

Challenges, perspectives and new technologies for Flash Flood Early Warning Systems

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ENHANCING COMMUNITY
RESILIENCE THROUGH
STRENGTHENING THE
PREPAREDNESS AND RESPONSE
CAPACITY TO TAILING AND WATER
DAM FAILURES



SCIENCE AWARENESS BEHAVIOURS

Observe to predict, predict to prevent



ARE YOU TOO BUSY TO INNOVATE?



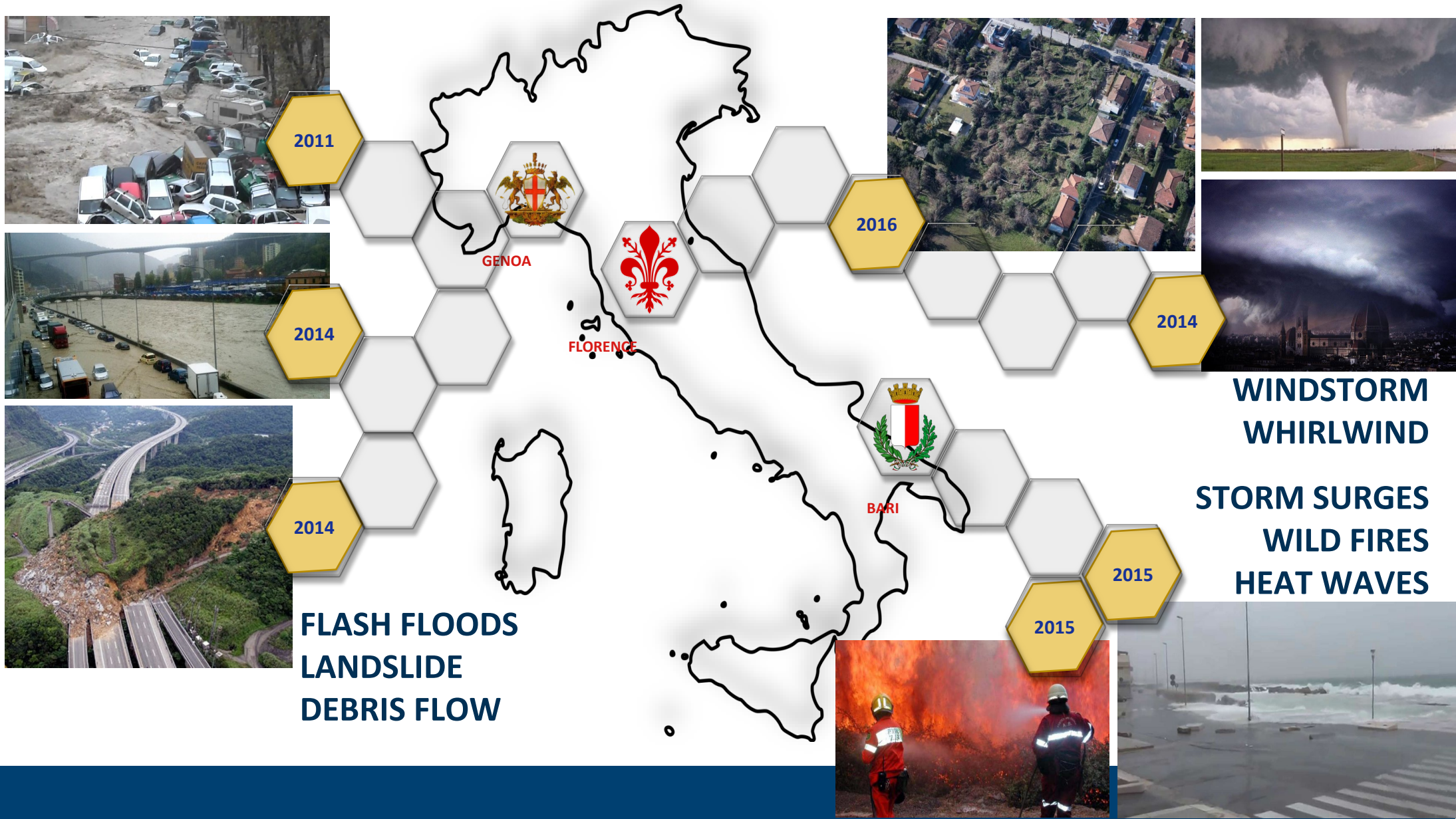
Research
Industry & SMEs

End-Users



@Rensvandenbergh

Frequent Climate Change impacts and threats in Italy (2011-2016)



2011

2014

2014

2016

2014

2015

2015

**FLASH FLOODS
LANDSLIDE
DEBRIS FLOW**

**WINDSTORM
WHIRLWIND**

**STORM SURGES
WILD FIRES
HEAT WAVES**

**150
victims,
30 injured,
45.000
people
displaced**

**€ 35
billions of
damage in
5 years in
Italy**

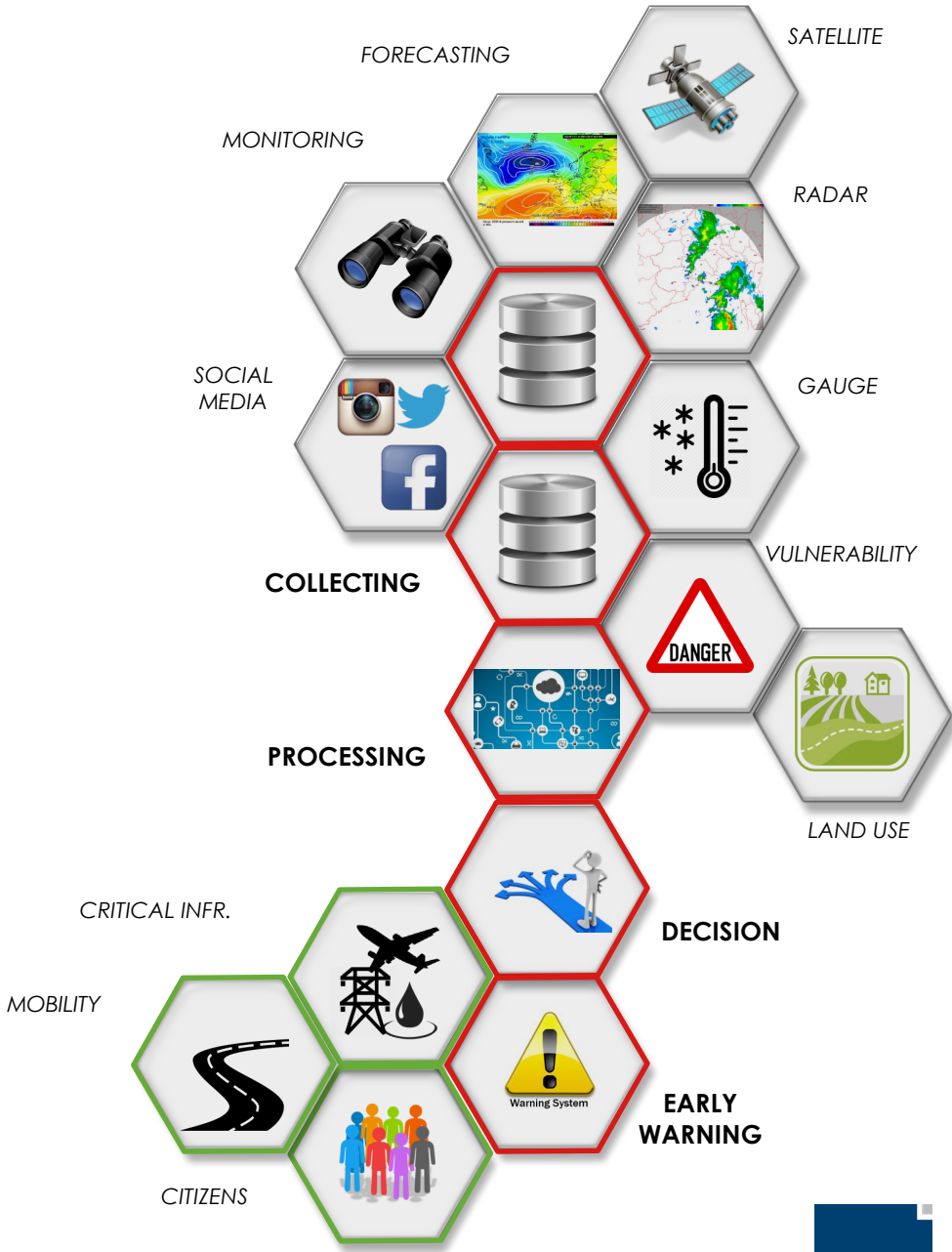
Challenges to face

- ***Move*** from models ***to real operational tools working in crisis situations***
- Build an efficient ***multi-risk DSS for emergency management***
- Ensure a ***close cooperation between End-Users Research & Industries***
- ***Provide a system able to be adapted*** to different hazards and to different environments

