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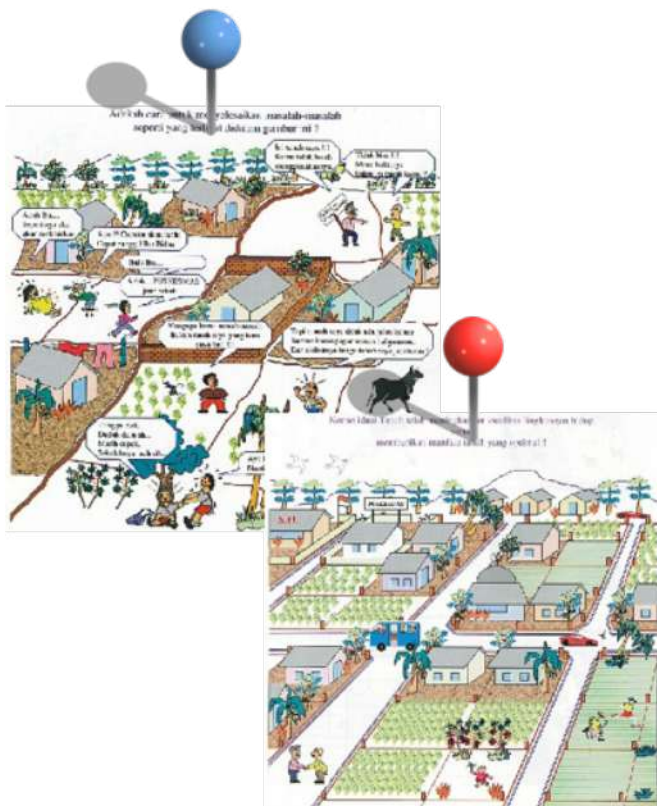
Soluzioni operative e casi studio in contesti urbani ed extraurbani

