



SaferPlaces Global Platform

Digital twin platform supporting flood emergency response and civil protection through real-time Earth Observation data.



**ONLINE INFOSESSION: SPACE4URBAN
ADAPTATION AND FLOODS**

**HOW SPACE USES EMPOWER LOCAL AND REGIONAL
AUTHORITIES FOR URBAN ADAPTATION AND FLOOD
RESILIENCE**



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THE PROBLEM

Are our cities ready to face the next extreme event?

Emilia Romagna :

- 2 May 2023
- 17 May 2023
- 19 Sep. 2024
- 19 Oct. 2024

Source: [Italian Red Cross](#),
Emilia-Romagna flooding, May 2023



Flood Risk Intelligence at your fingertips



Flood Risk Intelligence

- High Resolution data at building level
- Past, Real-time and Future Climate Change scenarios

For:

- Investment in adaptation and mitigation measures (NBS)
- Parametric Flood Insurance Schemes
- Flood Risk Disclosure
- Protect people, assets and reduce damages

PROBLEM

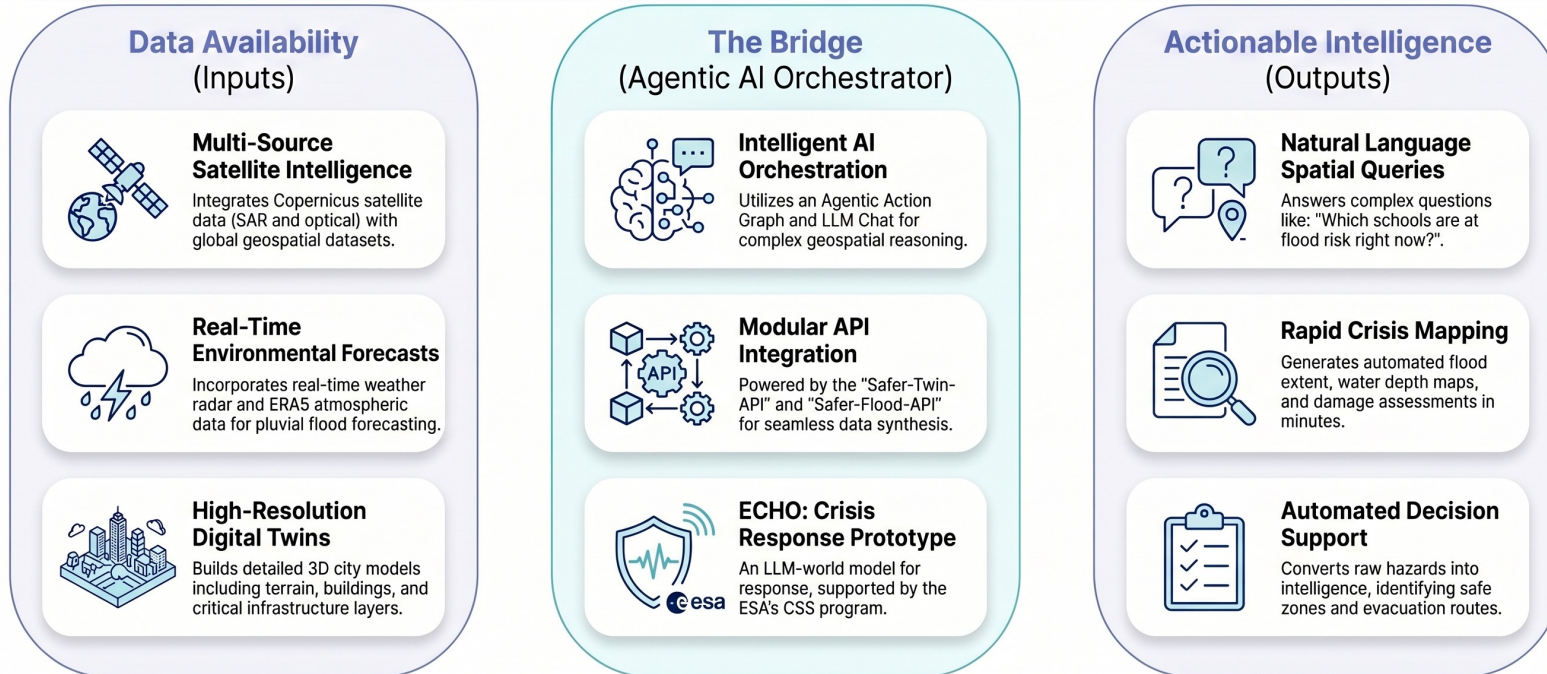
Flood risk information exists – but it doesn't reach people

Democratising Access-Interaction-execution

*If Climate, Geospatial and Satellite data aims to deliver real impact, it must become usable at **decision time**, by the people who actually manage risk on the ground*

SaferPlaces: Bridging the Gap from Raw Data to Actionable Flood Intelligence

SaferPlaces utilizes an **Agentic AI Orchestrator** to synthesize satellite imagery, weather forecasts, and city-scale Digital Twins. This system transforms complex geospatial data into rapid mapping and natural language answers for critical crisis response.



Flood Risk Intelligence

- Cities and emergency managers struggle to operationally use this data
- Flood decisions must be fast, intuitive, and actionable

SaferPlaces Cloud Web Platform

Dual Interface Intelligence for Resilience



Interface A: Classical Cloud Web GIS

Manual Simulation & Design

This interface provides full control over the Digital Twin, allowing expert users to manually generate flood scenarios and design specific mitigation measures like barriers or storage tanks.



Interface B: Agentic AI Interface

Natural Language Geospatial Reasoning

Users interact with the 'SaferAgent' using conversational prompts such as: 'Create a specific coastal flood scenario in 2050 and identify affected receptors, roads, and infrastructures.'

The Agentic Flood Orchestrator

Automated Decision Workflows

The AI acts as an orchestrator, converting complex spatial questions into clear, actionable intelligence by coordinating various software modules.



Zone A: Operational

Maritime Terminal Continuity

Testing operational continuity and forecast alerts for a dedicated logistics and maritime terminal.



Zone B: Public

Community Risk Identification

Assessing and protecting a mixed-use waterfront area to identify community-level risks.



Zone C: Environmental

Nature-Based Mitigation

Modeling ecologically sensitive zones to understand wetland behavior and natural flood barriers.

3D XR Reality Visualization

Immersive Data Convergence

All data and scenarios produced by both the Web GIS and Agentic AI are synthesized into a high-fidelity 3D model of the waterfront.



Visualization via XR Headsets

Immersive perspective on asset exposure

Stakeholders can use Visor XR reality headsets to walk through the 3D flood simulations.

