

From EO and Data sharing to Early Warning Systems: the Technological platform DEWETRA

Paolo Fiorucci & Marco Massabò
CIMA Research Foundation

Observe to predict, predict to prevent

CIMA is a non profit research foundation active to promote and sustain capacity building, research and technological development in the field of disaster risk reduction caused by weather related events mainly floods and forest fires.



PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile



Università degli
Studi di Genova



REGIONE LIGURIA



Provincia
di Savona

CIMA in numbers

55

employees

36

Average age

2

Headquarters in Savona
with a branch office in
Tirana

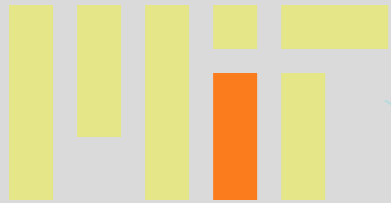
23

Active research project

73

papers

WHERE WE WORK



DEWETRA is a technological platform developed by CIMA on behalf of the Italian Civil Protection Department that shares and organizes EO and information **from local to national and regional level**

Using **technology** for making EO data and information available for decision-makers in **real time** and for turning data into information useful for decision makers

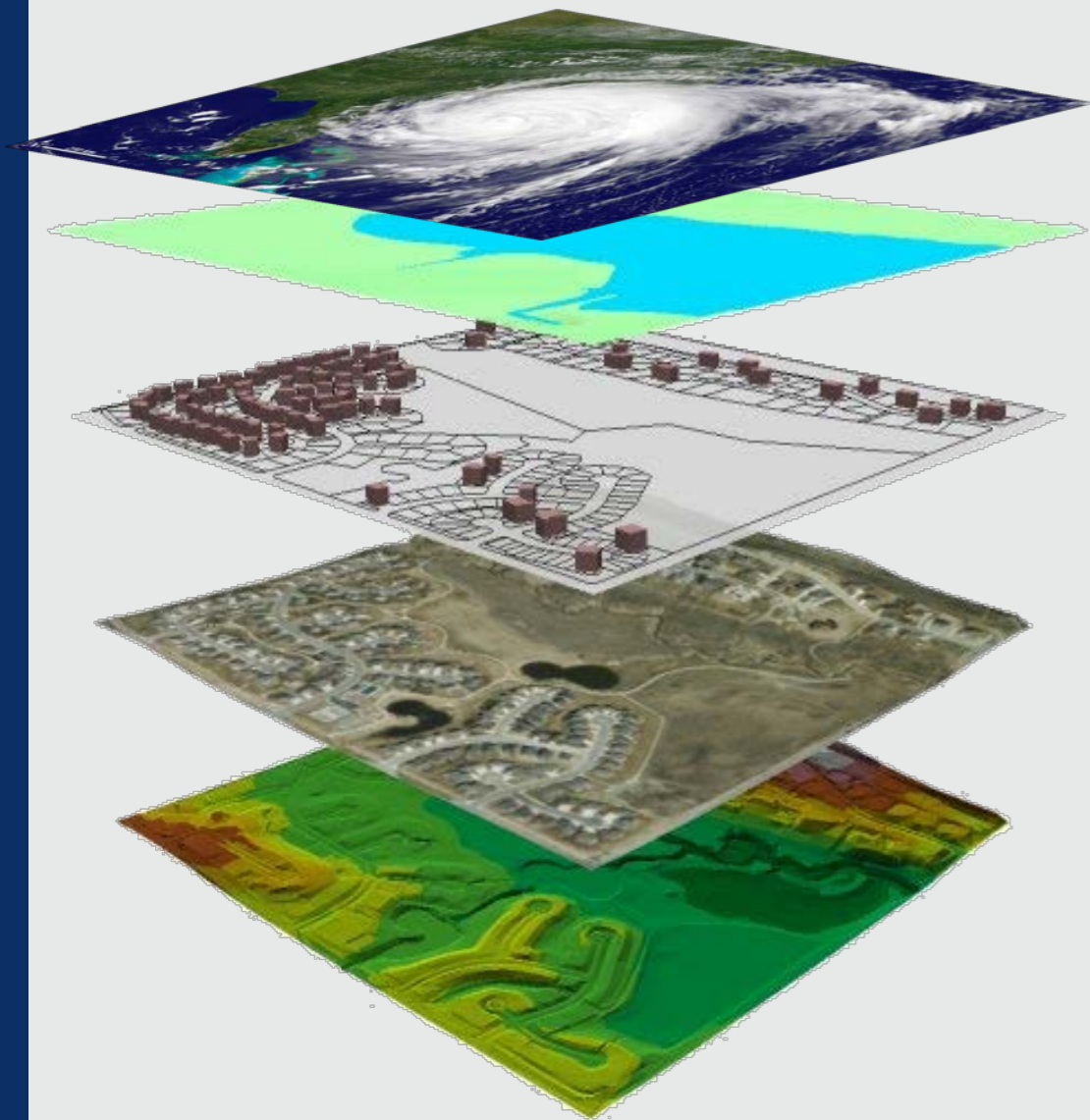
THE BASIC IDEA: Real-time Risk Assessment & Prediction

EXPOSURE:
Persons & assets

VULNERABILITY: potential
unitary losses

HAZARD: Expected
intensities of events (i.e.
rainfall, water level)

$$R = E \times V \times H(t)$$



Real-time information

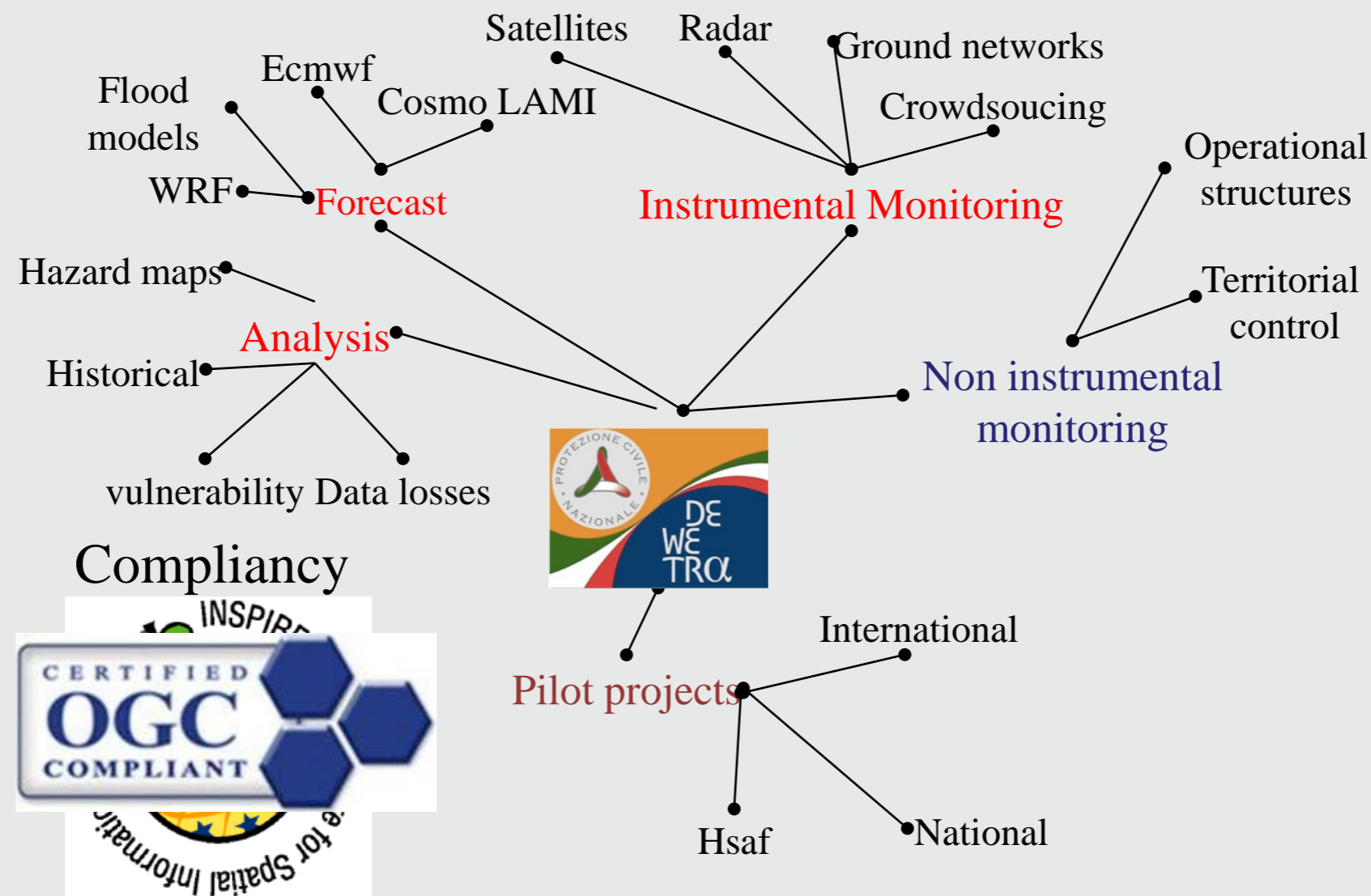
medium and short range weather forecasts,
hydro-meteorological monitoring,
impacts prediction (flood, soilslip),
uncertainty estimation,...

Quasi-static information

element at risks, hazard maps, ...

Multiple-sources of data and products

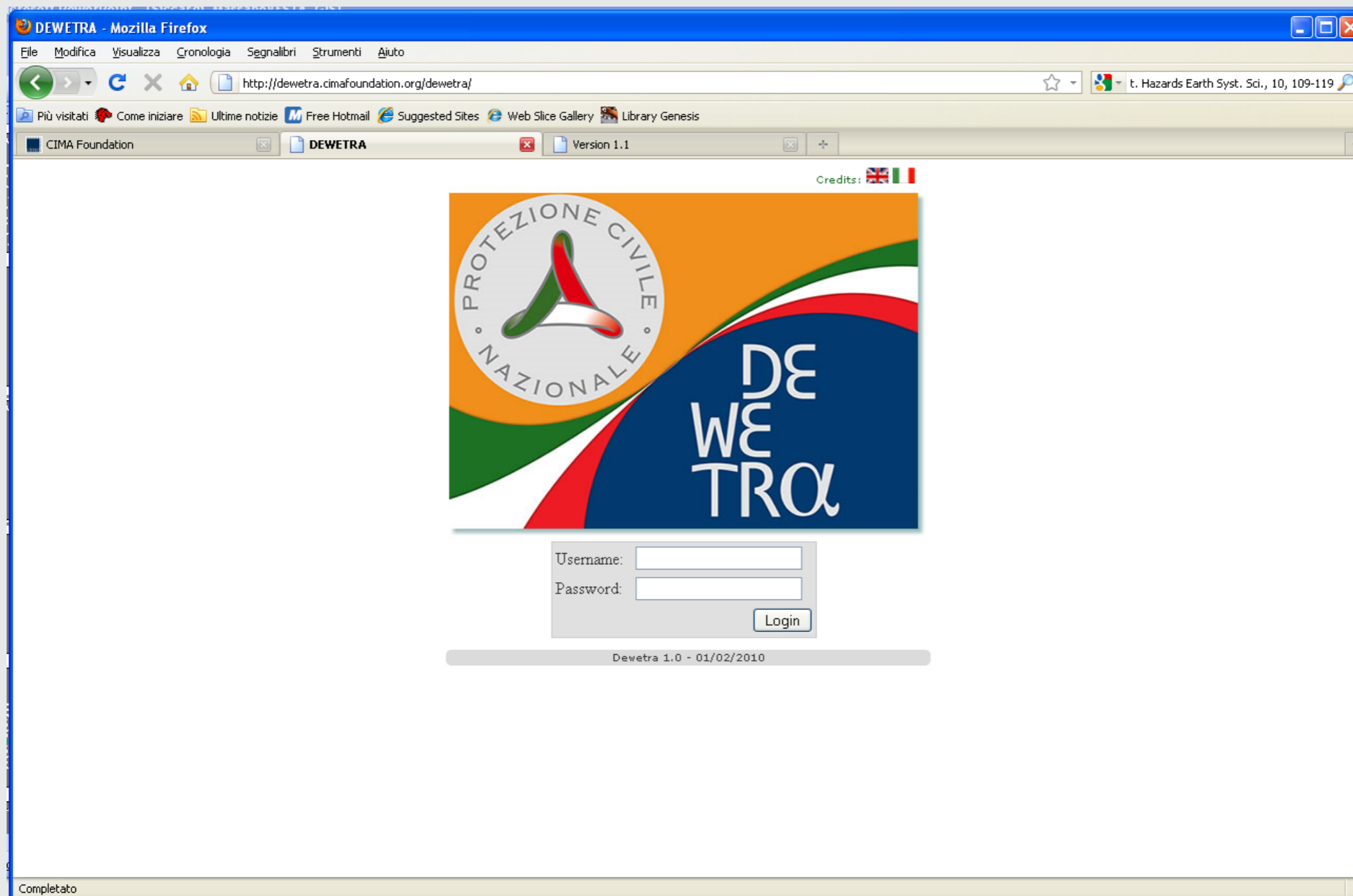
Data are spread into several local, regional, national and international organizations, DEWETRA is the technological tools that allow the collection, harmonization and dissemination of data and information from multiple-sources



