



Emergency Management

Copernicus Emergency Managment Service: overview ed accessibilità del servizio e del suo portafoglio di prodotti

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Academy National Workshop

COPERNICUS E LA GESTIONE INTELLIGENTE DELLE AREE URBANE

18 Novembre 2020, Politecnico di Milano





Copernicus Emergency Management Service



Emergency
Management

Il programma Copernicus

Copernicus è il programma di osservazione della Terra dell'Unione Europea, dedicato a monitorare il nostro pianeta e il suo ambiente a beneficio di tutti i cittadini europei. Offre servizi di informazione basati sull'osservazione satellitare della Terra e dati in situ (non spaziali)



Atmosphere
(CAMS)



Marine
(CMEMS)



Land
(CLMS)



Climate
(C3S)



Emergency
(EMS)



Security

17/11/2020



Copernicus
Europe's eyes on Earth



C o p e r n i c u s E m e r g e n c y

- Collaborazione tra DG DEFIS – DG ECHO – DG JRC
- Globale, operativo dal 2012
- Fornisce informazioni geografiche tempestive e accurate
- Per calamità naturali, emergenze provocate dall'uomo e crisi umanitarie
- Supporta tutte le fasi del ciclo di gestione delle emergenze per aumentare la resilienza



Mappatura su richiesta

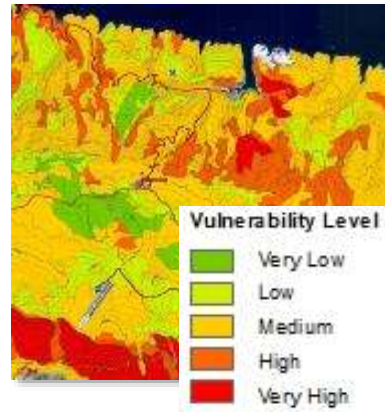
Rapid Mapping

Su richiesta 24/7
Fornisce
rapidamente info
geografiche



Risk & Recovery Mapping

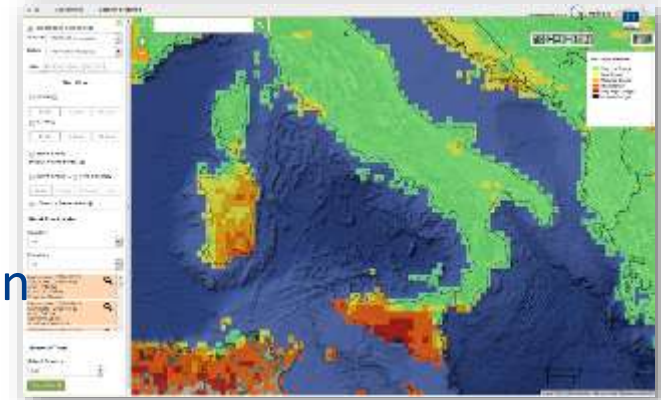
Su richiesta
Fornisce info
geografiche per
tutte le fasi del ciclo
di gestione delle
emergenze



Sistemi di monitoraggio e allerta precoce

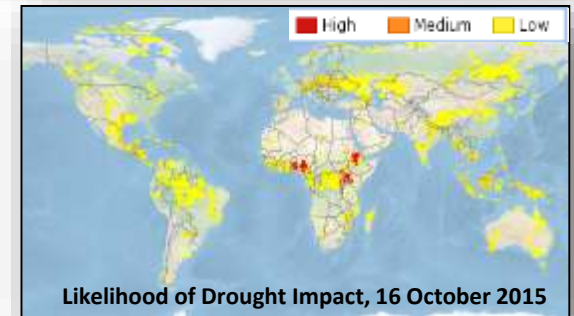
EFFIS & GWIS (incendi)

European Forest Fire &
Global Wildfire Information
Systems



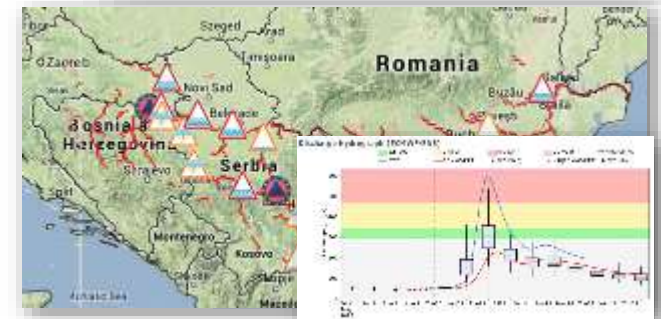
EDO & GDO (siccità)

European & Global Drought
Observatory



EFAS & GloFAS (alluvioni)

European & Global
Flood Awareness Systems





On-demand Mapping



Rapid / Risk & Recovery

Rapid Mapping

- 24/7/365
- Procedure e prodotti standardizzati
- Massima rapidità
- Consegna in ore/giorni

Risk & Recovery Mapping

- Attivo in orari d'ufficio
- Adattato alle esigenze dell'utente
- Supporta situazioni che non necessitano azioni immediate
- Consegna in giorni/settimane/mesi

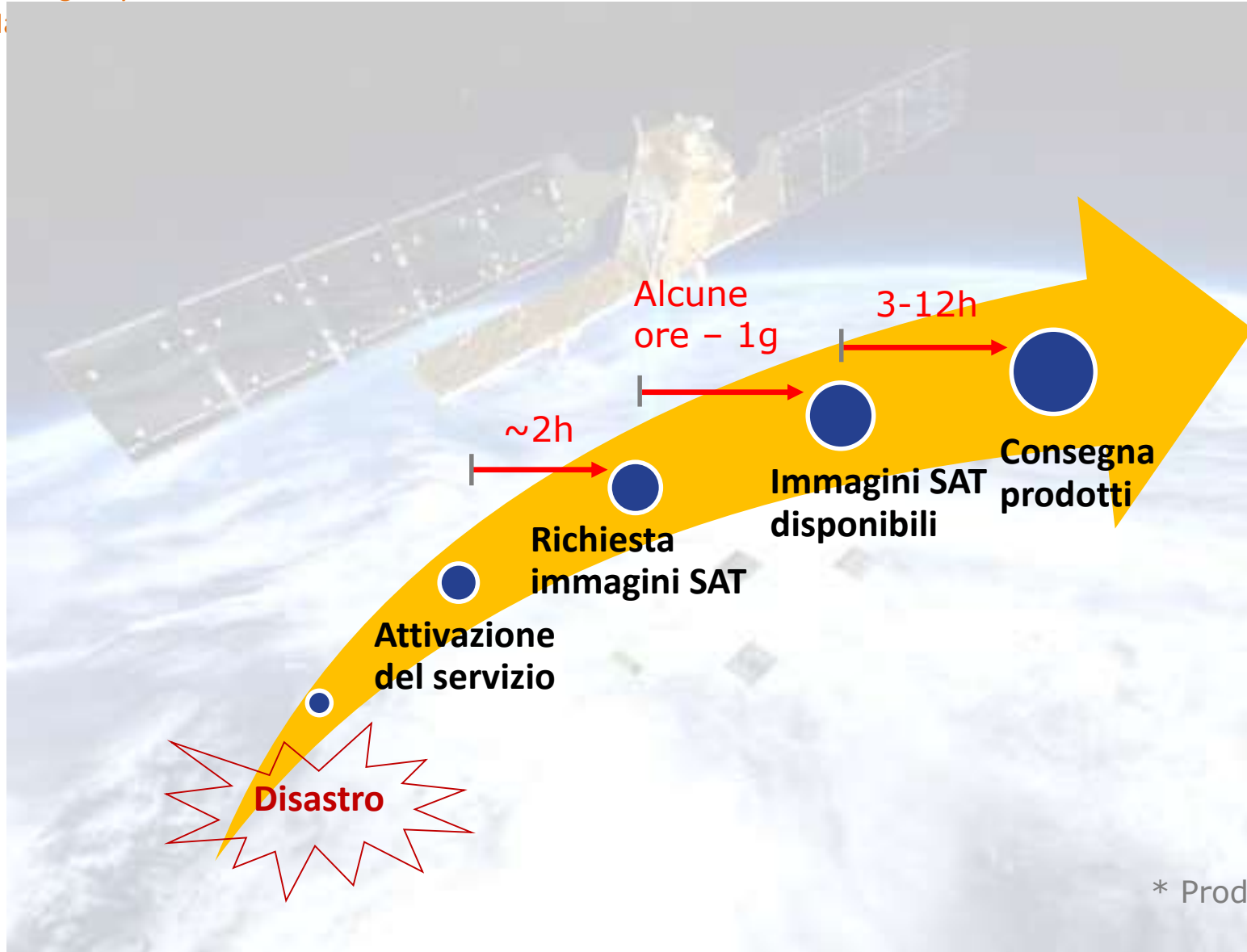
<http://emergency.copernicus.eu/mapping>



Emergency

M.