METTIAMOCI IN RIGA



UNIONE EUROPEA
Fondo Sociale Europeo
Fondo Europeo di Sviluppo Regionale





PIANIFICAZIONE PREVENZIONE PROGETTAZIONE MONITORAGGIO



La natura si prende/riprende i suoi spazi



Pianificazione

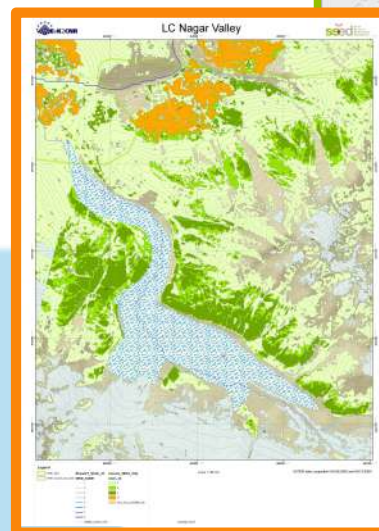
condivisione
di scelte



protezione
dell'ambiente



prevenzione
del rischio



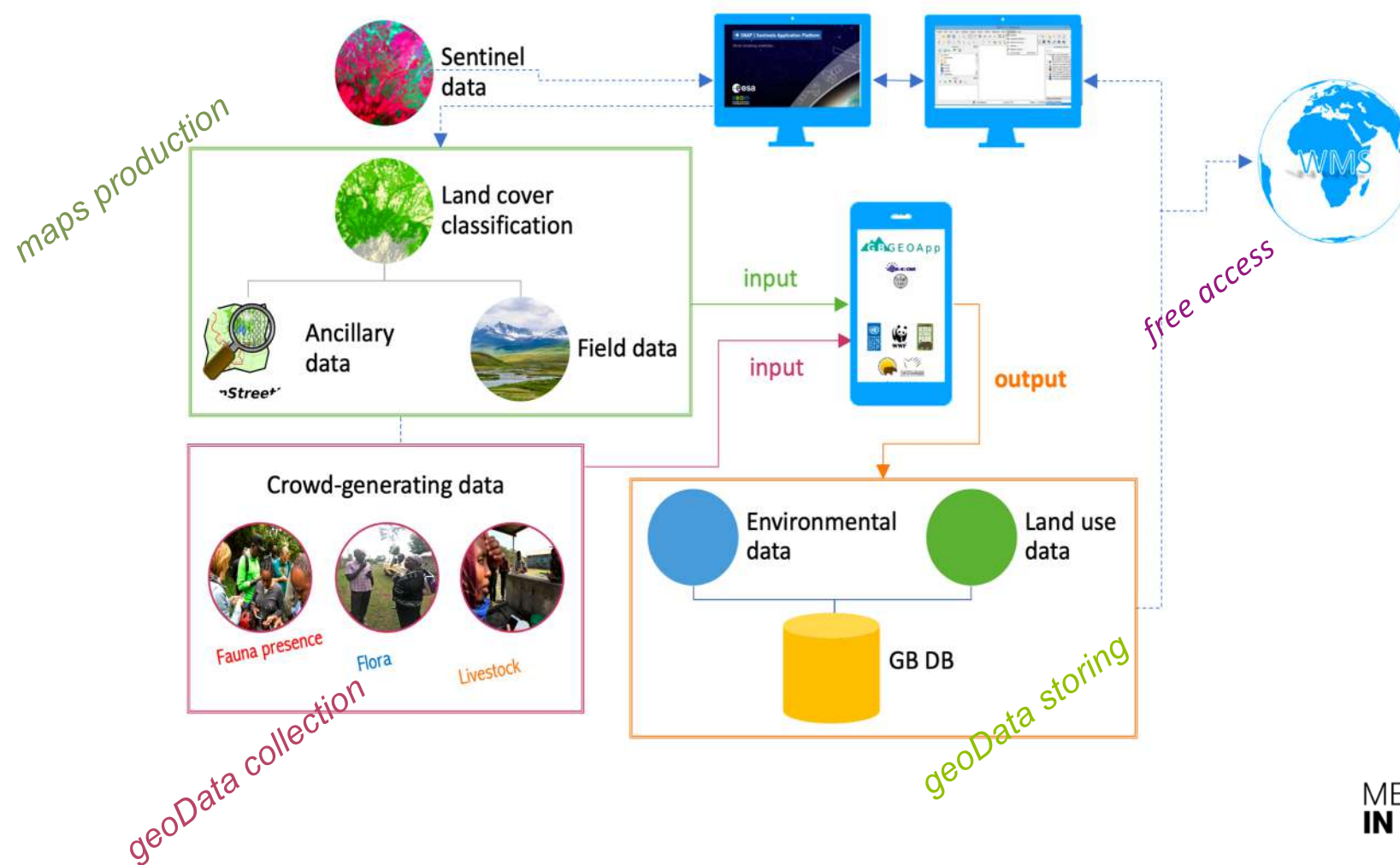


Gli strumenti della conoscenza



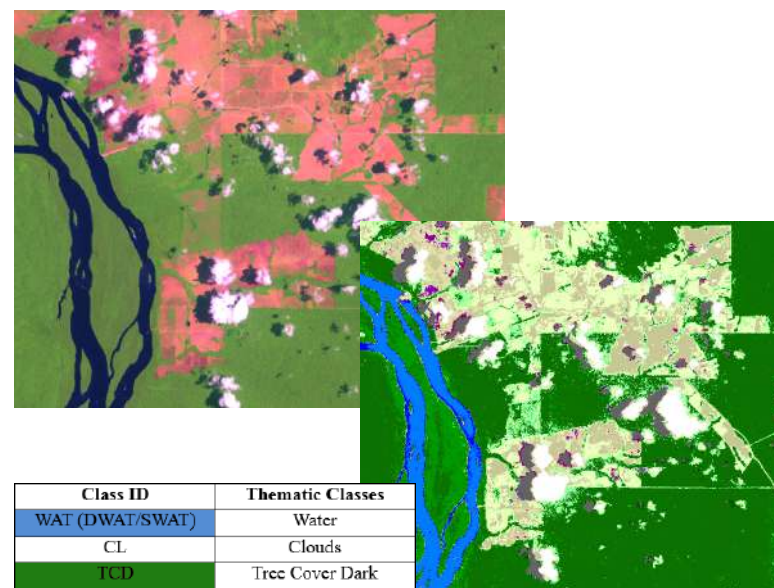
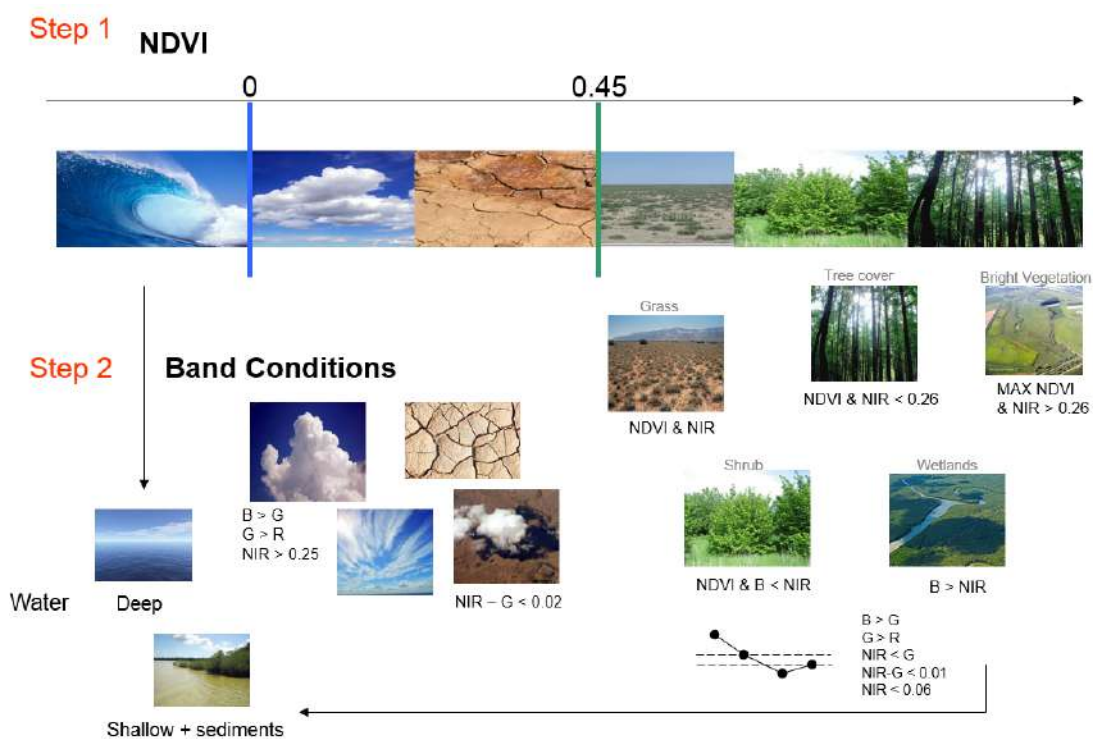


L'ambiente di lavoro





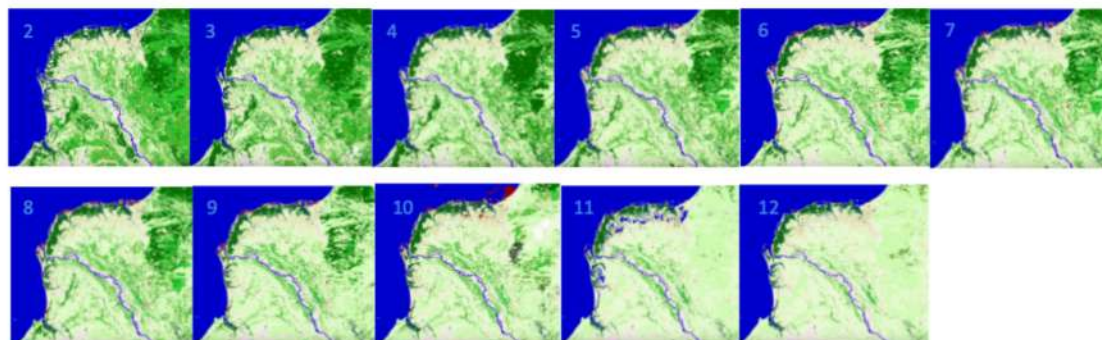
Dalla classificazione di una singola immagine....



Class ID	Thematic Classes
WAT (DWAT/SWAT)	Water
CL	Clouds
TCD	Tree Cover Dark
TCL	Tree Cover Light
SHR	Shrub
GRS	Grassland
SPV	Sparse vegetation
OLL	Other Land Light
OLD	Other Land Dark
SV	Shadowed Vegetation
SS	Bare or Shadowed Soil

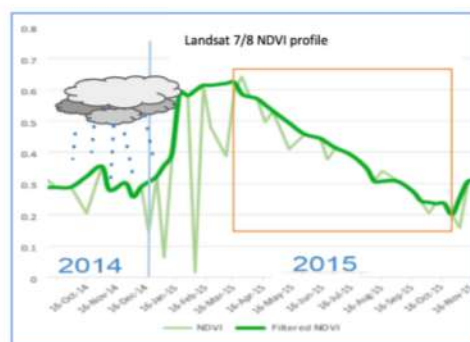


All'analisi di serie temporali di dati tematici



Single-date classification

OUT \ % IN	WAT	SV	TCD	TCL	SHR	GRS	SPV	OLL	OLD	SS
Permanent Water	100									
Seasonal Water	>60	≥ 0	≥ 0	≥ 0	≥ 0	≥ 0	≥ 0	≥ 0	≥ 0	≥ 0
Evergreen Forest		≥ 0	>40	≥ 0	≥ 0	≥ 0				
Evergreen Shrub			≥ 0	≥ 0	>60	<10				
Deciduous Forest		≥ 0		>60	≥ 0	≥ 0	≥ 0	≥ 0	≥ 0	<20
Grassland		≥ 0		<10	≥ 0	>50	≥ 0		<30	
Dark Rocks / Urban								≥ 0	≥ 0	>80
Dark Soil								≥ 0	>80	≥ 0
Light Soil/ Sand							<20	>80	≥ 0	≥ 0



Joint
Research
Centre

[First Results From the Phenology-Based Synthesis Classifier Using Landsat 8 Imagery.](#)
Simonetti D. et al., IEEE GEOSCIENCE AND REMOTE SENSING LETTERS, VOL. 12, NO. 7, JULY 2015



