

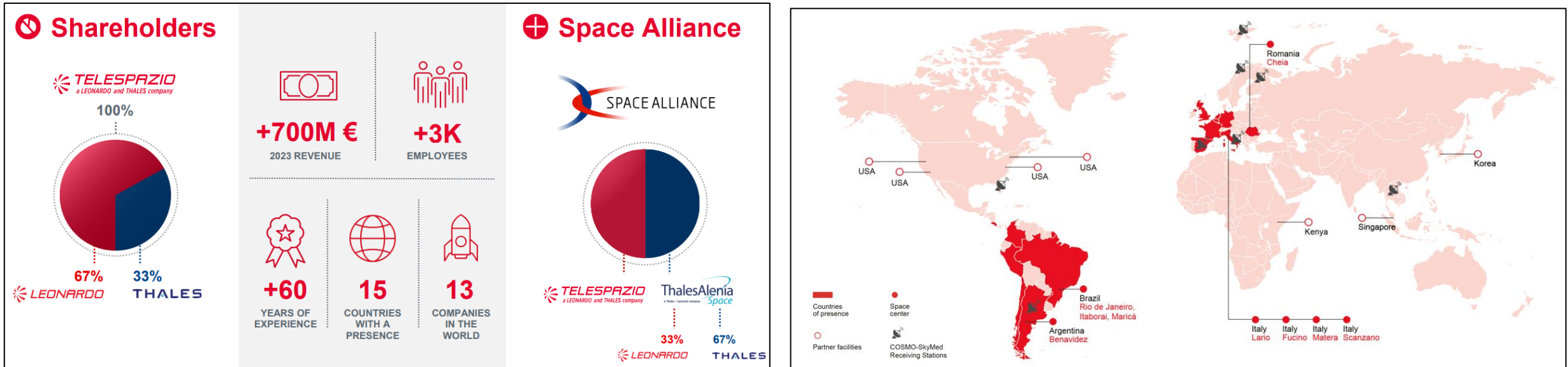
Copernicus Emergency Management Services.

Procedure, products, and users in response to the 2024 Valencia floods.

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Telespazio Ibérica is part of the Telespazio Group, a leading multinational company in Europe providing satellite technology services and geoinformation applications.



Telespazio develops an intense R + D activity, with significant participation in European reference programs in the field of Geoinformation and Navigation (Downstream Solutions).



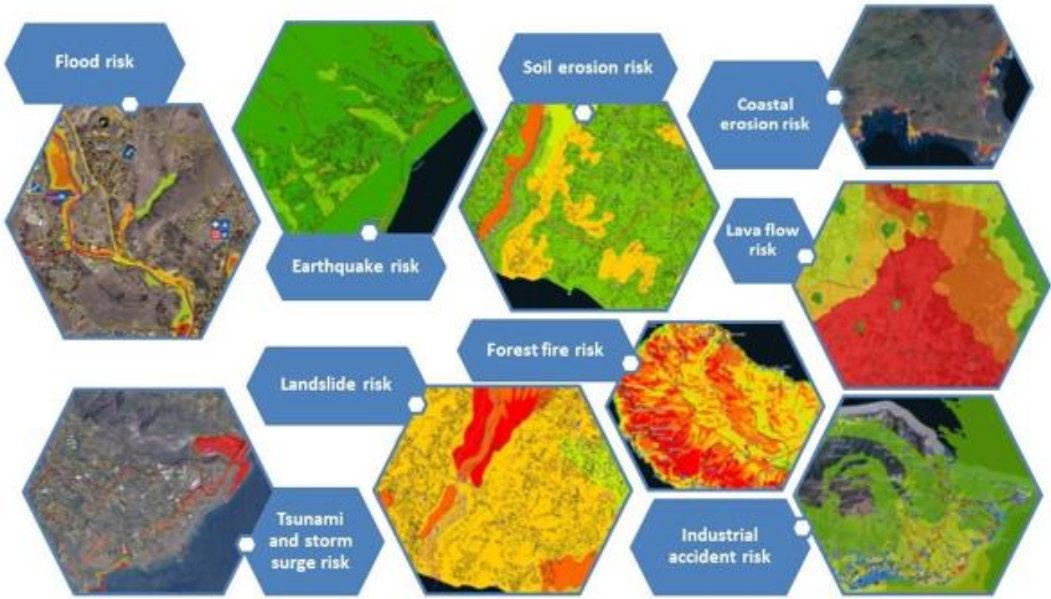
COPERNICUS – GALILEO – EGNOS – GNSS – OFFICIAL CARTOGRAPHY



Copernicus is the European Union's Earth Observation Programme, coordinated and managed by the European Commission. It provides observation and monitoring for the different domains.