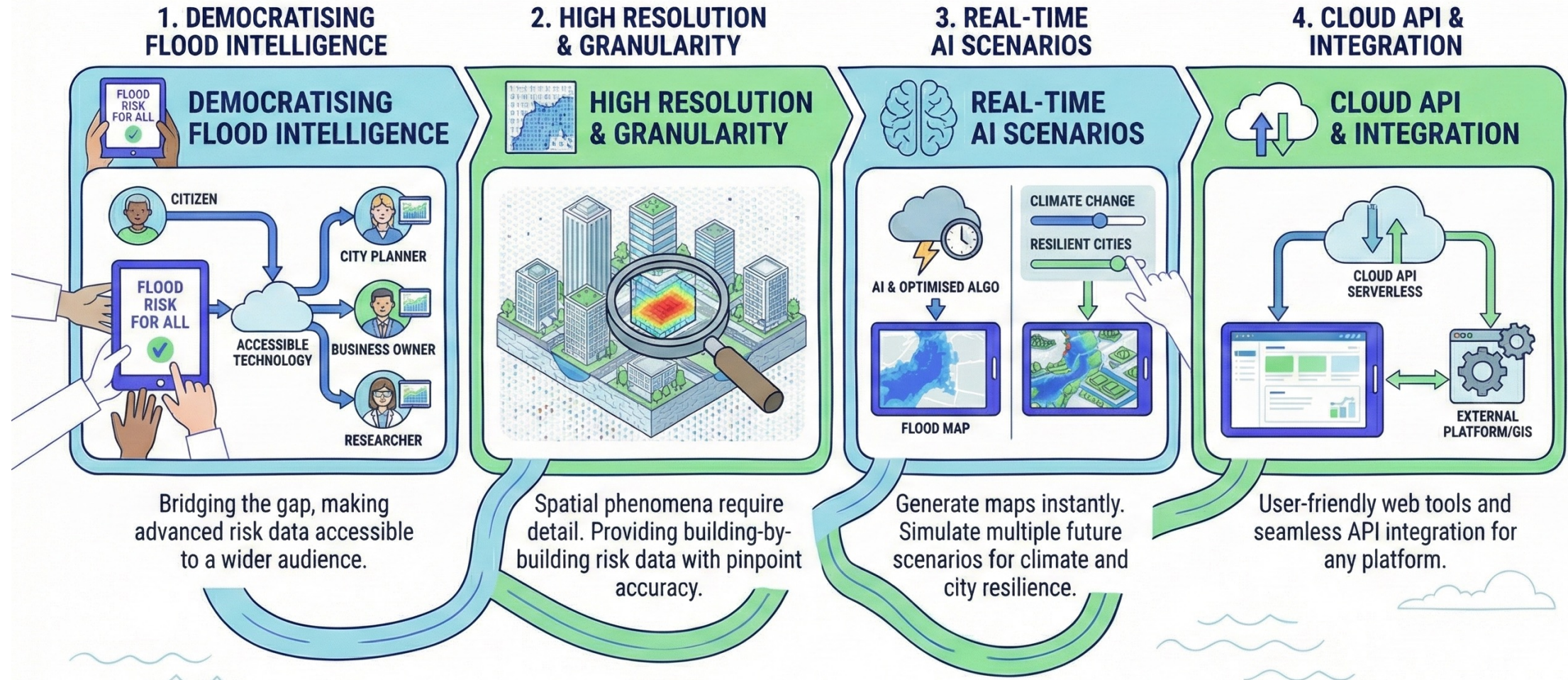


6-Pillar Technology Foundation

Built on Big Open Data

The 3D output is powered by a robust backend of climate, geospatial, satellite (Copernicus), and on-site IoT data.

SaferPlaces Value Proposition



Empowering smarter decisions with accessible, high-resolution, real-time, and integrated flood intelligence.

SaferPlaces Flood Intelligence Timeline

[STAGE 1: NOWCAST]
(0-3 Hours)



The Immediate Response Window



[STAGE 2: FORECAST]
(12-48 Hours)



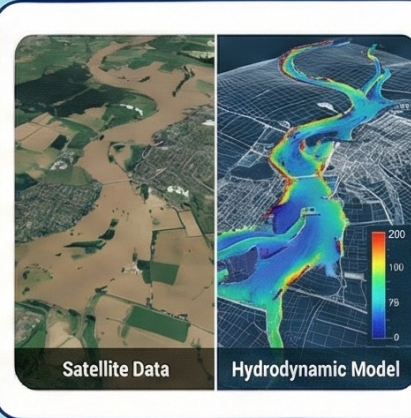
Anticipate & Prepare



[STAGE 3: POSTCAST]
(After the Event)



Forensics & Validation



[STAGE 4: CLIMATECAST]
(2030-2100)



Future-Proofing Assets



Flood Risk Intelligence



One Platform. Every Horizon. SaferPlaces integrates real-time intelligence, operational forecasting, event forensics, and climate fit.

5. Scalable and Powerful Cloud Computing



- A Scalable Cloud computing framework for a time and cost-effective deployment
- No need to install software locally
- Results in almost real time

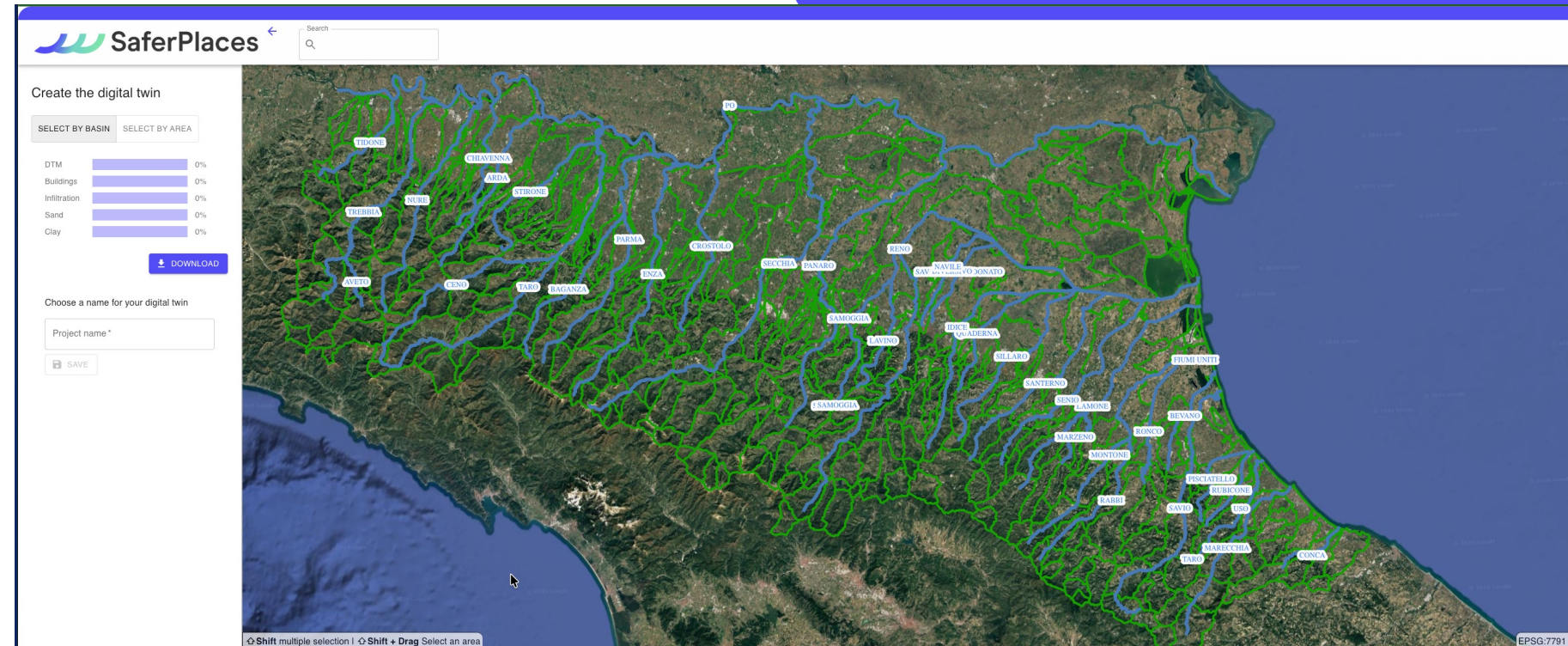
The Solution: An Agentic Digital Twin



A living, self-updating virtual replica of the entire San Diego jurisdiction—unifying geospatial, satellite, and on-site IoT data into actionable decision intelligence.

