafraq area

Triggering entity: German BBK on behalf of THW (through EC MIC)

- e-GEOS has been activated by the German BBK on behalf of THW (German entity for humanitarian aid operations) to regularly monitor the evolution of Al Mafraq IDP camp.

- e-GEOS has been regularly acquiring both optical and SAR data over more than six months, providing constant updates to the relief operators involved.

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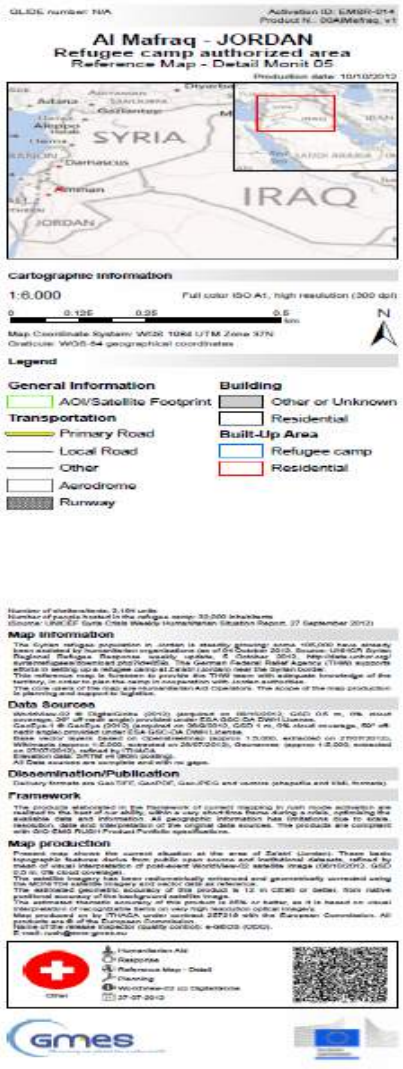
Optical based monitoring



EMSR-014 – Refugee camp in Jordan |
Monitoring period: August 2012 – September 2012
Al Mafraq | User: BBK - THW

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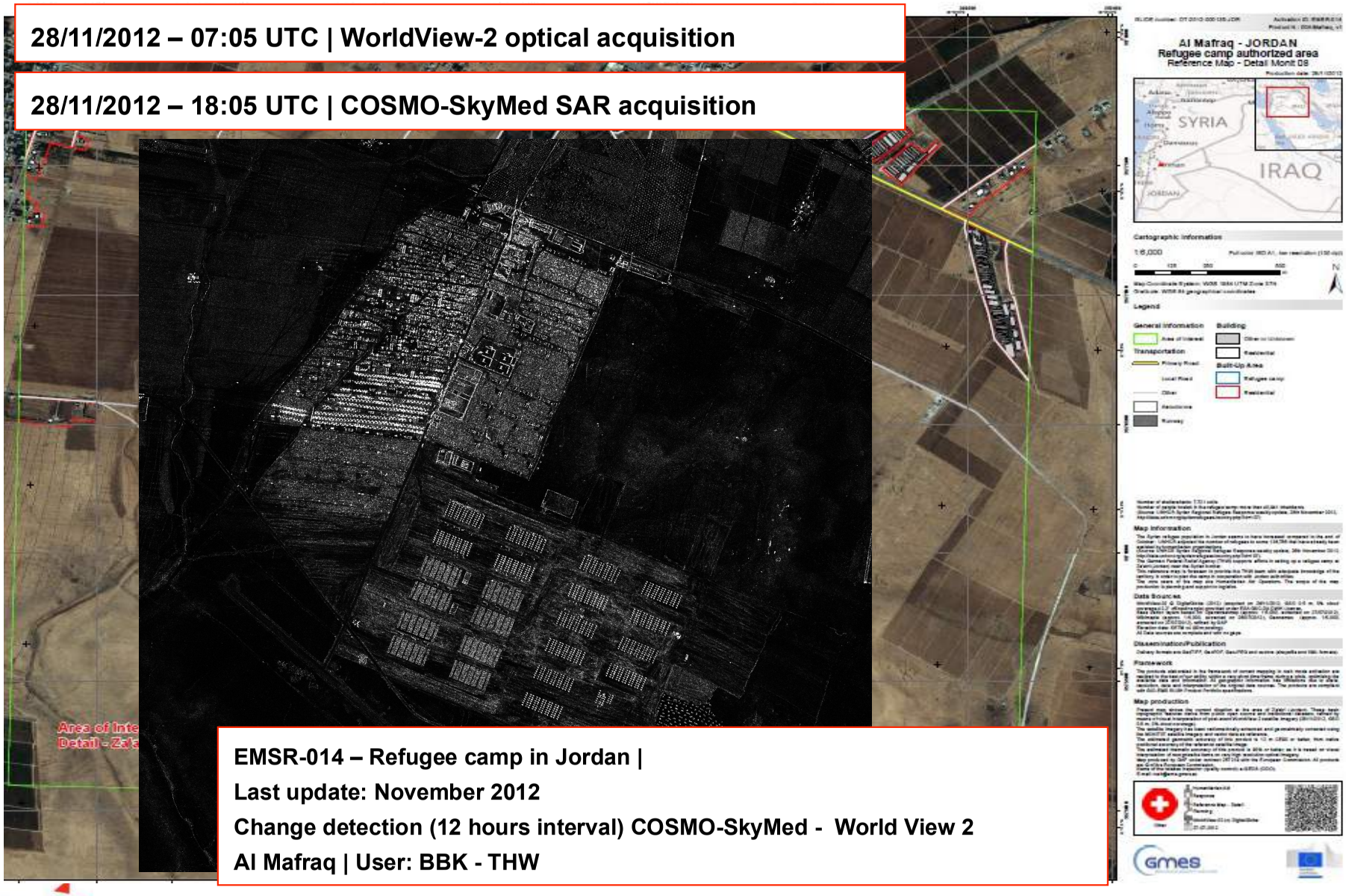
Optical – SAR integration

28/11/2012 – 07:05 UTC | WorldView-2 optical acquisition

28/11/2012 – 18:05 UTC | COSMO-SkyMed SAR acquisition



EMSR-014 – Refugee camp in Jordan |
Last update: November 2012
Change detection (12 hours interval) COSMO-SkyMed - World View 2
Al Mafraq | User: BBK - THW