Telespazio Ibérica participates in 3 of them:

Land Monitoring - Emergency Management - Security



Service that uses satellite imagery and other geospatial data to provide free mapping products in case of natural disasters or emergency situations.

Which are the most common:



Floods (39%), Wildfires (28%), cyclones/tropical storms (13%) , earthquakes (5%).

Service CEMS RM. Objectives and general workflow.

“CEMS supports actors involved in natural and man-made disasters management.”

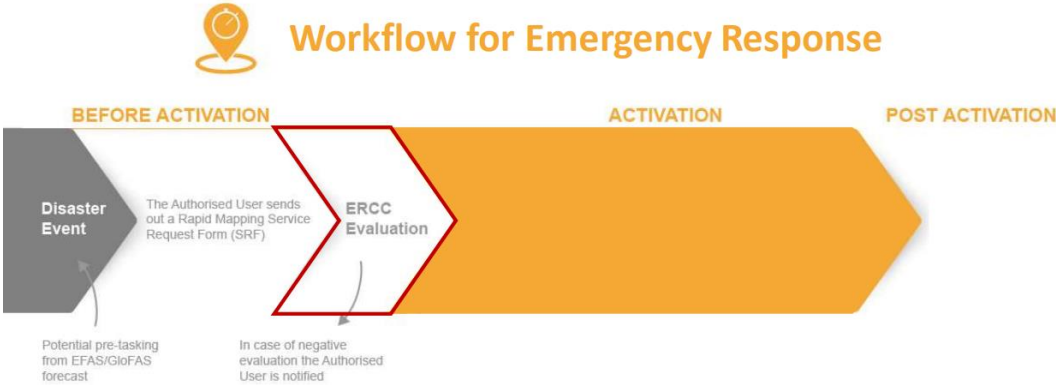
- 1. The **UA (end user)** requests the service through a formal request. **Authorised user Spain:** Ministry of the Interior - National Emergency Centre (CENEM) of the Directorate General for Civil Protection and Emergencies.
- 2. The service is launched, **ERCC analyses the request** and the feasibility of the event.
- 3. After **the request is approved**, the modality (response time) and type of product are defined.
- 4. The **OdO (On duty Operator)** is the person who manages and unifies all decisions.



Modalities:

SL1 → Rapid event response activations. Response time of 7-10 hours.

SL2 → Moderate event response activations. The user does not require immediate analysis. Response time up to 48 hours.



Modalities and delivery times. General workflow. Formal request.

Service CEMS RM. Floods in Valencia - DANA 29/10/2024.

On 29 October 2024 at 14:30 UTC, a DANA with extraordinary rainfall affected the regions of Valencia and Castilla la Mancha. High water levels in rivers caused flooding in Ribera Alta, Horta, La Plana de Utiel and Letur river.

Copernicus EMS Rapid Mapping is requested to provide emergency mapping of flood extent, monitoring and classification damages emergency mapping.

Affected Area, Built-up and Transportations



8400 ha flooded/mudflow



Potentially affected population
~ 80000



700km infrastructure affected
(roads, railway, bridges).



4500 damaged buildings.

224 deaths and 3 missing.



Landsat-8 satellite images before and after the event.

Service CEMS RM. Product types for Floods in Valencia - DANA.

Different types of product depending on the type of event and the response time. The difference between them is based on the detail of the analysis required (scale of analysis) and the resolution of the satellite image used.