II Rapid Mapping



Mappe riutilizzate dai MEDIA immediatamente dopo l'evento

* Production time in service level 1



4 PRODOTTI

Emergency
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PRE-EVENTO

Reference

Reference



Pre-volcanic eruption in the
Philippines, 2019 (EMSR418)

First Estimate

First Estimate



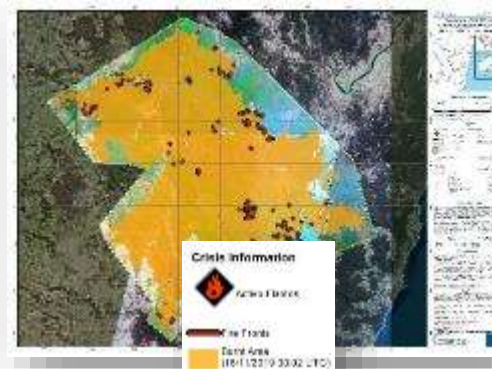
Flood delineation in France,
2019 (EMSR411)

POST-EVENTO

Delineation

Monitoring

Delineation

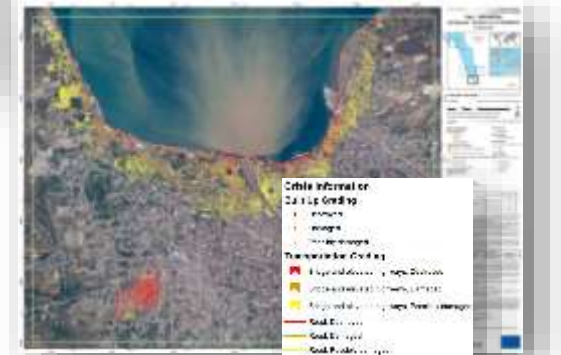


Fire delineation in
Australia, 2019 (EMSR408)

Grading

Monitoring

Grading



Damage assessment after earthquake &
Tsunami in Indonesia, 2018 (EMSR317)



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SRF



POST-EVENT

First Estimate

Delineation

Monitoring 1

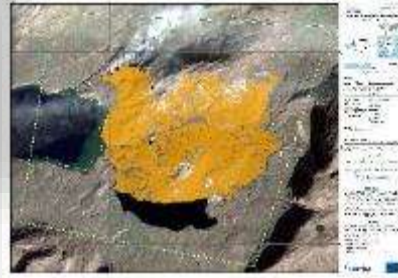
Monitoring 2

Grading

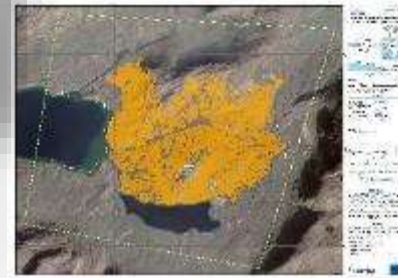
12-08-
2019
(17:00)



13-08-2019 (01:46)



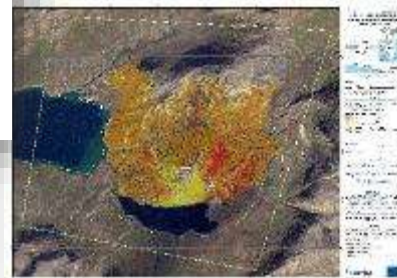
13-08-2019 (20:19)



14-08-2019



18-08-2019



22-08-2019

**Wildfire in West Greenland
(EMSR378)**



Tempi di consegna

- Produzione 24/7
(SL 1)

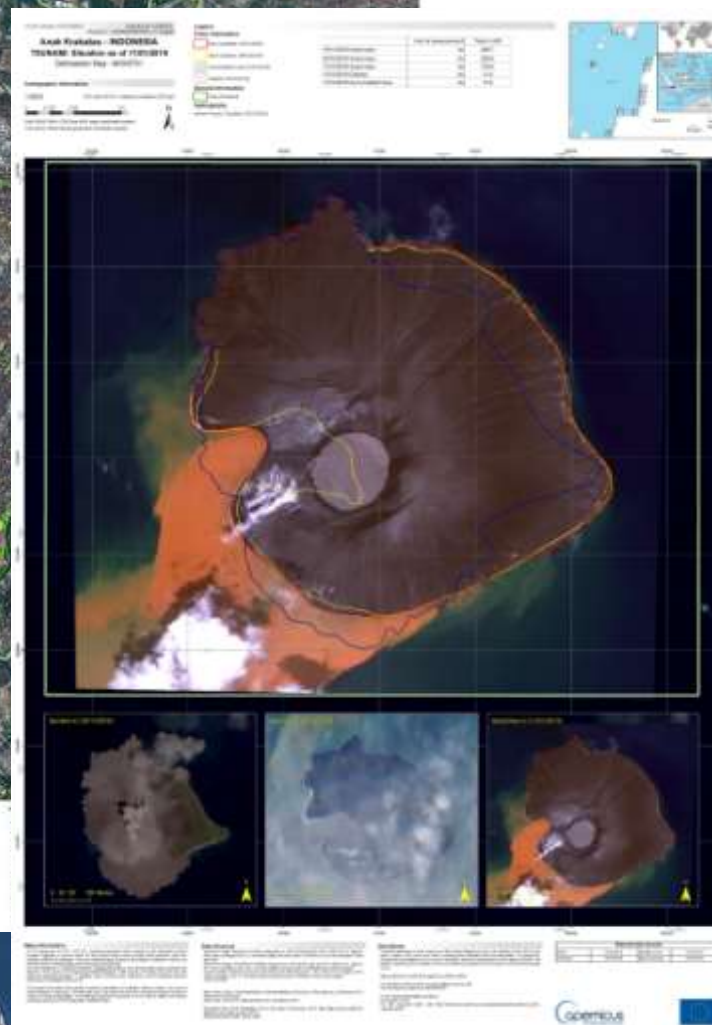
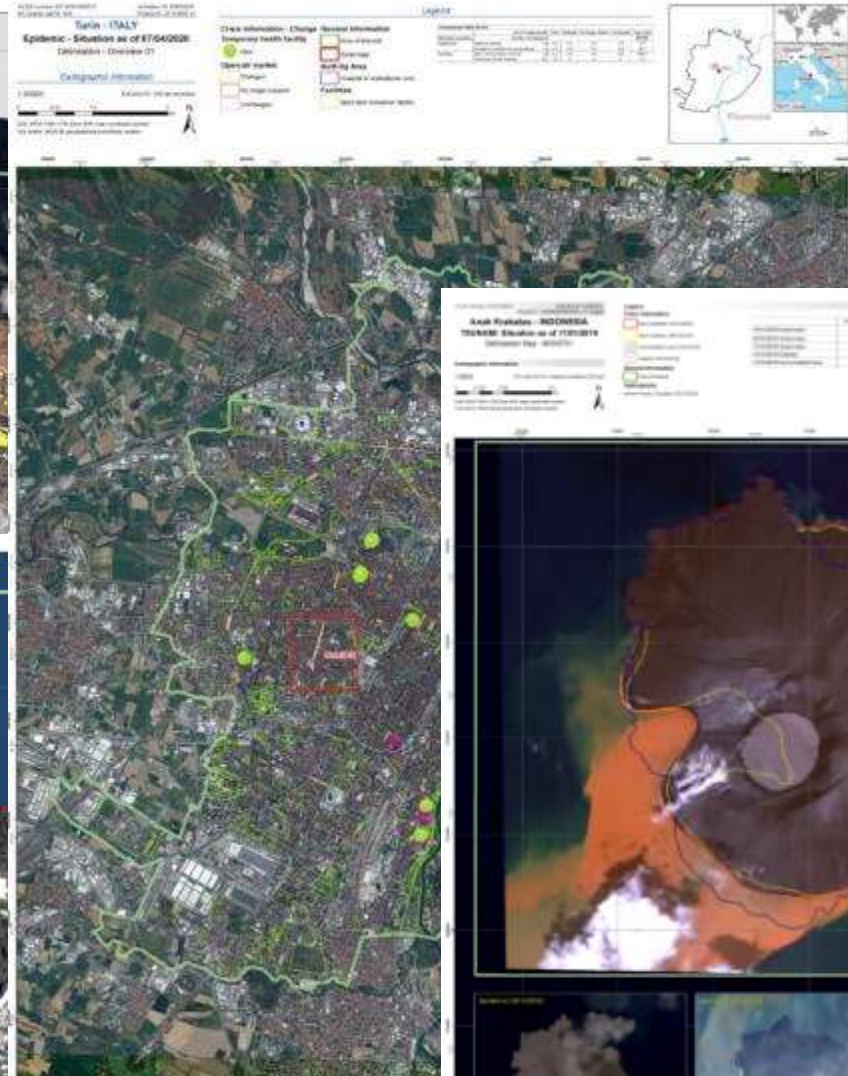
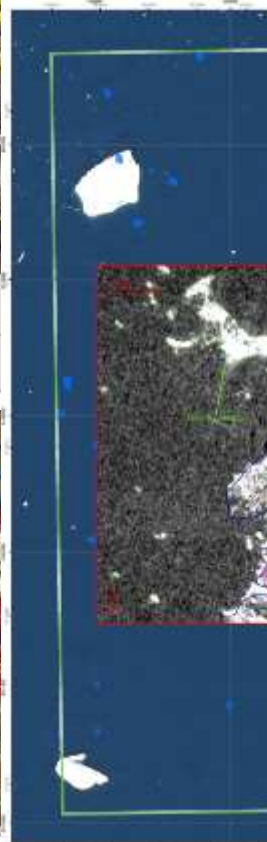
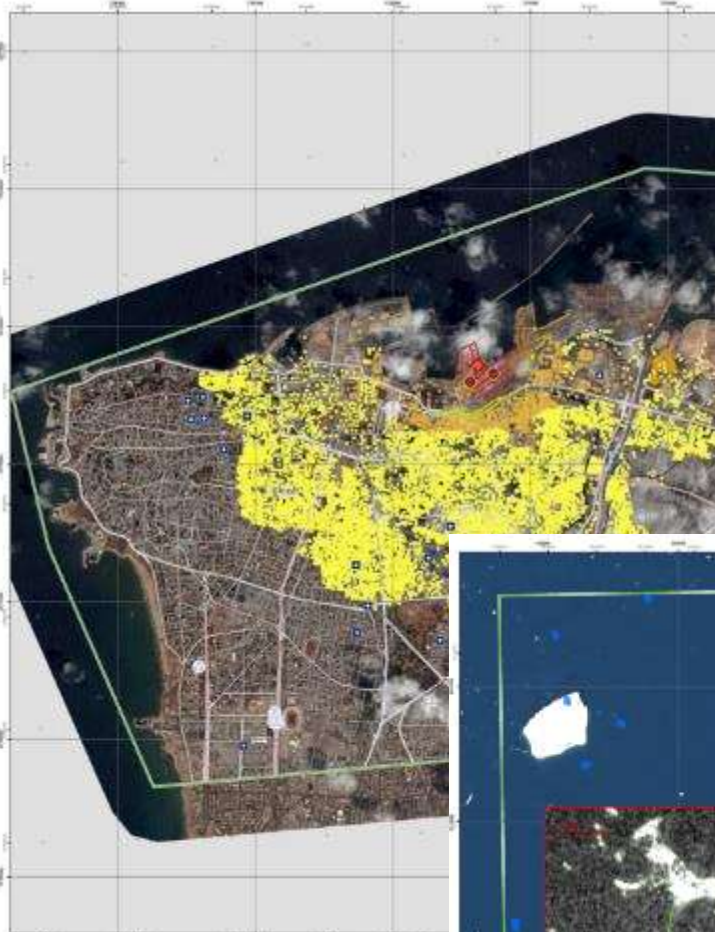
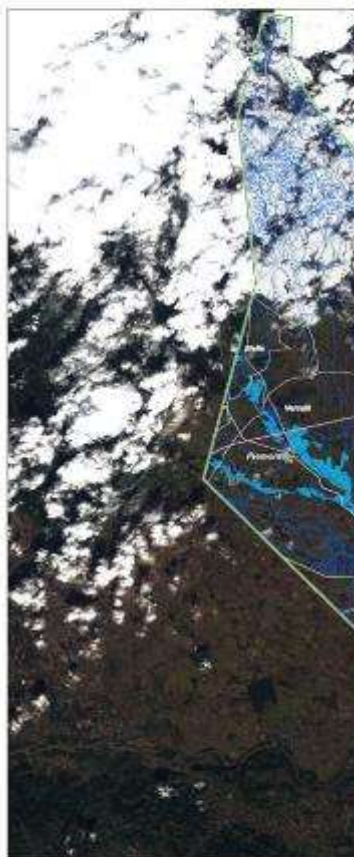
Product type	Content	Delivery times (hours)*	
		Vector	Ready-to-print maps
Reference	Pre-event situation	10	12
First Estimate	Fast impact assessment 	2	3
Delineation	Detailed assessment of the impacted area (extent)	7	9
Grading	Detailed damage assessment (extent of the impacted area and damage grade)	10	12