Bulding a Resilient Framework

■ Process Steps

- **PS1** - Data collection system
- **PS2** - Analysis, processing, management and use of data
- **PS3** - High resolution nowcasting - early warning systems
- **PS4** - Resilience of critical infrastructures and population



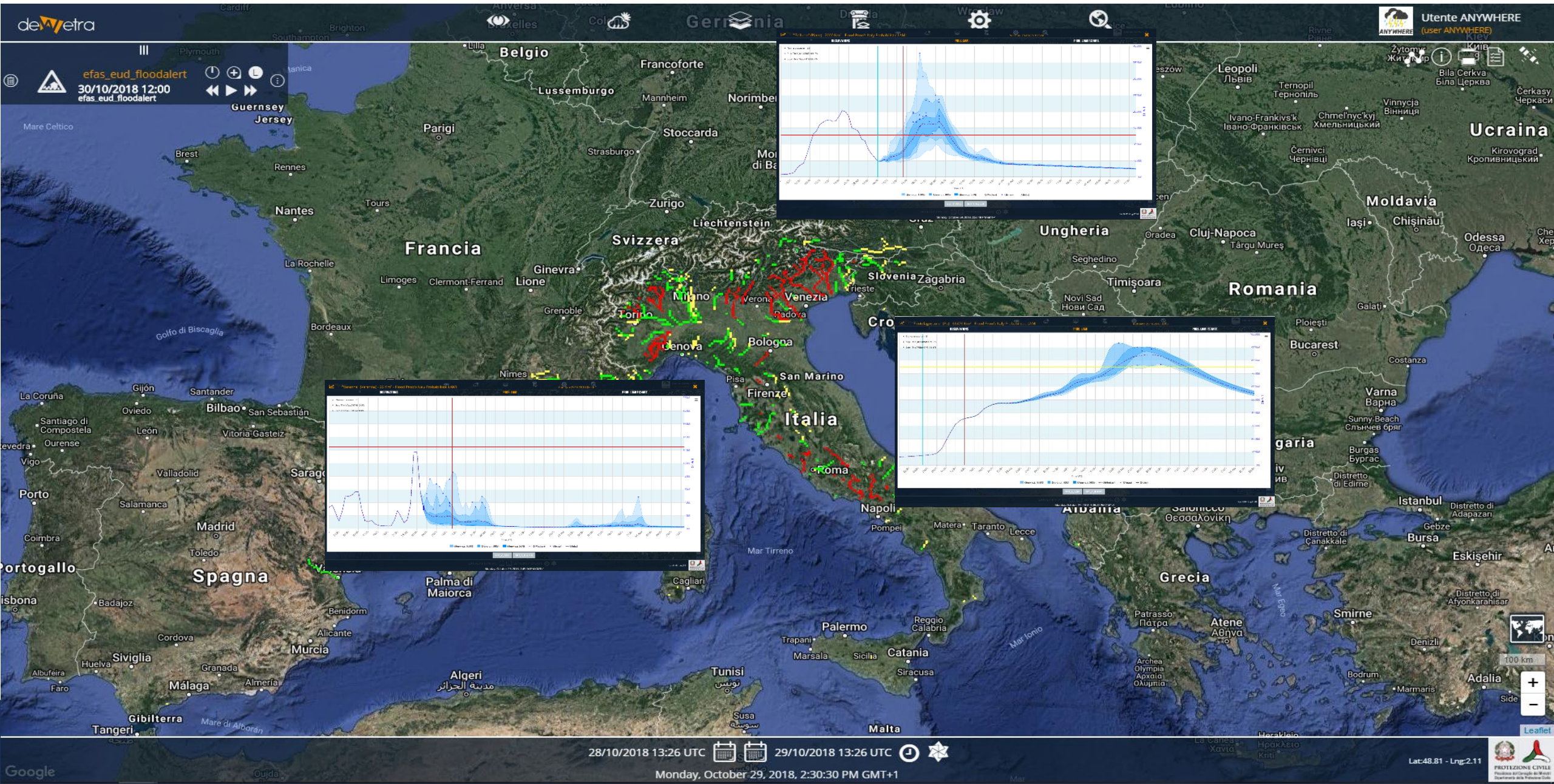
Use of the MyDewetra Platform during the 29th of October 2018 event in Italy



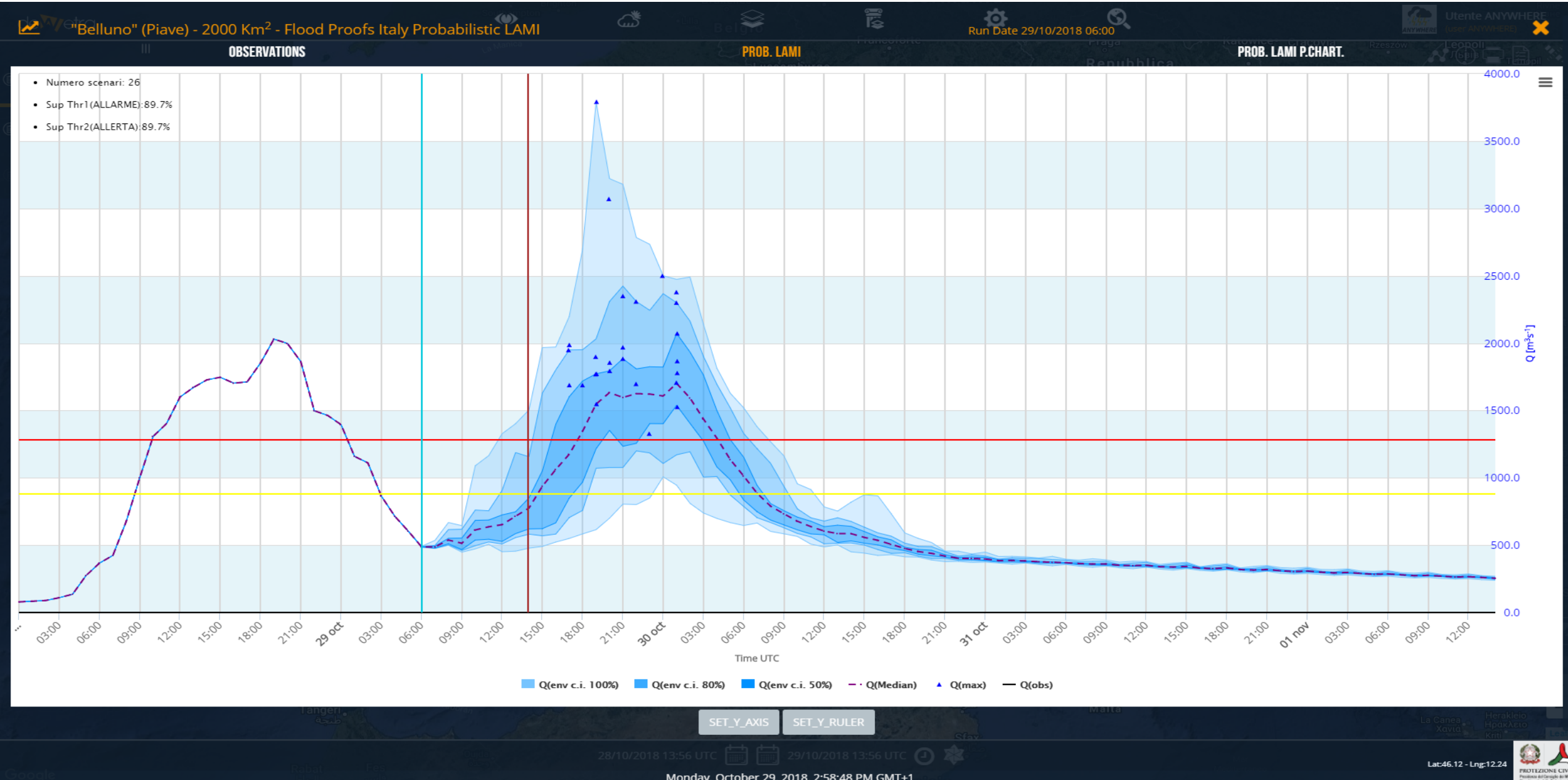
Use of the MyDewetra Platform during the 29th of October 2018 event in Italy