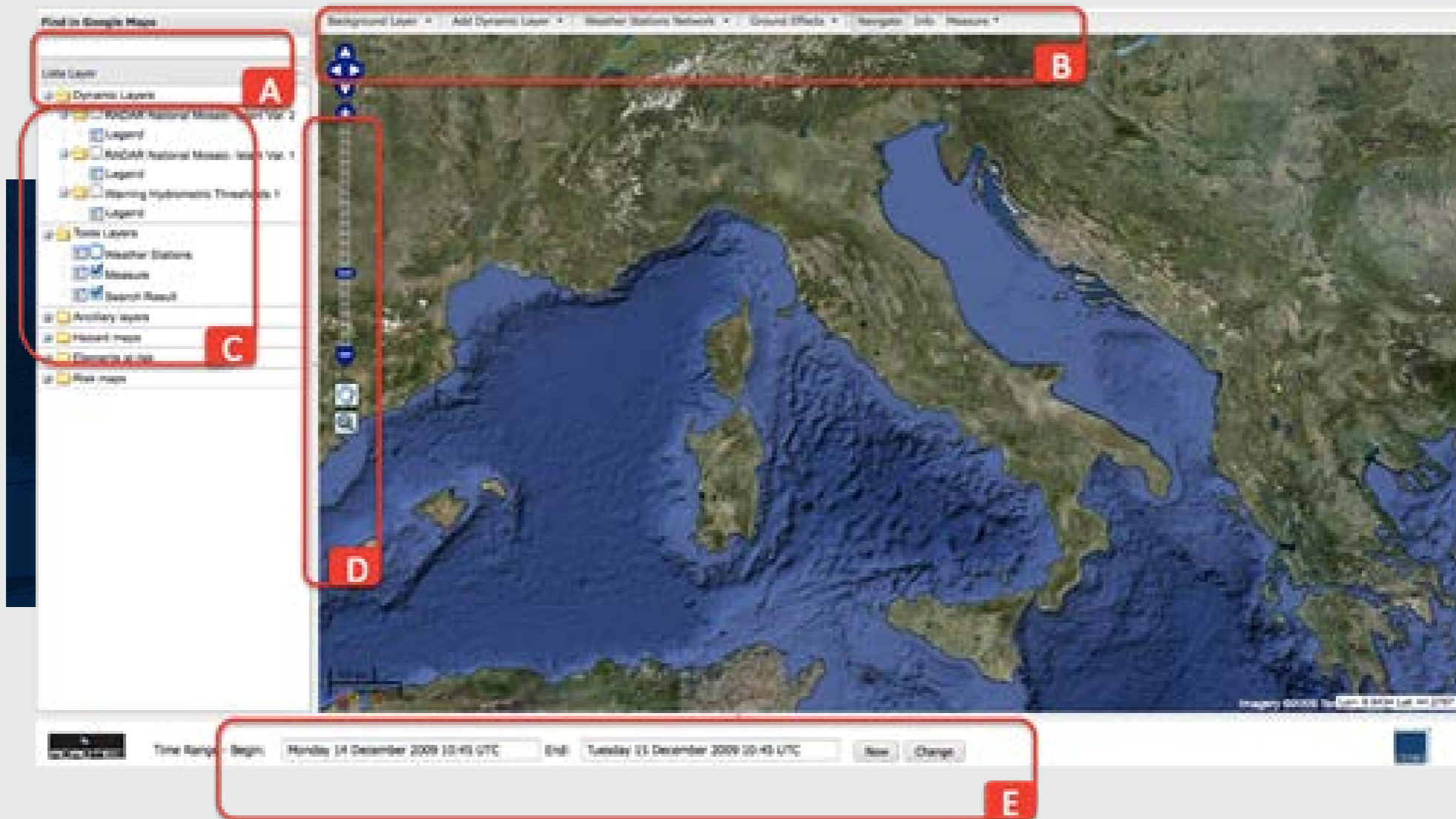
DEWETRA – the technology

Web-based – WebGIS – application to ensure capillary distribution of information.

Access policy: different user profiles

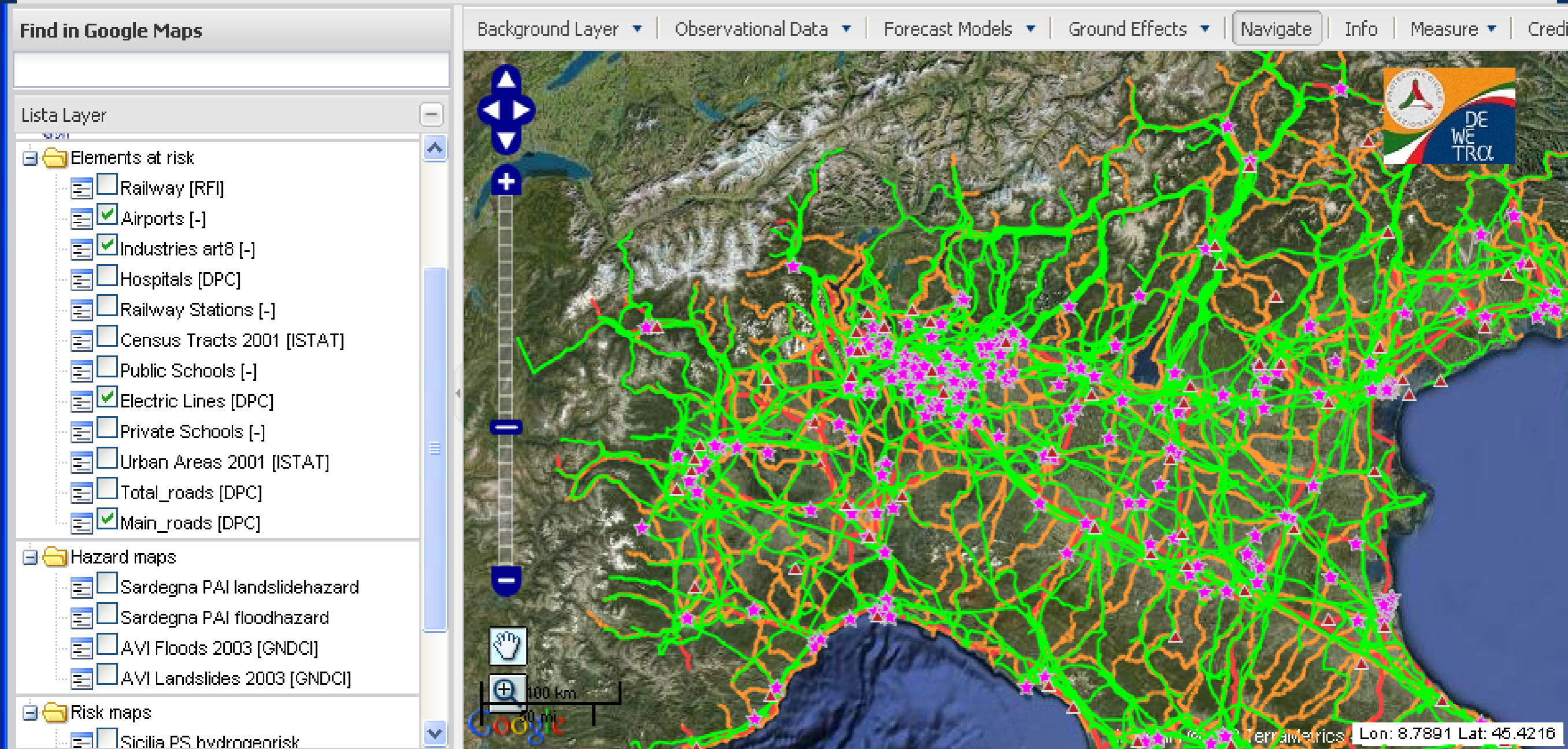


GRAFICAL USER INTERFACE



- A: Worldwide toponymies search (Google Maps®) and local search of Meteo Stations
- B: Dynamic information (hazard)
- C: Quasi static information (exposure and vulnerability)
- D: Navigation tools
- E: The time range of the data visualized .

Elements at risk



Hazard Maps (static Scenario)

The screenshot shows the DEWETRA web application interface. The browser tabs at the top indicate the URL <http://dewetr....org/dewetra/> and the application version, Version 1.1. The main map area displays a satellite view of a coastal region with a river system. Overlaid on the map are several hazard zones, primarily in red and orange, indicating areas of high risk. A scale bar at the bottom left shows 1000 m and 5000 ft. The bottom control bar includes a time range selector: "Time Range - Start: Wednesday 28 April 2010 18:30 UTC" and "End: Thursday 29 April 2010 18:30 UTC", along with "Now" and "Change" buttons. The bottom right corner shows the coordinates "Lon: 9.5796 Lat: 40.4169".

Find in Google Maps

Background Layer | Observational Data | Forecast Models | Ground Effects | Navigate | Info | Measure | Credits

Lista Layer

- Radar [DPC]
- Contour_levels_step 100 m [DPC]
- Geology [DPC]
- Warning Areas [DPC]
- Catchments [ISPRA]
- Municipality 2008 [ISTAT]
- Province 2008 [ISTAT]
- Region 2008 [ISTAT]
- Rivers [DBPrior10k]
- Dams[DPC]
- Lakes[DPC]

OPERA

- Elements at risk
 - Railway [RFI]
 - Airports [-]
 - Industries art8 [-]
 - Hospitals [DPC]
 - Railway Stations [-]
 - Census Tracts 2001 [ISTAT]
 - Public Schools [-]
 - Electric Lines [DPC]
 - Private Schools [-]
 - Urban Areas 2001 [ISTAT]
 - Total_roads [DPC]
 - Main_roads [DPC]
- Hazard maps
 - Sardegna PAI landslidehazard
 - Sardegna PAI floodhazard
 - AVI Floods 2003 [GNDCI]
 - AVI Landslides 2003 [GNDCI]