Supporting Emilia-Romagna Civil Protection

- Entire ER Activation
- 30 Users
- Pluvial and Fluvial Flood Event

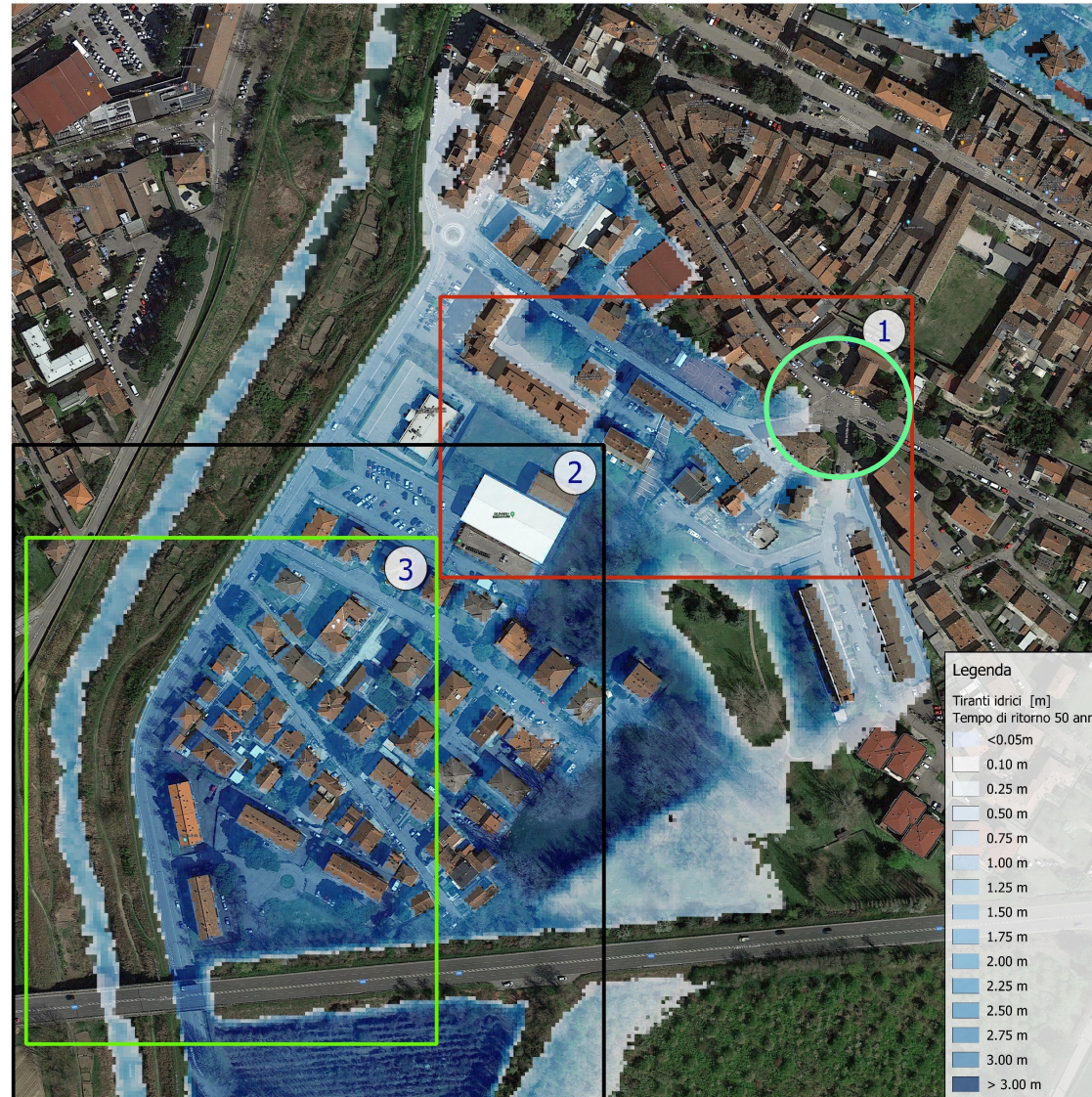


Supporting Emilia-Romagna Civil Protection

During the flooding
emergency in May 2023

- Rapid Flood Mapping
- Early-warning
- Evacuation of people

[Read more here](#)

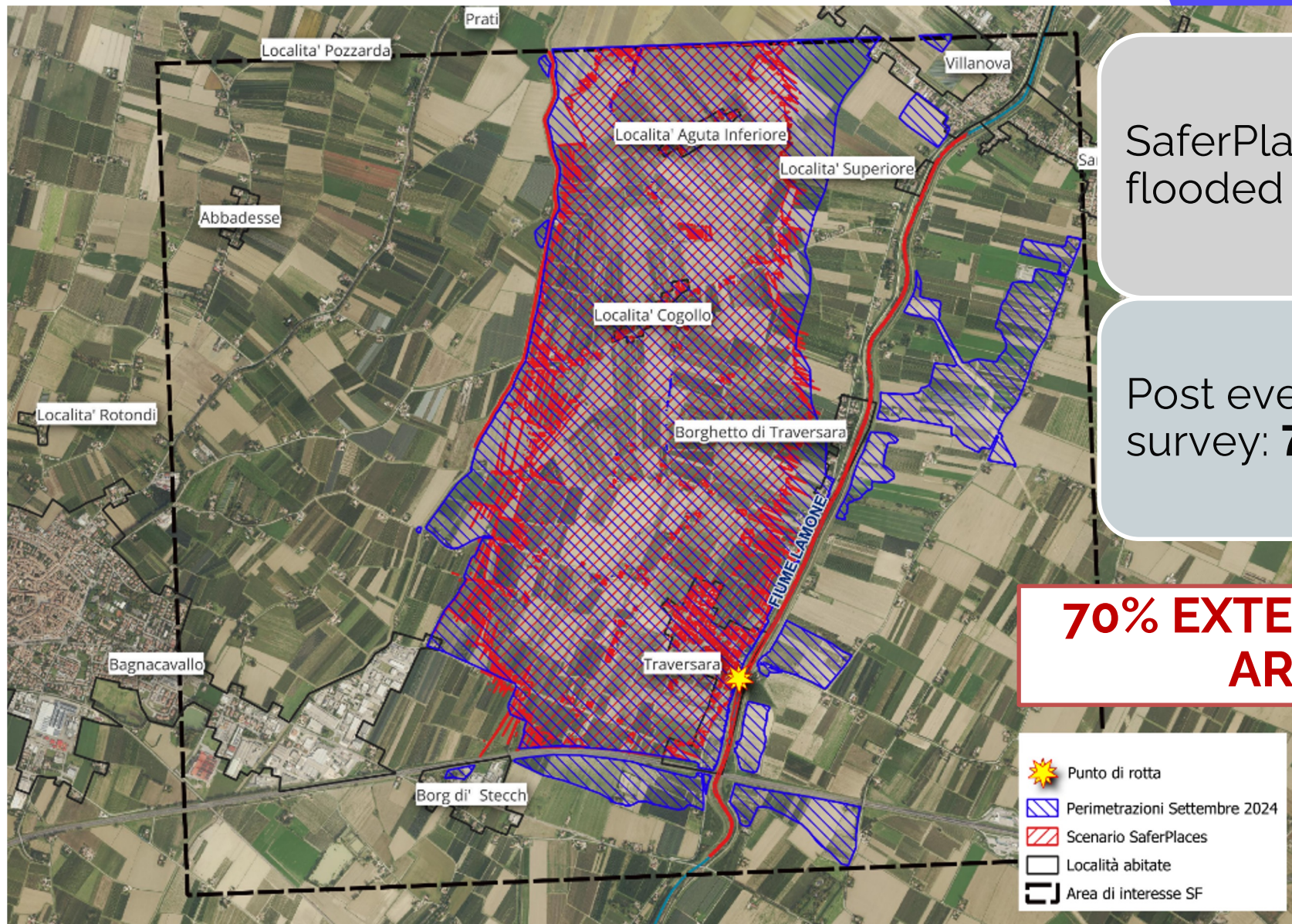


Alluvione del 3 maggio 2023 a Faenza
località Borgo Durbocco

Confronto tra aree allagate da ripresa aerea e
mappe dei tiranti idrici (tempo di ritorno 50 anni)
prodotte dalla piattaforma SaferPlaces








Supporting Emilia-Romagna Civil Protection



SaferPlaces UNTRIM computed flooded area map: **5,426 km²**

Post event real flooded areas aerial survey: **7,992 km²**

70% EXTENT CORRECT FLOODED AREAS DEFINITION

-  Punto di rotta
-  Perimetrazioni Settembre 2024
-  Scenario SaferPlaces
-  Località abitate
-  Area di interesse SF

Satellite-Based Flood Mapping in Emilia-Romagna



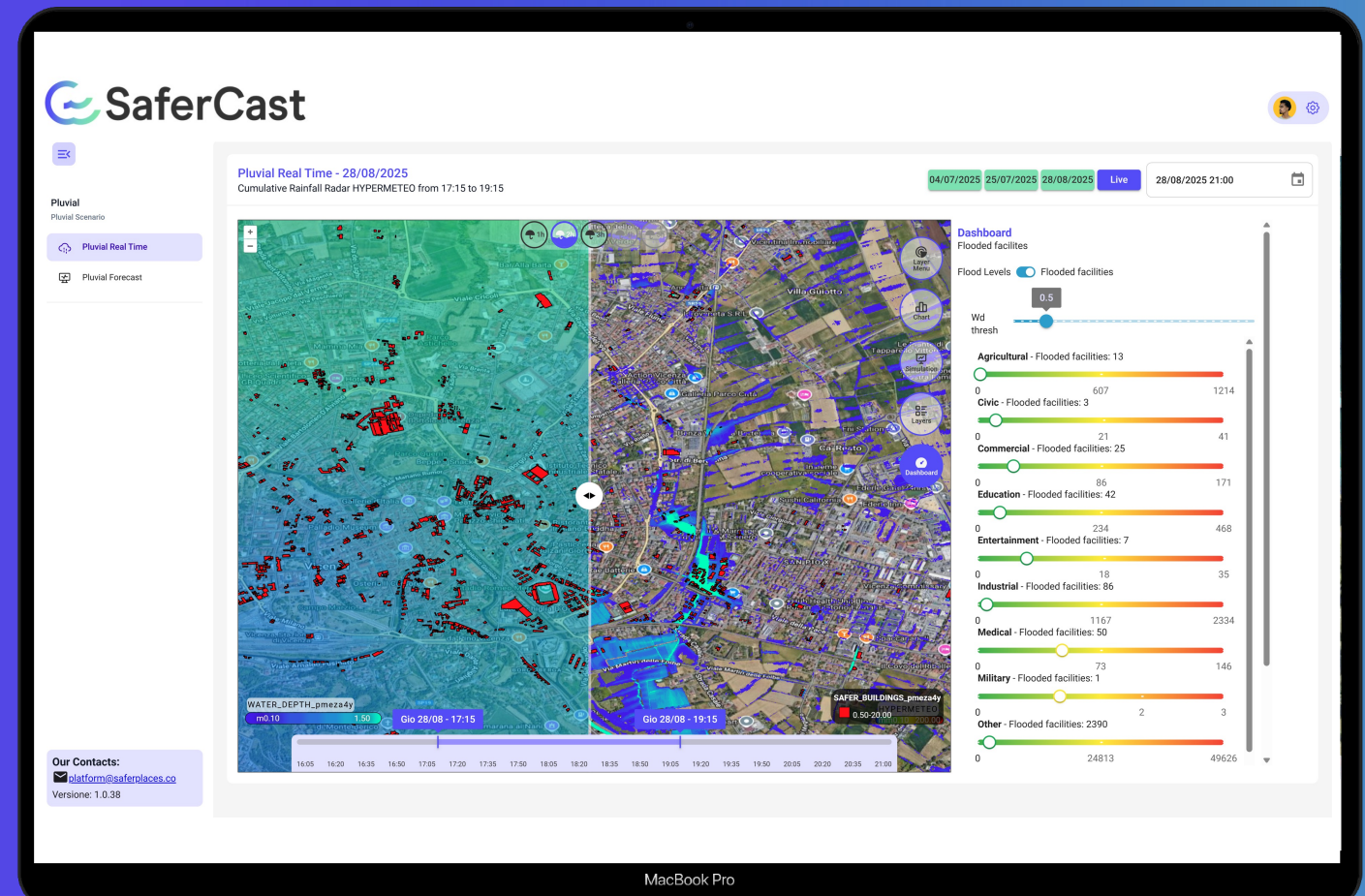
<https://dea.destine.eu/web/stories/viewer/69ef63f2d14c22093cb7b645>