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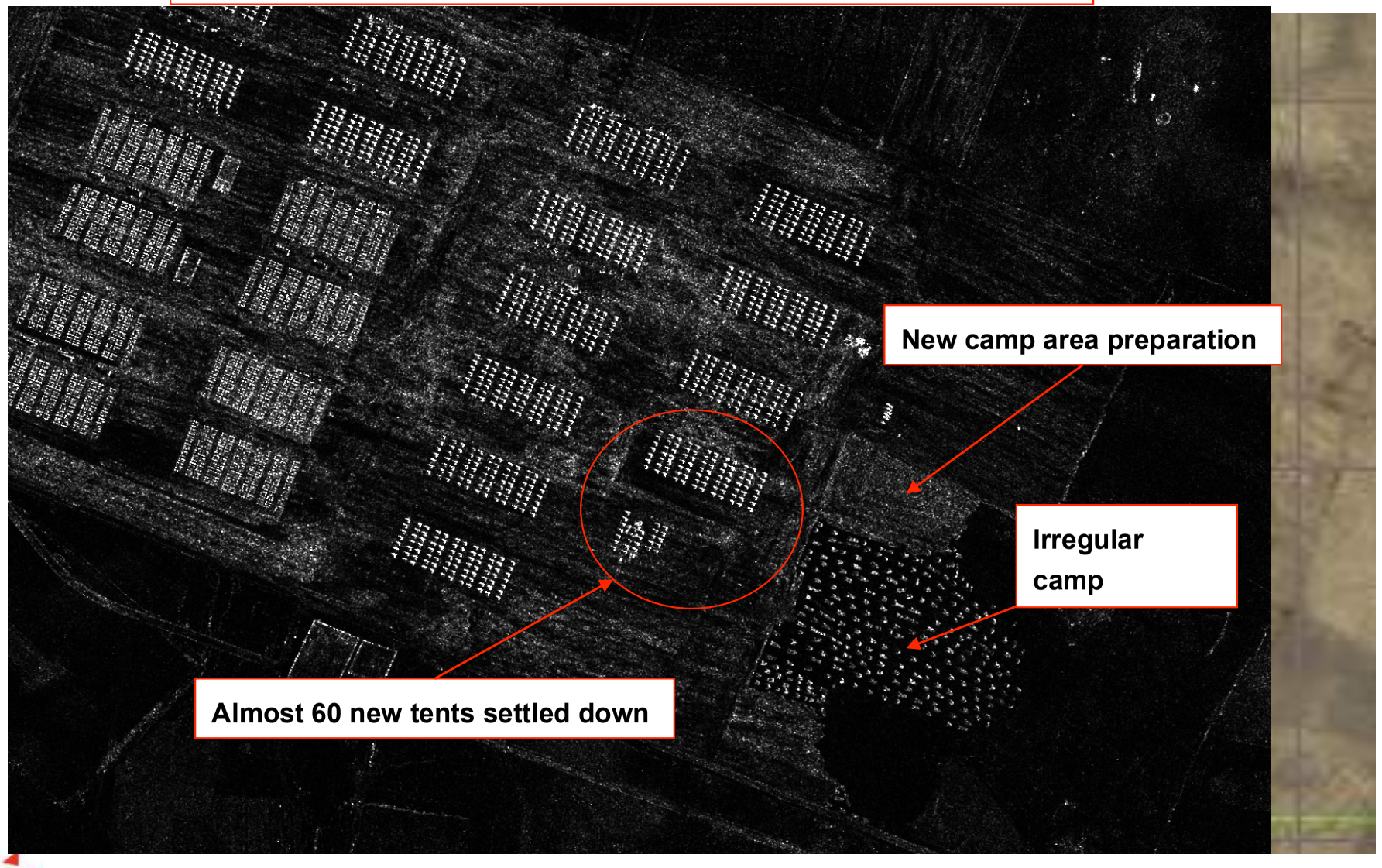
Very frequent change detection

What happened in 12 hours?



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Change detection over months

Two months later…..

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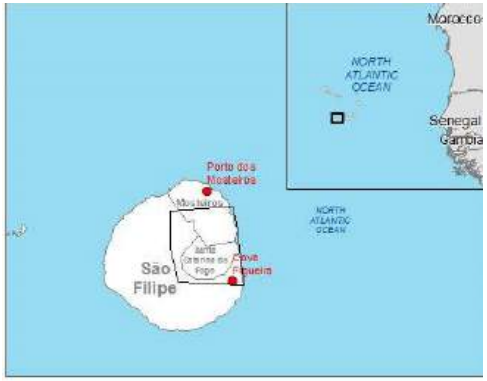
Fogo Island (Cape Verde) volcanic eruption

Event description:
The volcano on the island of Fogo, Cape Verde, started erupting on 23 November at 10.00 UTC, emitting gas and lava.

The National Authorities ordered the evacuation of the community of Chã das Caldeiras (700 - 1000 people), located approximately 3km from the erupting peak, Pico do Fogo.

Significant volcanic activity and lava flow continued up until the end of 2014.

It is the first time the volcano on the island of Fogo has erupted since 1995.



Event: volcanic eruption in Fogo Island (Cape Verde)

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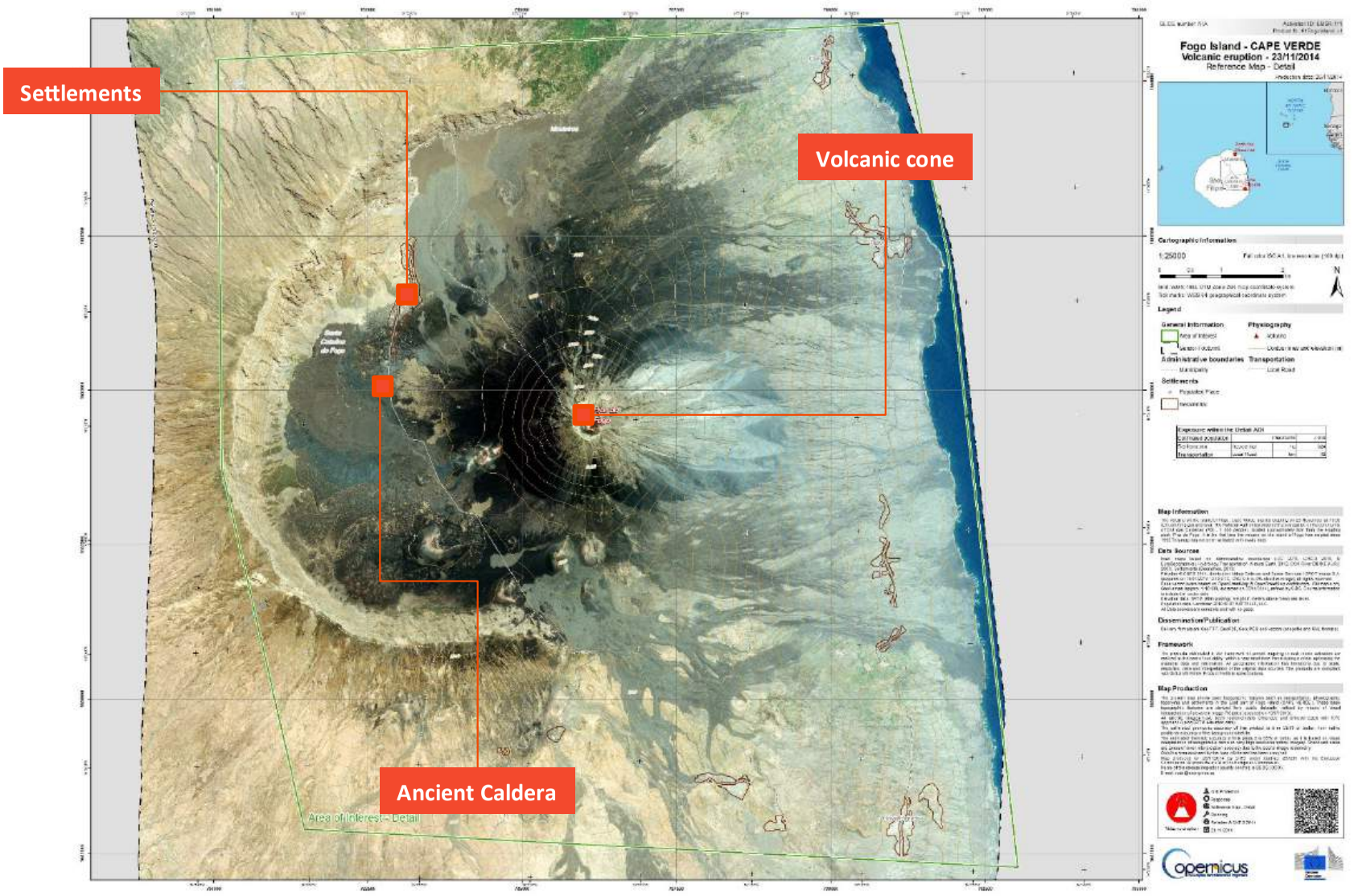
Fogo Island – Reference map