1000 m
5000 ft

Immagini ©2010 Digital Globe, Ines/Spot Image, GeoEye Lon: 9.5796 Lat: 40.4169

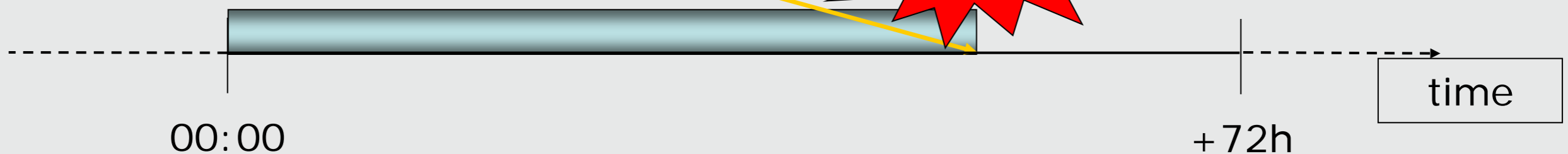
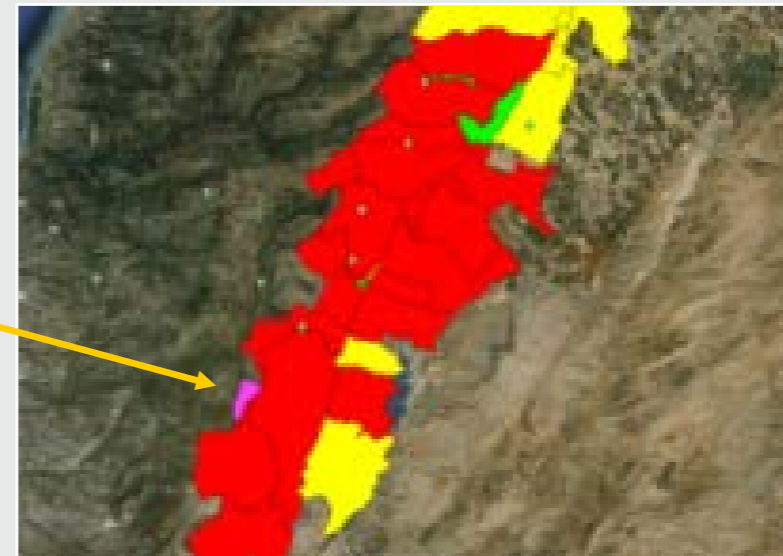
ACROTEC Time Range - Start: Wednesday 28 April 2010 18:30 UTC End: Thursday 29 April 2010 18:30 UTC Now Change

cimo

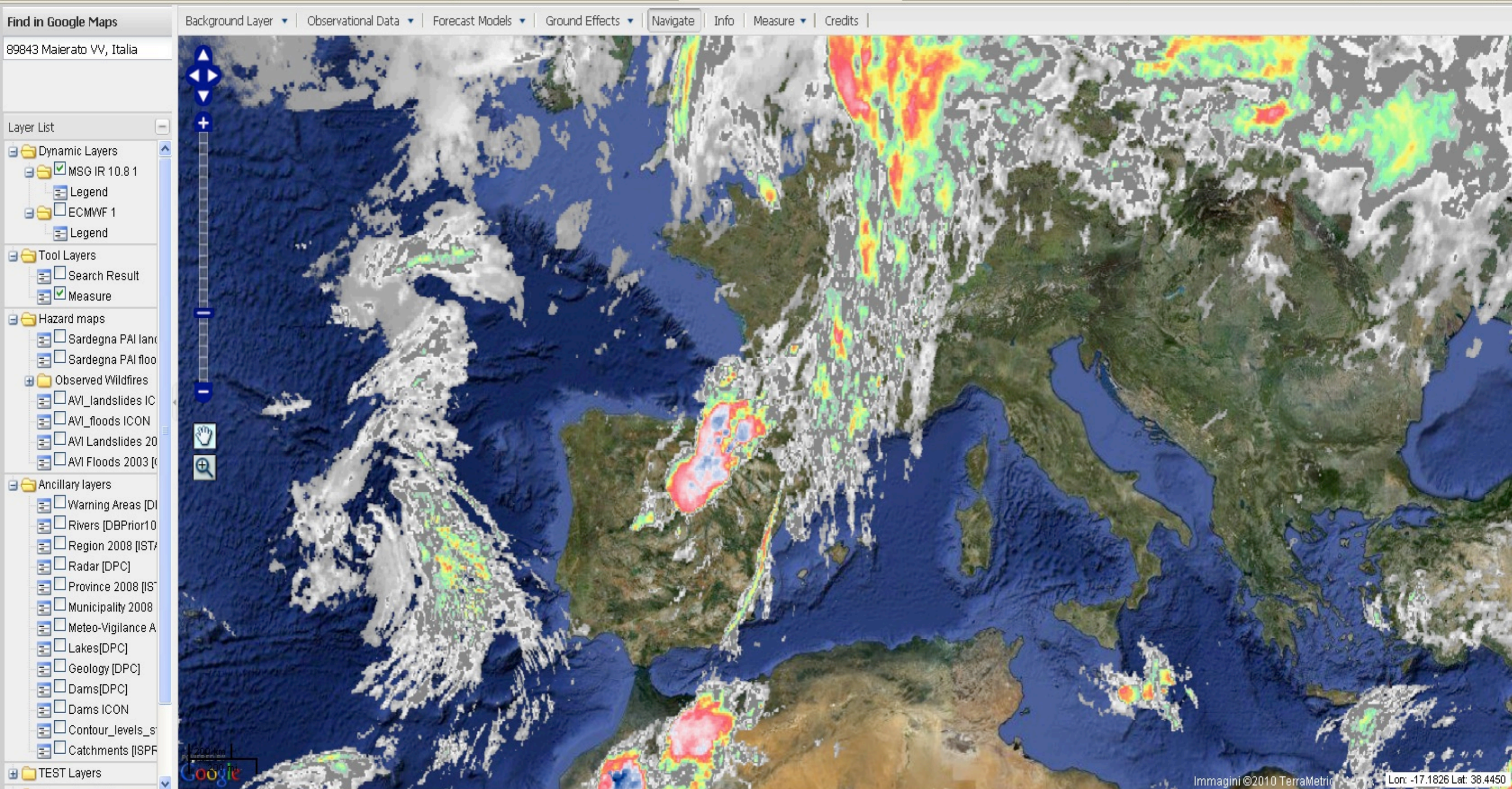
- Real-time observation
- Short range forecast (+72h)

where

when

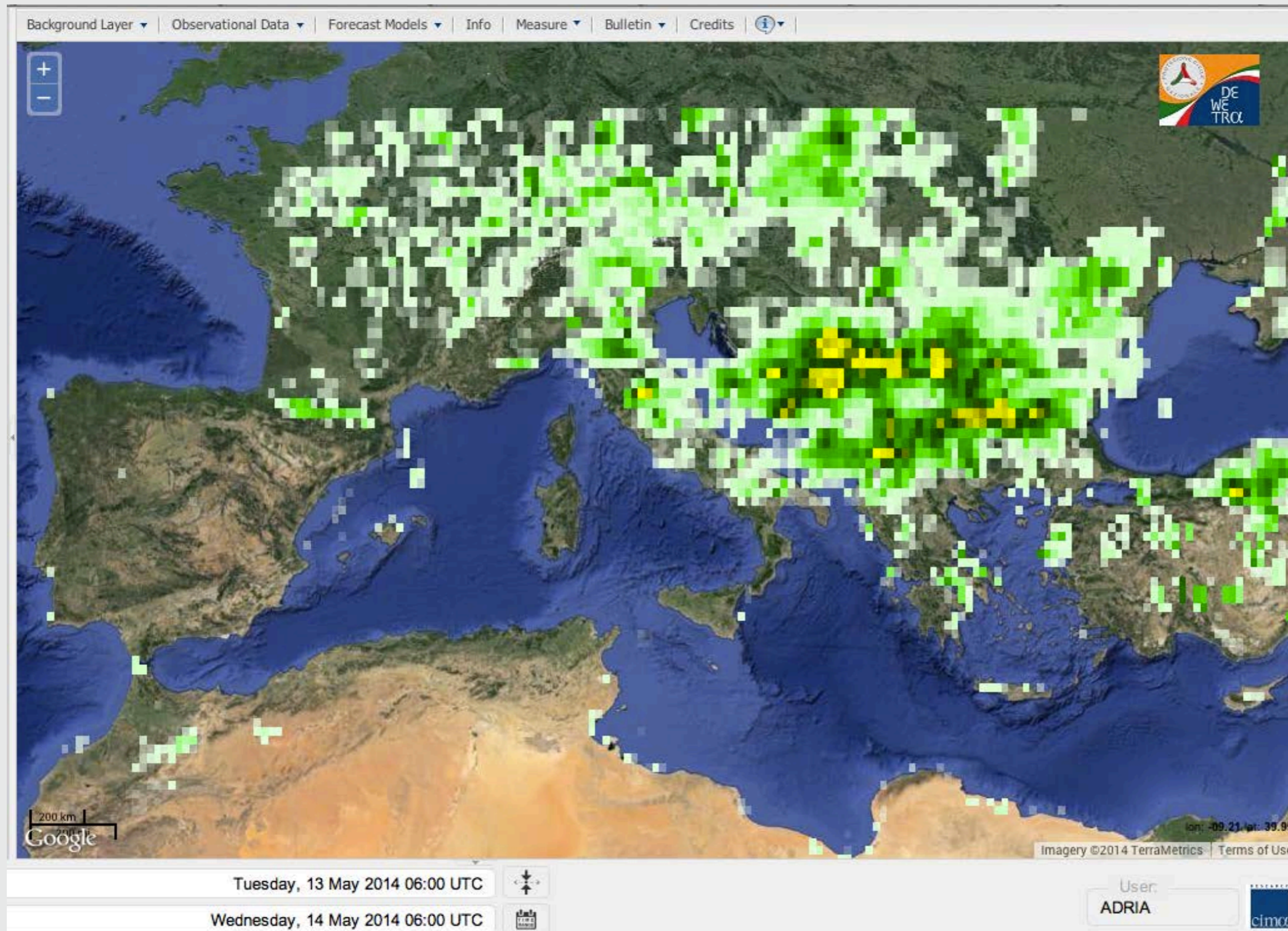


Geostationary Meteorological Satellites



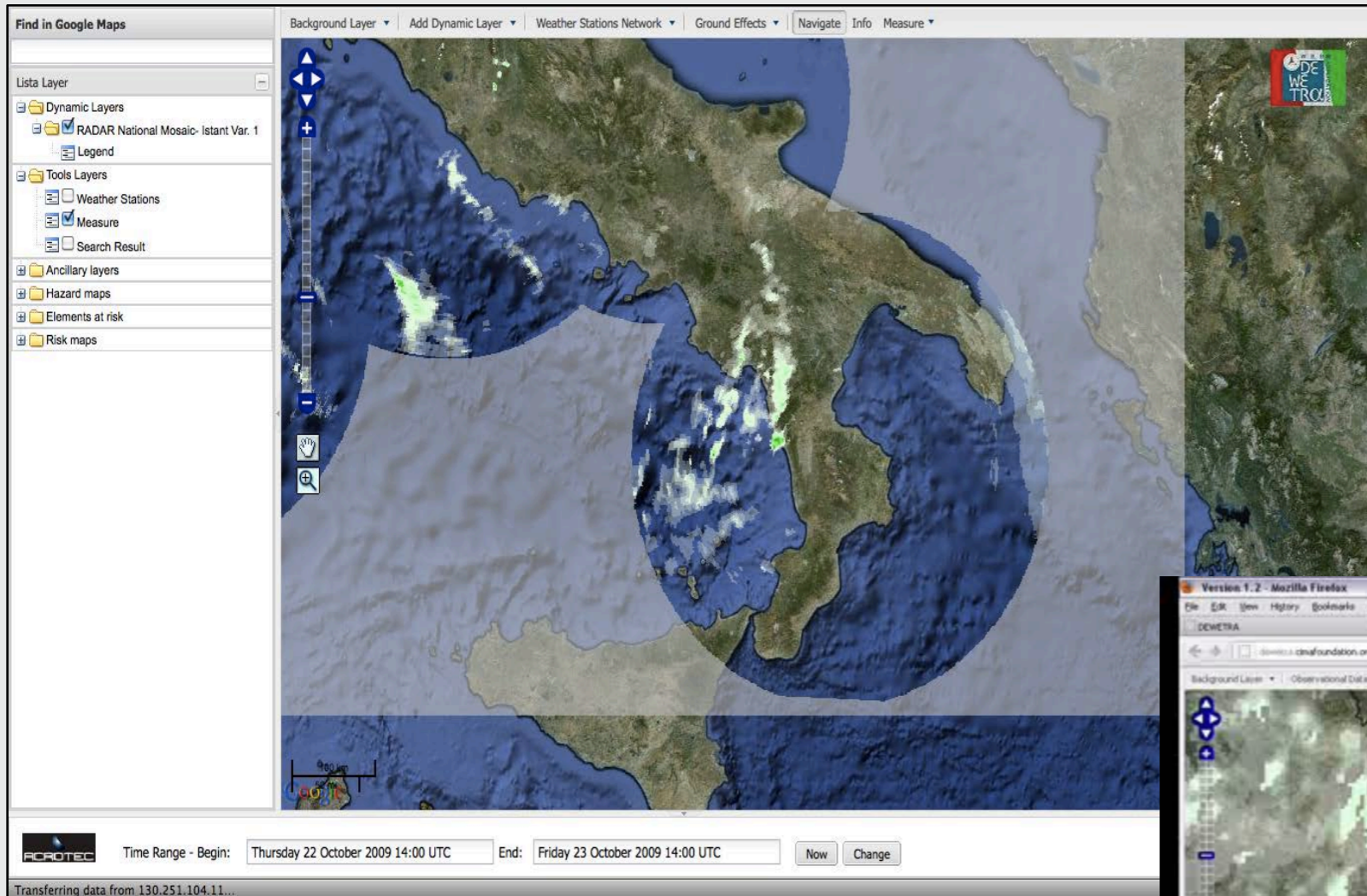
Real-time hazards assessment: observations