SaferCast

Flood Early Warning



- Cloud Web Operational Flood Forecasting
- Predicting pluvial flood events in real time



SaferPlaces Value Proposition

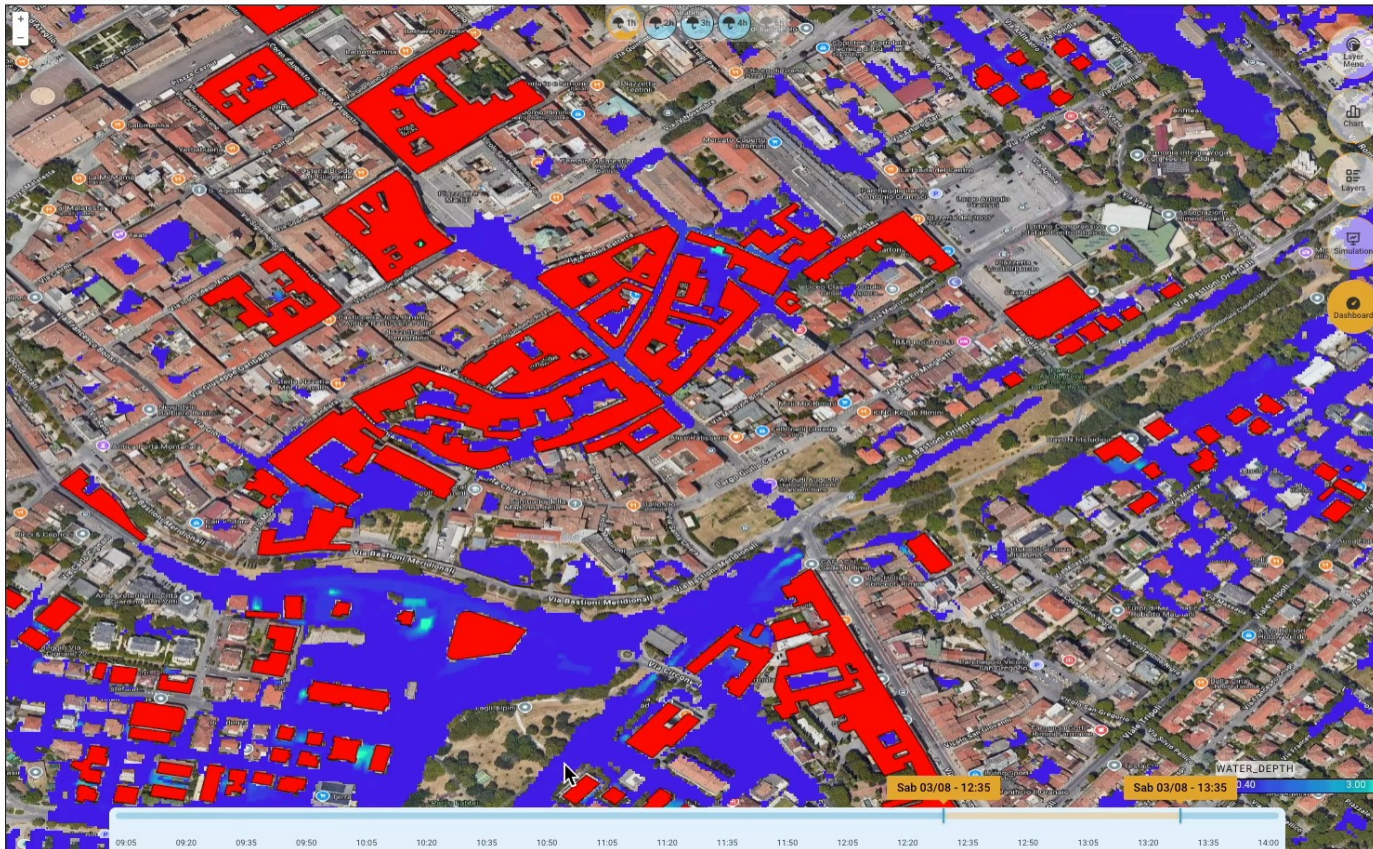
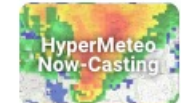
The screenshot displays the SaferPlaces web application interface. At the top, the 'Directed Project' logo is on the left, and navigation links for 'Home', 'Real World Labs', 'Directed Project Website', 'Github Organization', and 'Model Documentation' are in the center. On the right, the version '1.0.106', a 'Login' button, and a 'Sign Up' button are visible.

The main content area is titled 'Pluvial Real Time - 24/08/2025' with the subtitle 'Instantaneous Rainfall DPC and ARPAE At 06:00'. It features a date selector with '24/08/2025', '26/03/2026', and 'Live' options, and a time selector set to '24/08/2025 06:00'. A map of the Cesena region shows rainfall data with a color scale from 0.00 to 200.00 mm. A legend at the bottom left of the map indicates 'DPC' with a scale from 0.30 to 200.00 mm. A time axis at the bottom of the map shows intervals from 01:00 to 06:00. A 'Layers' panel on the right includes 'DPC', 'ARPAE', 'social_vulnerability_index_rimini_2', 'Google Hybrid', 'Google Road', and 'OSM Standard'. A 'Our Partners:' section at the bottom left lists SaferPlaces, arpae, and HERA.