- Produzione in
orari di ufficio
(SL level 2)

Product type	Content	Delivery times (hours)*	
		Vector	Ready-to-print maps
Reference	Pre-event situation	As soon as possible (in average: 40 hours ; Max: 5 days)	
Delineation	Detailed assessment of the impacted area (extent)		
Grading	Detailed damage assessment (extent of the impacted area and damage grade)		

E s e m p i

Emergency Management





II Risk & Recovery mapping

STD (standard activations)	FLEX (complex activations)
• Lista di prodotti • Area di interesse limitata • Scale fissate • Metodologia predefinita • Attivazione e consegna rapide (giorni) • Per le prime fasi del recupero • Non copre la valutazione del rischio pre disastro	• Prodotti definiti in base alle richieste dell'utente • Contratti specifici (settimane/mesi) • Copre tutte le fasi



Prodotti STD

- Digital Surface Model
- Reference dataset
- Land use and land cover dataset
- Flood delineation
- Modelled flood extent for major events
- Temporal analyses of occurred flood events
- Wildfire delineation and grading
- Detailed damage assessment analyses over affected areas
- Reconstruction monitoring
- Urban sprawl analyses
- Human footprint evaluation of cities
- Ground deformation analyses
- Ready to print maps and map books for field campaigns
- Impact assessment/exposure analyses on asset and population
- Detailed impact assessment/exposure analyses on selected aspect
- Post-disaster soil erosion risk assessment
- Post-disaster landslide risk assessment
- Human settlements mapping
- Population displacement location
- Detailed reference dataset for high-importance areas



E s e m p i o : R i s c h i o v u l c a n i c o

Volcanic risk in Democratic Republic of the Congo (EMSN047)