L'informazione



L'ambiente urbano



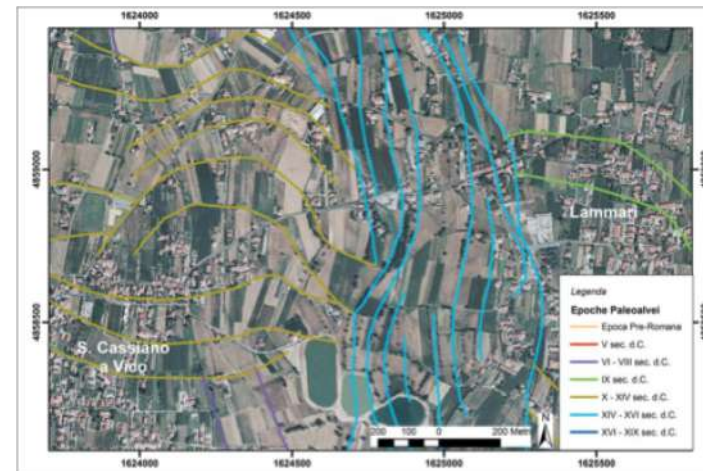
Aggiornamento dei dati
Riconoscimento dell'abusivismo



COSMO- SkyMed



Interferenze con il sistema fluviale (anche minore) esistente (circolazione idrica di subalveo, canali tombati)



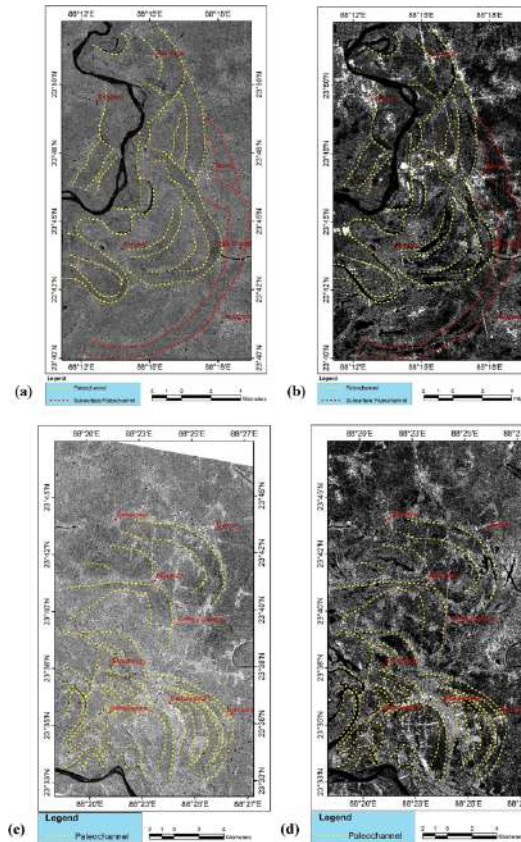
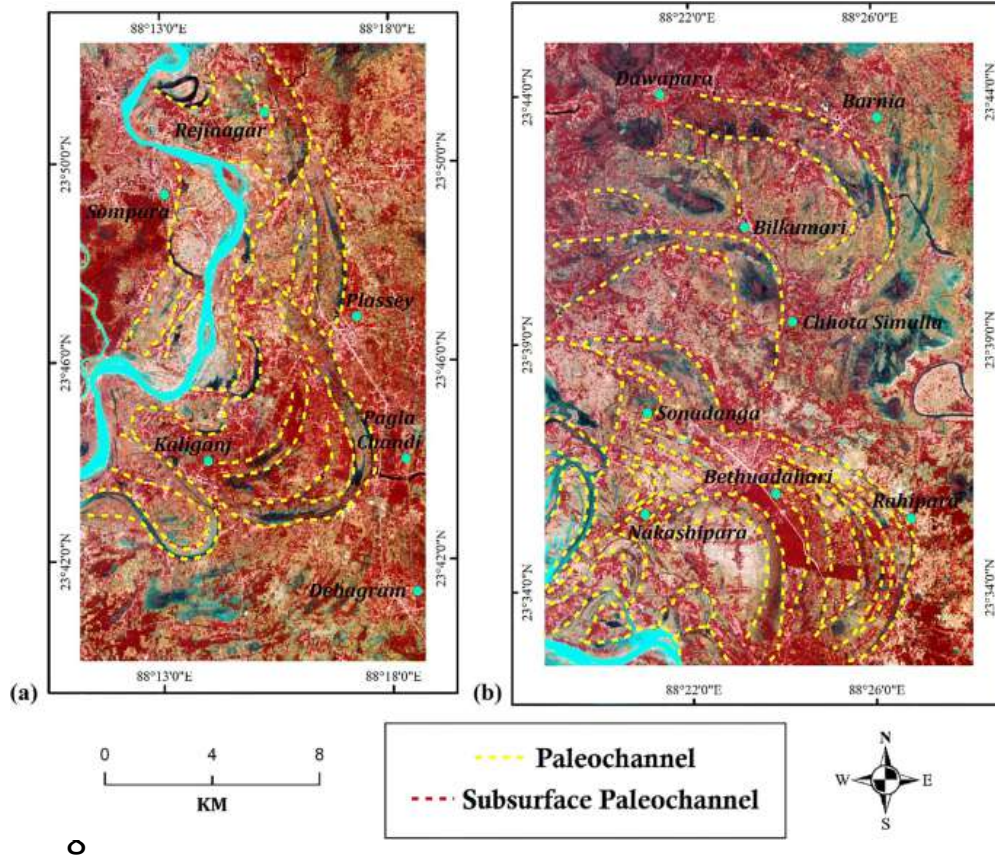
Paleoalvei del Fiume Serchio
sovrapposti all'ortofoto 261110.

<http://www.aiqua.it/index.php/the-journal/il-quaternario-1988-2011/volume-19-2/285-ricostruzione-del-paleoalveo-del-fiume-serchio-lucca-italia-tramite-rilievi-lidar-foto-aeree-ed-immagini-quick-bird/file>

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Dati ottici e radar



<https://link.springer.com/article/10.1007/s41976-021-00047-0>

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La risoluzione

Band number	1	2	3	4	5	6	7	8	8a	9	10	11	12
Center (nm)	443	490	560	665	705	740	783	842	865	940	1375	1610	2190
Width (nm)	20	65	35	30	15	15	20	115	20	20	30	90	180
Spatial resolution (m)	60	10	10	10	20	20	20	10	20	60	60	20	20

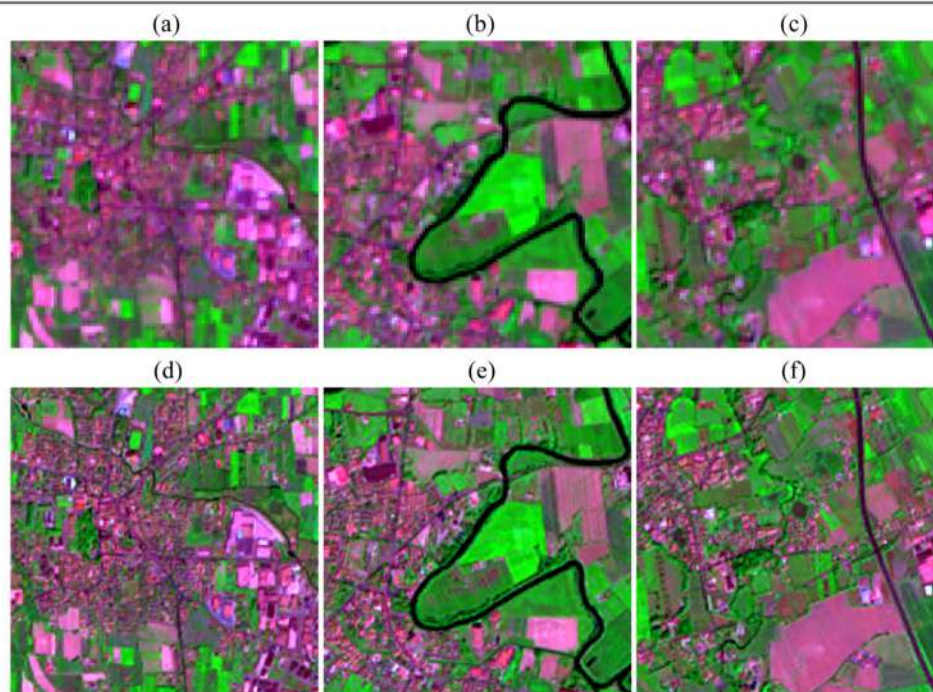


Fig. 6. Downscaling results (10 m) for three sub-areas in Treviso (bands 12, 8a and 5 as RGB). (a)-(c) The 20 m data. (d)-(f) The 10 m results.