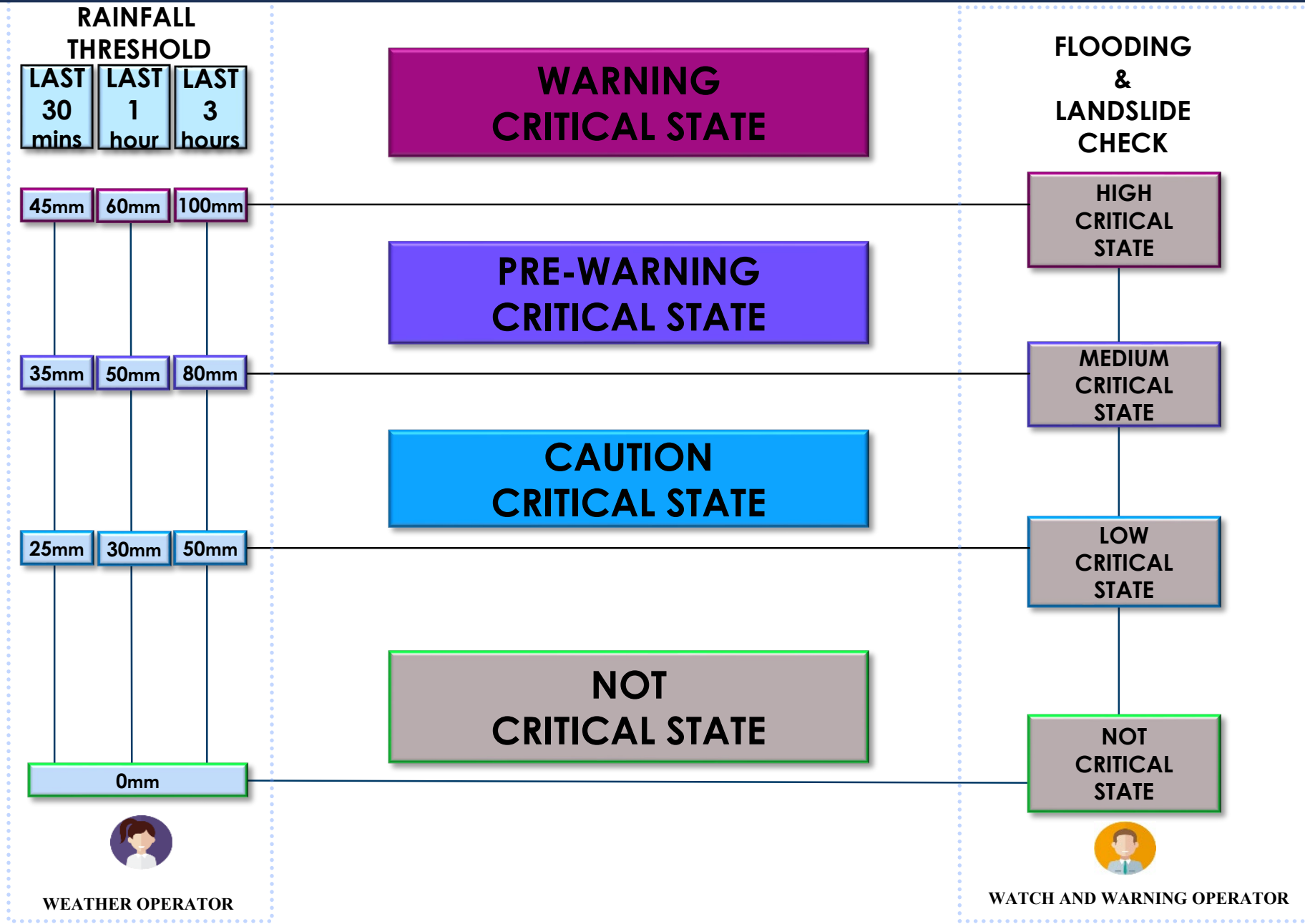
Use of the MyDewetra Platform during the 29th of October 2018 event in Italy