We have 4 product:

FEP → First estimated product. It is an initial analysis of the area with low resolution image. **2-3 hours.**

DEL → Delineation product. The event is outlined with a low-medium resolution image. **7 hours.**

DEL MONIT → Monitoring. When the event lasts several days and you need to see its evolution. Medium resolution images. **7 hours.**

GRA → Gradient product. It is the most complete product. It contains the type of event, the extent of the impact (delineation) and the damage classification. High-resolution VHR images. **10 hours.**

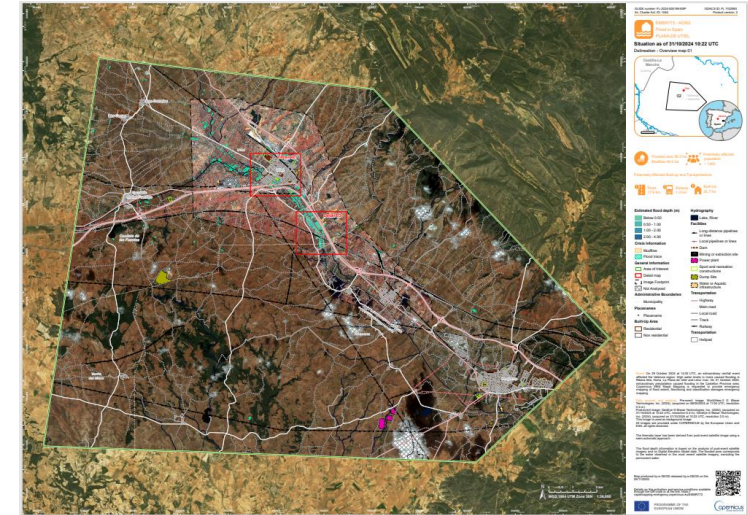
In the case of DANA Valencia DEL + DEL MONIT + GRA over 36 areas were required.

EMSR773 - Rapid Mapping

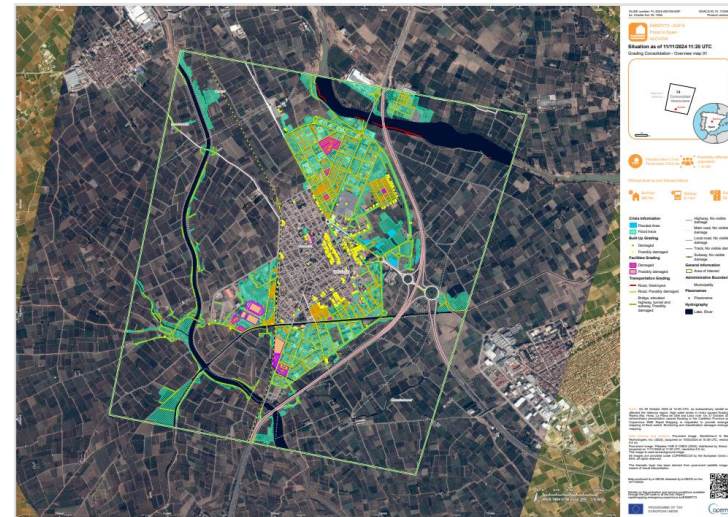


AREAS
36

PRODUCTS
44



EMSR773 DELINEATION PRODUCT – AOI02 – PLANA DE UTIEL



EMSR773 GRADING PRODUCT – AOI14 - ALCUDIA



Service CEMS RM. Floods in Valencia - DANA 29/10/2024 with optical images.



There are 3 types of damage to assign.

- Destroyed
- Damaged
- Possibly damaged

When the affected infrastructure is totally damaged (unusable), the degree of damage assigned is:

Destroyed

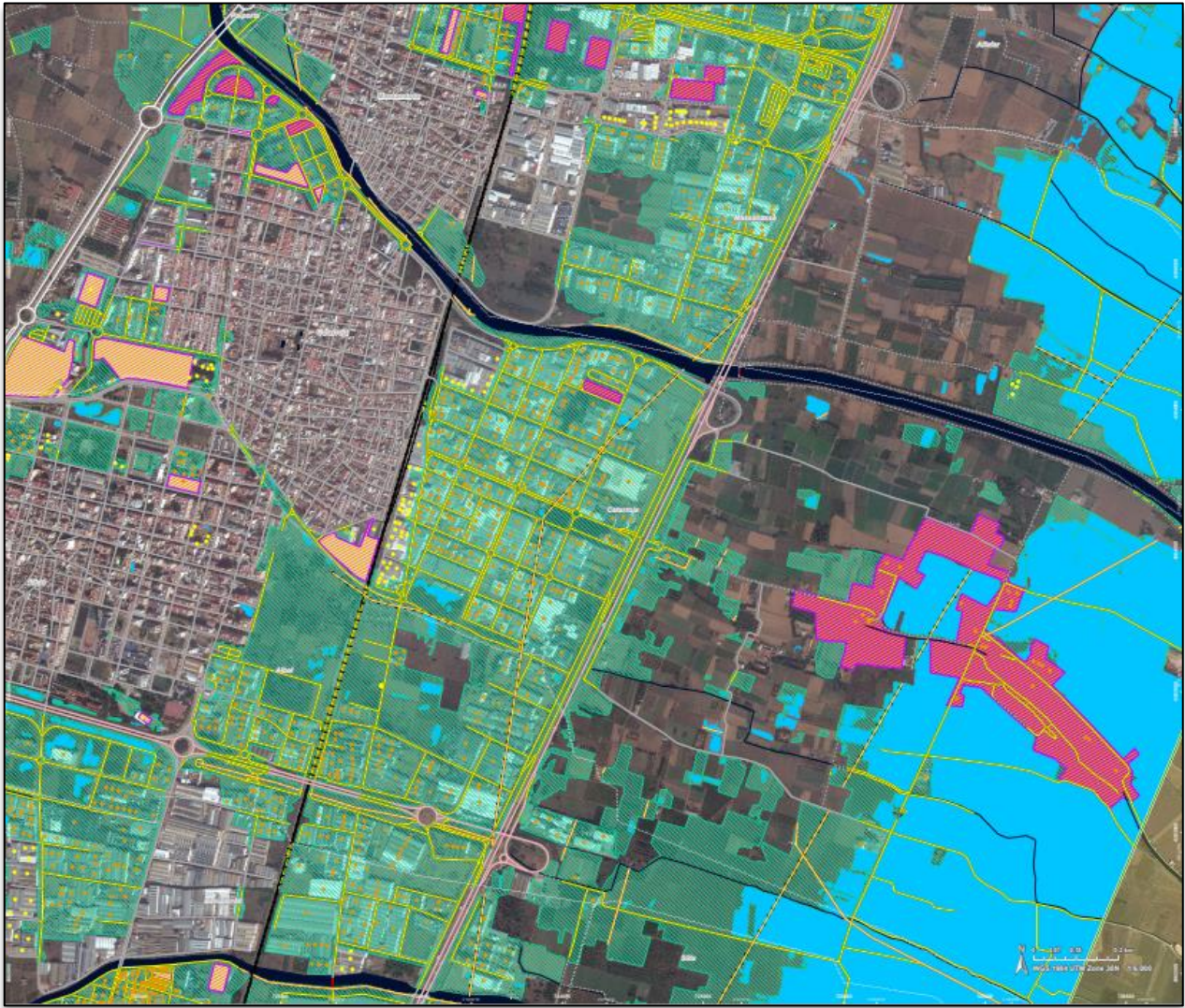
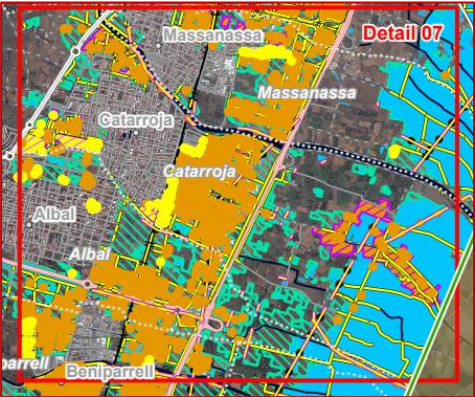
Infrastructure and communication routes have been severely affected.
Some destroyed bridges can be seen in the high-resolution images.

Difference with VHR GeoEye images PRE and POST event.



Service CEMS RM. Floods in Valencia - DANA 29/10/2024.

Detail map.