https://www.researchgate.net/publication/309308481_Fusion_of_Sentinel-2_images

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La risoluzione

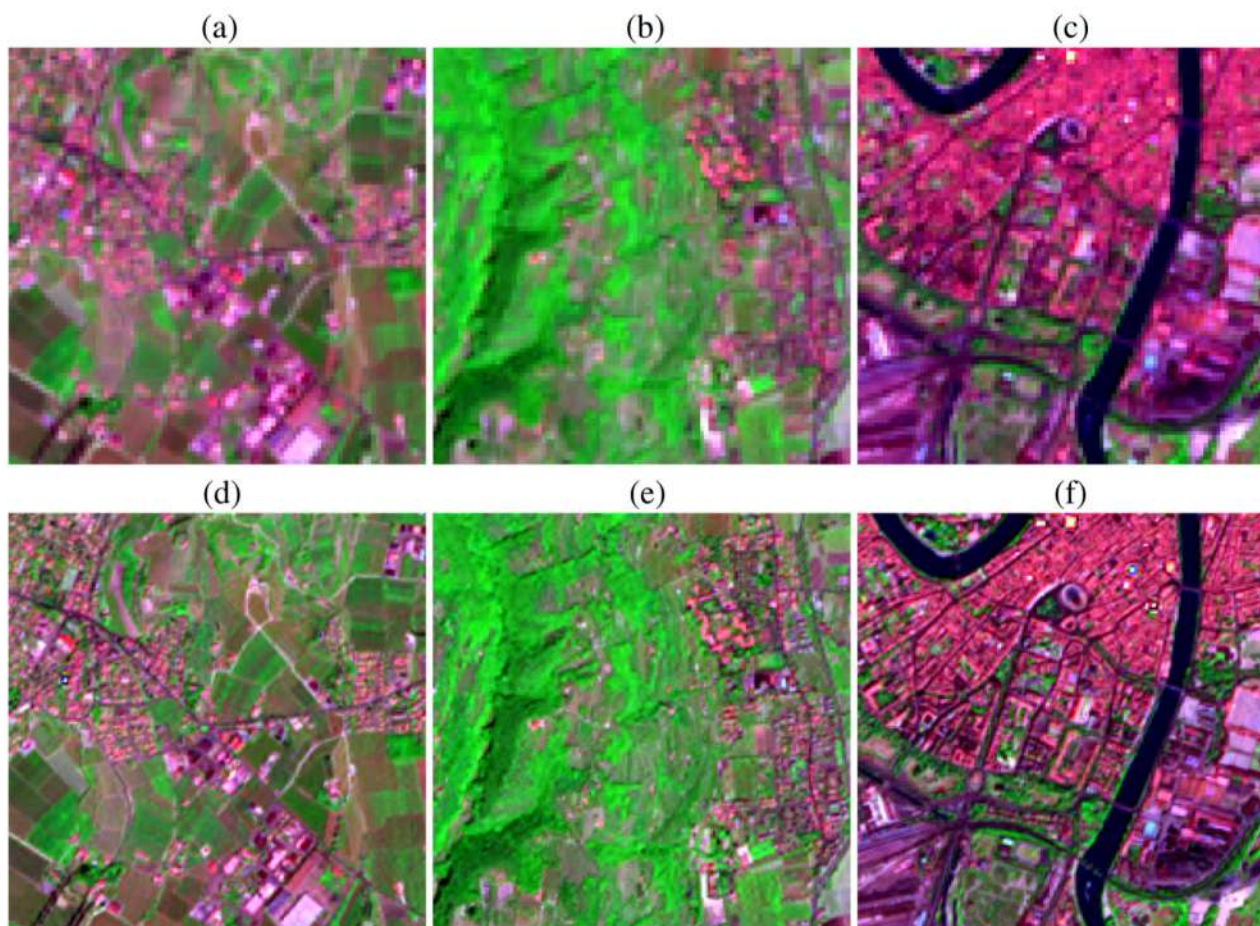


Fig. 5. Downscaling results (10 m) for three sub-areas in Verona (bands 12, 8a and 5 as RGB). (a)-(c) The 20 m data. (d)-(f) The 10 m results.

https://www.researchgate.net/publication/309308481_Fusion_of_Sentinel-2_images

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IL SERVIZIO EMERGENCY MAPPING SERVICE



CEMS



<https://emergency.copernicus.eu/mapping/ems/emergency-management-service-mapping>



RAPID MAPPING PER LE EMERGENZE

Rapid Mapping fornisce informazioni geospaziali entro poche ore o giorni dall'attivazione a supporto delle attività di gestione delle emergenze immediatamente successive a un evento.

Supporting emergency response

The service is based on the acquisition, processing, and analysis, in rapid mode, of satellite imagery and other geospatial raster and vector data sources. In order to provide information within 24h of a user's request, the workflow is highly standardised, and the products are following a set of parameters such as product type and production mode.

4 PRODUCT TYPES

- **Reference Product:** Quick knowledge on the territory and assets prior to the emergency
- **First Estimate Product:** Fast assessment of most affected locations
- **Delineation Product:** Assessment of the event impact, extent, update of the situation
- **Grading Products:** Information about the damage grade, its spatial distribution and extent, update of the situation

SERVICE LEVELS

1. **SL 1:** production in 24/7/365; to be delivered within 2–12 hours after image reception
2. **SL 2:** production during working days and delivery time 1–5 working days after image reception

Emergency Response

Recovery

Preparedness



 Access the portfolio

 List of Activations

e-GEOS EMERGENCY RESPONSE MAPPING SERVICE

Copernicus EMS Rapid Mapping Service:

Operational numbers at April 2021



502

rapid mapping activations



6.000+

maps



5.000.000+

km2 delivered



50+

Countries worldwide

*Service Provider **since 2012***

winning 3 tenders





Copernicus Emergency Management Service (CEMS) RAPID MAPPING – how it works: workflow