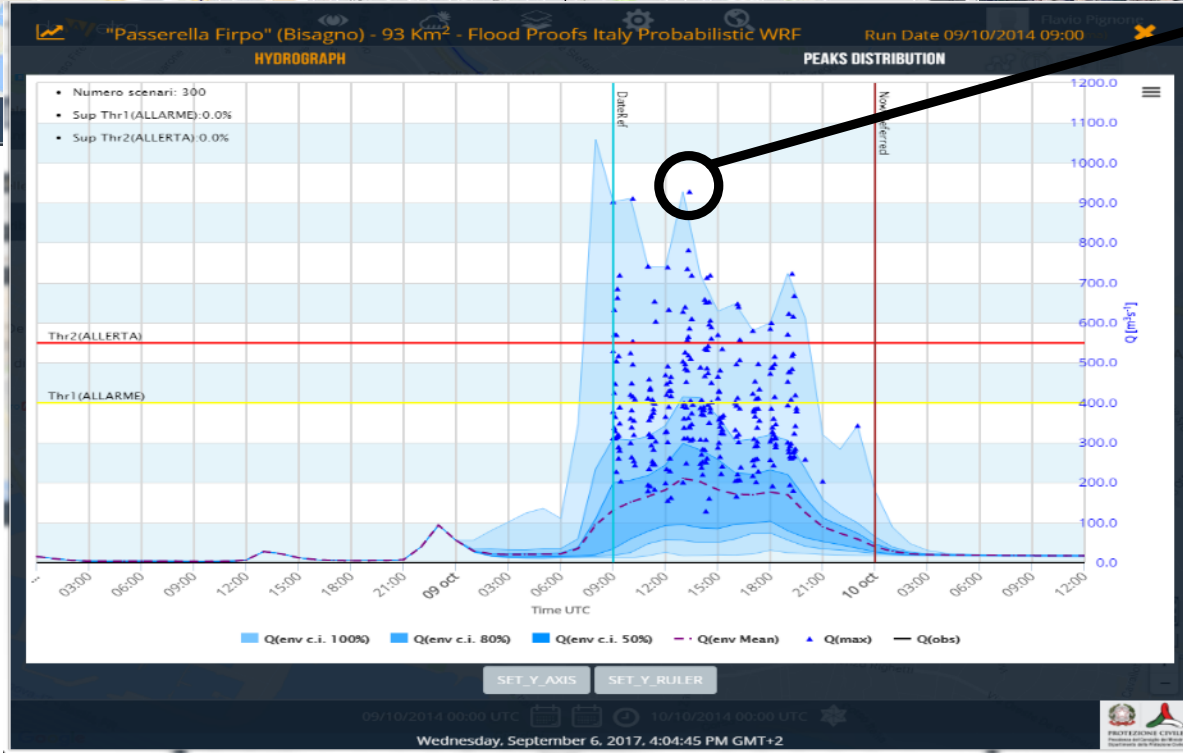
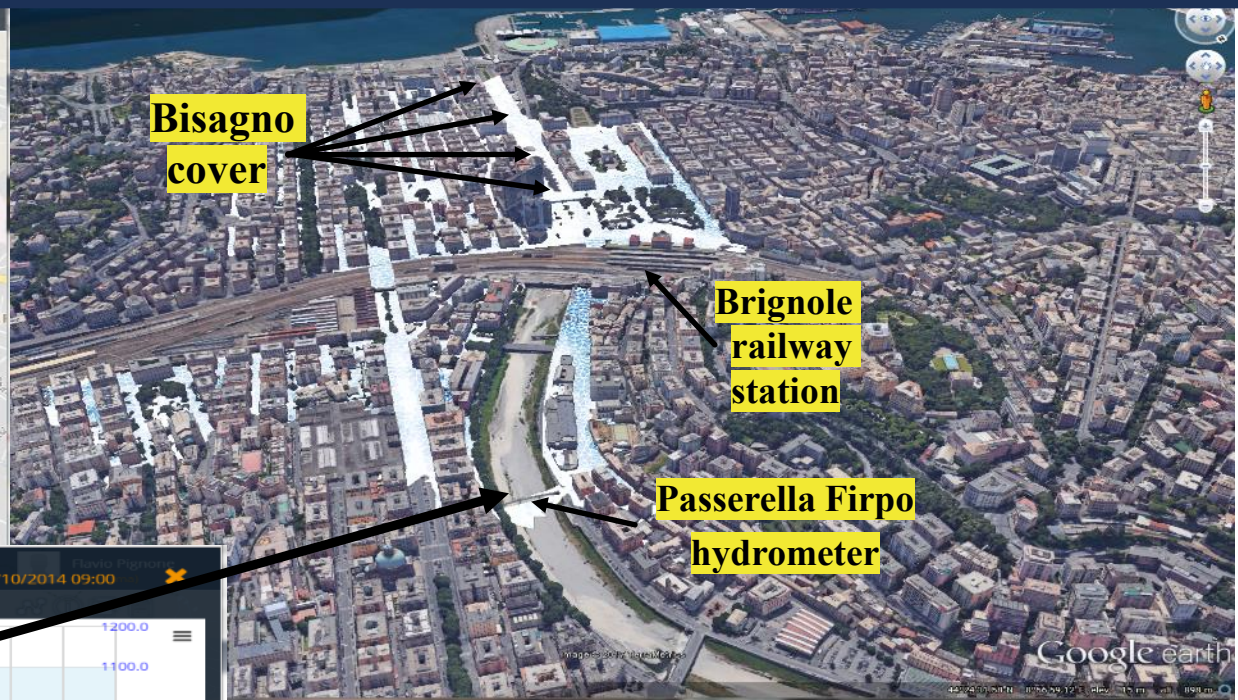
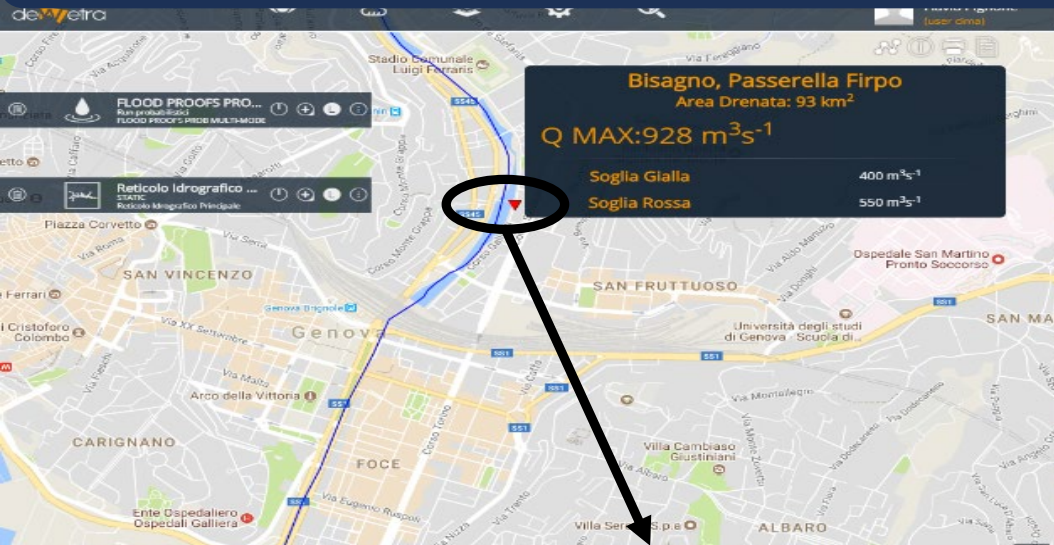
Use of the MyDewetra Platform during the 29th of October 2018 event in Italy



DECISIONAL PHASE: current situation



DECISIONAL PHASE: NEW PERSPECTIVES



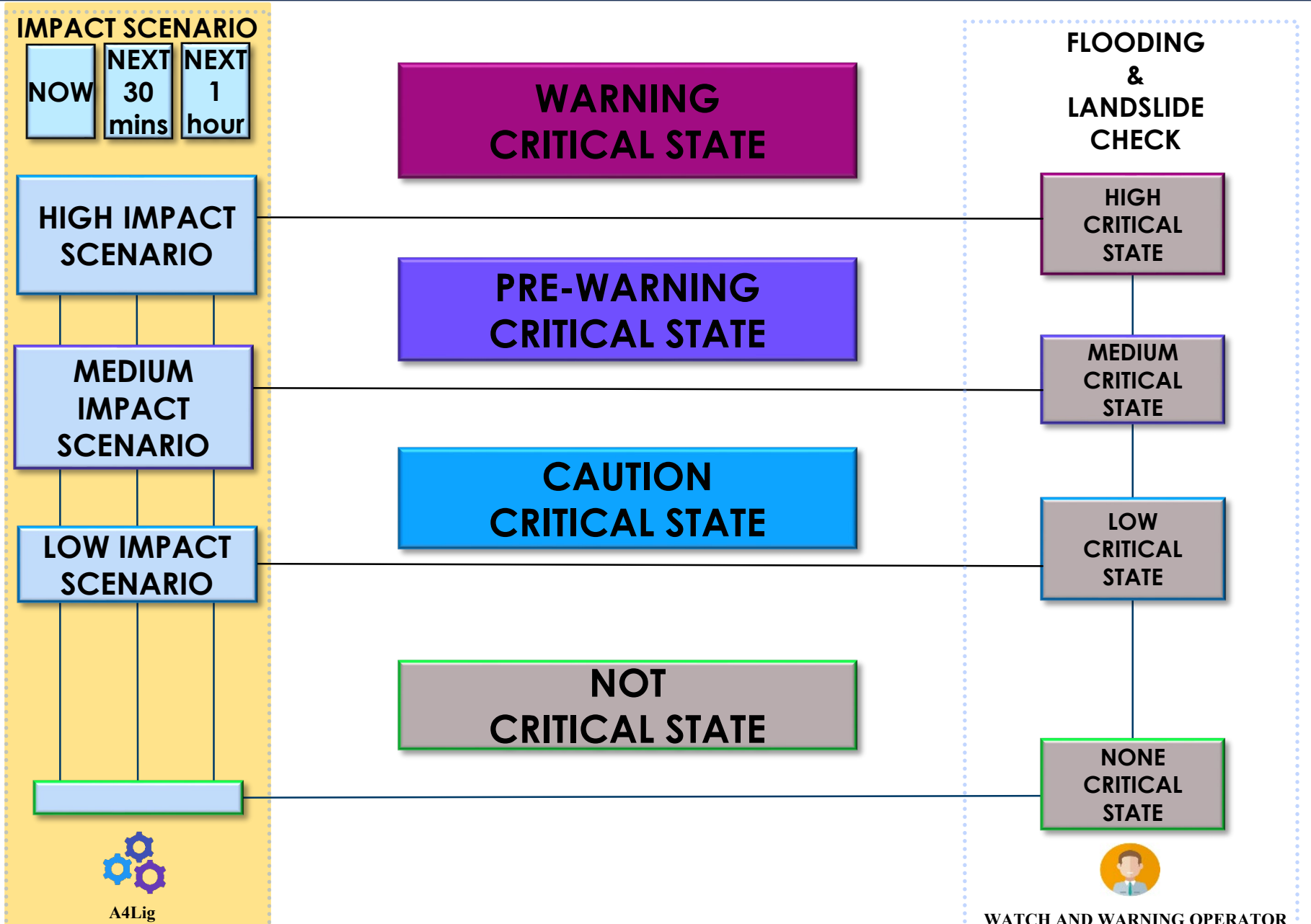
Based on an ensemble of meteorological predictions, **an ensemble of discharge scenarios at the specific section** (Passerella Firpo close to the beginning of the Bisagno cover) is available.