Product 1: Reference maps

Product 2: Land Use/Land
Cover mapping

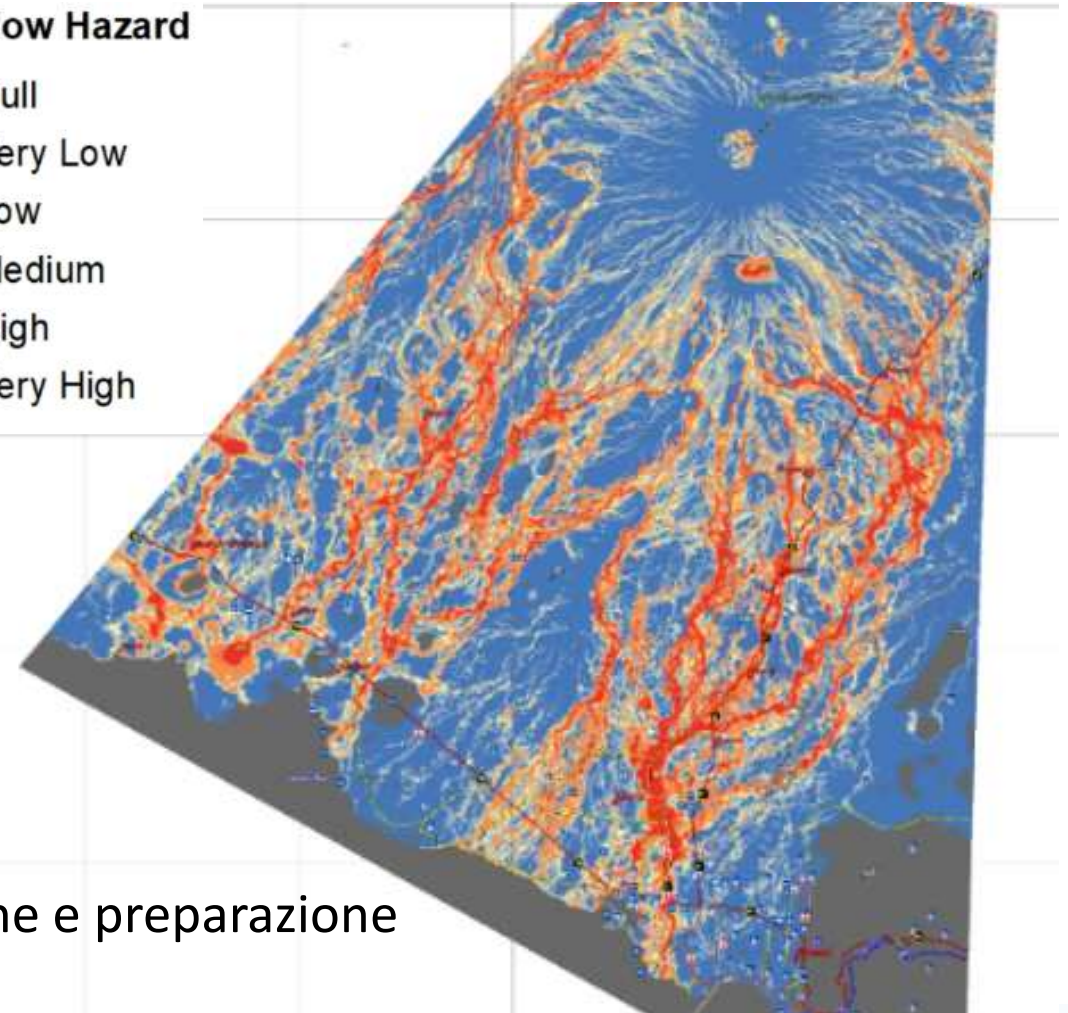
Product 3: Digital Elevation
Model

Product 4: Lava Flow Hazard
assessment

Product 5: Transportation
Network Vulnerability to
disruption



Lava Flow Hazard



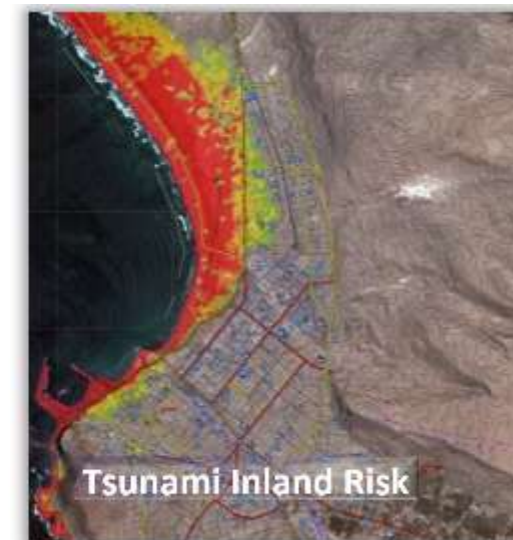
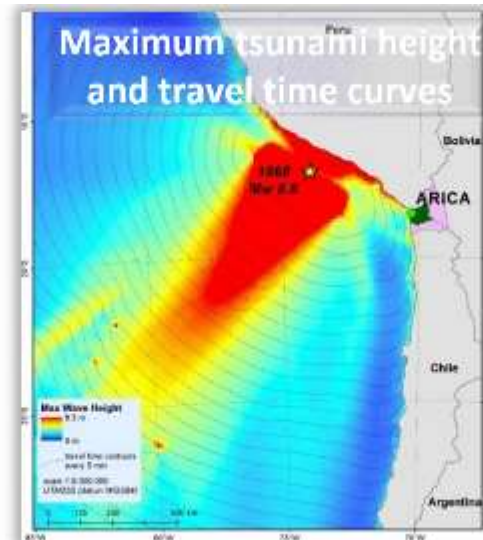
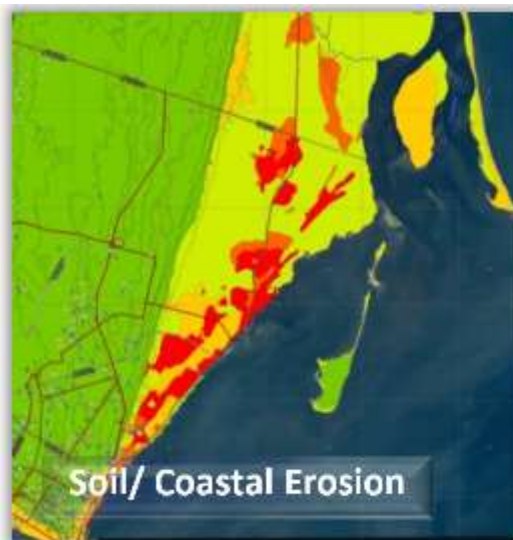
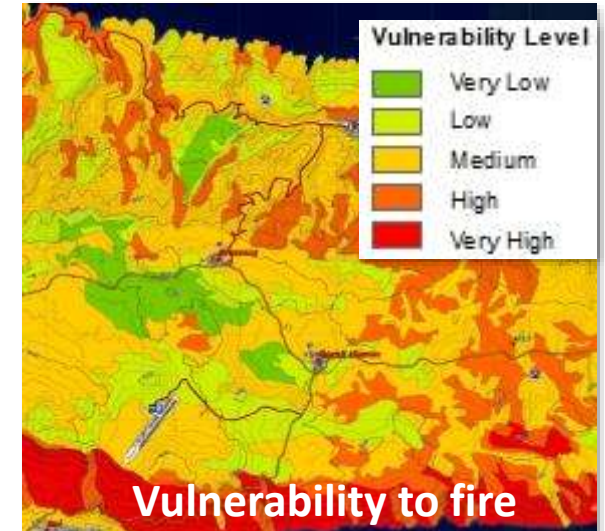
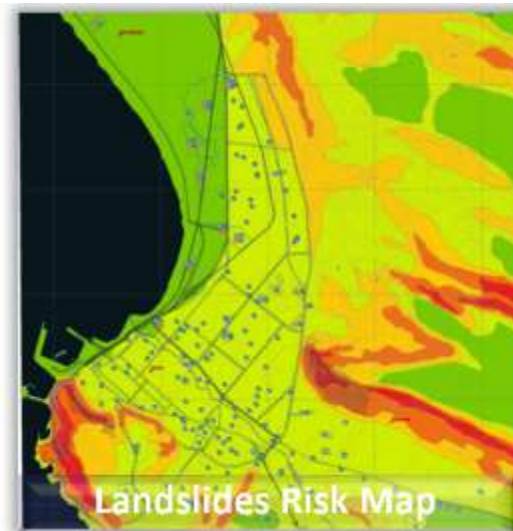
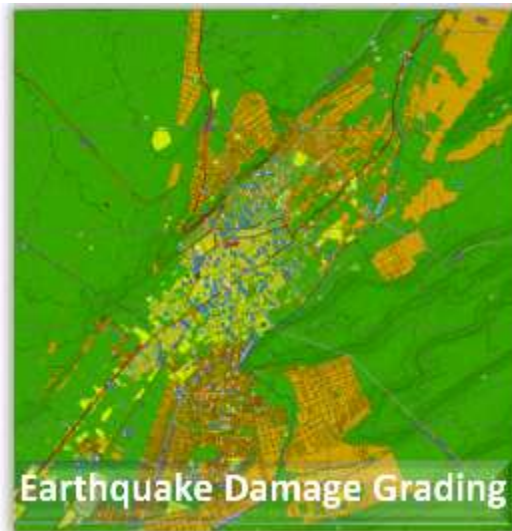
Scopo: supporto alle decisioni in fase d prevenzione e preparazione

<http://emergency.copernicus.eu/EMSN047>



Altri esempi

Emergency
IV



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La Validazione



Misura di caratteristiche dei prodotti del Mapping e occasionalmente degli early warning



Raccolta di risposte e opinioni dettagliate degli utenti riguardo l'impatto del mapping sui loro flussi di lavoro; paragone con fonti alternative



Esplorazione di possibili miglioramenti e alternative

Scopi:

- *Generare fiducia*
- *Miglioramento continuo del servizio*

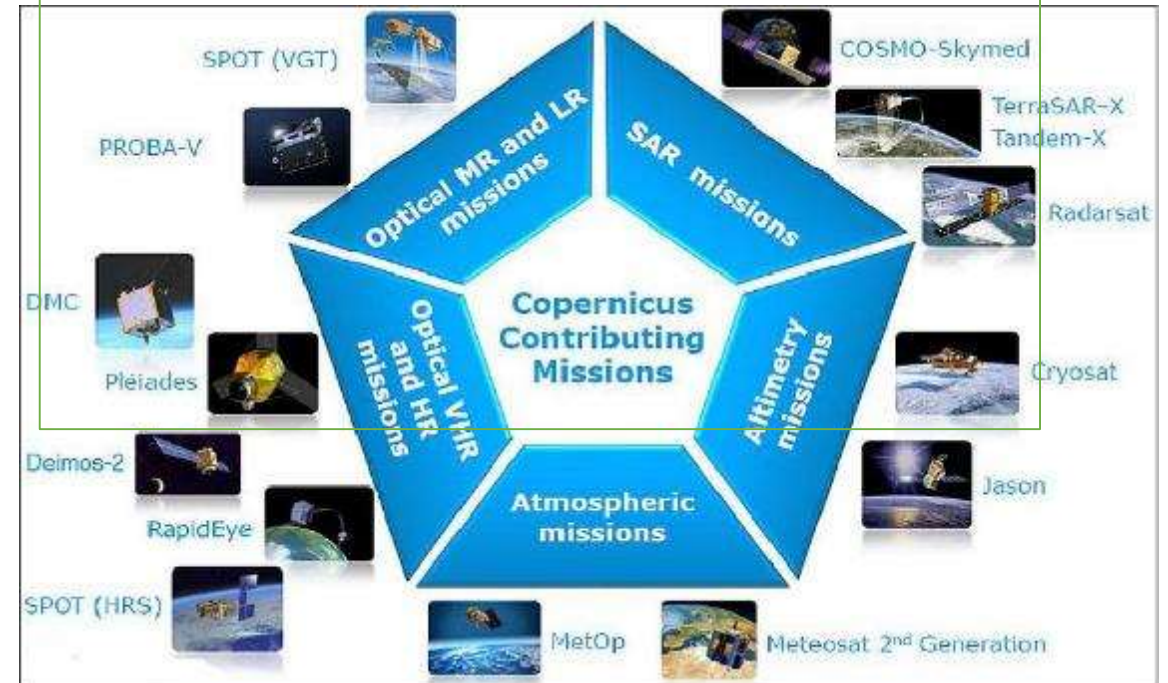


Quali satelliti?

Sentinel, Sentinel, Sentinel (1 e 2)



... E Copernicus Contributing Missions



- Più utilizzati: VHR e HR (in generale <10m)
- Team e procedura dedicati presso ESA (REACT)



emergency.copernicus.eu/mapping

- Contesto dell'attivazione
- Dati vettoriali
 - Shapefiles (shp, shx, prj, dbf)
 - SLD files
 - KML/KMZ
 - GeoJson
 - Web services (Vector Tiles)
- Mappe raster
 - Pdf con layer
 - Jpeg
- Webservices - mapviewer
- In più, per RRM: Report e metadati
- Strumenti di supporto:
 - GeoRSS, mappa dell'attivazione,

NOTA: possono attivare il servizio solo gli utenti autorizzati; in IT: DPC

COPERNICUS
Emergency Management Service

Copernicus EMS - Copernicus Emergency Mapping Service

Home | What is Copernicus | EMS - Mapping | EMS - Early Warning System | News

Copernicus Emergency Management Service - Mapping

A service in support of European emergency response

Latest Copernicus EMS - Mapping Activations

Act. Code	Title	Event Date	Type	Country	Feed
EMSR110	Flood in Spain	2013-02-01	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-02	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-03	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-04	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-05	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-06	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-07	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-08	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-09	Flood	Spain	10
EMSR110	Flood in Spain	2013-02-10	Flood	Spain	10

Summary of the Experiences EMS - Mapping Activations

Type of Disaster	Number of Activations	Number of Reference Maps	Number of Definition Maps	Number of Drafting Maps
Portuguese	7	17	17	16
Flood	52	112	413	13
Technical accident	12	22	22	22
Other	5	12	12	1
Other	24	24	24	24
Other	5	5	5	5
Other	119	119	119	119

By the above table, only activations are presented and considered.

Copernicus Emergency Management Service (EMS) provides information for emergency response in relation to different types of disasters, including macroscopic hazards, geophysical hazards, deliberate and accidental man-made disasters and other humanitarian disasters, as well as persistent, prolonged, recurrent and complex situations.

Copernicus EMS consists of the Mapping Service and of the Early Warning System (Floods).

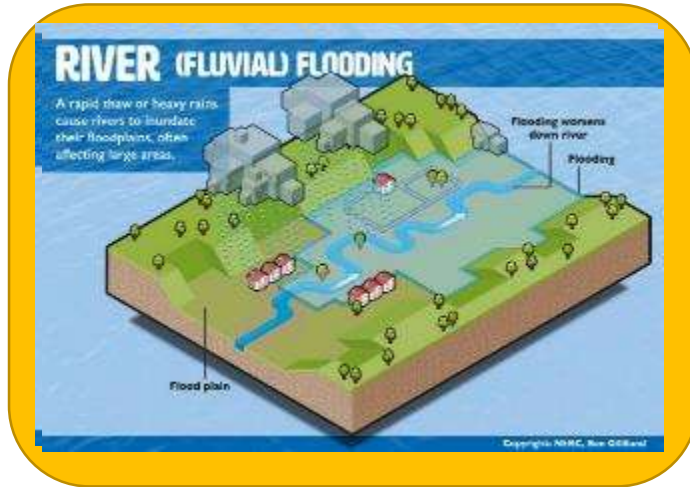
The Emergency Management Service - Mapping, which has been an operational activity since April 1st, 2012, is a fully operational service and defined in detail in the Emergency Regulations.



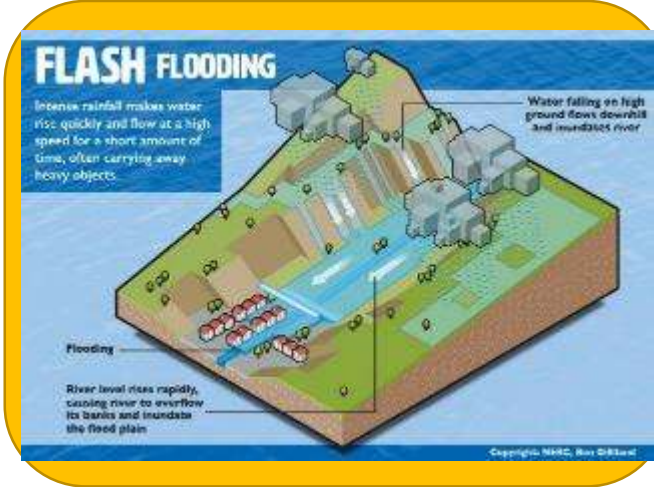
European & Global Flood Awareness Systems (EFAS & GloFAS)



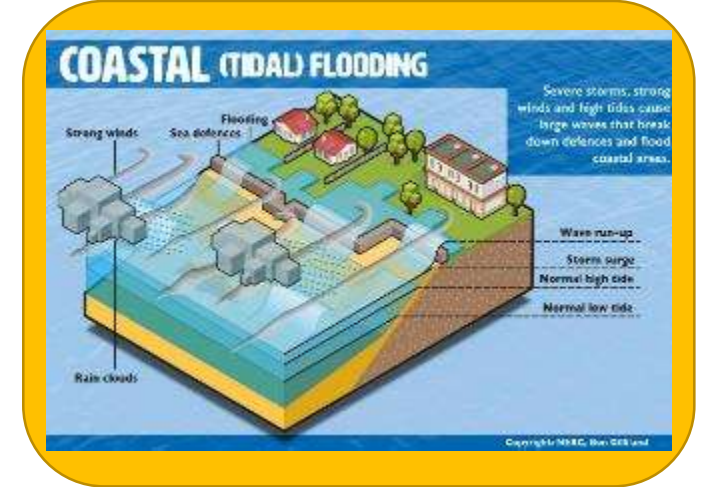
Tipi di alluvioni in EFAS e GLOFAS



- ✓ are monitored & forecasted on European scale (EFAS)
- ✓ are forecasted on global scale (GloFAS)



- ✓ area forecasted over most parts of Europe by EFAS
- global forecasting of flash floods is in current research stage at ECMWF (European Centre for Medium-Range Weather Forecast)



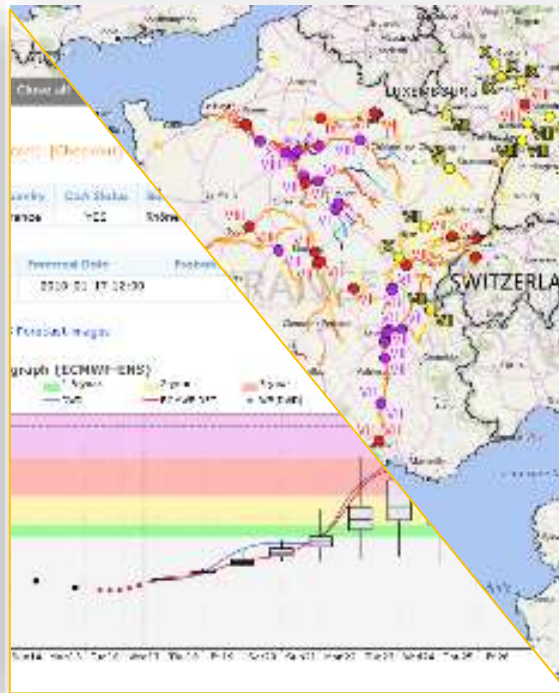
- forecasting of coastal floods is in current research stage at JRC