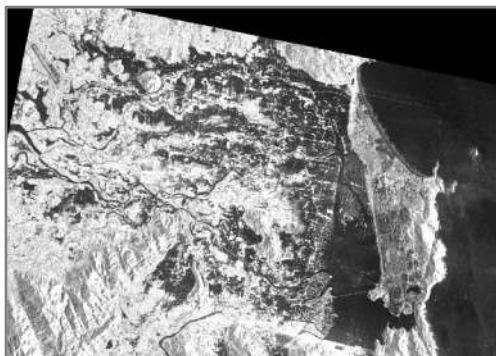


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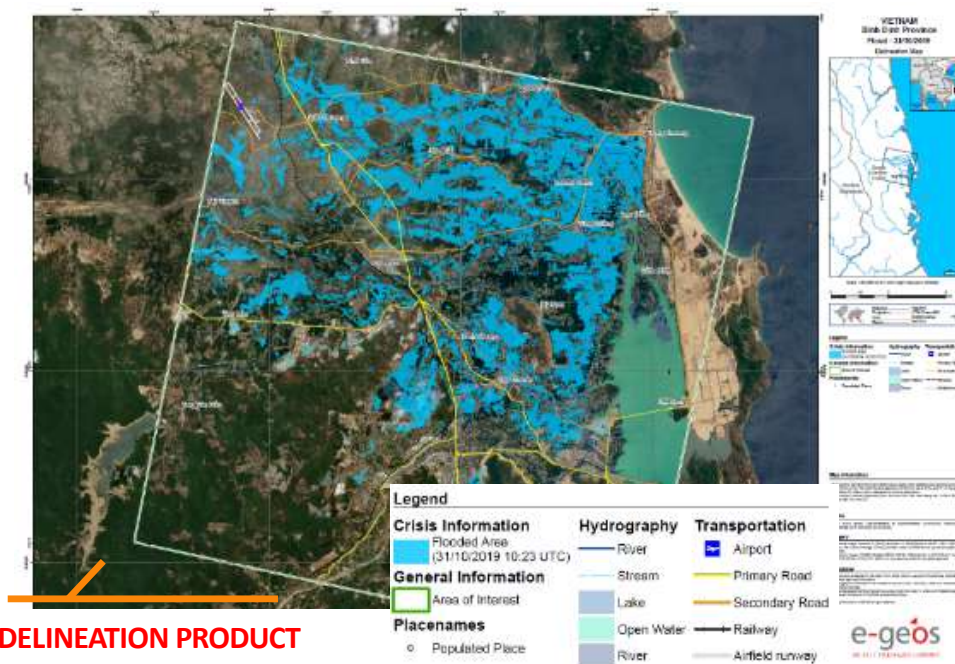


e-GEOS EMERGENCY RESPONSE MAPPING SERVICE for FLOOD (traditional)

Typhoon Matmo in Vietnam 30.10.2019



COSMO-SkyMed acquired on
31.10.2019



DELINEATION PRODUCT

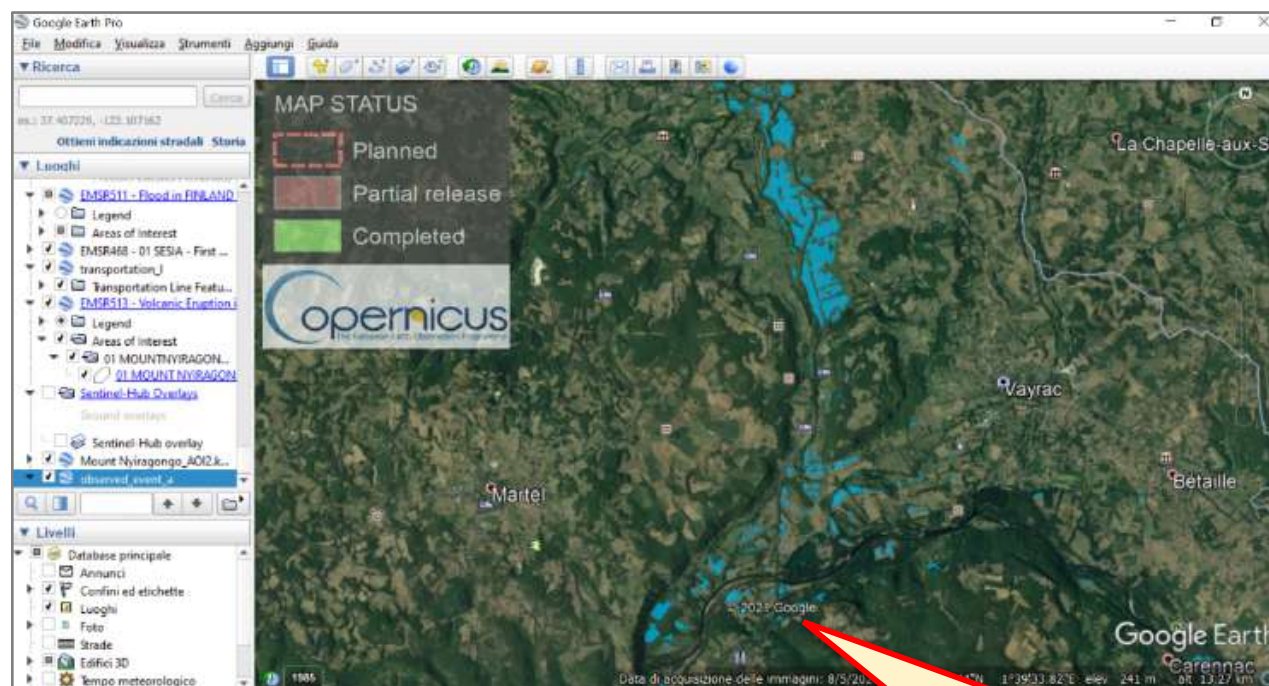
Based on SAR image, the Delineation product provides information on the extent and location of the affected areas



Copernicus Emergency Management Service (CEMS) RAPID MAPPING – new flooding service



EMSR498: Flood in Corrèze Department, France



FORMATIS

- ESRI shapefiles (containing .shp, .shx, .dbf, .prj),
- Google Earth KML (or KMZ),
- TopoJSON
- styling rules in SLD format

Vector data disponibili
gratuitamente on-line possono
essere utilizzati per effettuare
ulteriori analisi da parte
dell'Utente

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Copernicus Emergency Management Service (CEMS) RAPID MAPPING –new flooding service



EMSR498: Flood in Corrèze Department, France

Event Time (UTC): 2021-02-02 00:00

Event Time (LOC): 2021-02-02 00:00

Event Type: Flood (Riverine flood)

Activation Time (UTC): 2021-02-02 01:08

Activation Status: Closed

Affected Countries/Territories:

French Republic

Service Output: 1 products (2 maps)

Delineations: 1 products (2 maps)

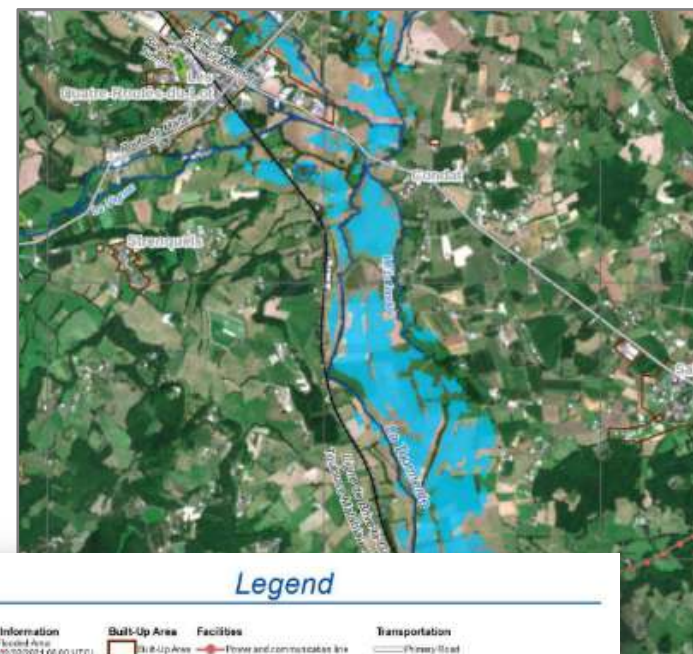
Authorised User:

France (Centre Opérationnel de Gestion Interministériel de Crises (C.O.G.I.C.))