Precipitation estimation TRMM (3h) (14 may 2014)

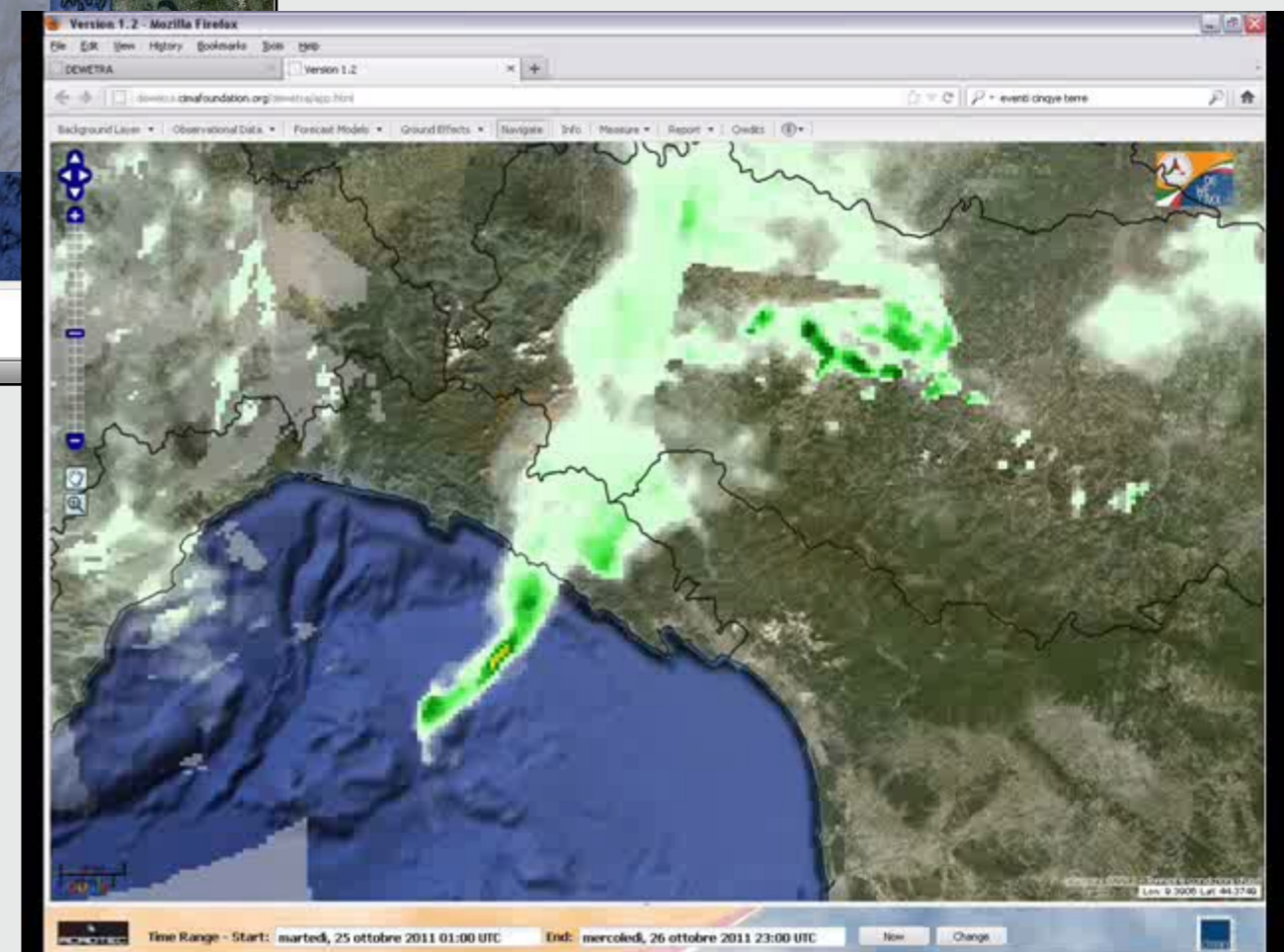


Real-time hazards assessment: observations

National weather radar network



25 /10/2011



Automatic weather stations

RT STATION OBSERVATIONS

The interface displays a map of Italy with numerous green diamond markers representing weather stations. A red diamond marker highlights the Viganego station. A data table provides the following information:

Weather Station: Viganego					
Sensors		Station Data			
Variable	Last Value	UoM	Date Time	Tren	
1 Pluviometro	-	mm	-	-	
2 Termometro aria	9,2	°	03/01/2011 13:00	+	
3 Igmometro	36,0	%	03/01/2011 13:00	-	

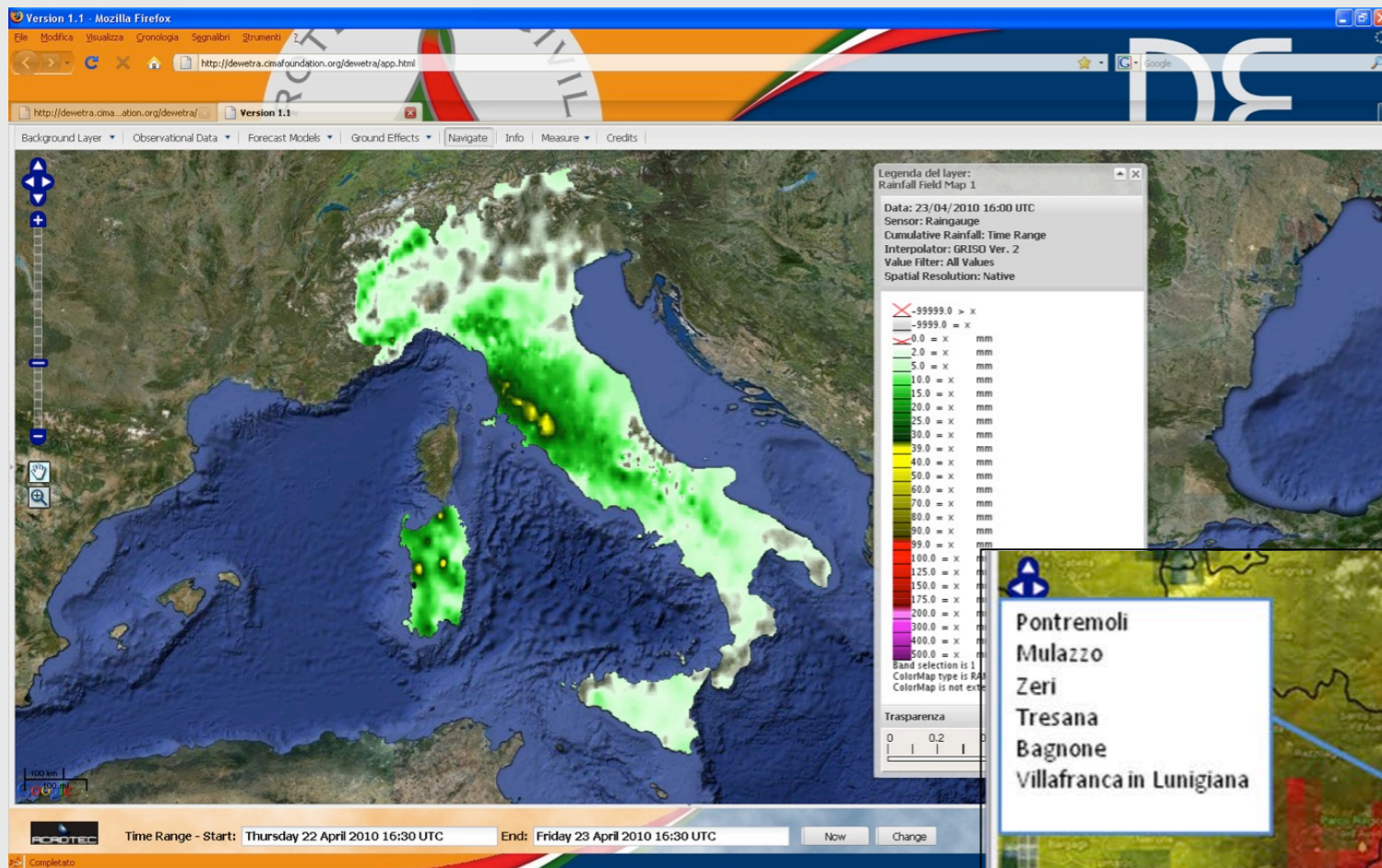
The temperature chart shows the following data points:

Time UTC	Temperature [°C]
17:00	8,0
21:00	5,0
01:00	1,0
05:00	1,0
09:00	2,0
13:00	9,2

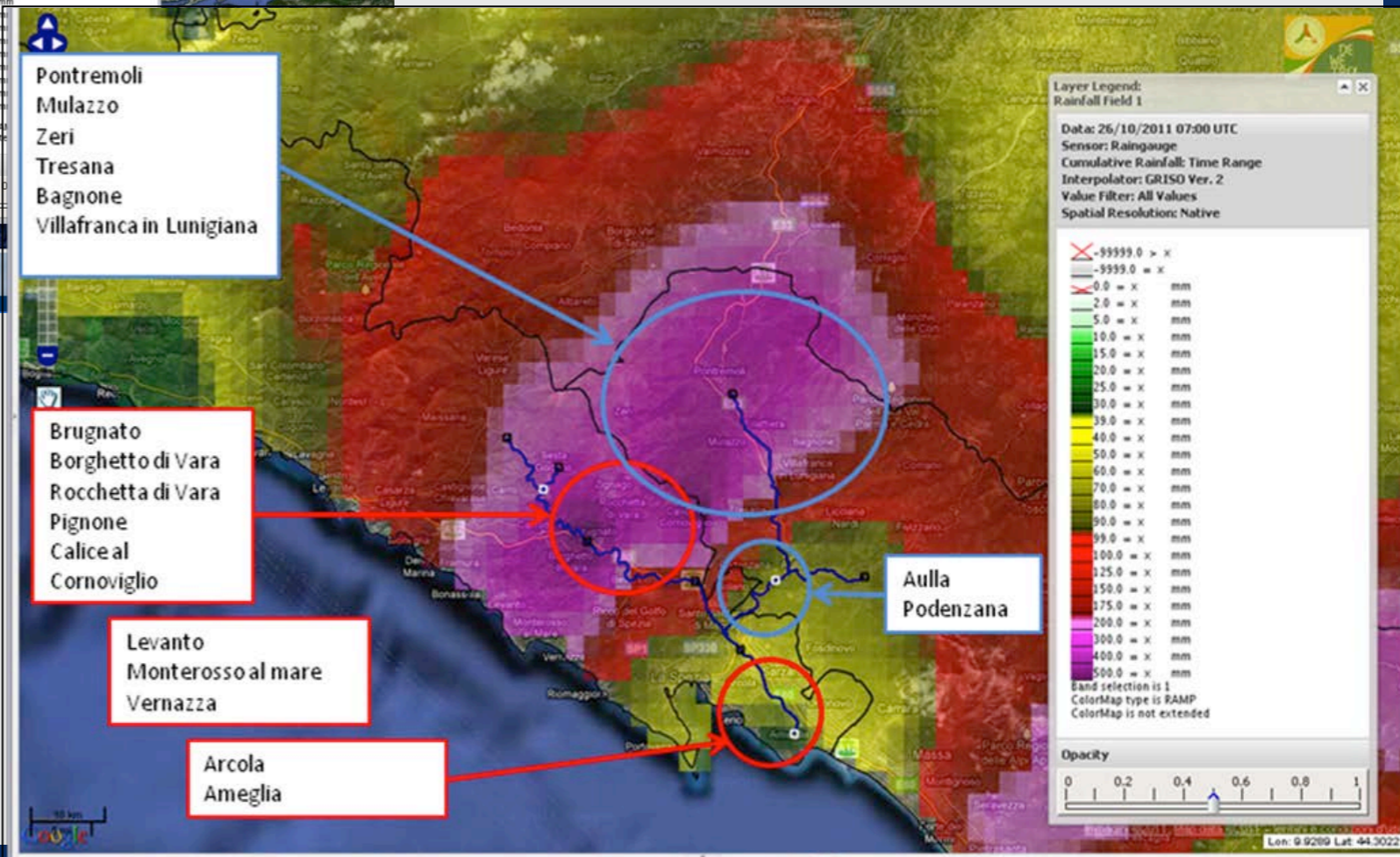
Time Range - Start: Sunday 02 January 2011 14:30 UTC End: Monday 03 January 2011 14:30 UTC