Source:

Event: volcanic eruption in Fogo Island (Cape Verde)

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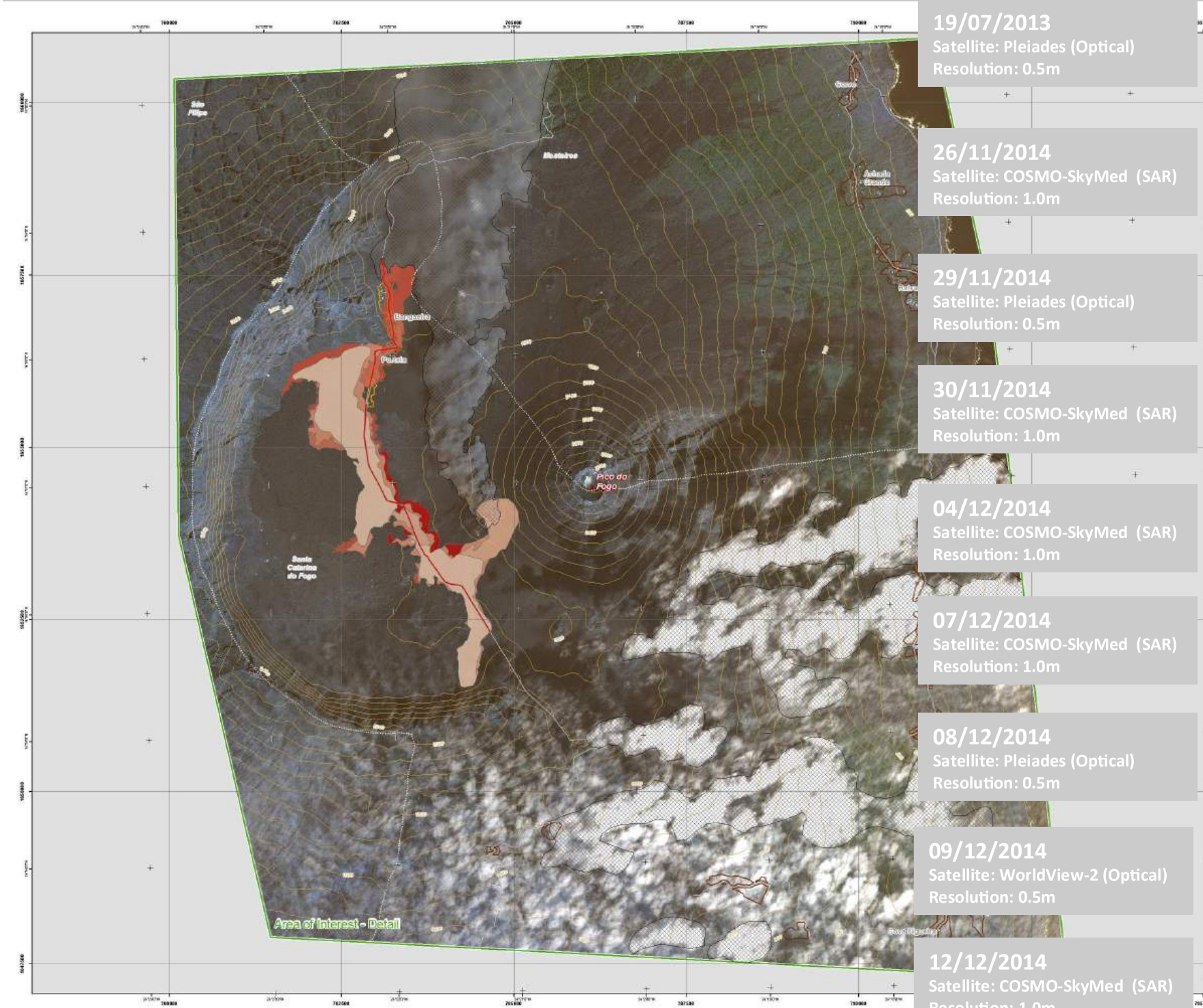