Activation Reason:

Following the floods in the Corrèze department and the increasing water level due to the ongoing heavy rainfall, the French National Focal Point activated the Copernicus FMS Rapid Mapping to visualize the current situation.

Informazioni
sull'evento
disponibili on-line



Consequences within the AOI		Unit of measurement	Affected	Total in AOI
Flooded area		ha		296.3
Estimated population	Number of inhabitants		73	23'641
Built-up	Residential Buildings	ha	0.9	NA
	Wholesale and retail trade buildings	ha	0.0	NA
	Industrial buildings	ha	0.0	NA
	School, university and research buildings	ha	0.0	NA
	Military	ha	0.0	NA
	Cemetery	ha	0.0	NA
Transportation	Primary Road	km	0.1	NA
	Secondary Road	km	0.2	NA
	Cart Track	km	2.4	NA
	Long-distance railways	km	1.5	NA
Facilities	Settling Basin	ha	0.0	NA
	Berthing Structure	ha	0.0	NA
	Dams	ha	0.0	NA
	Constructions for mining or extraction	ha	0.0	NA
	Power plant constructions	ha	0.0	NA
	Sport and recreation constructions	ha	0.7	NA
	Long-distance pipelines, communication and electricity lines	km	0.4	NA
	Local pipelines and cables	km	0.1	NA
	Navigable canals	km	0.0	NA
Land use	Arable land	ha	0.0	178.7
	Permanent crops	ha	0.8	1'546.8
	Pastures	ha	183.1	12'803.3
	Heterogeneous agricultural areas	ha	96.5	11'249.5
	Forests	ha	13.3	21'887.8
	Shrub and/or herbaceous vegetation association	ha	0.0	876.7
	Other	ha	2.7	3'225.3



CONSEQUENCES TABLE: utile per avere una prima stima degli edifici, infrastrutture ed il tipo di uso del suolo che ha subito danni dovuti all'alluvione



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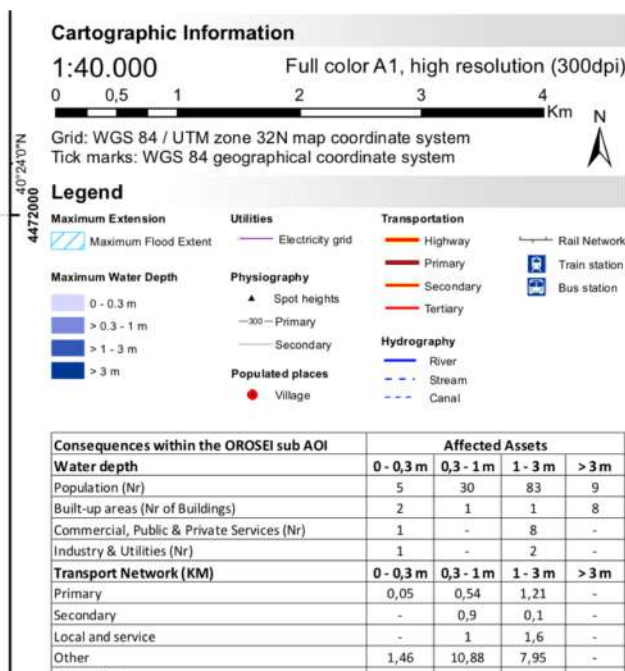


Risk and Recovery Mapping



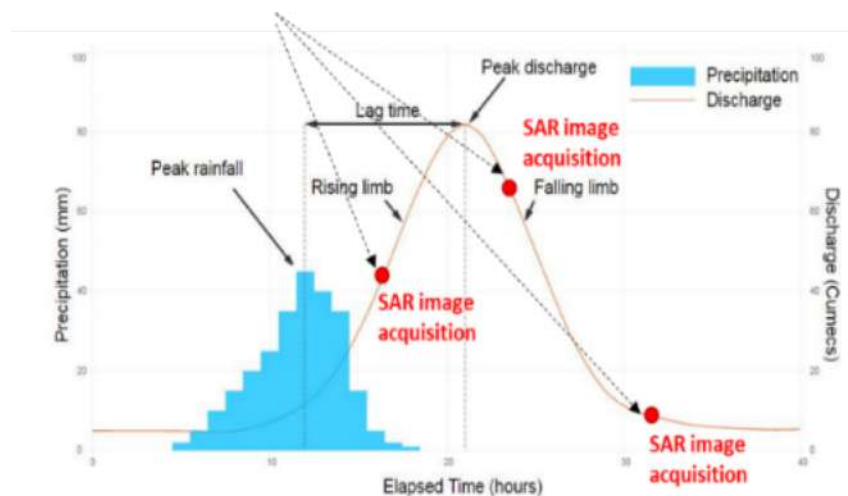
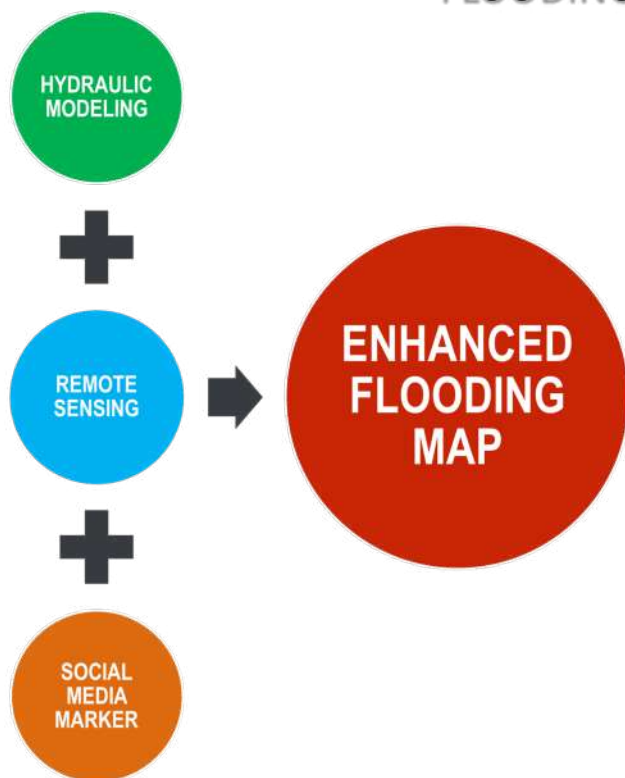
Risk and Recovery Mapping fornisce informazioni geospaziali su richiesta a supporto delle attività di gestione dei disastri, non riferite alla risposta immediata. Ciò vale in particolare per le attività relative alle fasi di prevenzione, preparazione, riduzione del rischio di catastrofi, e ripristino.

Esistono **tre** categorie di prodotti: Mappe di riferimento, Mappe della situazione pre-disastro e Mappe della situazione post-disastro.