Monitoraggio e situazione corrente



Previsione di alluvioni fluviali (probabilità)



Previsione di alluvioni fluviali (impatto)



Previsione di inondazioni improvvisi



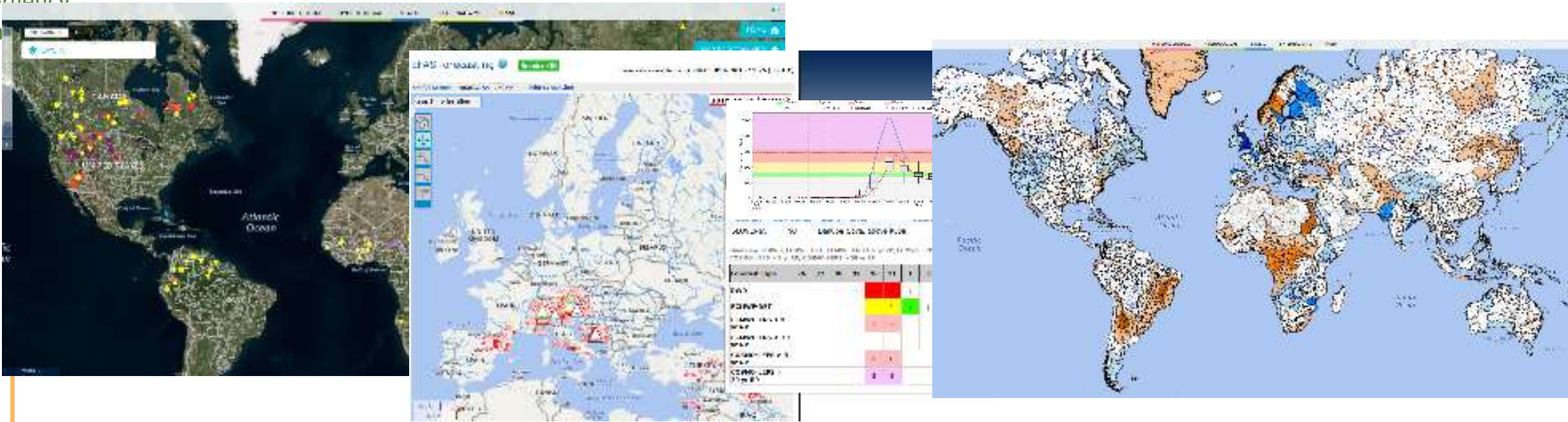
Bollettini, sintesi quotidiana e notifiche

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Global Flood Awareness System - GloFAS

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Fornisce free and open previsioni idrologiche (fino a 30 giorni & / 4 mesi)

Supporta EU Emergency Response and Coordination Centre, servizi idro-meteo nazionali, organizzazioni internazionali di aiuto e sviluppo, privati (e.g. assicurazioni). Più di 1500 utenti registrati.

Sviluppo comune di EC JRC ed ECMWF, così come servizi idro-meteo nazionali e università. Pienamente operativo dal 2018 in Copernicus Emergency

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A c c e s s o a E F A S / G L O F A S

- <https://www.efas.eu/>
- I dati EFAS più vecchi di 30 giorni sono scaricabili free and open come GRIB3 o NetCDF da (I dati +recenti sono solo per i partner EFAS)
<https://cds.climate.copernicus.eu/cdsapp#!/dataset/efas-historical?tab=overview>
- <https://www.efas.eu/efas-web-services>
- GLOFAS è disponibile come WMT-S; vedi
http://www.globalfloods.eu/static/downloads/GloFAS-WMS-T_usermanual.pdf



European Forest Fire & Global Wildfire Information Systems (EFFIS)



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European Forest Fires Information System - EFFIS

EFFIS

Definito nel 1998 da DG JR e DG ENV come sistema informativo per gli incendi forestali

Sviluppato dal JRC

Supporta tutto il ciclo di gestione delle emergenze

Complementa i sistemi nazionali fornendo dati, metodi e standard armonizzati

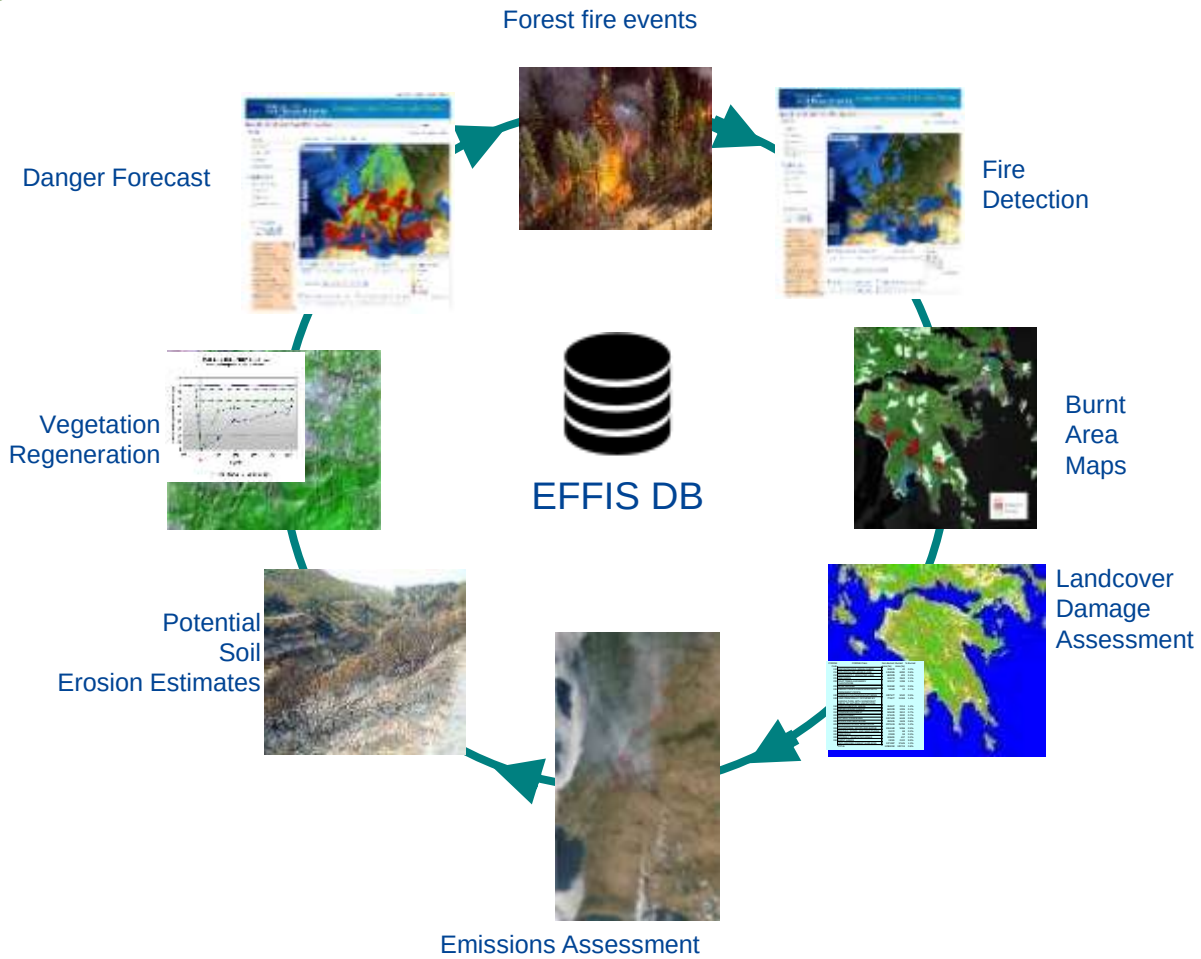
Utenti

Istituzioni Europee, servizi forestali e di protezione civile nazionali e regionali EU e non-EU, FAO, Nazioni Unite