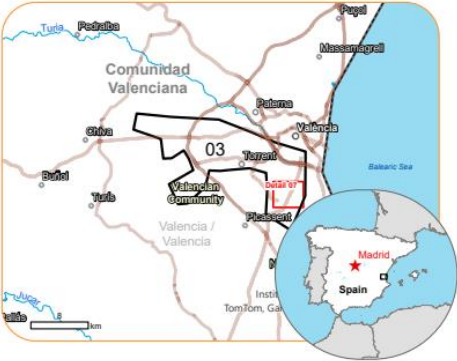


GLIDE number: 2024-000199
Int. Charter Act. ID: 1054

GDACS ID: FL 1102983
Product version: 2

 EMSR773 - AOI03
Flood In Valencia Region, Spain
HORTA SUD

Situation as of 31/10/2024 10:22 UTC
Grading - Detail map 07



- Crisis Information**

 - Flooded Area
 - Flood trace

Built Up Grading

 - Damaged
 - Possibly damaged
 - Long-distance pipeline or line, Possibly damaged
 - Local pipeline or line, Possibly damaged
 - Damaged
 - Possibly damaged

Transportation Grading

 - Road, Destroyed
 - Road, Possibly damaged
 - Railway, Possibly damaged
- Highway, No visible damage
 - Main road, No visible damage
 - Local road, No visible damage
 - Track, No visible damage
 - Railway, No visible damage

General Information

 - Area of Interest
 - Not Analysed

Administrative Boundaries

 - Municipality

Placenames

 - Placename

Hydrography

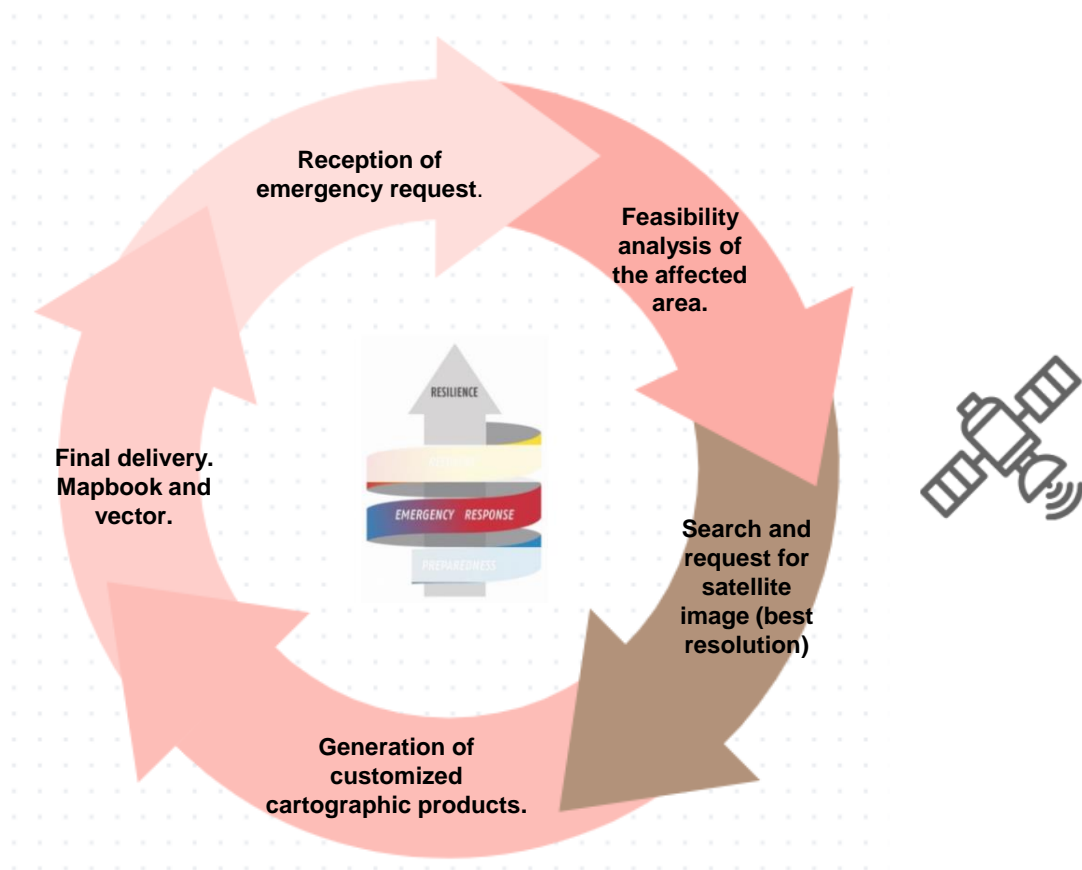
 - Lake, River

Example of a Detail map above Horta Sud area - Valencia - Spain.