Real-time hazards assessment: observations

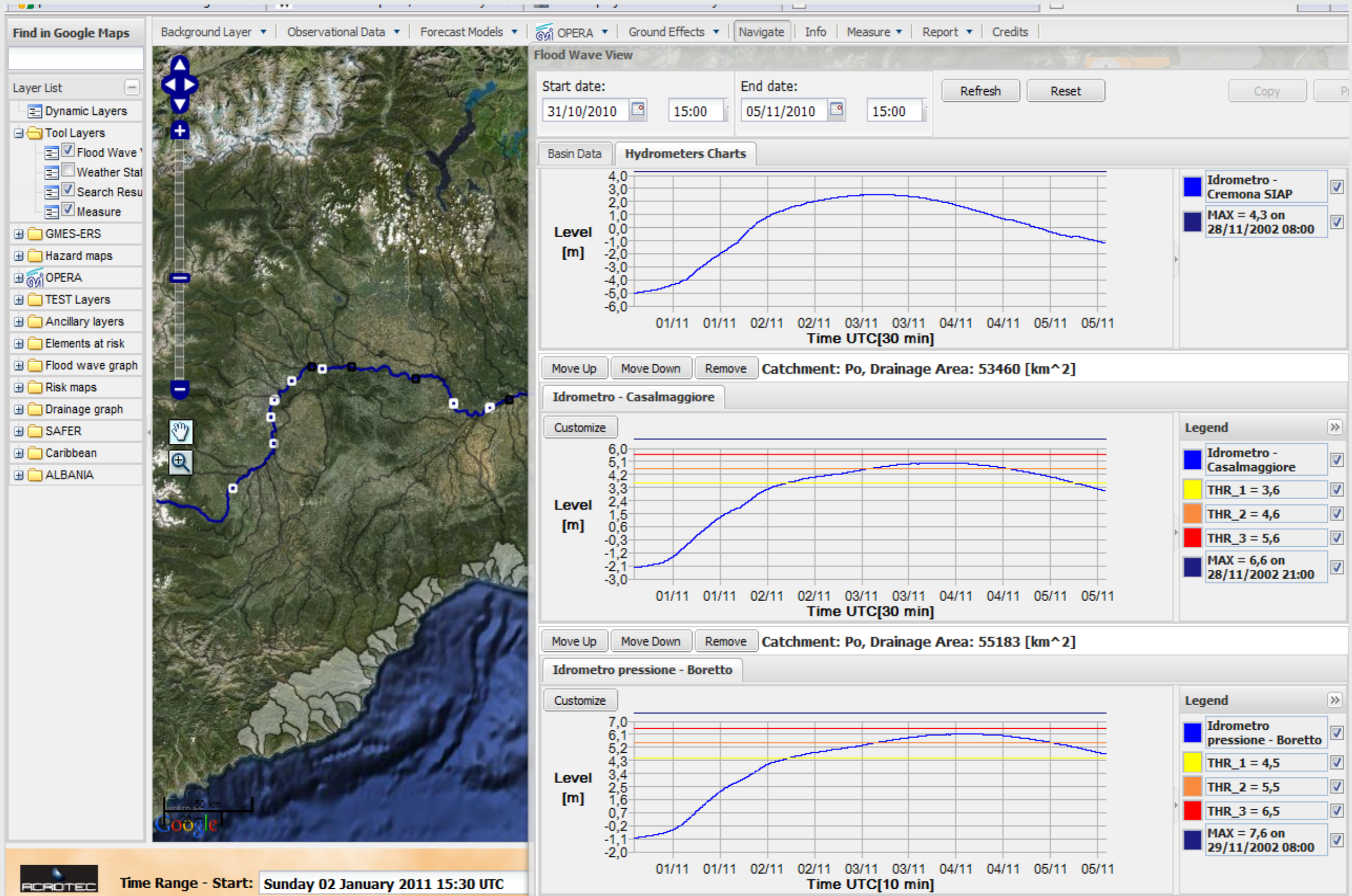
Information presentation : MAPPING-GRISO model)