By selecting a specific scenario it is possible to verify if and how it will be translated in ground effect (Flood Hazard) and then **the system provides the associated impacts.**

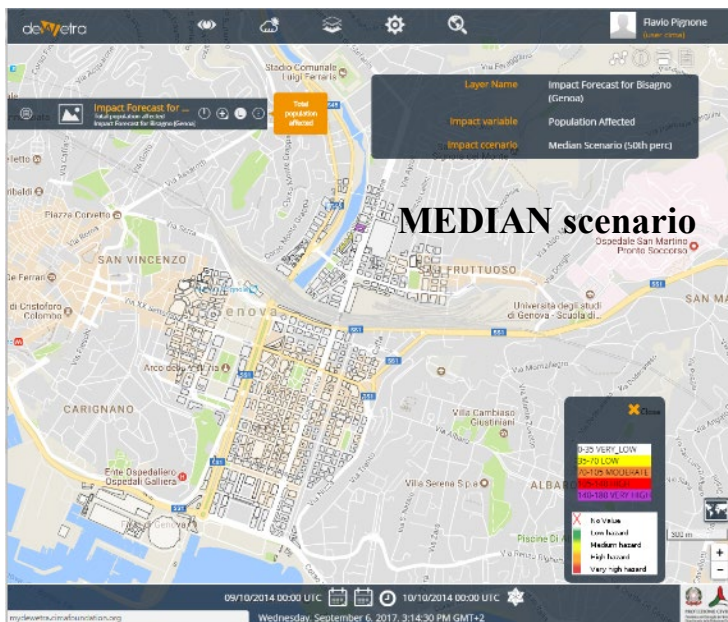
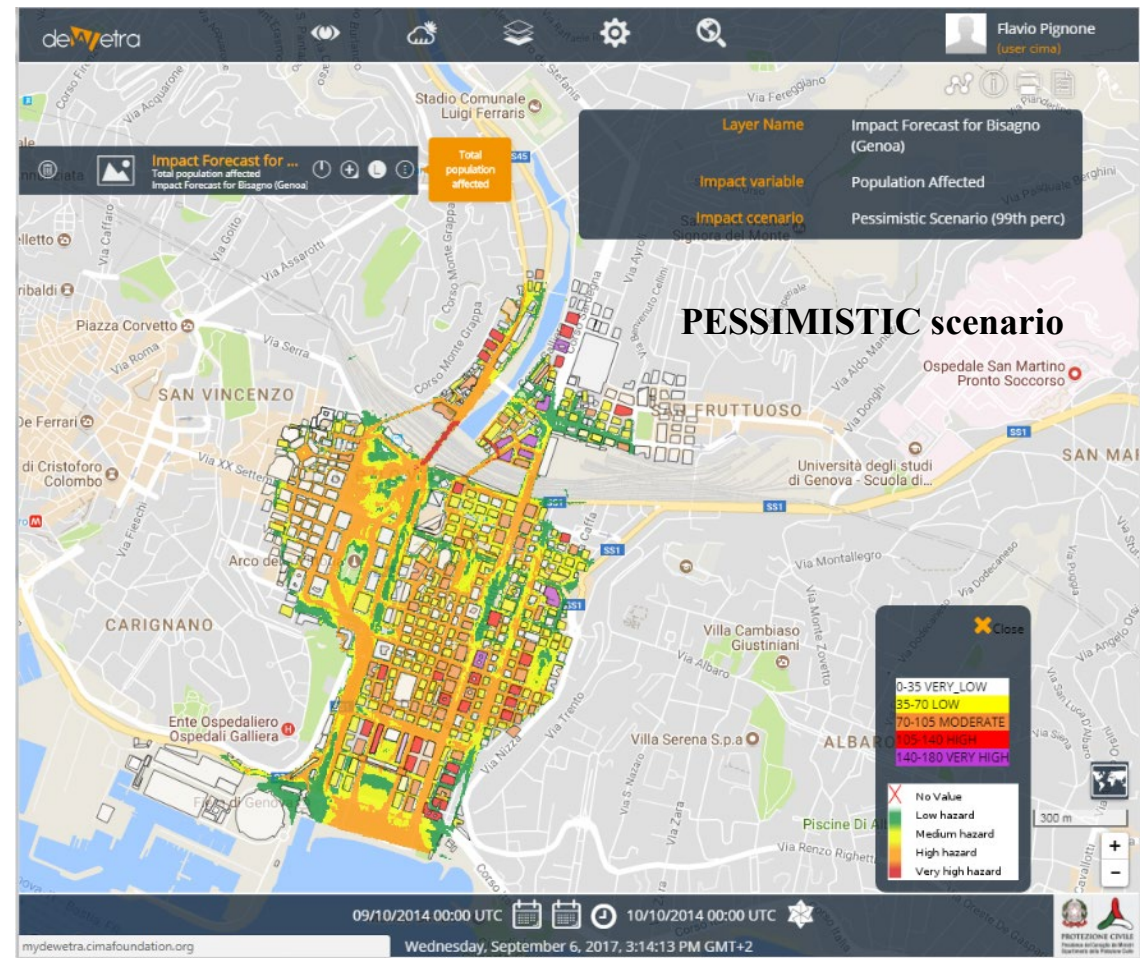
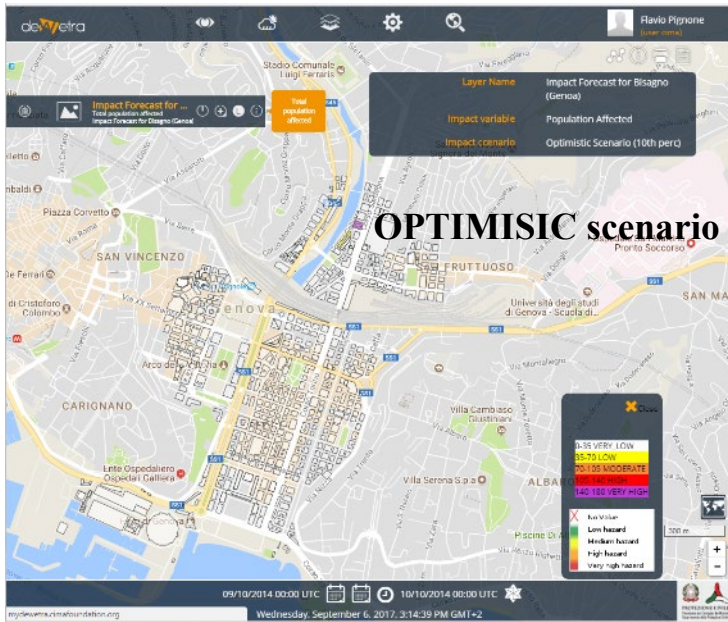
DECISIONAL PHASE: NEW PERSPECTIVES

Decision based on impacts and not on proxy information (e.g. raingauges observation)

Based on **IMPACT SCENARIO** the **Emergency Manager** defines the operational phase and **takes decisions.**