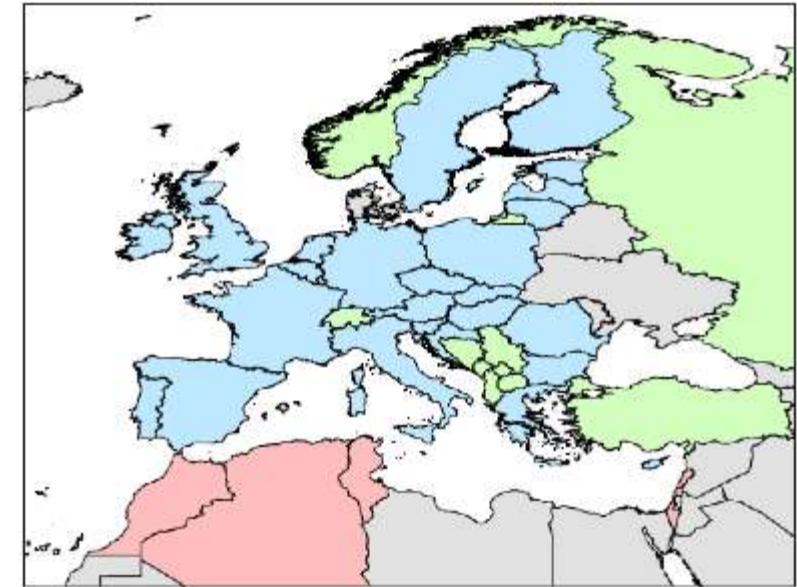


Ciclo di monitoraggio

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Rete EFFIS – 42 paesi

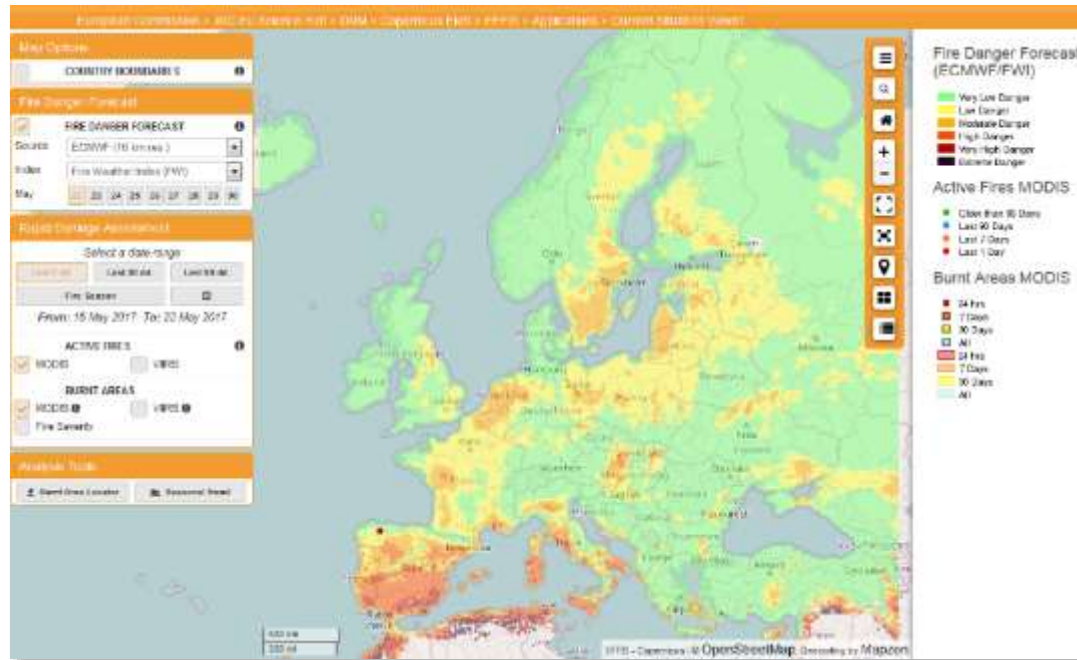




Prodotti principali

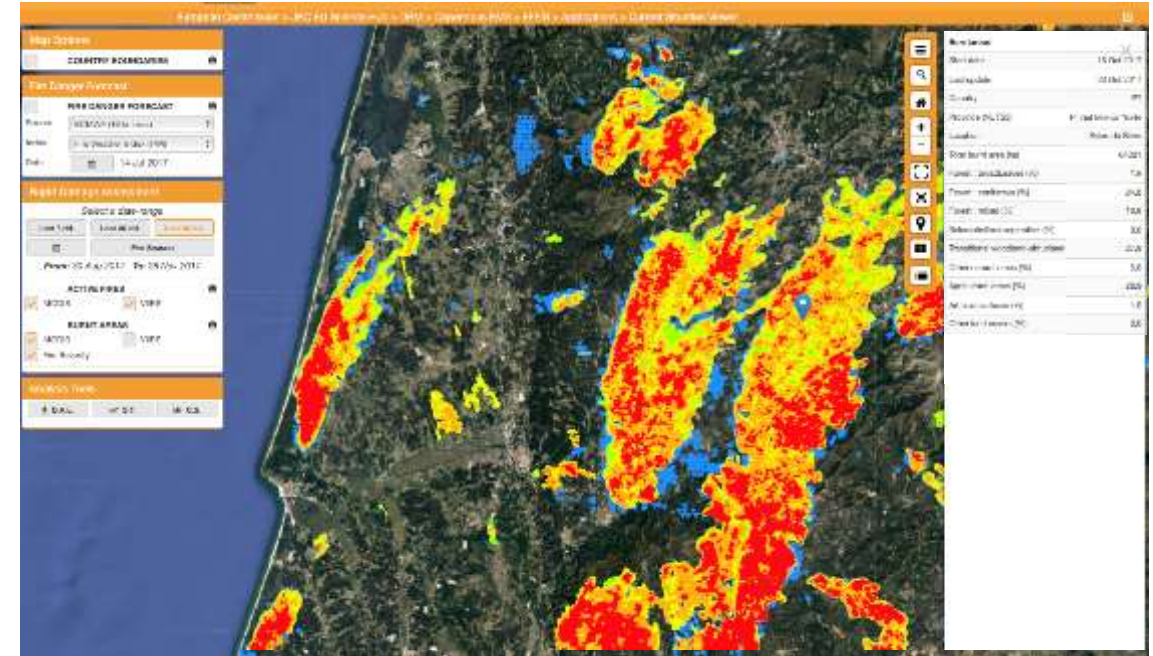
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Previsione del pericolo incendi



Short and long-term fire danger
Monthly and seasonal fire weather

Area bruciata / incendi attivi



Active fire mapping (MODIS/VIIRS/Sentinel2&3)
Medium spatial resolution (~ 300 m): twice a day in pan-EU region
High spatial resolution (~10-30 m) weekly (or bi-weekly)



- <https://effis.jrc.ec.europa.eu/>
- <https://gwis.jrc.ec.europa.eu/>
- WMS format
 - base url: <https://maps.wild-fire.eu/effis>
 - LAYERS parameter
 - **modis.hs** for MODIS Thermal Anomalies
 - **viirs.hs** for VIIRS Thermal Anomalies
 - **modis.ba** for MODIS Burnt Areas
 - **viirs.ba** for VIIRS Burnt Areas
 - **ecmwf007.fwi** for Fire Weather Index (FWI)
 - **ecmwf007.isi** for Initial Spread Index (ISI)
 - **ecmwf007.bui** for Build Up Index (BUI)
 - **ecmwf007.ffmc** for Fine Fuel Moisture Code (FFMC)
 - **ecmwf007.dmc** for Duff Moisture Code (DMC)
 - **ecmwf007.dc** for Drought Code (DC)
 - **ecmwf007.anomaly** for Anomaly
 - **ecmwf007.rankingfwi** for Ranking



European & Global Drought Observatory (EDO & GDO)



European Drought Observatory (EDO)

- Sviluppo iniziale del JRC in collaborazione con DG ENV e WS&D Expert Group (WFD) 2008-2012. Ora in continuo sviluppo.
- Basato su una combinazione di indicatori di pericolo e impatto

Global Drought Observatory (GDO)

- Sviluppato con DG ECHO – ERCC dal 2016
- Include la valutazione dinamica del rischio di impatto per vari settori (basato su pericolo, esposizione, vulnerabilità)
- Database di eventi di siccità dal 1950 ad oggi

In Copernicus EMS dal 2018

Prodotti principali

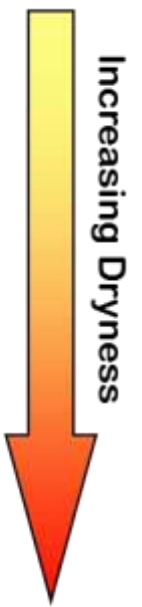
- Monitoraggio e previsione siccità (a varie scale spaziali e temporali)
- Analisi del rischio di impatto su persone e vari settori