Telespazio Iberica has developed a emergency rapid mapping system specific to the autonomous communities of Spain. This service provides geospatial information to support emergency management activities in each community, in the case of natural disaster.

For the currents projects the service is active in **10/5 mode** (8:00 - 18:00h on working days), but potential: 24x7 ready, and is present in the communities of **Catalonia, Andalusia and Aragon.**



General Workflow for Emergency Mapping Service.

Optical Sensors.

BLACK|SKY

MAXAR
TECHNOLOGIES

BlackSky as main provider:

SATELLOGIC

AIRBUS

SPACE WILL

- Constellation with 14 operational satellites.
- Acquire scenes several times a day on the same target
- Average delivery time 90min max.

Copernicus
Europe's eyes on Earth

Radar Sensors.

Capella Space

COSMO
SkyMed

Capella as main provider:

UMBRA

- Available 24h (in all weather conditions or day/night)
- Very high resolution (0.5 m– 1.2 m)
- Average delivery time 180min max.

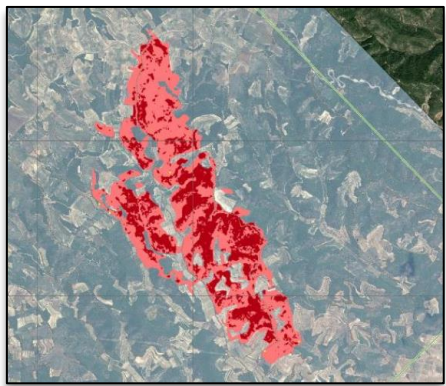
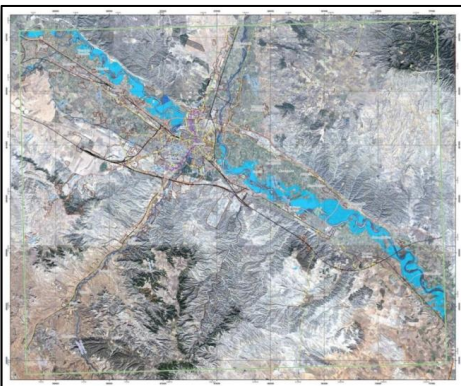
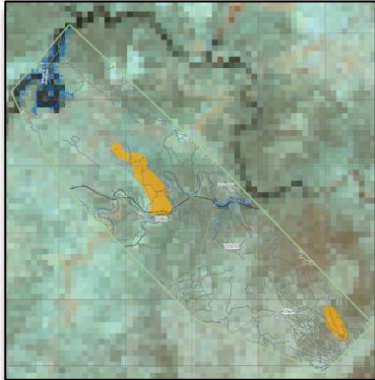
RADARSAT

TERRA SAR

Main providers for Emergency Mapping Service.

When the EMS service is activated, the user can choose the type of product he needs depending on the time and type of event (floods - wildfires, etc.). All products are based on the cartography specific to the region, cartography of each community.