25 /10/2011

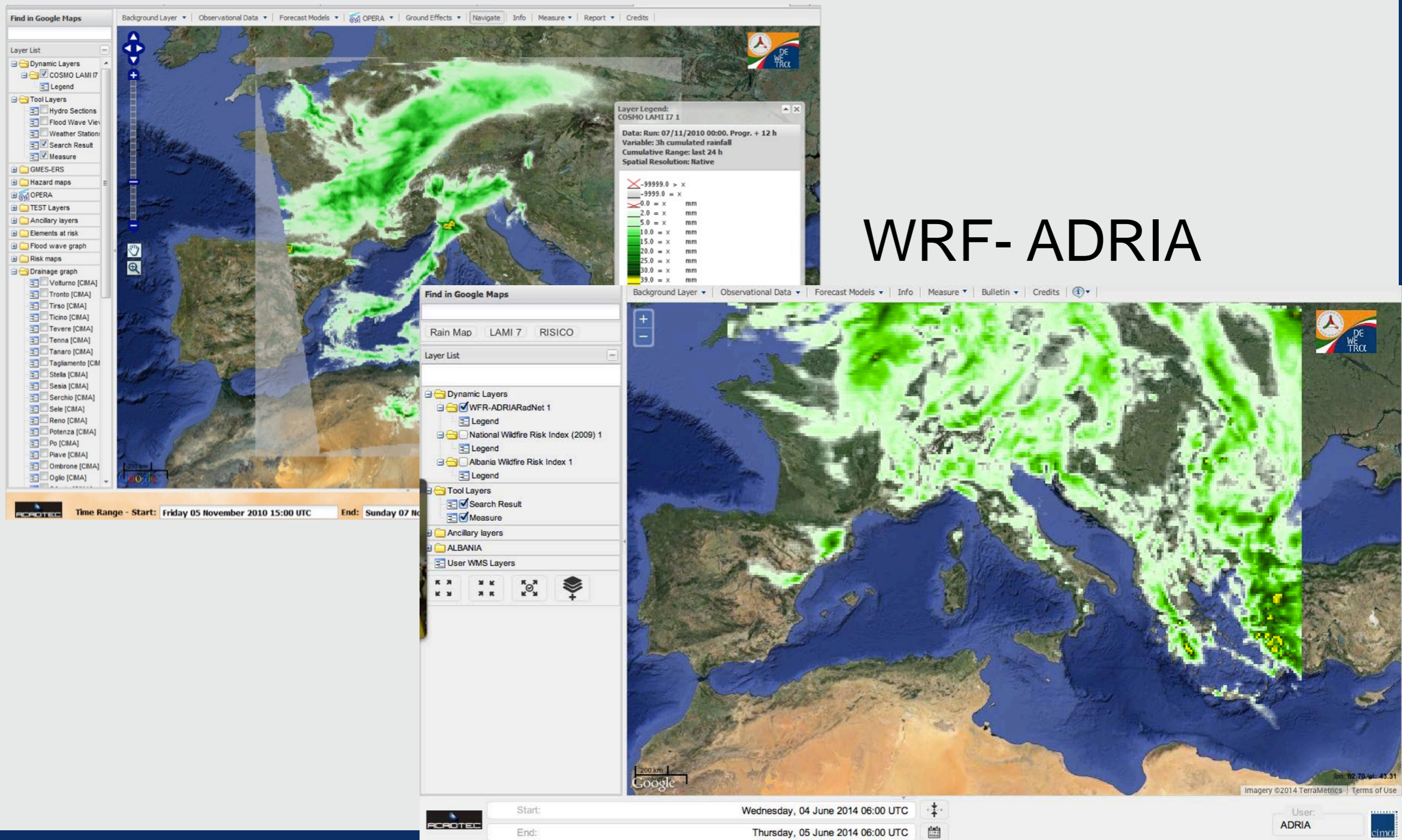


Water level



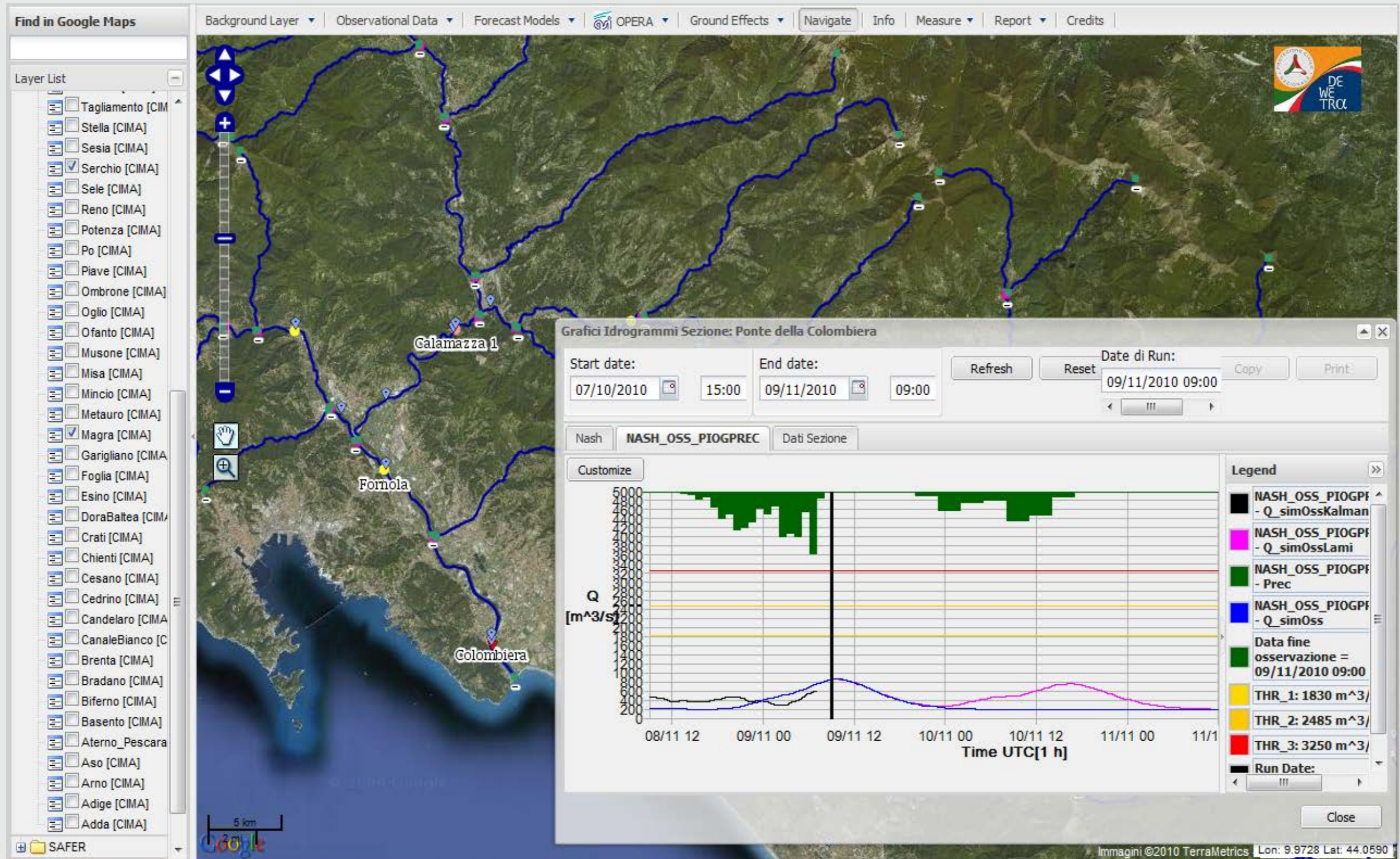
Real-time hazards assessment: forecasts

NWP: COSMO 17, COSMO 12.8, GFS, ECMWF, WRF

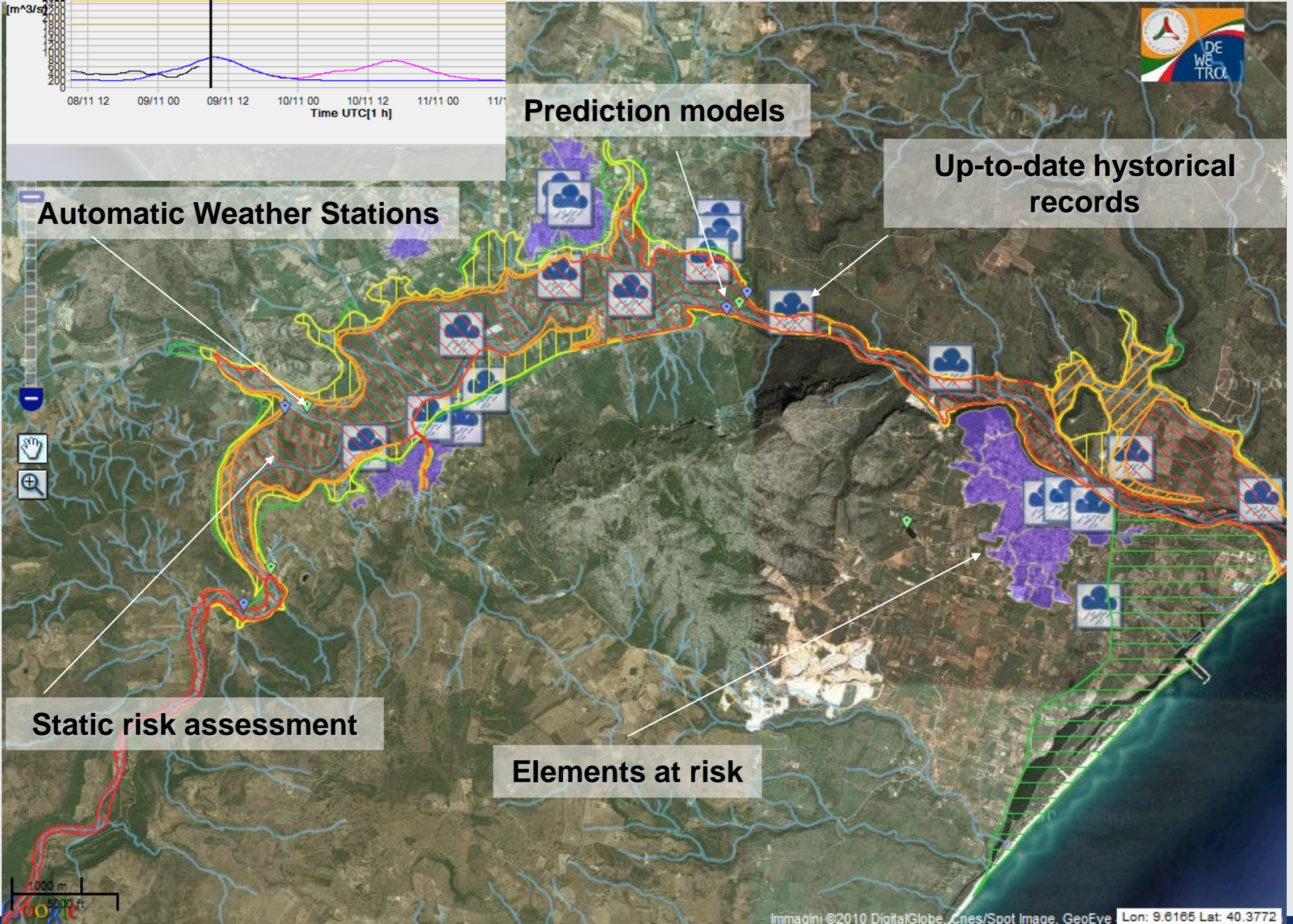
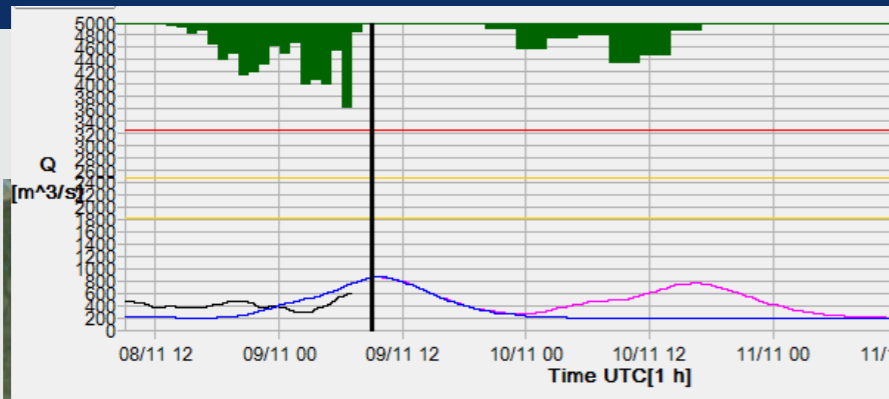