SaferCast - Pluvial Flood in Cities

Weather Short-Term Forecast

Select Forecast Model



Dashboard

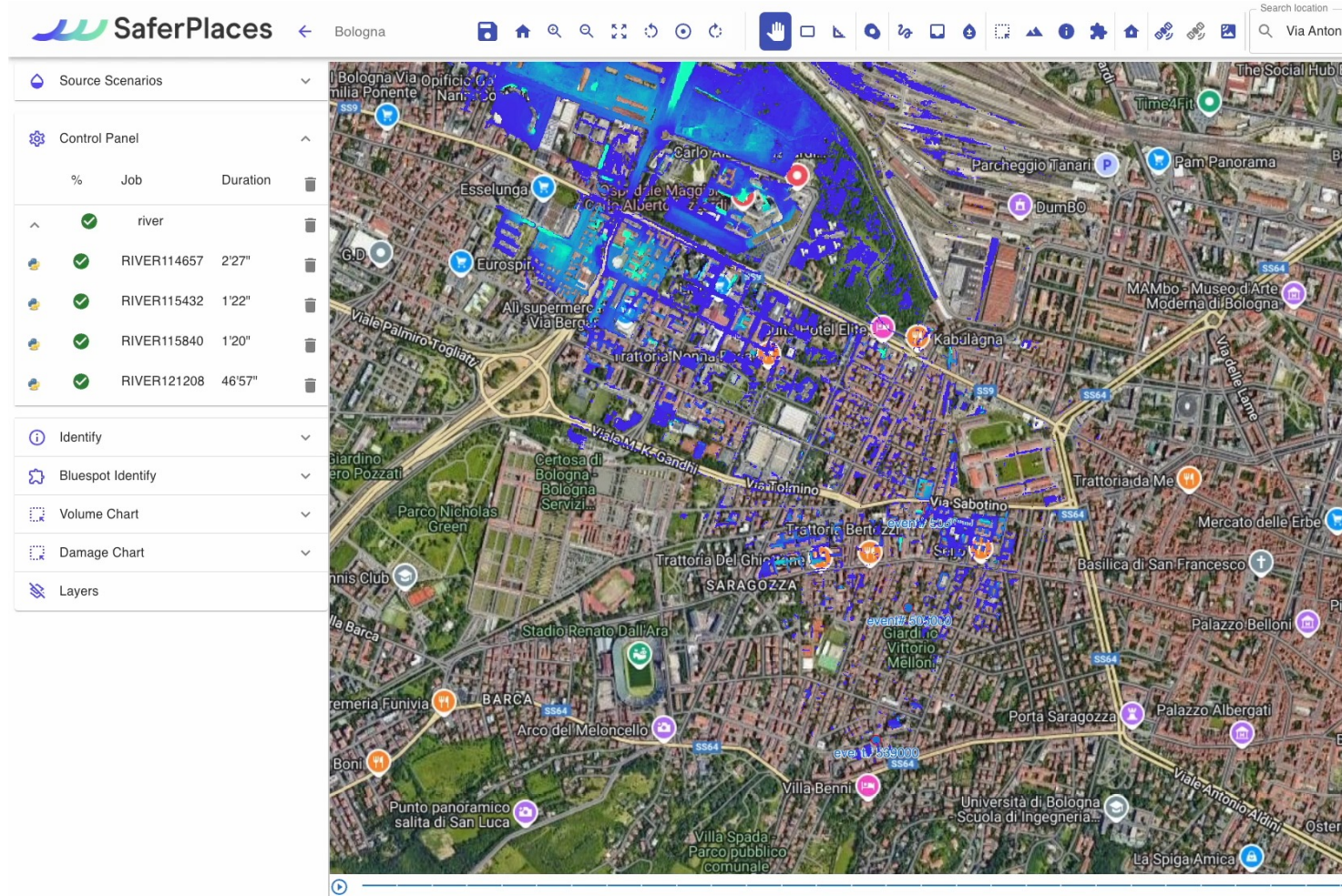
Flooded facilities

Flood Levels F 0.5 facilities



Post-event Analysis Bologna Digital Twin

Bologna Flood Event 20 October 2024

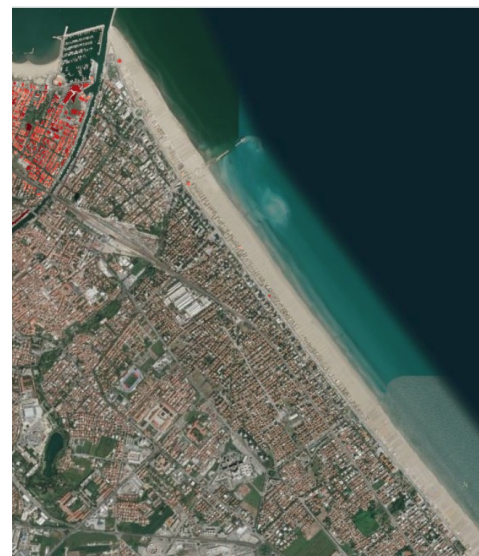


Coastal Flood Resilience -Design of Rimini's "Sea Park"



Year 2050
*Coastal Flooding
Extension &
Associated Damages*

*Without Parco del
Mare (left)
and with "Parco del
Mare" (right)*



- Nature-based solution
- Preventing and mitigating coastal flood risk
- Cost-benefit analysis
- Quantification of the avoided damages



Coastal Flood Resilience -Design of Rimini's “Sea Park”



The Brain of Safer-Sat



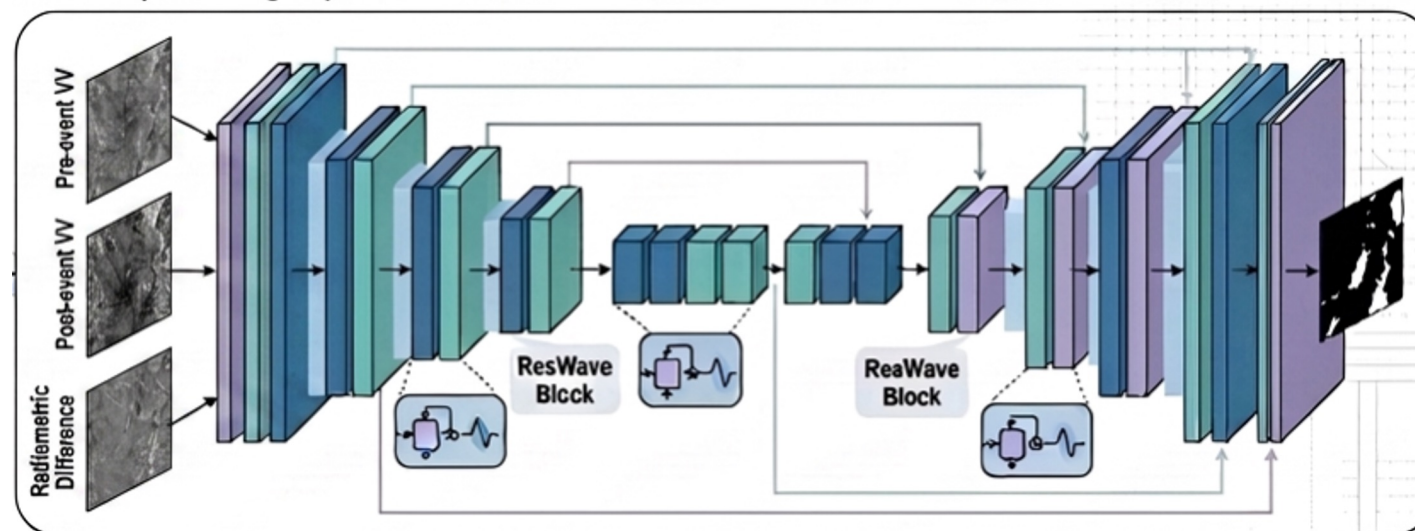
Pr-ResWaveUNet

Ultra-Lightweight

Only 2.6 Million parameters

Tri-channel Physical Input

Pre-event VV, Post-event VV, and Radiometric Difference



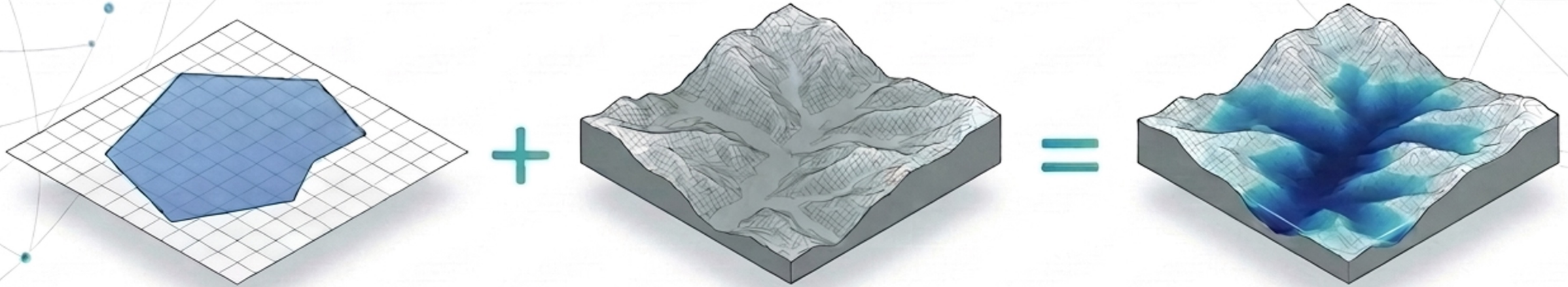
S1GFloods Dataset

42 Global Flood Events

5,360 Image Pairs

| Model | Param (M) | Prec (%) | Rec (%) | Acc (%) | F1 (%) | IoU (%) |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| FC-Siam-Diff (Daudt et al., 2018) | 1.35 | 88.3 | 96.3 | 94.9 | 92.2 | 85.4 |
| FC-Siam-Conc (Daudt et al., 2018) | 1.54 | 91.2 | 96.3 | 96.0 | 93.7 | 88.1 |
| DTCDCSN (Liu et al., 2020) | ~25.0 | 91.2 | 96.6 | 96.0 | 93.8 | 88.3 |
| U-Net (Ronneberger et al., 2015) | 31.0 | 93.3 | 94.2 | 96.1 | 93.8 | 88.3 |
| ResNet50-RSP (He et al., 2016) | 25.5 | 93.8 | 94.1 | 96.3 | 94.0 | 88.6 |
| ResNet50-IMP (He et al., 2016) | 25.5 | 95.3 | 94.6 | 96.9 | 94.9 | 90.4 |
| SNUNet-ECAM (Fang et al., 2021) | 12.0 | 95.2 | 96.4 | 97.4 | 95.8 | 92.0 |
| Siam-Nested-UNet (Zhang et al., 2021) | ~36.0 | 96.1 | 97.1 | 97.7 | 96.3 | 93.1 |
| Swin-T-IMP (Liu et al., 2021) | 28.3 | 95.0 | 94.2 | 96.7 | 94.6 | 89.8 |
| ViTAEv2-IMP (Qin et al., 2022) | ~48.0 | 96.5 | 95.4 | 97.5 | 95.9 | 92.2 |
| DAM-Net (SOTA) (Saleh et al., 2024) | ~44.0 | 96.8 | 97.2 | 97.8 | 96.5 | 93.2 |
| Pr-ResWaveUNet (Ours) | ~2.6 | 97.0 | 97.1 | 98.1 | 97.0 | 94.3 |

From 2D to 3D Using FLEXTH Model



1. 2D Flood Extent

The 'Where'. Satellite imagery or modeled data mapping the flat surface boundaries of a flood.