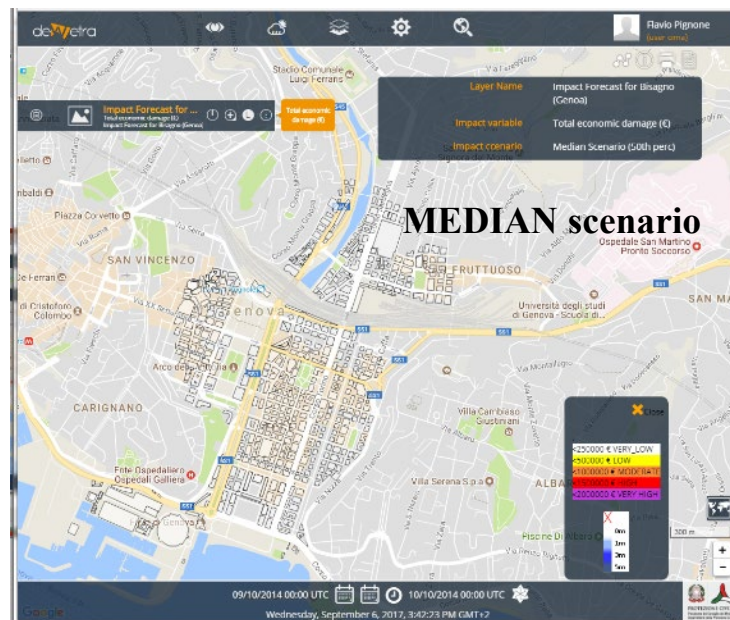
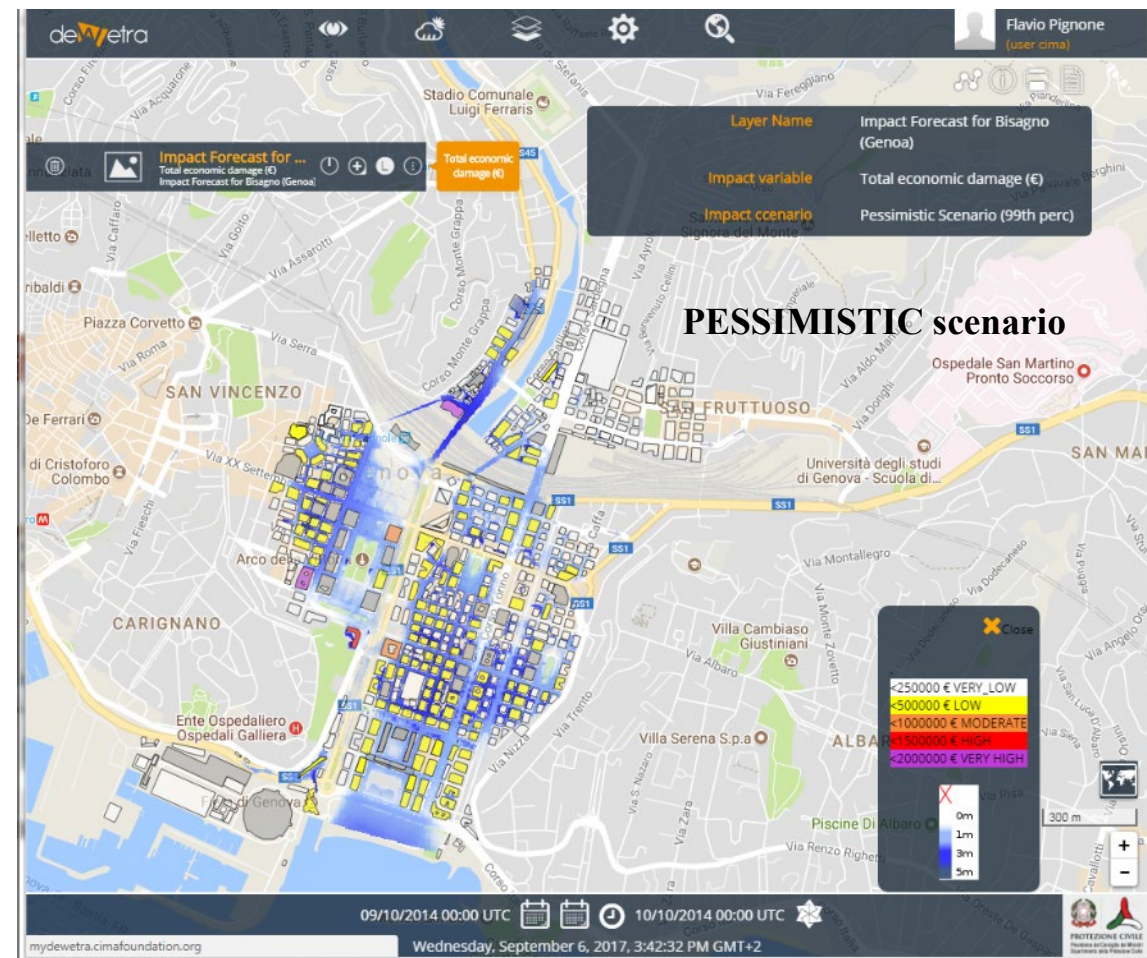
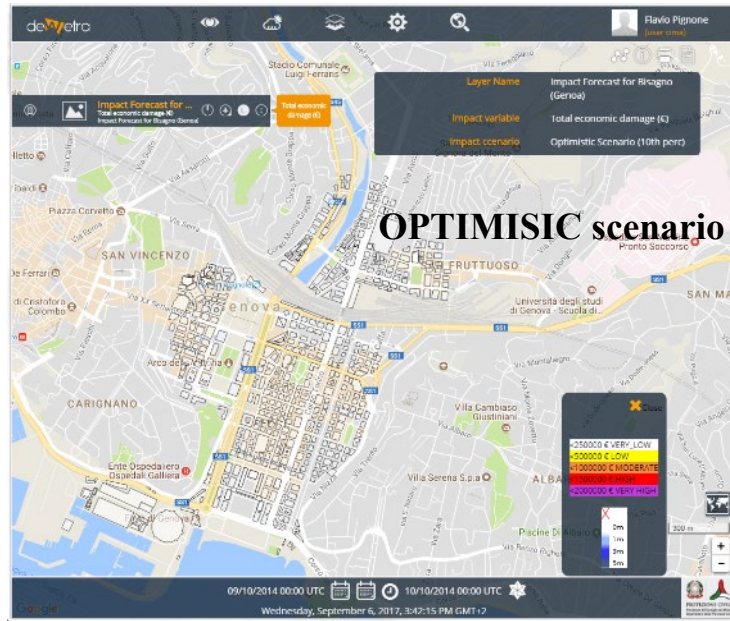
DECISIONAL PHASE: based on forecast it is possible to evaluate the impact scenarios on PEOPLE



Data for Emergency Manager decisions:

Peak discharge time:	20:00 UTC
Population affected:	#10000
Schools affected:	#10
Hospitals affected:	#2

DECISIONAL PHASE: based on forecast it is possible to evaluate the impact scenarios on INFRASTRUCTURES



Data for Emergency Manager decisions:

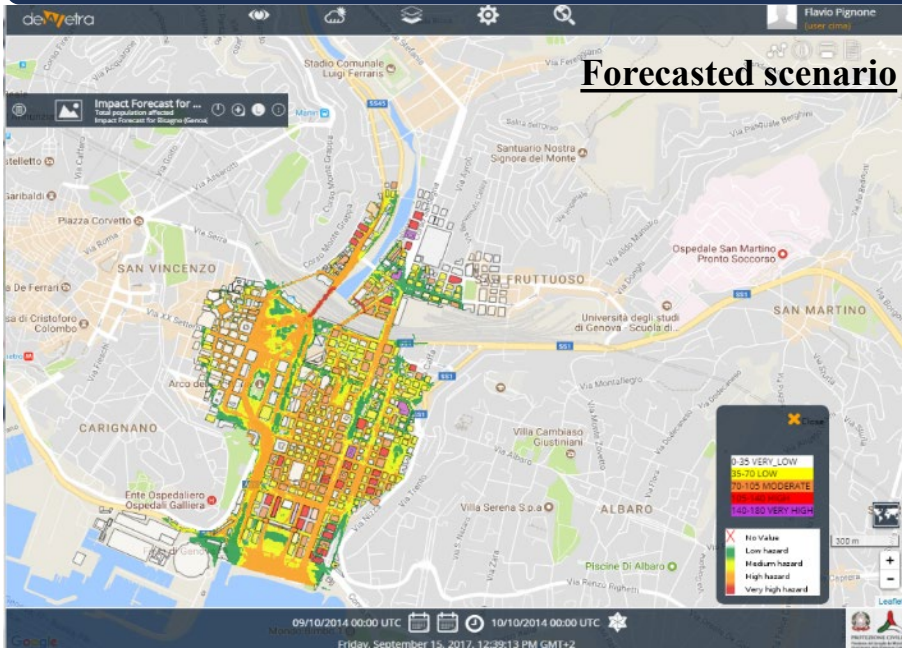
Peak discharge time: 20:00 UTC

Total economic damages: 3 millions euros

Number of building affected: #250

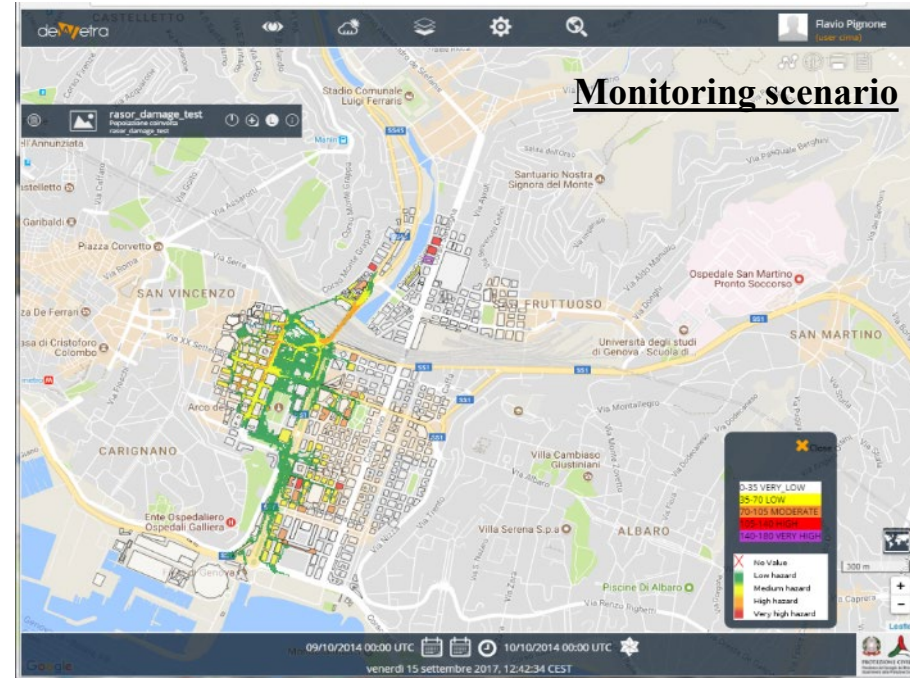
Number of streets affected: #300

MONITORING PHASE:



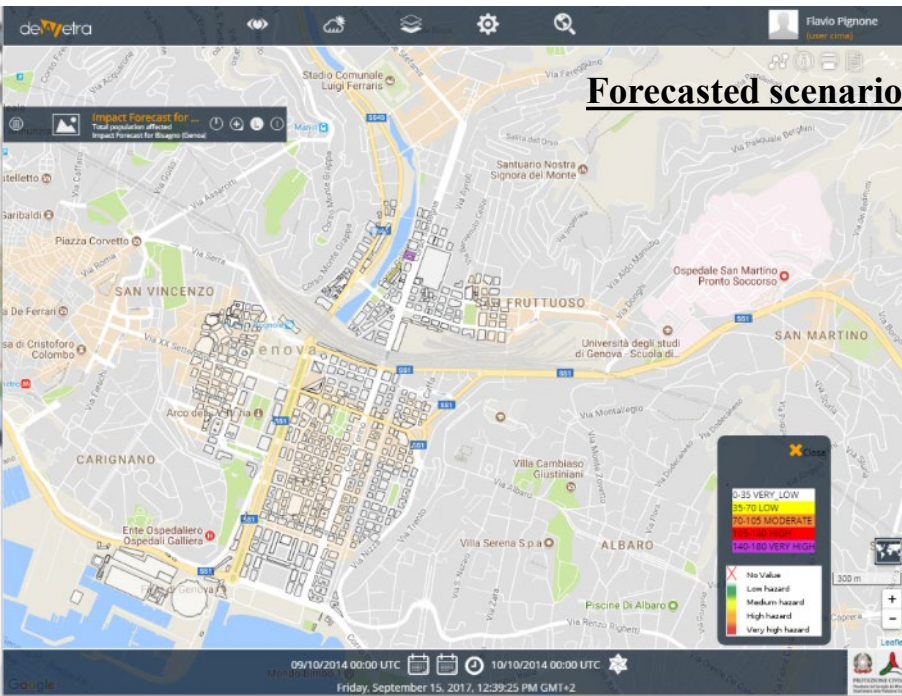
The forecasted scenario is equal or greater than the monitoring scenario

In this case all the “Operational handbook actions” that were set up are appropriate to face the event and the estimation of the event impact is correct.

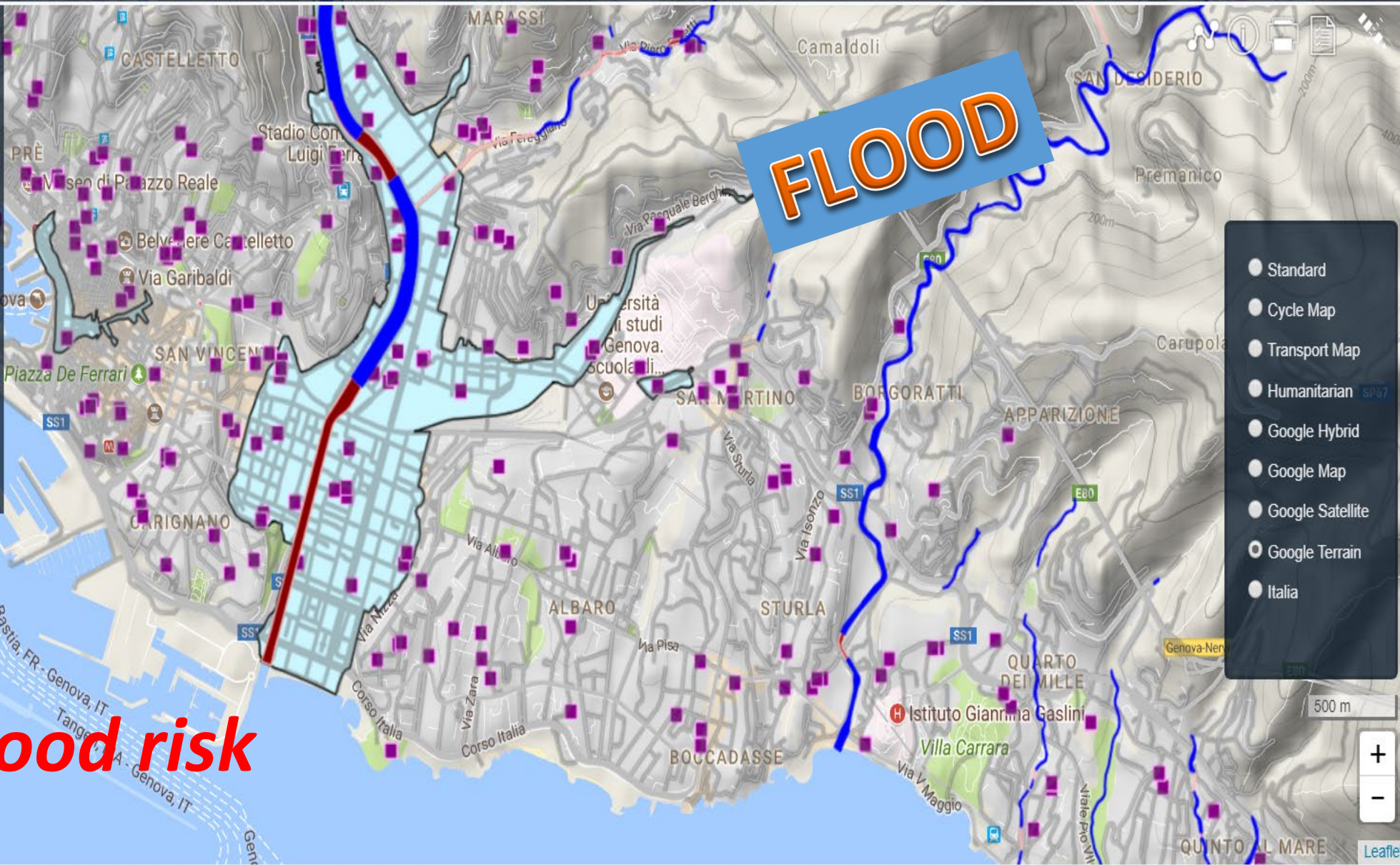


The forecasted scenario is underestimated respect to the monitoring scenario.