Real-time hazards assessment: forecasts

Flood predictions –FLOODPROOF, Chym



Real-time risk assessment: Building a risk scenario



Automatic Weather Stations

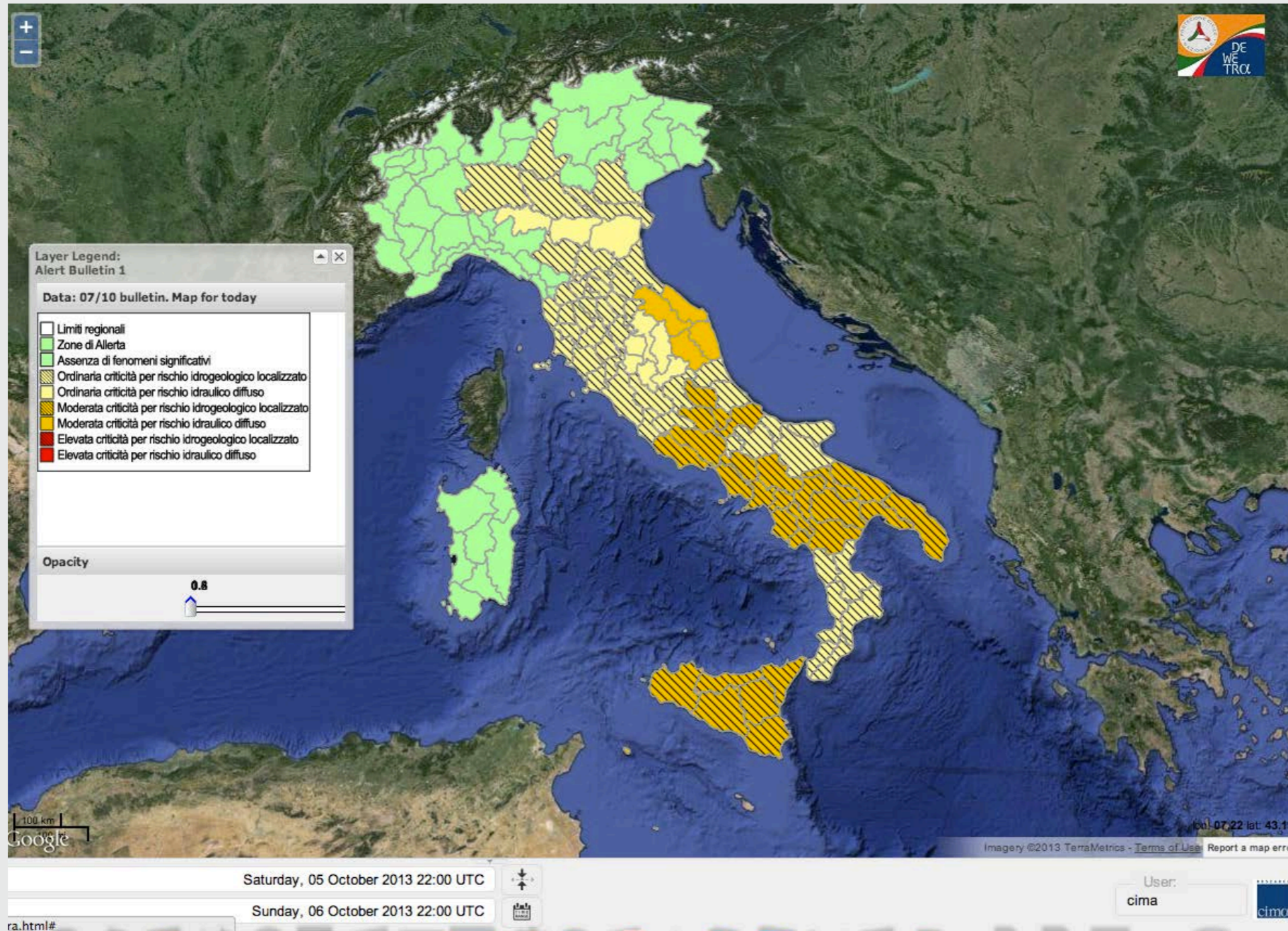
Prediction models

Up-to-date historical records

Static risk assessment

Elements at risk

Warnings and Dissemination

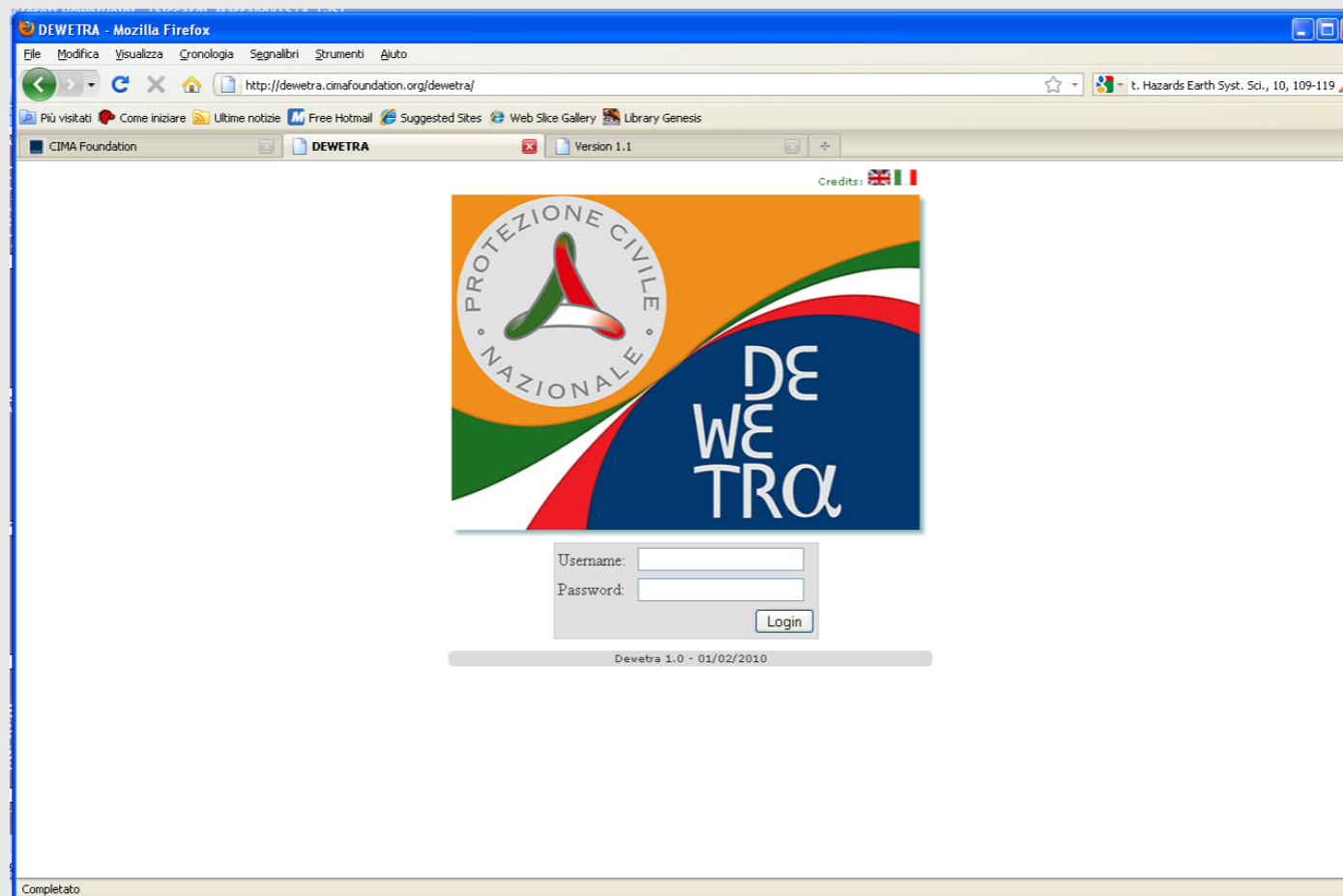




ADRIATIC integrated RADar-based and web-oriented information processing system NETwork to support hydro-meteorological monitoring and civil protection decision"

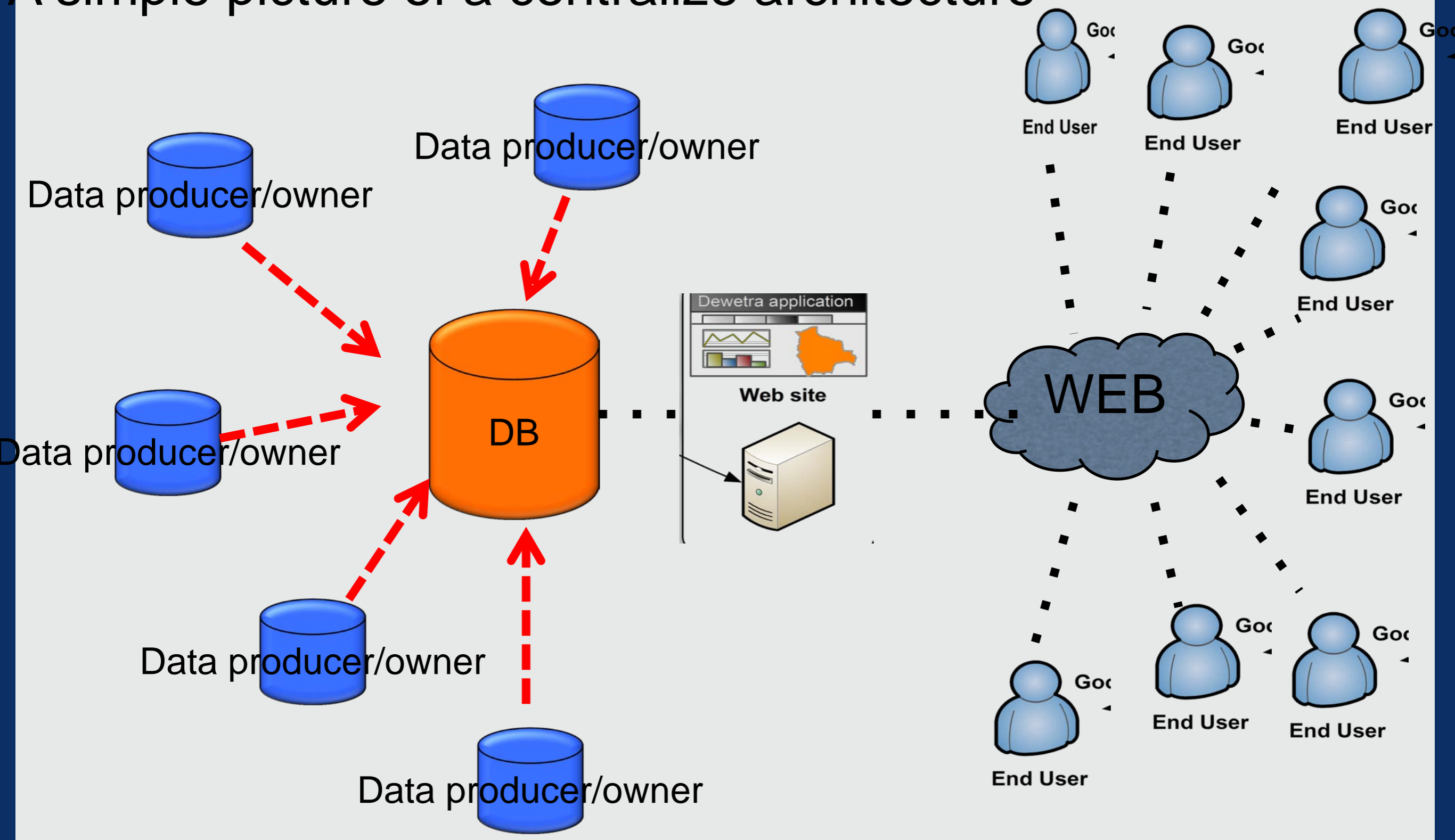
- Partner countries: Italy, Albania and Croatia
- Main Objectives
 - *The main aim of the ADRIARadNet project is to set up an integrated web-based platform for data sharing and consultation*
 - *development of an innovative integrated decision support tool for weather monitoring and hydro-meteorological applications based **on mini-radar**, satellite and model data*
 - *install and testing 4 mini-radar systems (1 in Croatia, 1 in Albania and 2 in Italy)*

ADRIARadNet consortium agreed to adapt the existing DEWETRA system to new requirements of ADRIARadNet platform