Area (m²)

2. Digital Elevation Model (DEM)

The 'Shape'. High-resolution topographic data capturing the exact ground elevation baseline.

Elevation (m)

3. 3D Flood Map

The 'Impact'. Intersecting the 2D extent with the terrain generates accurate, volumetric water bodies.

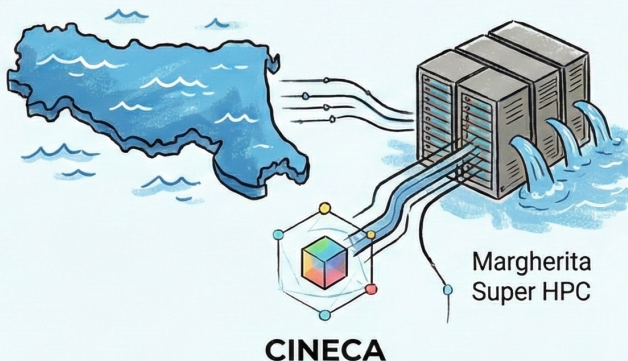
Depth (m) & Volume (m³)

SaferPlaces for the Emilia-Romagna Civil Protection

Supercomputing installation: «*MarghERita*» infrastructure

Proven Adoption

Civil Protection



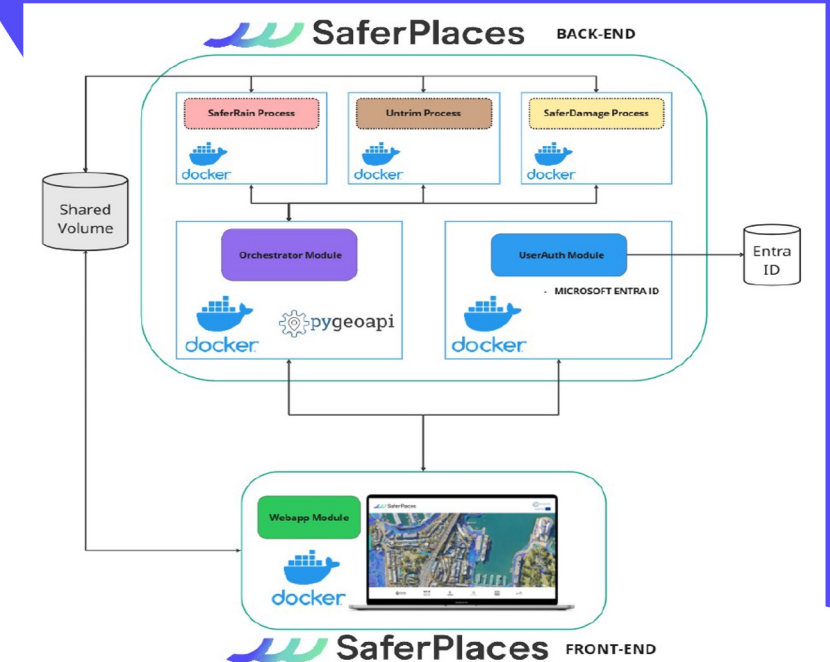

Margherita Super HPC

CINECA

Emilia-Romagna Region (Italy)
Dedicated deployment on the 'Margherita' Super HPC (CINECA). Used operationally for rapid flood mapping during emergency events.

World Bank

International Development
Supporting flood resilience development projects in Angola. Proving the platform's ability to scale to data-scarce regions.



Rapid flood modeling powered by the regional supercomputer

The Solution

From complex data to decision intelligence:

- Autonomous AI Agent
- Performs geospatial reasoning and LLM-based interpretation
- Understands and answers spatial questions like:
 - “Is my area at risk of flooding?”
 - “How can I protect my house from the flood of tomorrow?”

SaferPlaces AI Agent

Our Solution: Agentic AI

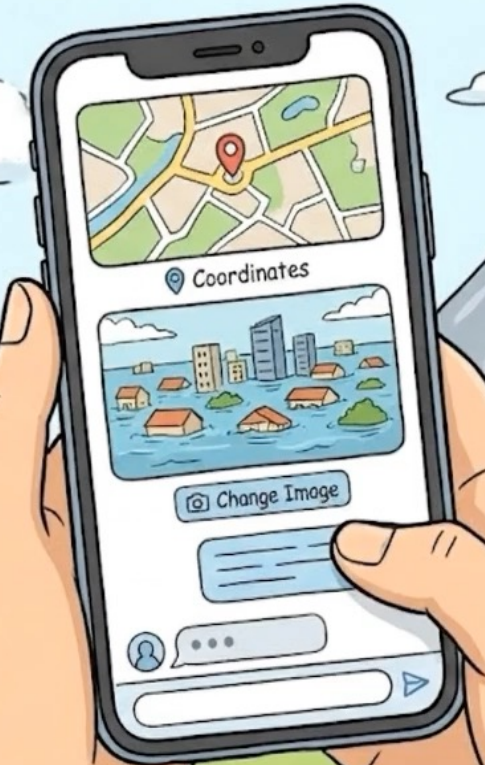
We replace complex dashboards with a ChatGPT-like interface...

Users ask simple questions in natural language, and autonomous AI agents orchestrate data retrieval, simulations, and results.

Can you simulate the flood risk for Rimini tomorrow?



WARNING: High risk detected in City tomorrow!



AI Chat

Settings

Clean



- Simulating flooding scenarios based on rainfall input using SaferRain.
- Creating Digital Twins by generating Digital Elevation Models (DEMs) and base layers for specified areas.
- Accessing meteorological data for Italy, including past and recent rainfall, temperature, and radar data.
- Providing global weather forecasts for up to 14 days through Meteoblue.
- Simulating wildfires with SaferFire, given the necessary DEM and ignition sources.
- Detecting flooded buildings using SaferBuildings, which requires a water depth raster.

If you have a specific request or need assistance with a simulation or data retrieval, feel free to ask!