19/07/2013
Satellite: Pleiades (Optical)
Resolution: 0.5m

26/11/2014
Satellite: COSMO-SkyMed (SAR)
Resolution: 1.0m

29/11/2014
Satellite: Pleiades (Optical)
Resolution: 0.5m

30/11/2014
Satellite: COSMO-SkyMed (SAR)
Resolution: 1.0m

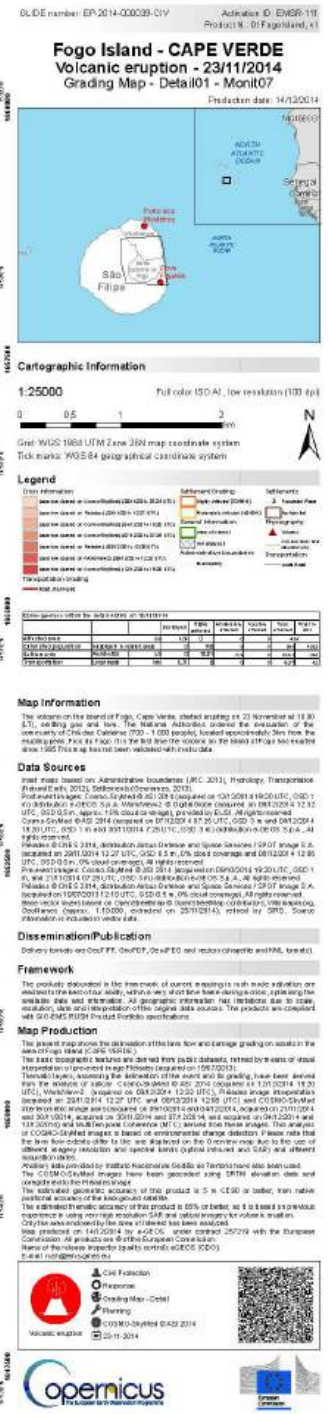
04/12/2014
Satellite: COSMO-SkyMed (SAR)
Resolution: 1.0m

07/12/2014
Satellite: COSMO-SkyMed (SAR)
Resolution: 1.0m

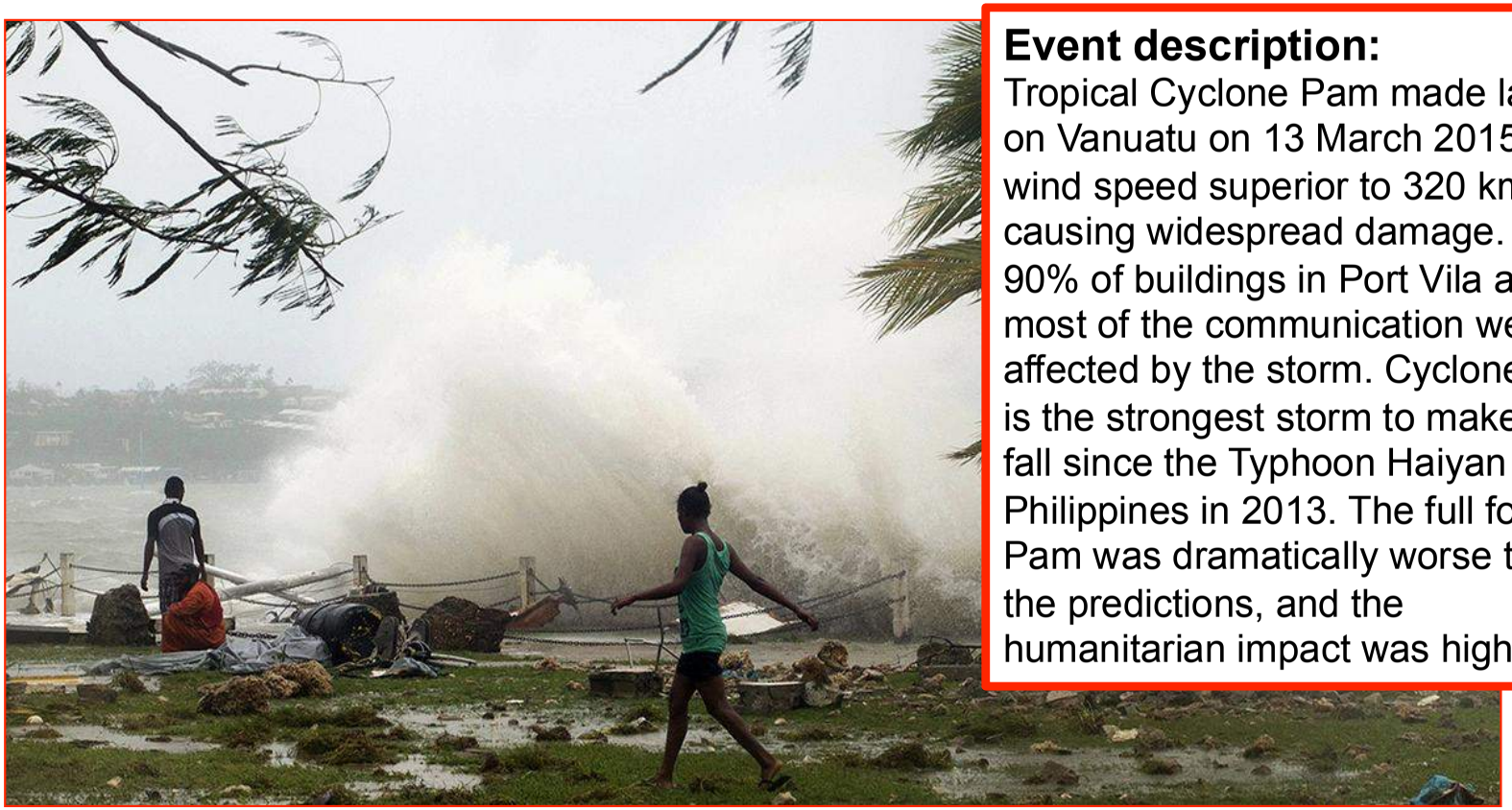
08/12/2014
Satellite: Pleiades (Optical)
Resolution: 0.5m

09/12/2014
Satellite: WorldView-2 (Optical)
Resolution: 0.5m

12/12/2014
Satellite: COSMO-SkyMed (SAR)
Resolution: 1.0m



Activation – Cyclone Pam in Vanuatu



Event description:
Tropical Cyclone Pam made land fall on Vanuatu on 13 March 2015 with wind speed superior to 320 km/h, causing widespread damage. Up to 90% of buildings in Port Vila and most of the communication were affected by the storm. Cyclone Pam is the strongest storm to make land fall since the Typhoon Haiyan hit the Philippines in 2013. The full force of Pam was dramatically worse than the predictions, and the humanitarian impact was high.

Triggering entity: EU Emergency Response Coordination Center

- Copernicus Emergency Management Service in Rapid Mapping mode was activated by the EU Emergency Response Coordination Center (ERCC) on March 17th, 2015 on behalf of the World bank Global Fund for Disaster Risk Reduction (GFDRR) requesting detailed damage assessment over 9 areas of interest spread across the typhoon track.