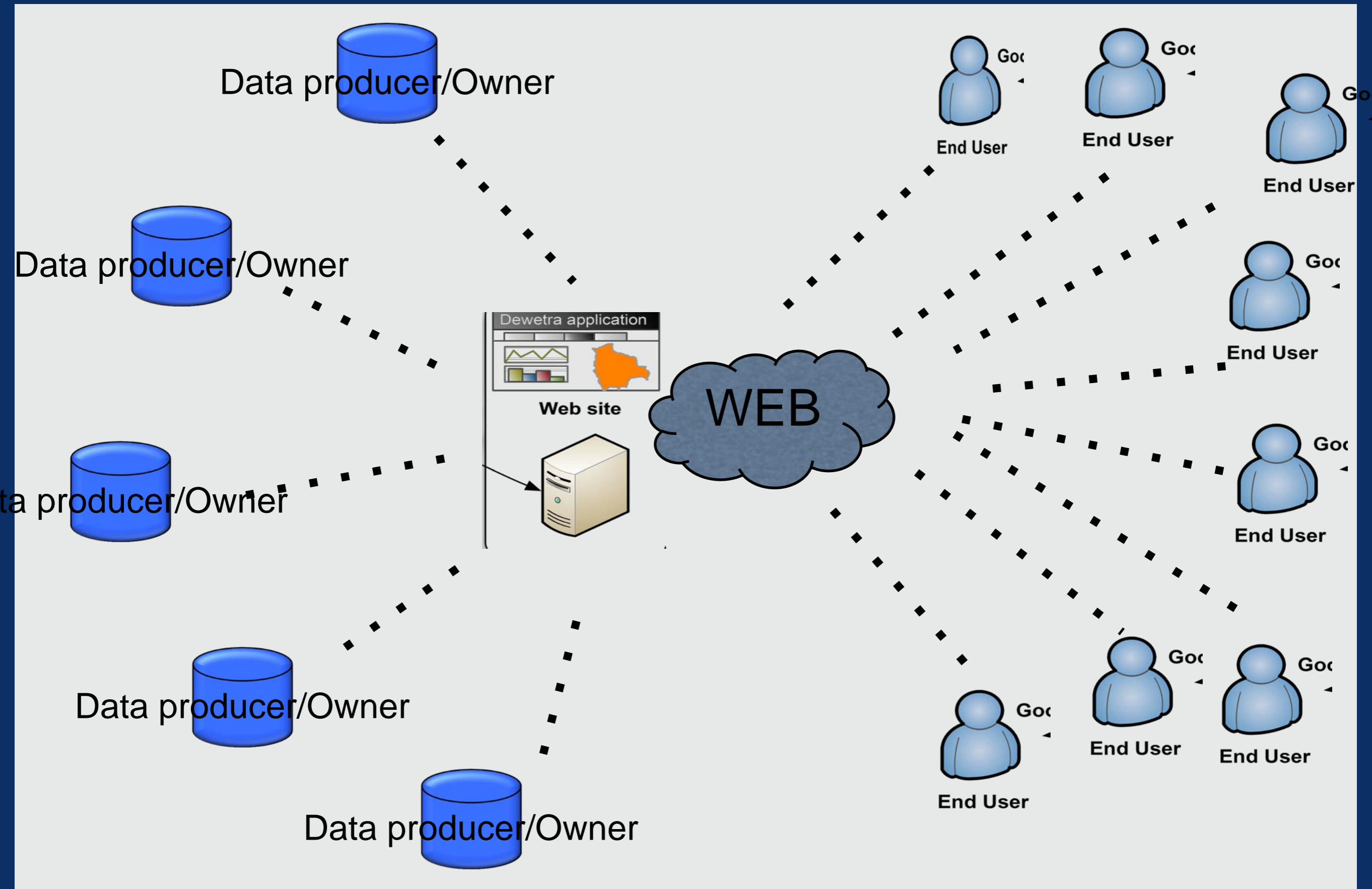


From centralized to decentralized/distributed systems for data management

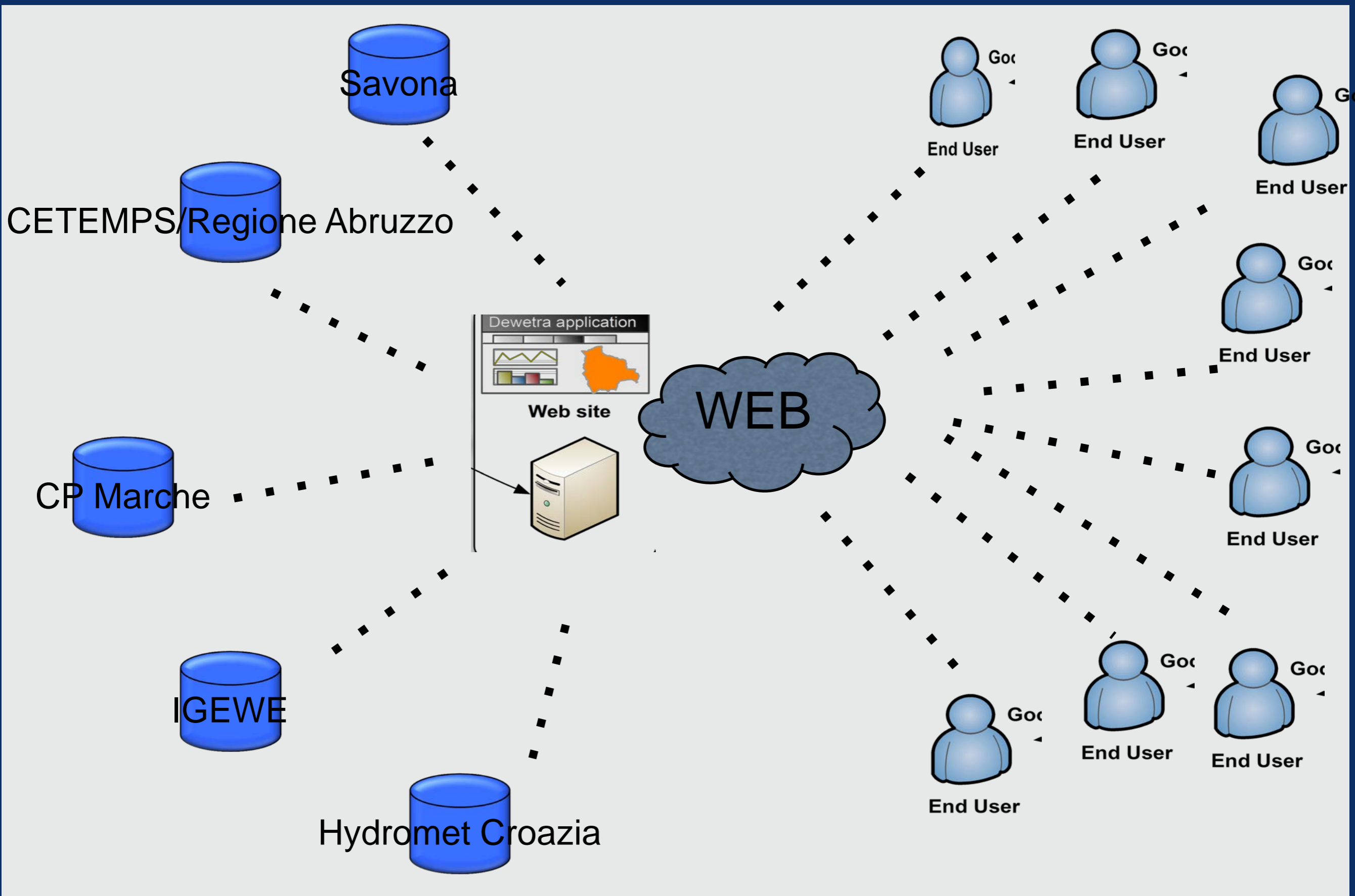
A simple picture of a centralized architecture



Decentralized/distributed architecture



Decentralized/distributed architecture - ADRIARADNET



Radar-based products

Existing products that consortium wishes to share

- Italian Radar network
- Regional radar (CETEMPS)
- Radar network Croatia



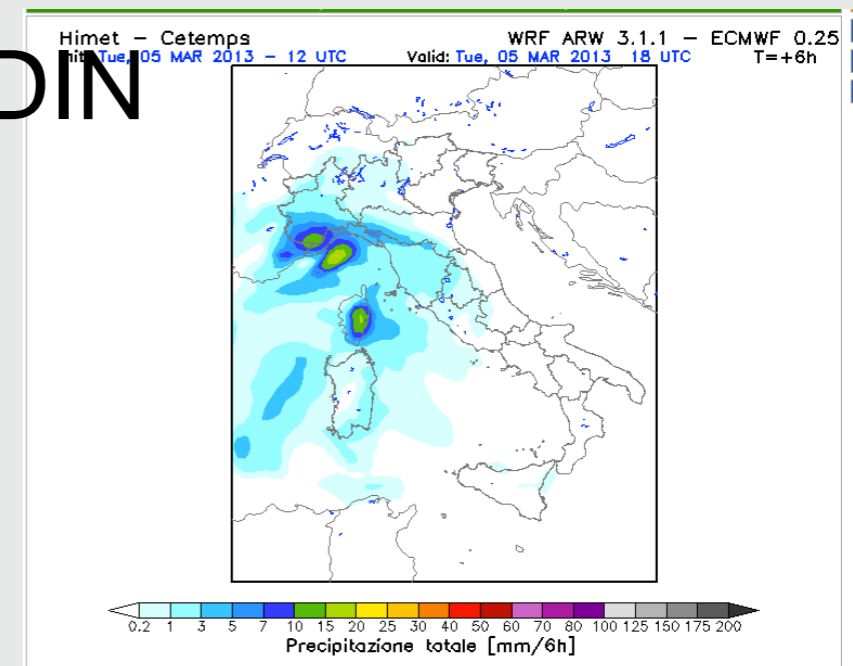
New project products with 4 mini-radar

- rainfall field
- now-casting products
- hale detection

Meteo-forecasting model

Existing models to be shared

- COSMO-LAMI, ECMWF, GFS
- ALADIN



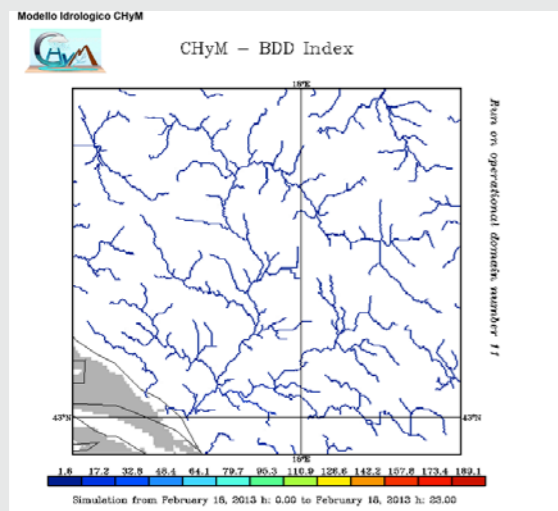
New project model

- WRF 3km

Hydro-meteorological model

Existing products that consortium wishes to share

- FloodProofs for DRIN
- Nash, Mike 11 (Marche)
- Chym (Abruzzo)



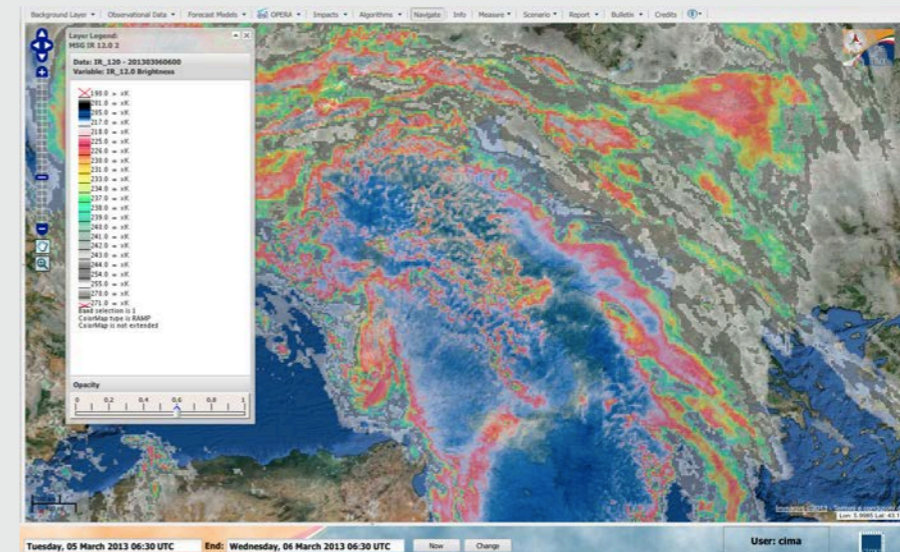
New project model

- CHym implemented in pilot basin (Neretva, Drin, Marche and Abruzzo)

Satellite products

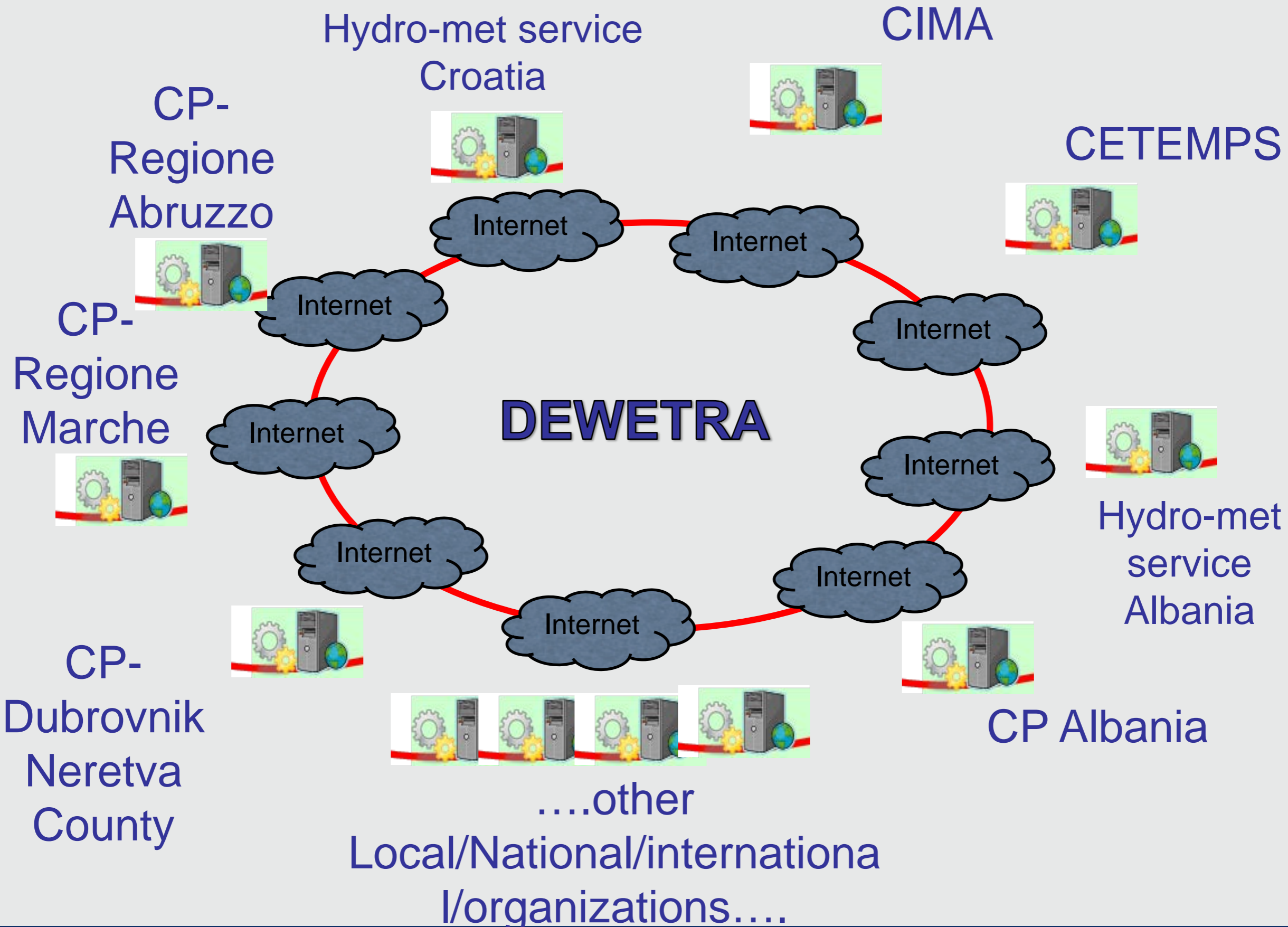
Existing products

- Meteosat 12.0 10.8 0.6, HRV, WV
- TRMM and GSMAO



- rainfall field estimation

ADRIARadNet - NETWORK



Thank you for your attention