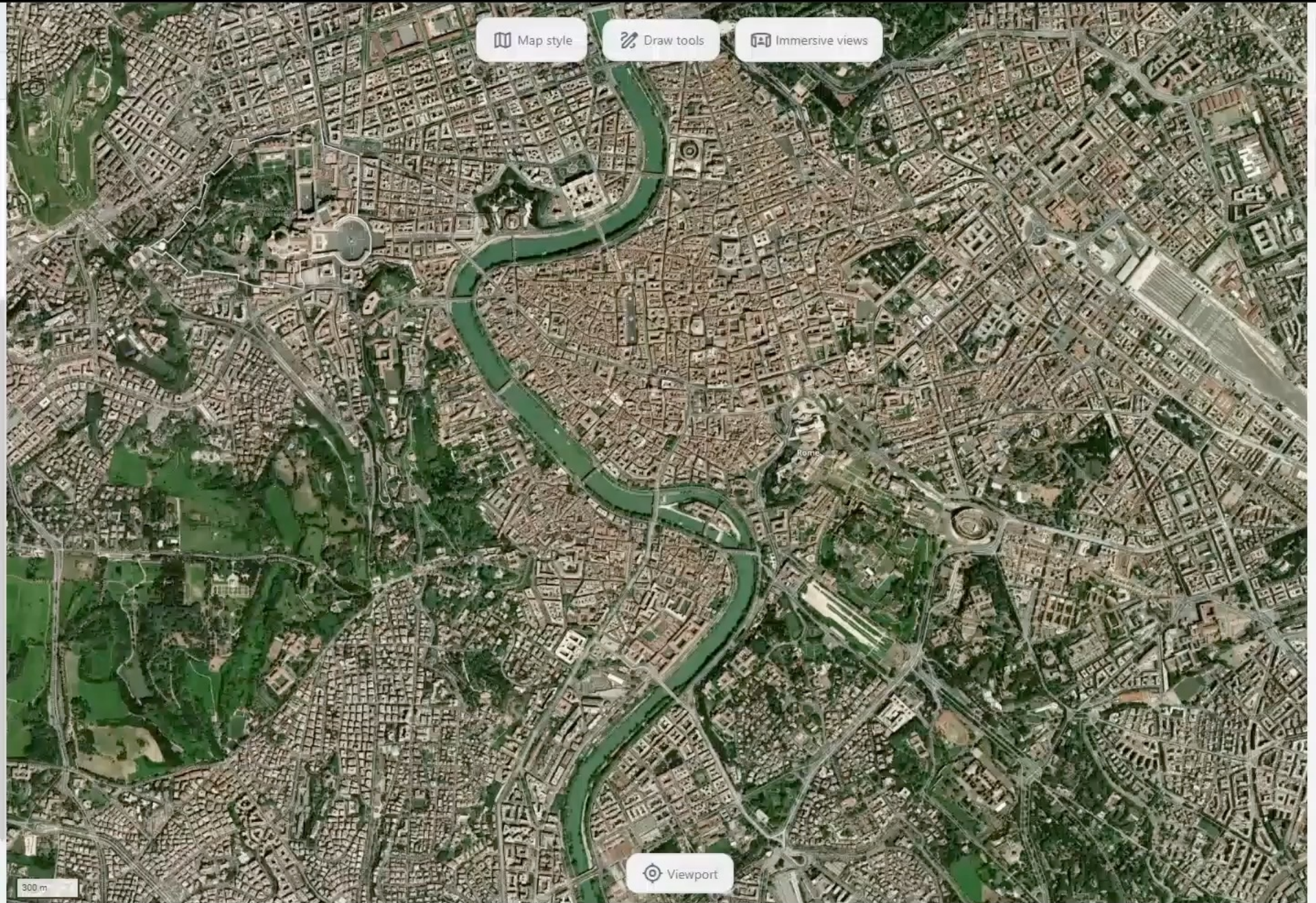
good, please zoom to rome city center

Currently, there are no layers or shapes available in the project, and the map remains at a zoom level of 3. Therefore, I was unable to zoom specifically to the Rome city center.

As a next step, you could consider:

1. Registering a shape or layer related to Rome to enable more detailed zooming and analysis.
2. If you have specific data or a scenario in mind, please provide that information so I can assist you further.

Write a message... (Enter to send)

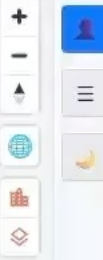


Map style

Draw tools

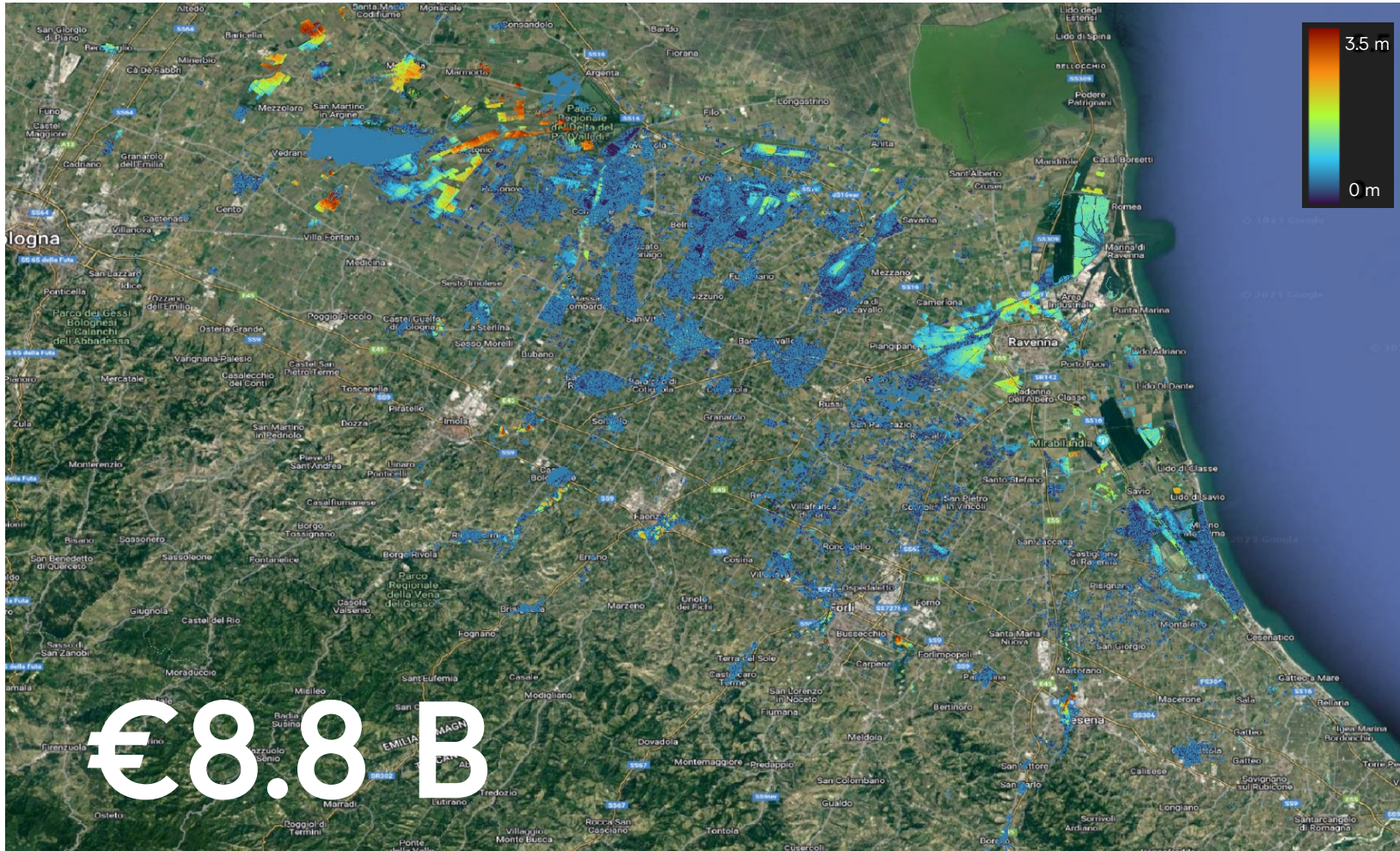
Immersive views

Viewport



Supporting post-event analysis for Emilia-Romagna Civil Protection (Italy)

Water depth



- Water depth from Copernicus Sentinel, commercial optical & SAR data
- Post-event estimation of damages

[ESA NEWS](#)

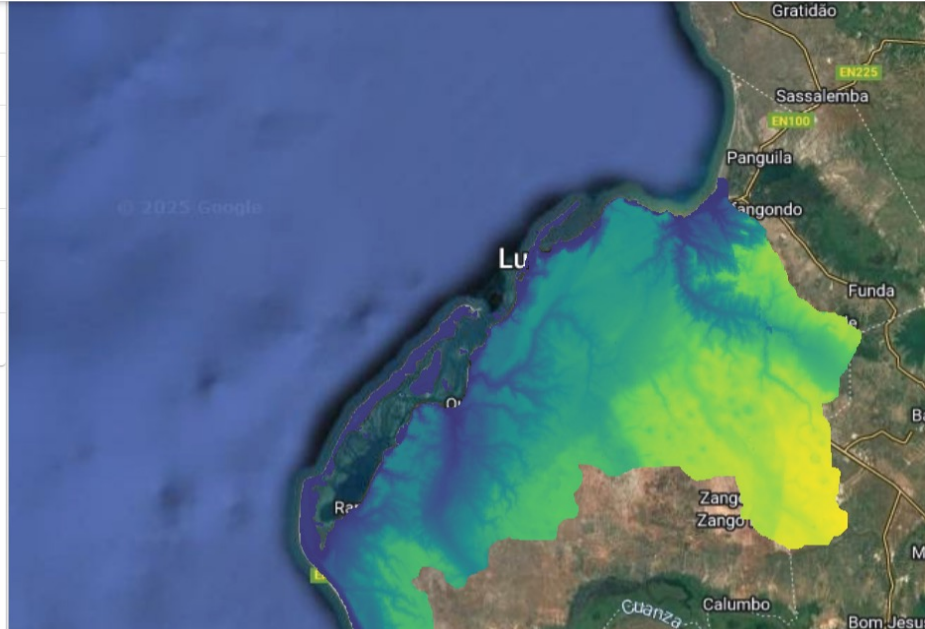


The Storm Harry - Sicily



Supporting WorldBank in Flood Resilience

- Source Scenarios
- Control Panel
- Identify
- Bluespot Identify
- Volume Chart
- Damage Chart
- Layers



CREATE PROJECT

Viana_School
12/03/2025 10:02
wbluanda@saferplaces.co

Talatona
12/03/2025 09:32
wbluanda@saferplaces.co

Luanda_5m
12/03/2025 09:08
wbluanda@saferplaces.co

HojiYa_Henda
12/03/2025 09:01
wbluanda@saferplaces.co

Kilimba
12/03/2025 08:50
wbluanda@saferplaces.co

Camuxiba
10/03/2025 11:47
wbluanda@saferplaces.co

Luanda_5m_river
28/02/2025 17:29
wbluanda@saferplaces.co

Luanda_city_5m
22/02/2025 10:11
wbluanda@saferplaces.co

Luanda_30m
12/02/2025 17:10
wbluanda@saferplaces.co

Pluvial Flood

- Copernicus ERA5 IDF
 - RT 20-50-100-200-500-1000
- CIMP6 Projected ERA5 rainfall IDF Data
 - RT 20-50-100-200-500-1000
 - SSP2.4.5/5.8.5
 - 2050/2100