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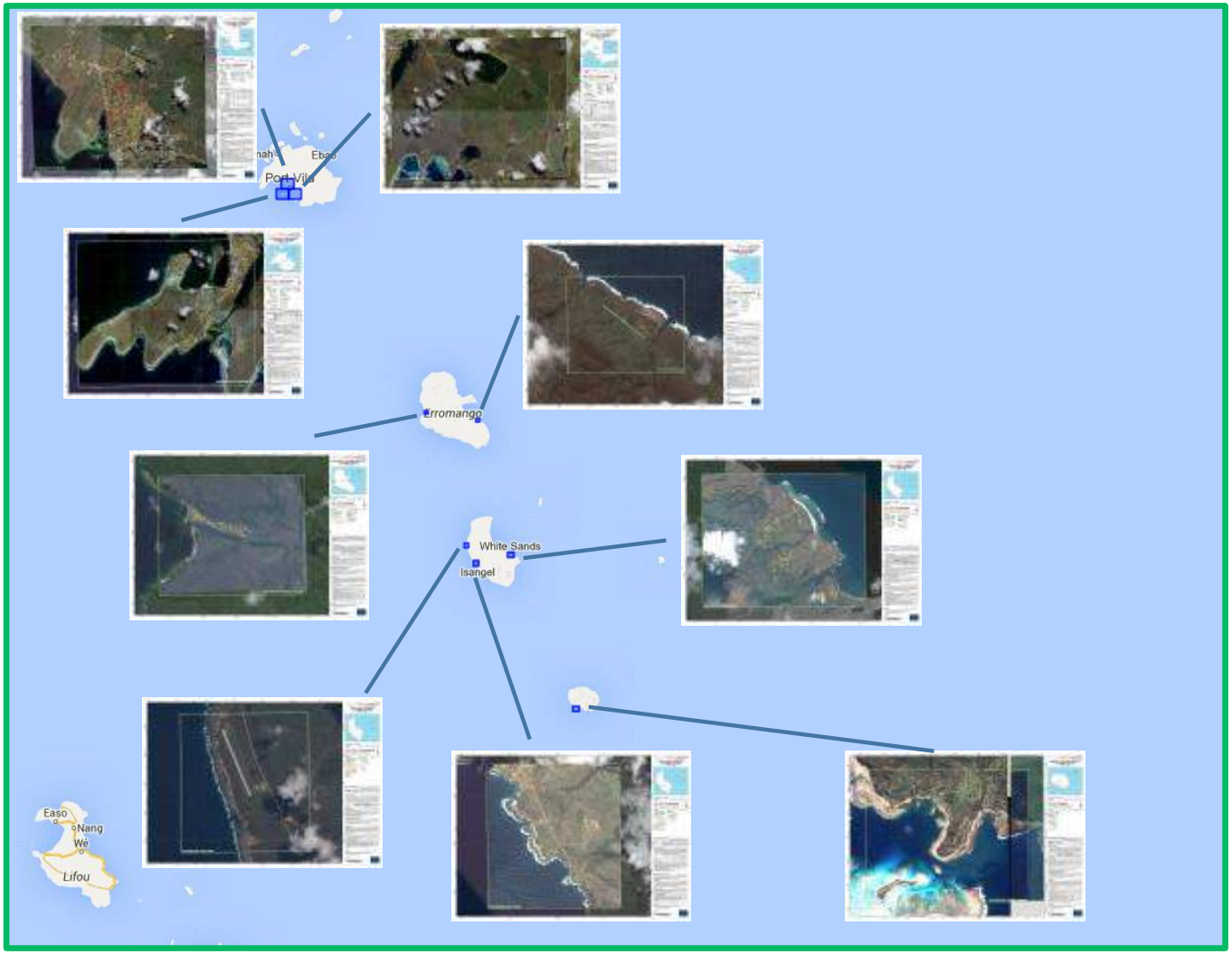
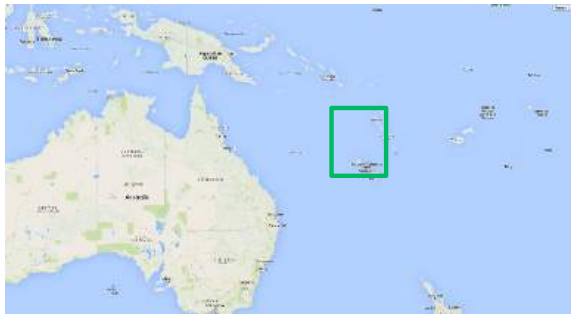
Several Areas of Interest analyzed and positive user feedback





Areas of Interest:

- Tanna Isangel
- Port Vila South West
- Port Vila South East
- Erromango - Ipota
- Port Vila North
- Tanna - Airport
- Tanna - Sulphur
- Erromango - Unpongkor
- Aneityum - Anelgauhat

User feedback (World Bank GFDRR):

- ”The grading products allowed validation of ground surveys”
- ”The team was happy with the product. We would like to engage with EMS for future events. Thank you for your assistance.”
- Overall, the products were rated “very useful”

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Tanna Island – Pre/Post satellite view