EMSN068: Germany, Brandenburg flood mapping

FLOODING VELOCITY flow in m/s and FLOODING DEPTH in m products



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Copernicus Emergency Management Service (CEMS) RISK and RECOVERY MAPPING **Alluvioni**



EMSN068: Germany, Brandenburg flood mapping

Event Time (UTC): 2017-06-29 00:00

Event Type: Flood

Activation Time (UTC): 2020-02-17 17:01

Activation Status: Closed

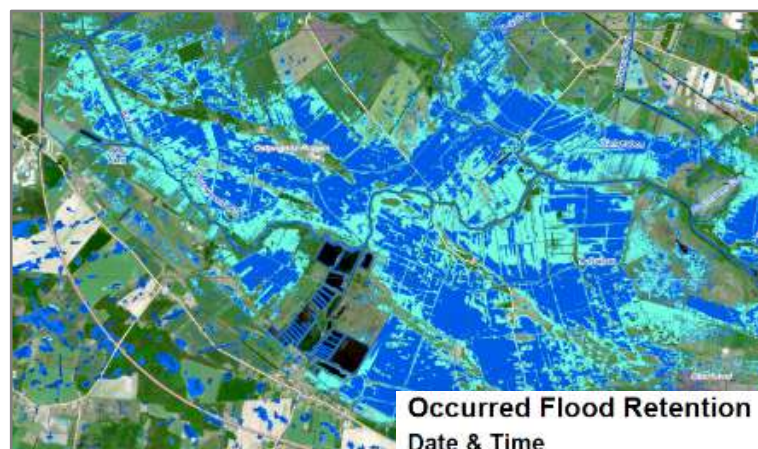
Affected Countries/Territories:

 Federal Republic of Germany

Area Descriptor: Area of Rhin-Havelluch, District
Oberhavel in Brandenburg (Germany)

Authorised User:

Federal Office of Civil Protection and Disaster Assistance



Occurred Flood Retention Date & Time	
	29/06/2017 12:00 UTC
	30/06/2017 17:00 UTC
	01/07/2017 16:51 UTC
	02/07/2017 12:00 UTC
	03/07/2017 05:24 UTC
	04/07/2017 05:16 UTC

Nel servizio **Risk and Recovery Mapping** è possibile trovare prodotti che si basano anche su modellistica idraulica che consente di ricostruire l'intero evento e soprattutto di estrarre ulteriori informazioni sull'area colpita:

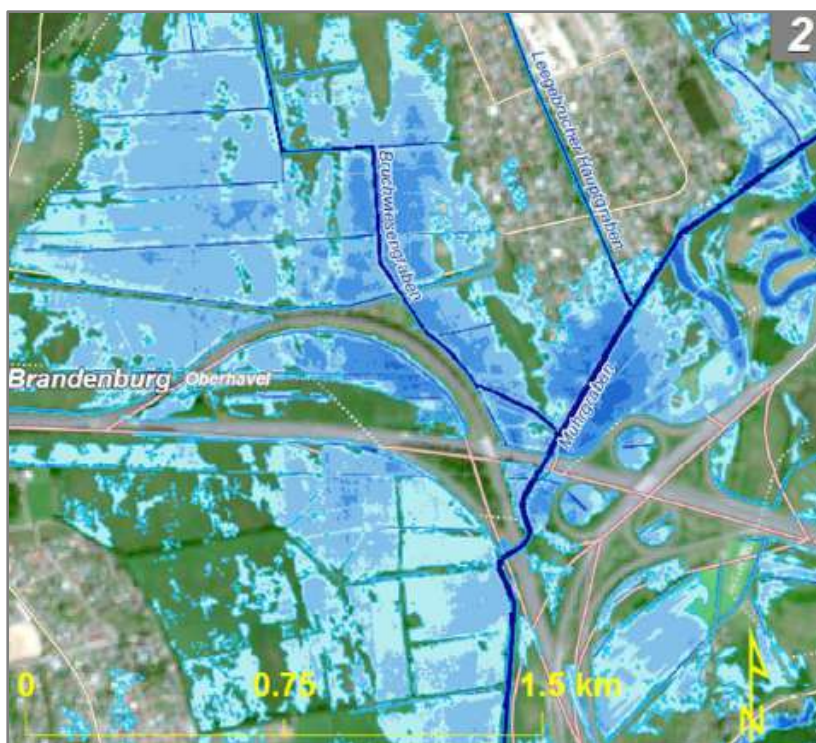
- Massima estensione del flood
- Profondità dell'acqua
- Flood retention



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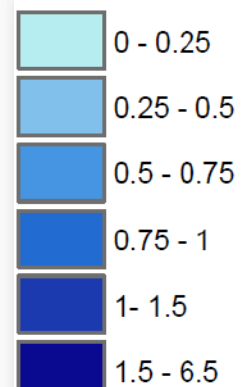
EMSN068: Germany, Brandenburg flood mapping

P06 TEMPORAL ANALYSIS



**Massima estensione
&
Massima altezza dell'acqua**

Max Water Depth (m)



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Copernicus Emergency Management Service (CEMS) RISK and RECOVERY MAPPING – flooding



EMSN068: Germany, Brandenburg flood mapping

P14 IMPACT ASSESSMENT ANALYSIS

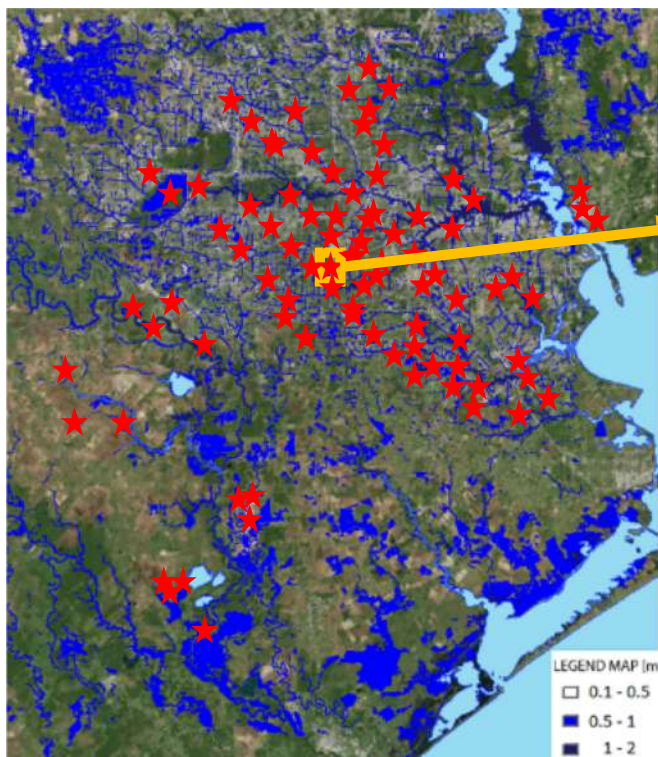
Consequences within the AOI				
	Unit of measurement		Affected	Total in AOI
Flooded area	ha		12543	
Estimated population	Number of inhabitants		1171	20076
Settlements	Residential Buildings	No.	884	15154
Transportation	Highways	km	2,0	42,5
	Primary Roads	km	0,2	9,7
	Secondary Roads	km	10,3	185,8
	Long-distance railways	km	3,4	22,9
Landuse	Arable lands	ha	3242,6	15771,1
	Permanent crops	ha	0,7	10,5
	Pastures	ha	7611,6	16819,4



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The Enhanced Flood Footprint (EFF) product VALIDATION



Validation phase with social media marker



Confrontando le informazioni estratte da tutti i marker rilevati, per tutti i giorni di eventi estremi, e i risultati ottenuti dal modello idraulico, è possibile validare LOCALMENTE i risultati della profondità simulata al fine di ottenere una mappa delle piene con altissima precisione .