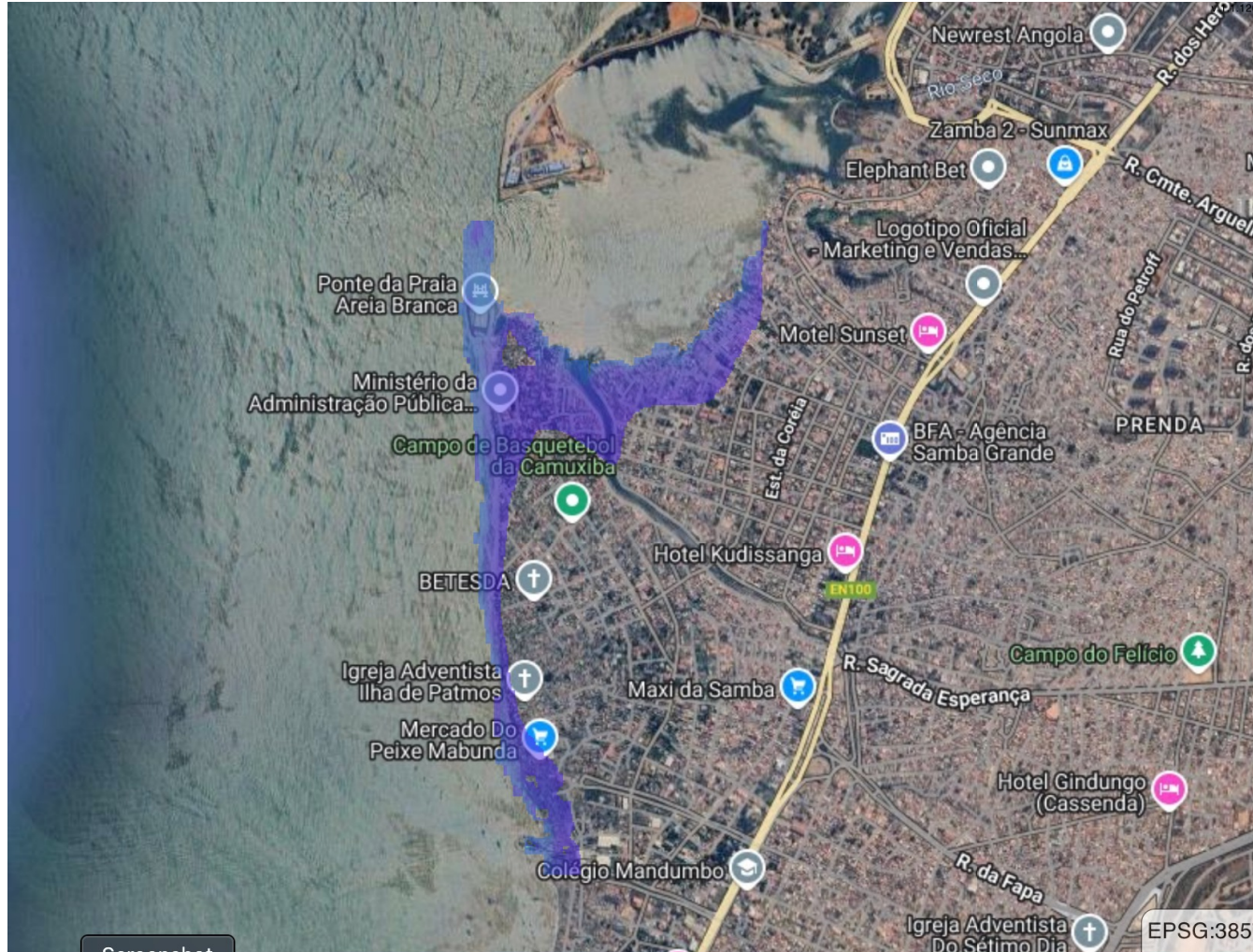
Coastal Flood

- Copernicus CIMP6 Extreme Sea Level
 - RT 20-50-100-200-500-1000
 - Historical
 - SSP25.8.5

Fluvial Flood

- GFI Downscaled Hazard Map
 - RT 10-25-50-100-200-500-1000
 - Historical
 - RCP 2.6/8.5

Coastal Flooding – Camuxiba

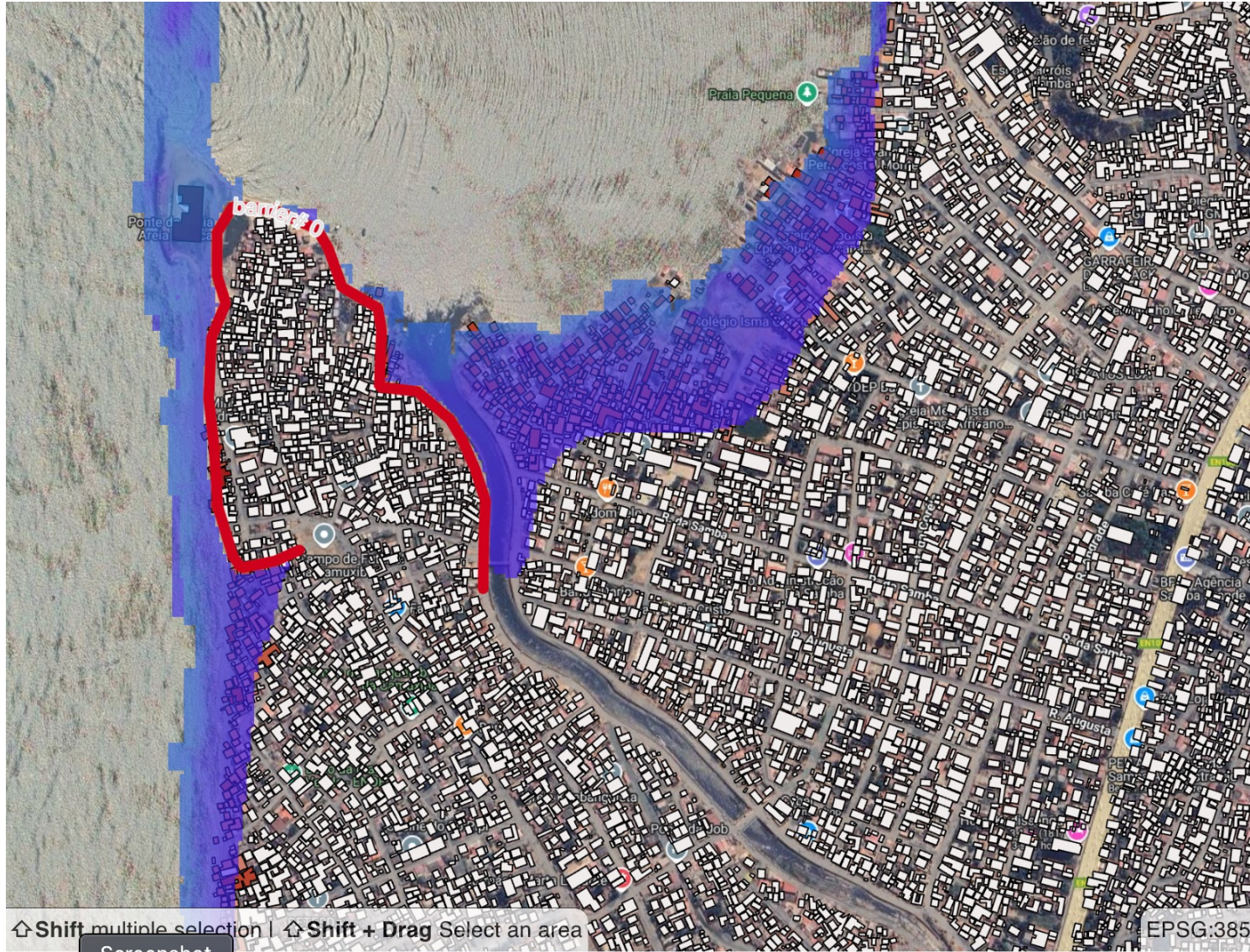


— RT100 ESL 1.42 m

Coastal Flooding Mitigation – Camuxiba



Coastal Flooding Mitigation – Camuxiba



— Barrier 1.5m



We don't just visualize DestinE Data
We activate it

AI-based Flood Risk Intelligence in
everyone's hands

 **SaferPlaces**

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Global Platform

AI-based Digital Twin Solution for
Flood Risk Intelligence in Urban Areas

saferplaces.co

[@SaferplacesCKIC](https://twitter.com/SaferplacesCKIC)