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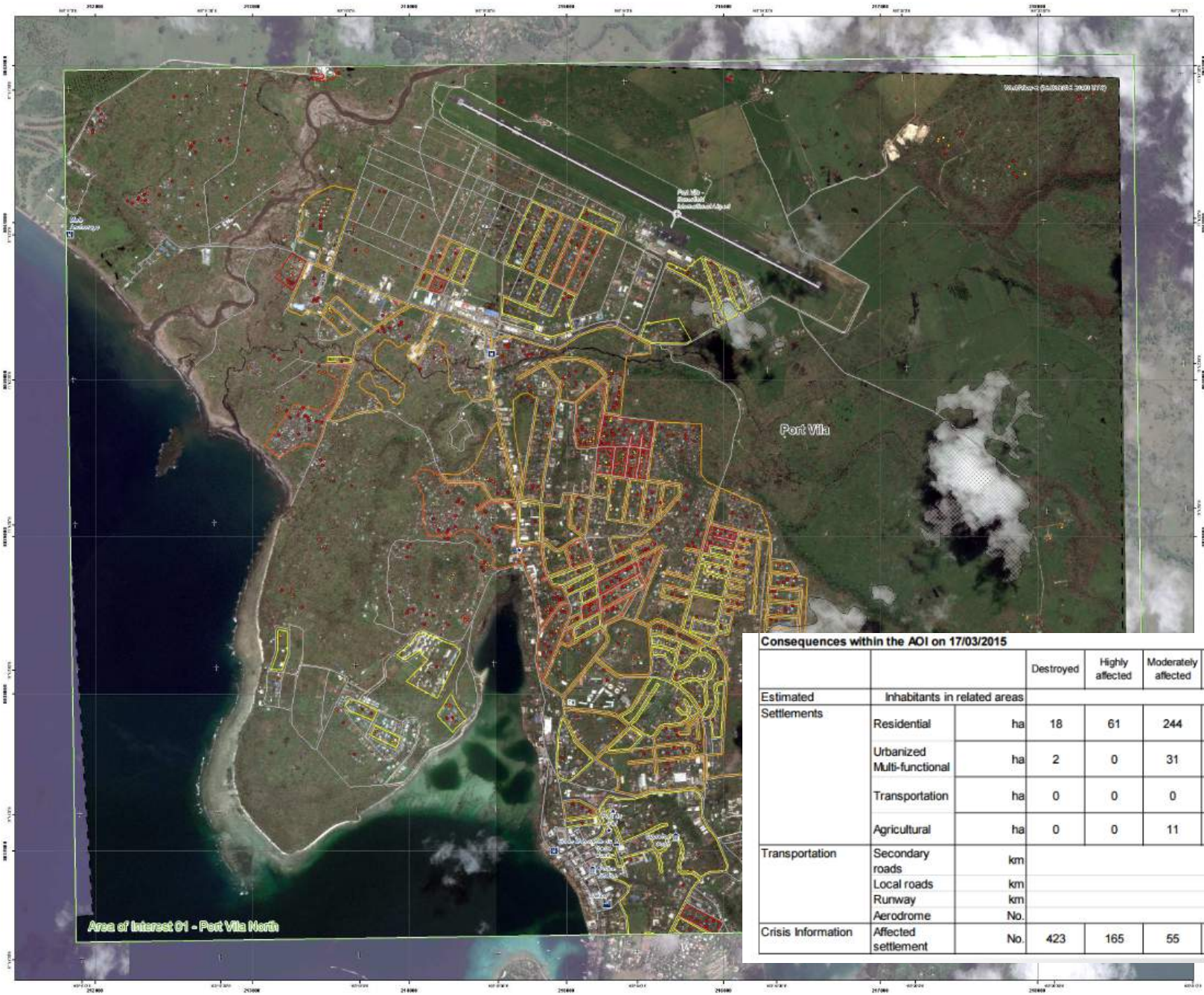
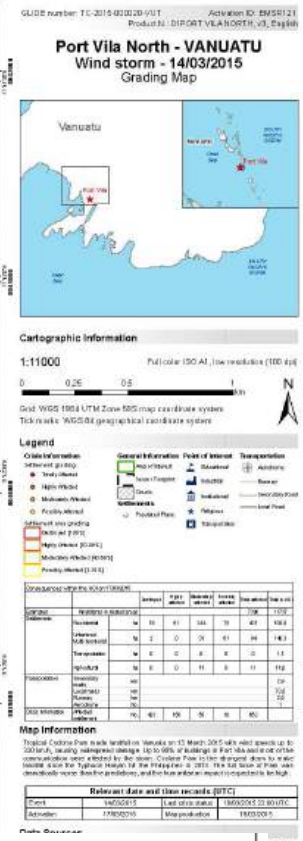
Damage assessment in Port Vila



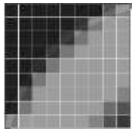


Consequences within the AOI on 17/03/2015

			Destroyed	Highly affected	Moderately affected	Possibly affected	Total affected	Total in AOI
Estimated	Inhabitants in related areas						7300	11737
Settlements	Residential	ha	18	61	244	78	401	538,8
	Urbanized Multi-functional	ha	2	0	31	61	94	140,1
	Transportation	ha	0	0	0	0	0	1,1
	Agricultural	ha	0	0	11	0	11	11,0
Transportation	Secondary roads	km						2,9
	Local roads	km						73,5
	Runway	km						2.6
	Aerodrome	No.						1
Crisis Information	Affected settlement	No.	423	165	55	10	653	

Vanuatu

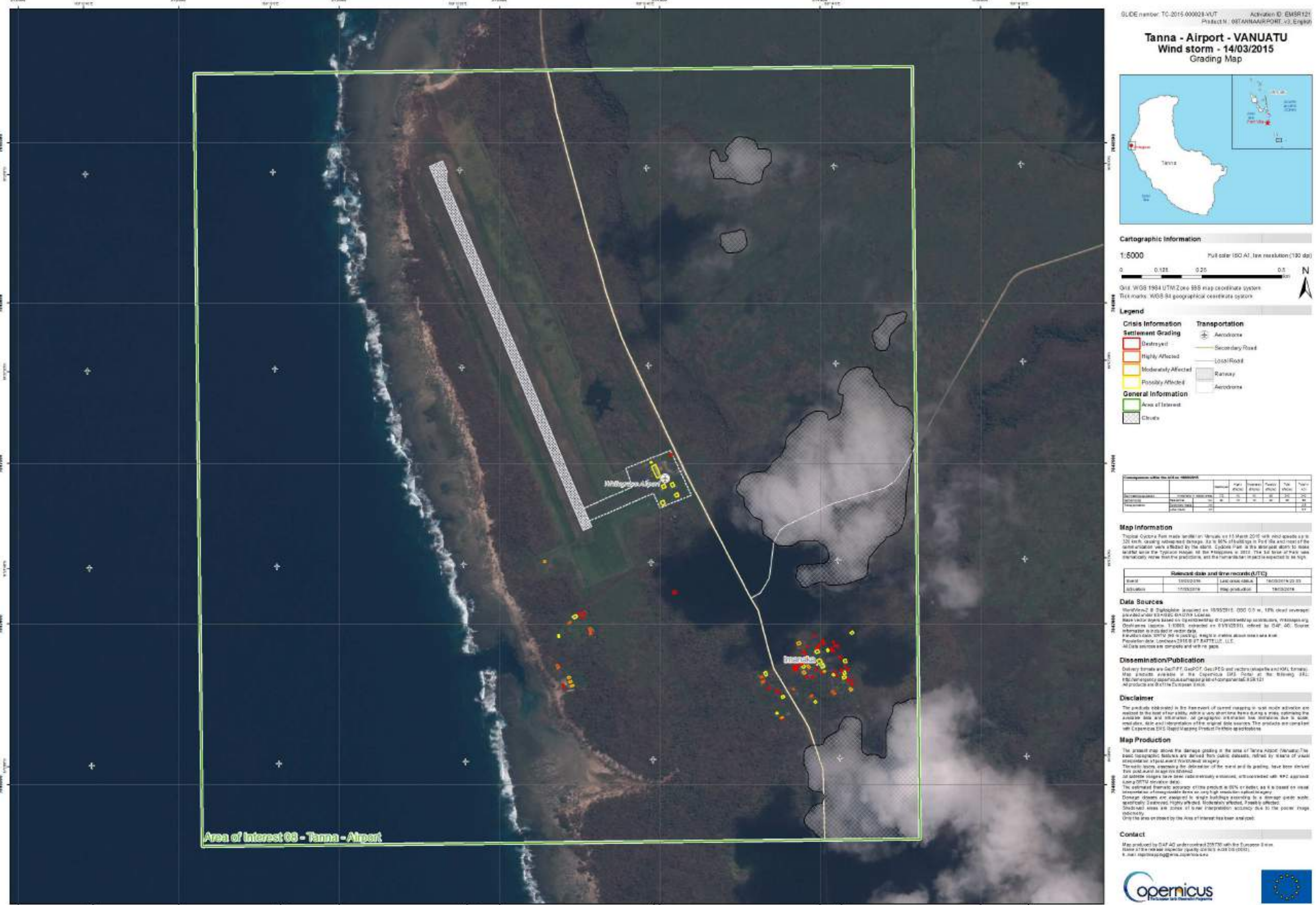
WorldView-2



0.5 m

16/03/2015

Airport conditions assessment in Tanna island



Vanuatu

WorldView-2

0.5 m

27

16/03/2015

Activation – Floods in Myanmar

Event description:
Unusual heavy monsoon rains have been affecting Myanmar since 16 July 2015 causing river overflows and floods. In the past few days, torrential rains damaged farmland, roads, railtracks, bridges and houses.