In this case all the “Operational Handbook actions” that were set up were not enough to face the event and a new decision of the COC is necessary in order to properly manage the event



- Genoa primary river ...
STATIC
Genoa primary river net...
- Genoa primary river ...
STATIC
Genoa primary river net...
- Genoa streets Genova
STATIC
Genoa streets
- Genoa schools
STATIC
Genoa schools
- Genoa Flooding areas
14/09/2015 03:00 (Ru...
905 giorni fa



- Standard
- Cycle Map
- Transport Map
- Humanitarian SP67
- Google Hybrid
- Google Map
- Google Satellite
- Google Terrain
- Italia

schools at flood risk

13/09/2015 03:00 UTC 14/09/2015 03:00 UTC

Tuesday, March 6, 2018, 4:48:05 PM GMT+1



IT-alert

NATIONAL ALERTING SYSTEM

«Alerting people located into a geographic target
with brief text messages»



«Allow citizens to consult local emergency plan»

NATURAL RISKS IN ITALY (OUR SUPERMARKET)

- Earthquake
- Land slides
- Flash floods
- Inundations
- Volcanoes Eruptions
- Forest Fire
- Tsunami
- Avalanches

and others

www.protezionecivile.gov.it



NATIONAL ALERTING SYSTEM

Build in the last 20 years

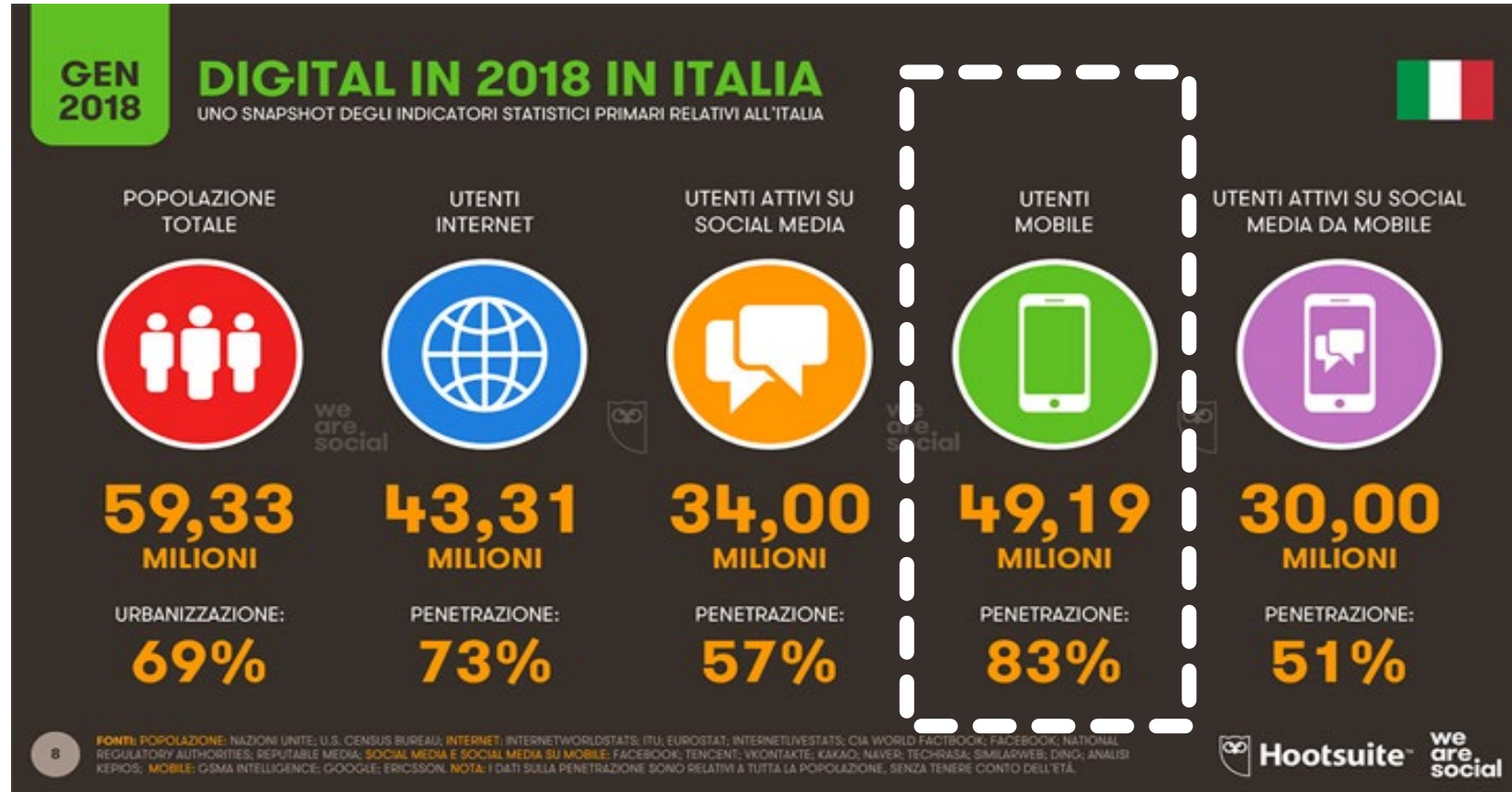
All Civil Protection System involved

MULTIRISK and **MULTILEVEL**

Sub-divided in 5 phases:



promptly alert the exposed population



We must therefore address the "mobile" devices (mobile phones and smartphones) ...
... in Italy about 50 millions with 4 mobile operators

CELL BROADCAST SOLUTIONS



COMPLY THE EUROPEAN STANDARD EU-ALERT



ONLY REACHES THE MOBILE INTERESTED DUE TO THE CELLS TO WHICH THEY ARE ATTACHED



IT IS INDIFFERENT TO NETWORK SATURATION



THE CITIZEN DOESN'T NEED TO REGISTER TO ANY SERVICE



IT WORKS ON AN UNIDIRECTIONAL BROADCAST CHANNEL THAT DOES NOT AFFECT USERS PRIVACY



CELL BROADCAST SOLUTIONS

Timeliness

possibility of reaching a very high number of users in a very short time



Geographical location

Based on the distribution of mobile phone cells



No additional load on the network

messages are not individually addressed and are transmitted on independent traffic control channels



PARTICULARLY SUITABLE FOR EMERGENCY USE

THE CHALLENGE

Add to the National Alert System a new voice:

PUBLIC
FREE
MASSIVE
UNIQUE
TRUSTED
CAPILLARY
TIMELY
SCIENTIFICALLY CORRECT
UNEQUIVOCAL
MULTILINGUAL

No action need by people
No impact on previous responsibility



INTERNATIONAL STANDARDS

EU-Alert (European Public Warning Service) ETSI TS 102 900 V1.1.1 (2010-10)

Countries that intend to use the EU-Alert standard identify their services by replacing the EU prefix with the country's initial identifiers according to the ISO 3166-1 standard.



For example:

NL-Alert

RO-Alert

LT-Alert

...



IT-a!ert

Allows foreign citizens to receive messages in English

DETECTION, MONITORING, ANALYSIS AND FORECASTING HAZARDS AND CONSEQUENCES



PREPAREDNESS AND RESPONSE CAPABILITIES

WARNING DISSEMINATION AND COMMUNICATION



DISASTER RISK KNOWLEDGE



Thank you



SCIENCE AWARENESS BEHAVIOURS

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