GENERAL CARTOGRAPHIC PRODUCTS



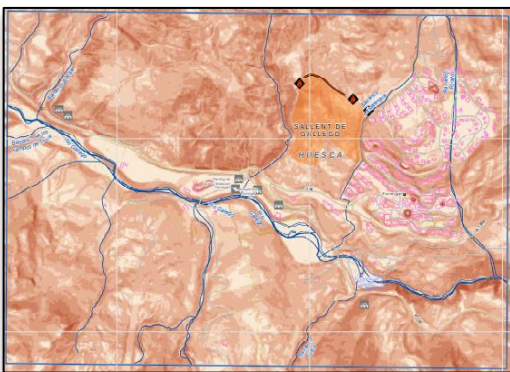
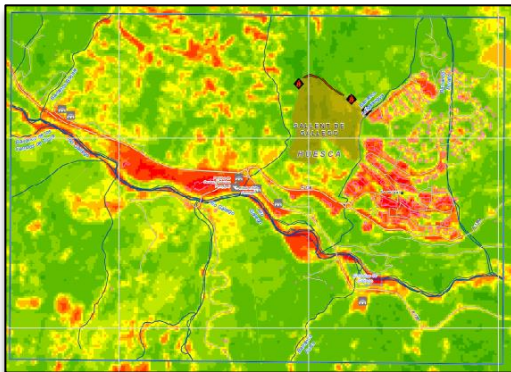
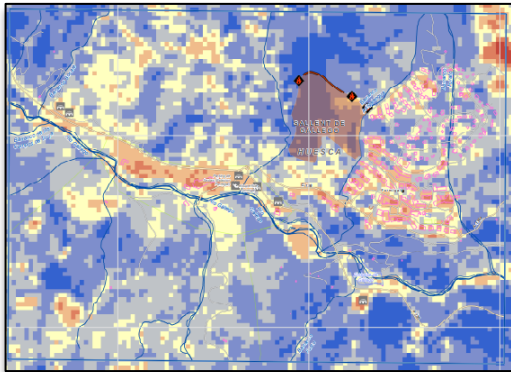
REFERENCE MAP (REF)

FIRST ESTIMATED MAP (FEM)

EVENT DELINEATION MAP (DEL)

DAMAGE ASSESSEMENT MAP (DASSM)

CUSTOMIZED CARTOGRAPHIC PRODUCTS



NORMALIZED
DIFFERENCE MOISTURE
(NDMI) INDEX MAP

NORMALIZED
DIFFERENCE
VEGETATION (NDVI)
INDEX MAP

SLOPES MAP



FORMIGAL – ESPAÑA
IGEAR EMS ARAGÓN
Situación a partir del 07/02/2023
Delineación de la inundación – Visión general 01



Información del mapa

Lluvias intensas inusuales han estado afectando a la localidad de Formigal (Huesca) desde el 30 de enero, provocando desbordamientos de ríos e inundaciones. En los últimos días, las lluvias torrenciales dañaron carreteras, vías férreas, puentes y casas.

El presente mapa muestra la delineación de la inundación en el área de Formigal (Huesca). La capa temática se ha derivado de la imagen satelital posterior al evento utilizando un enfoque semiautomático. La escala de análisis es 1:10000.

La precisión geométrica estimada (RMSE) es de 2.5 m o mejor, a partir de la precisión posicional nativa de la imagen satelital de fondo. La unidad mínima de mapeo (MMU) es de 100 m².

Fecha relevantes (UTC)

Evento	30/01/2023 17:00	Situación a	02/02/2023 11:43
Activación	01/02/2023 09:00	Producción de mapas	22/06/2023

Fuentes de datos

Imagen previa al evento:
Sentinel-2A (2023) (adquirida el 04/02/2023 a las 10:52 UTC, GSD 10 m) proporcionada bajo COPERNICUS por la Unión Europea y la ESA.

Imagen posterior al evento:
BlackSky © distribuida por Blacksky (2023) (adquirida el día 02/02/2023 a las 11:43 UTC, GSD 1 m) proporcionada por Telespazio Ibérica S.L.U.

Imagen base:
MD505 2020 CC-BY 4.0 Instituto Geográfico Nacional
MosaicoSentinel2Historico 2019-2021 CC-BY 4.0 Instituto Geográfico Nacional.

Capas vectoriales base:
Gobierno de Aragón: Instituto Geográfico de Aragón (IGEAR), Dirección General de Transportes, CARTOFOR y 112 Aragón.

Gobierno de España: Instituto Geográfico Nacional (IGN), Dirección General de Tráfico (DGT), Dirección General de Catastro, Confederación Hidrográfica del Ebro (CHE), Instituto Nacional de Estadística (INE), Red de Carreteras del Estado (RCE) y Sistema Geográfico Nacional de Parcelas Agrícolas (SIGPAC).



Consecuencias dentro del AOI		Afectado	Total en AOI
Área inundación	ha	5.4	
Área inundación previa	ha	1.0	
Rastro inundación	ha	6.9	
Usos de suelo	ha	13.3	476.0

Example of a delineation map (DEL) of the Formigal area - Aragon - Spain.



Thank you very much for your attention.



Madrid

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