Triggering entity: EU Emergency Response Coordination Center

- Copernicus Emergency Management Service in Rapid Mapping mode was activated by the EU Emergency Response Coordination Center (ERCC) on August 7th, 2015 requesting flood delineation maps over a large area of the country aftected by the event.

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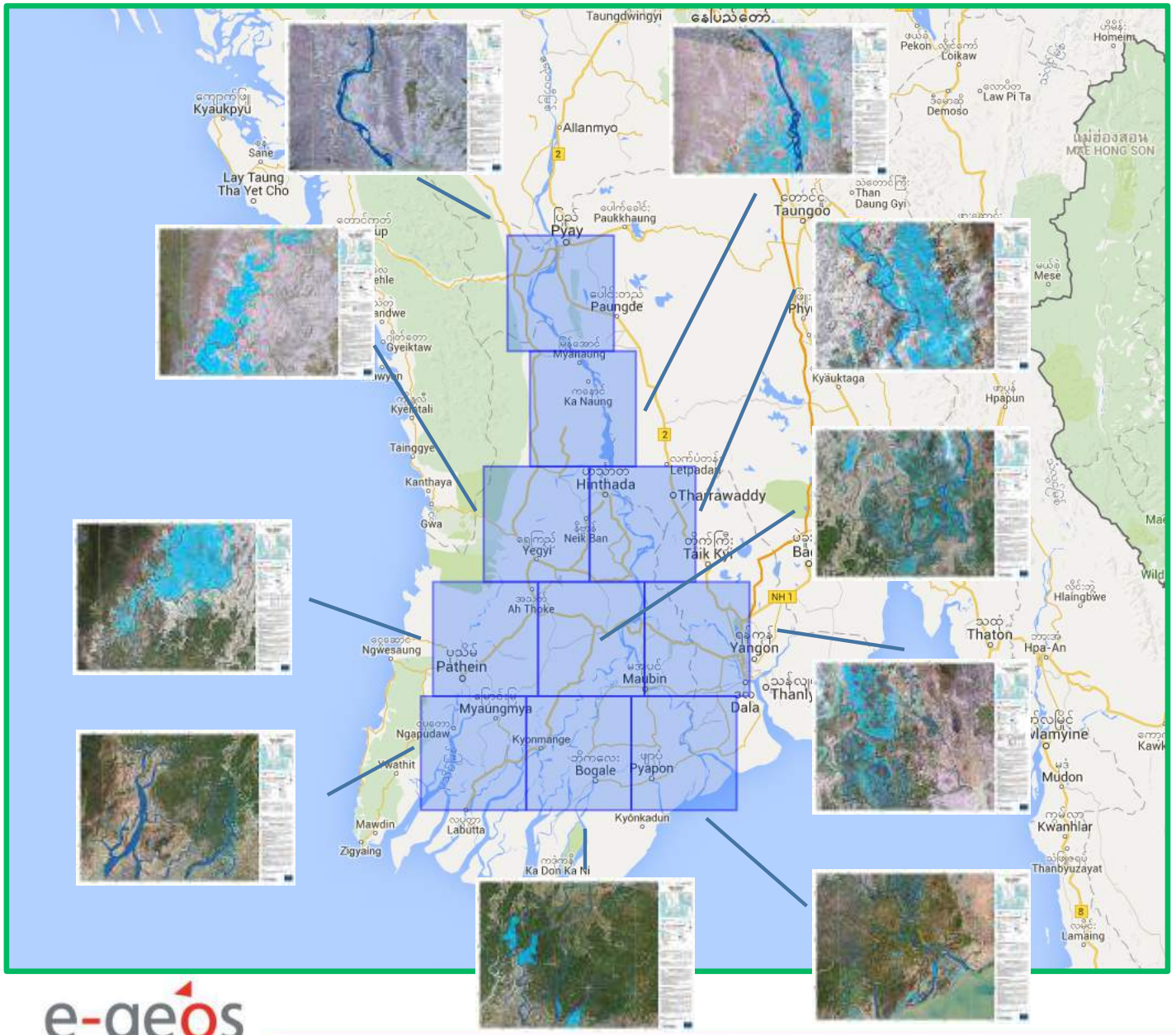
Large area covered for rapid flood assessment



Areas of Interest:

- Yegyi
- Pyay
- Monyo
- Labutta
- Pathein
- Bogale
- Kaiklat
- Hinthada
- Yangon West
- Pathwe