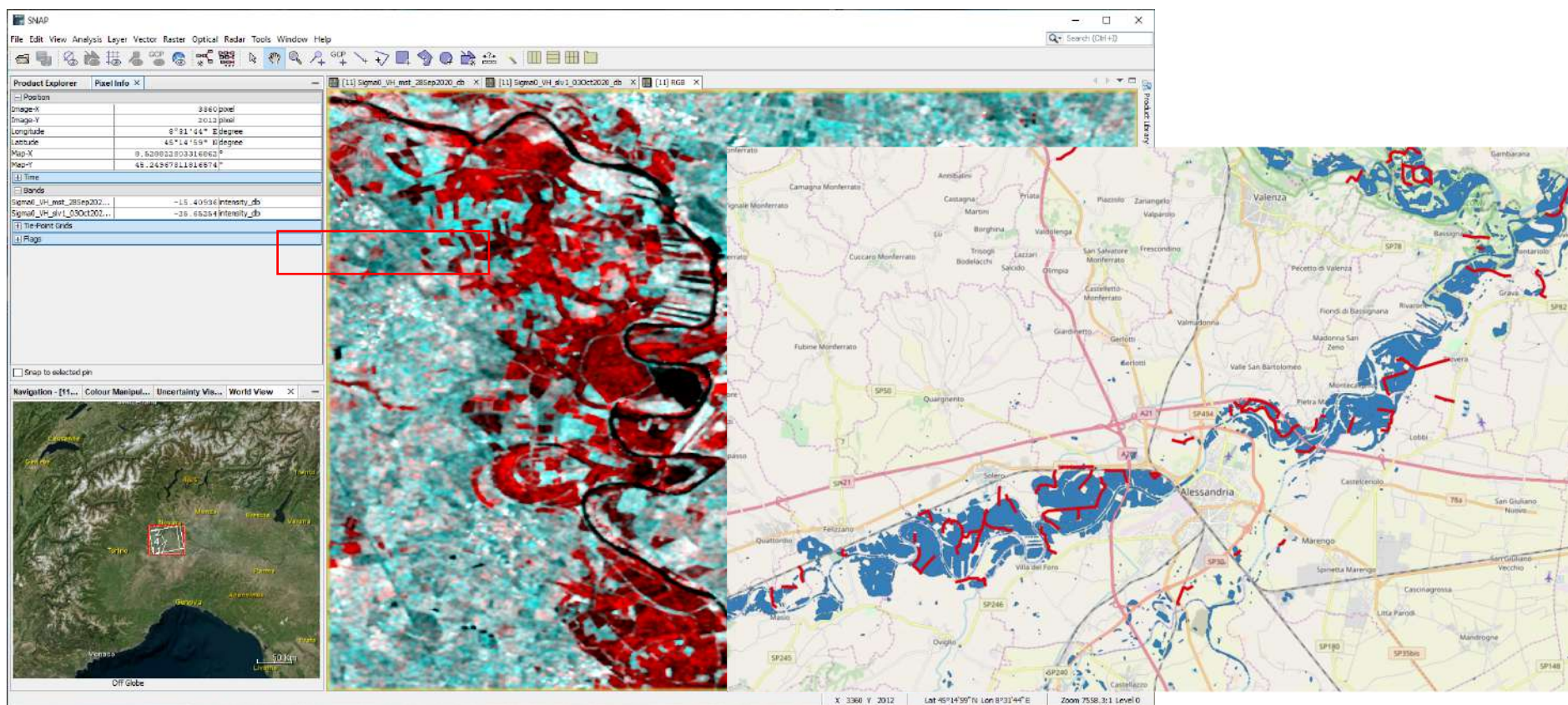
TECNICA INNOVATIVA PER LA VALIDAZIONE DELLA MODELLAZIONE IDRAULICA, EFFETTIVAMENTE NON PRESENTE IN LETTERATURA

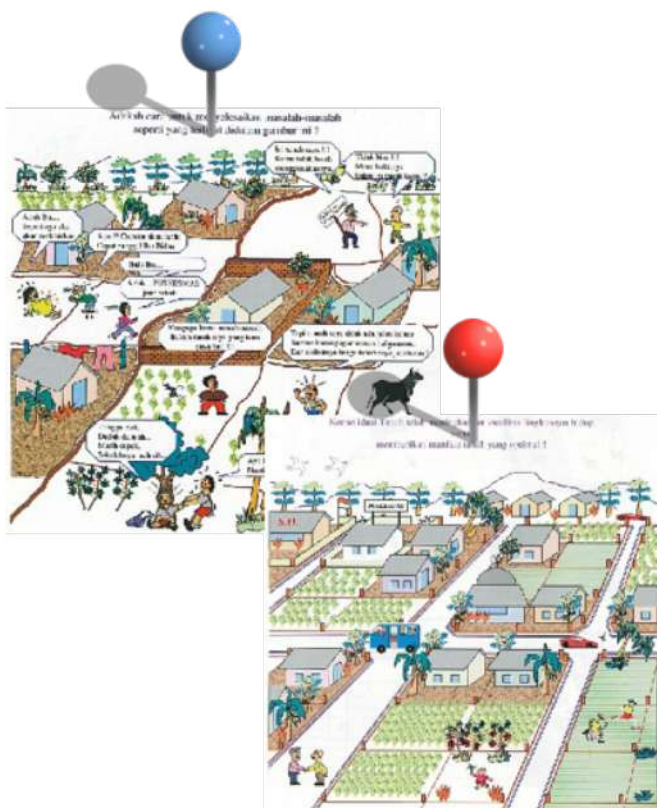
e-geos

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Utilizzo operativo dei dati disponibili in locale

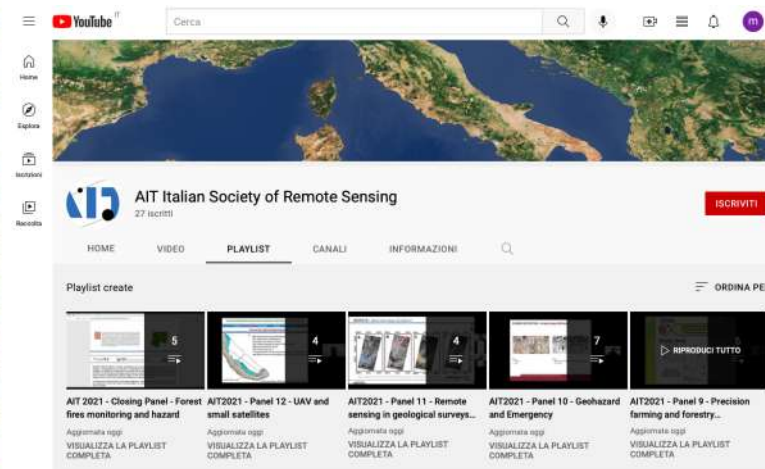




PIANIFICAZIONE PREVENZIONE PROGETTAZIONE MONITORAGGIO



La natura si prende/riprende i suoi spazi



https://www.youtube.com/channel/UC_AyJcWpWCADS0KYU2IvdwyQ/playlists

Grazie per l'attenzione

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