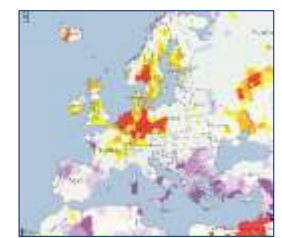
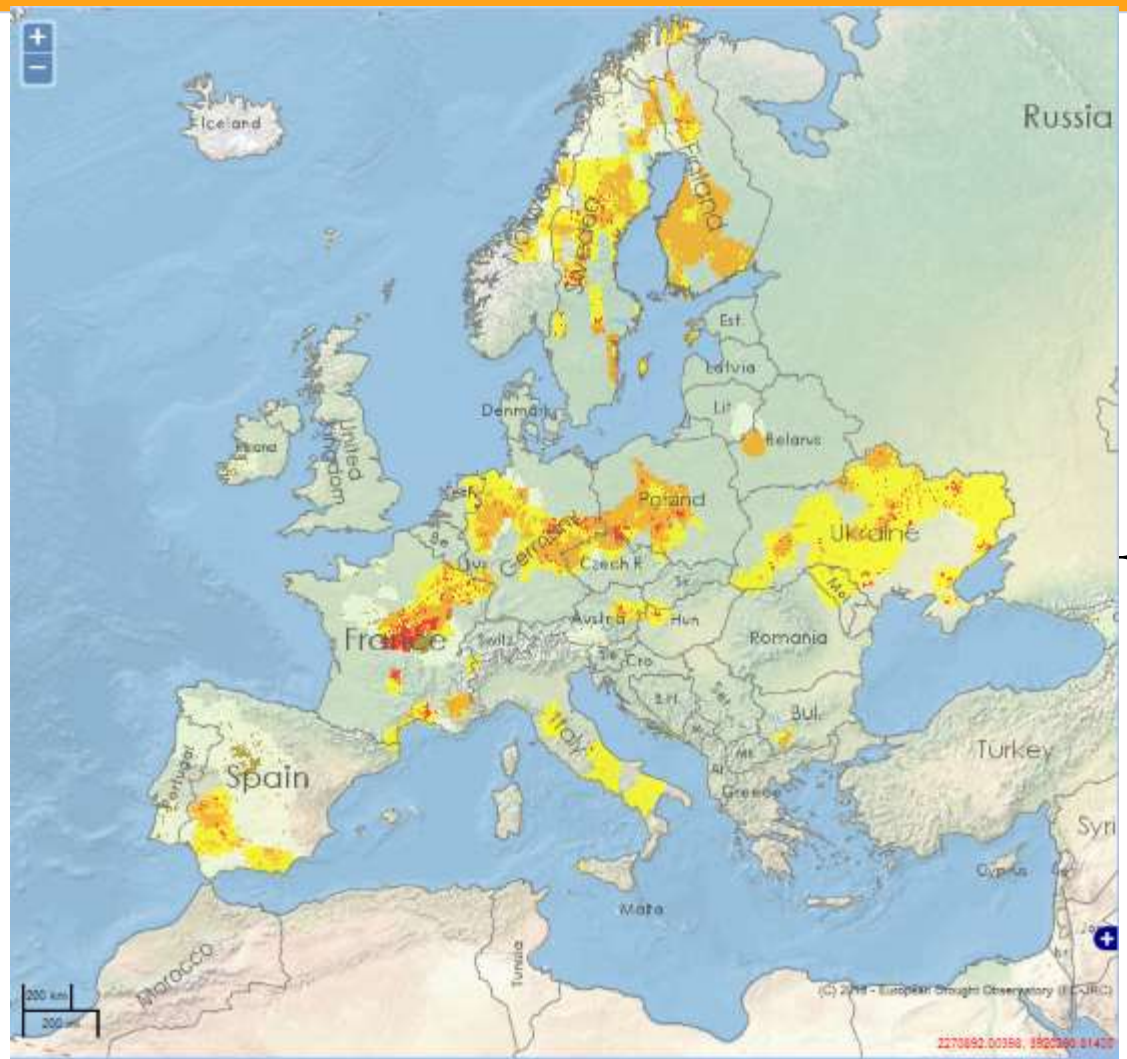
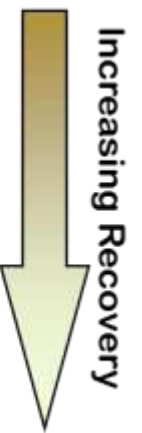
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Indicatore combinato di siccità (CDI)

Impact	Level
Watch: rainfall deficit	1
	2
	3
Warning: soil moisture deficit	4
	5
	6
Alert: vegetation stress following rainfall/soil moisture deficit	7
	8
	9
	10



Impact	Level
Partial Recovery of Vegetation:	11
	12
Full Recovery of Vegetation:	13
	14

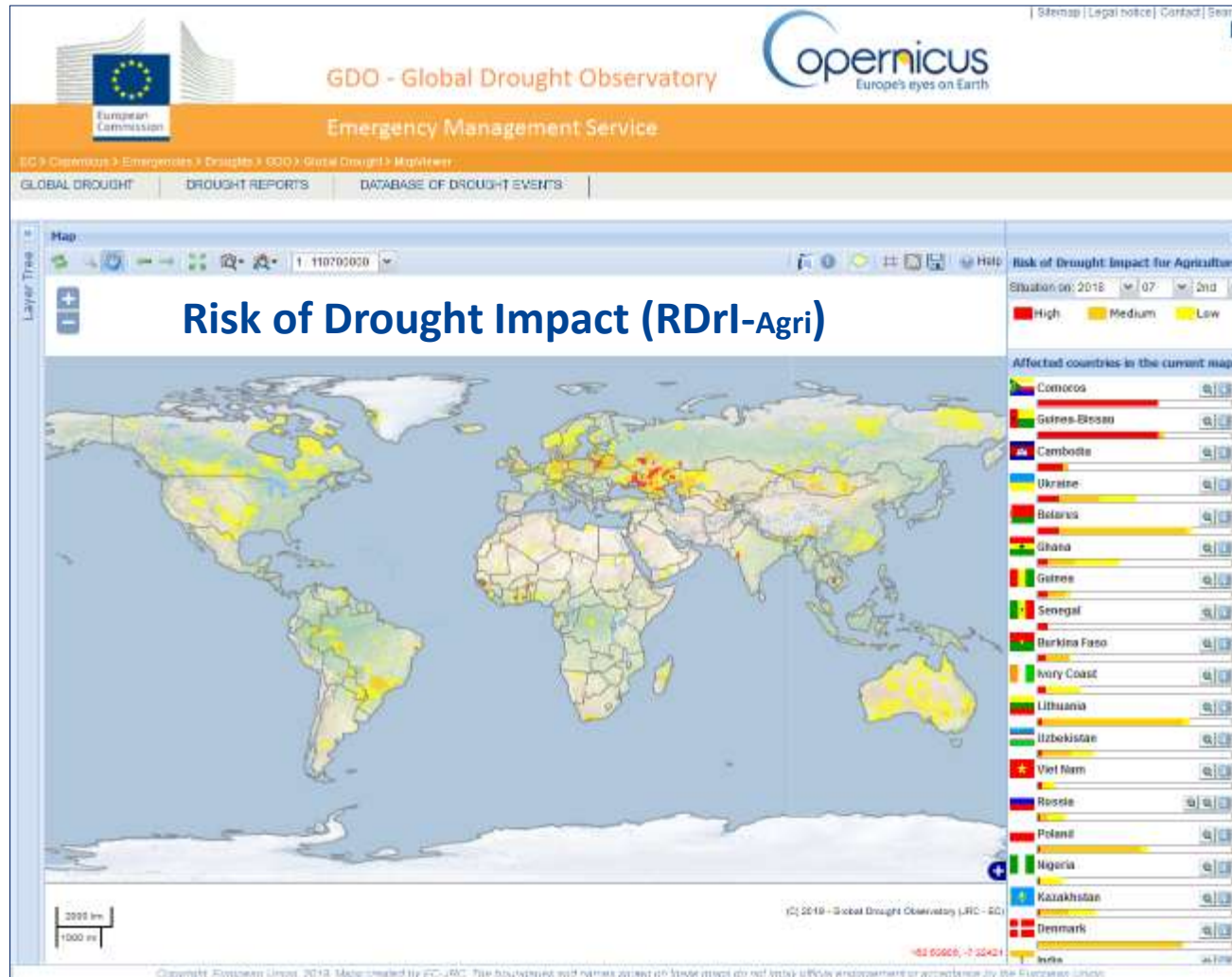


CDI, 21-31 August 2019

<https://edo.jrc.ec.europa.eu>



Global Drought Observatory (GDO)



<https://edo.jrc.ec.europa.eu/gdo>

Hierarchical list of
affected countries

[Example detailed report](#)

The **risk of impact** is evaluated based on the **drought hazard**, **exposure** and the **vulnerability**.

Updated every 10 days.



<https://edo.jrc.ec.europa.eu>

<https://edo.jrc.ec.europa.eu/gdo>

WMS <https://edo.jrc.ec.europa.eu/gdo/php/index.php?id=2031>



Grazie per la vostra attenzione!

Email

- JRC-EMS@ec.europa.eu

Link a Copernicus

- <https://www.copernicus.eu/it>
- <https://www.copernicus.eu/it/accesso-ai-dati>

Link a Copernicus emergenze

- <http://emergency.copernicus.eu/>