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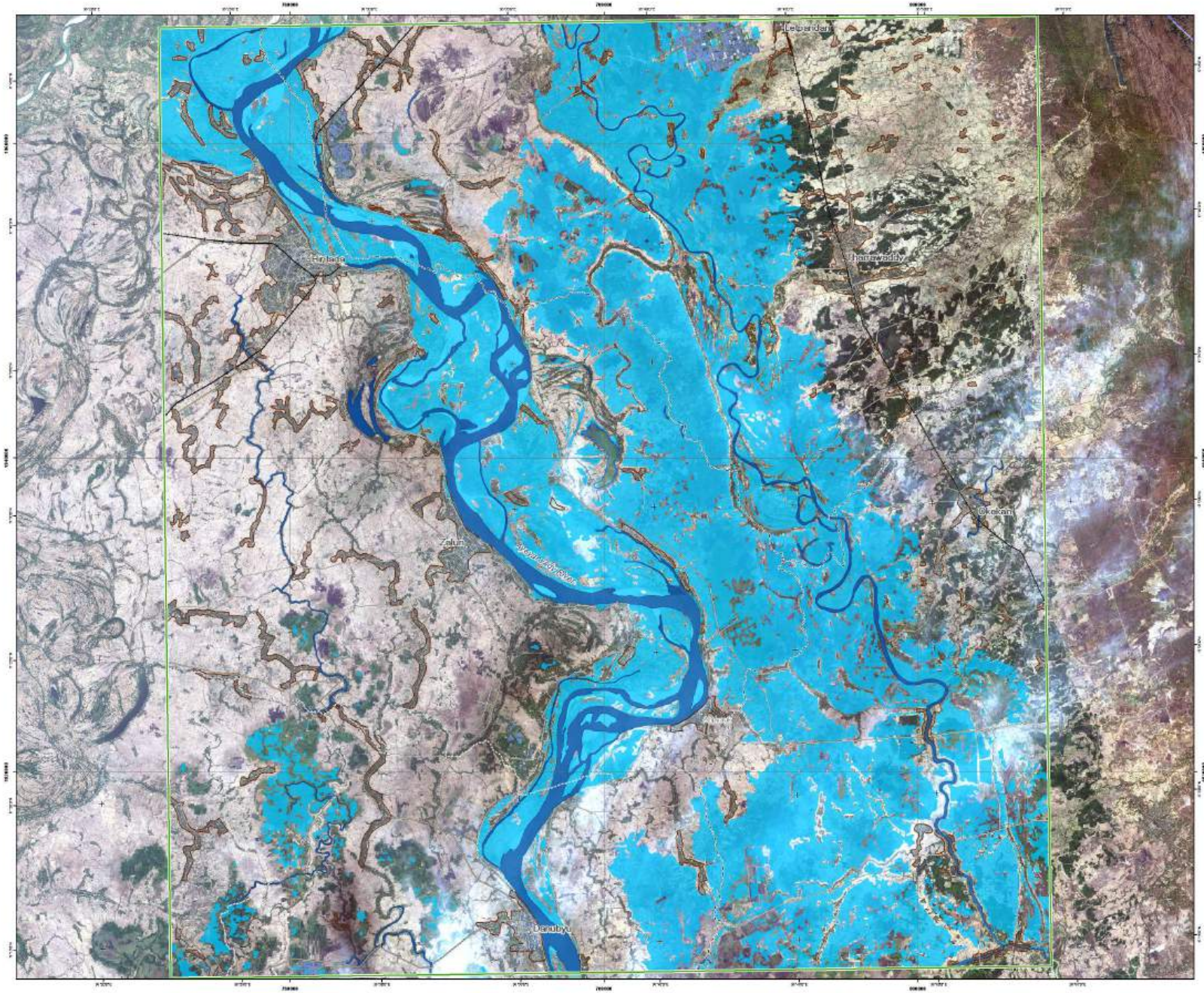
Flood extent in Hintada (Myanmar, 09/08/2015)



Hinthada - Myanmar
Flood - 01/08/2015
Delineation Map

Cartographic Information

1:110000

Legend

Crisis Information
General Information
Administrative boundaries
Settlements
Hydrology
Transportation

Map Information

Data Sources

Dissemination/Publication

Disclaimer

Map Production

Contact

Myanmar

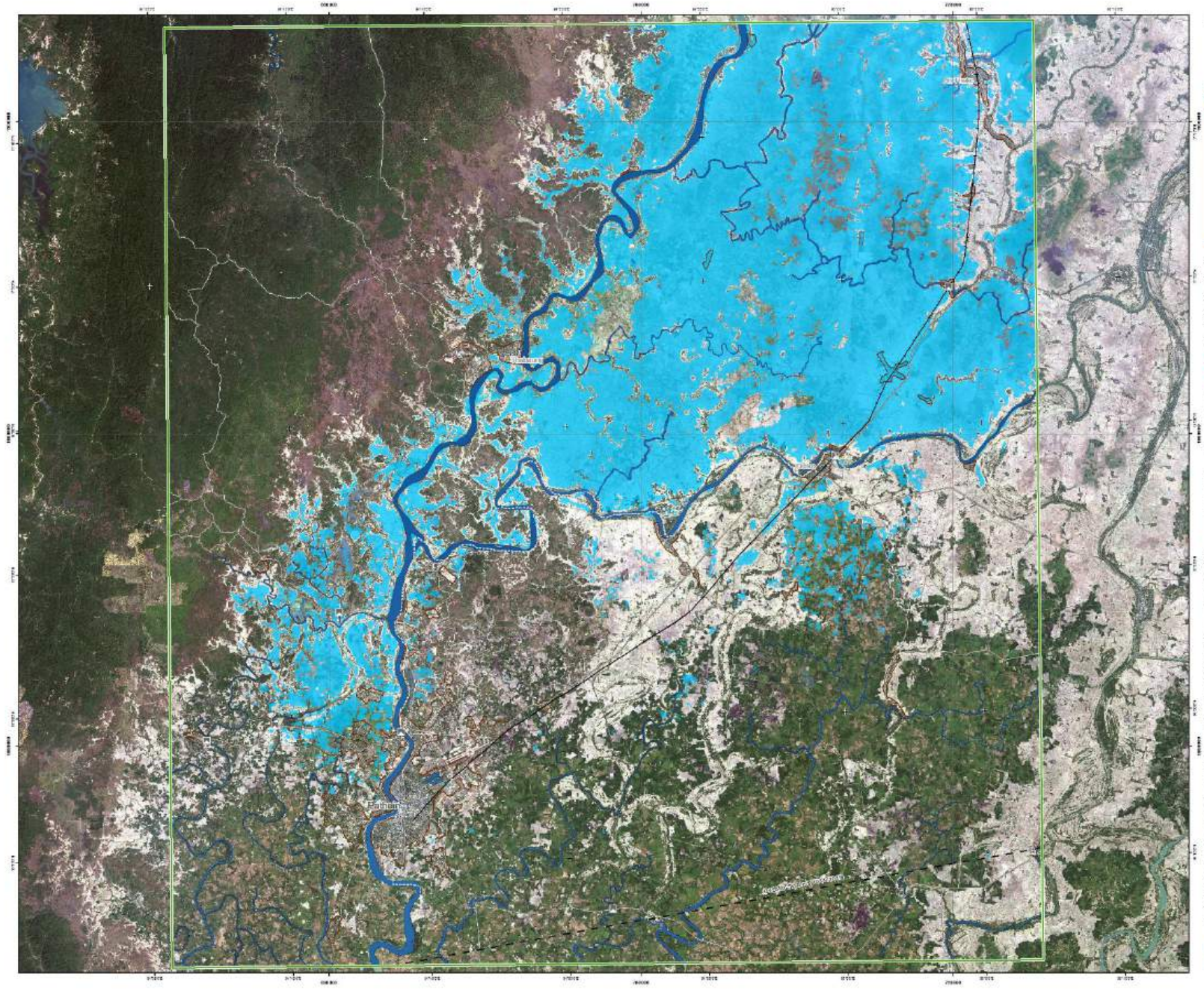
COSMO-SkyMed

30 m

27

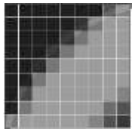
09/08/2015

Flood extent in Pathein (Myanmar, 09/08/2015)



Myanmar

COSMO-SkyMed



30 m

09/08/2015