

The Civil Protection System of the Autonomous Region of Friuli Venezia Giulia (Italy)

Geol. Raffaele Lotto La Plata, November 2017

Friuli Venezia Giulia Autonomous Region





Organisation widespread on the regional territory



- 216 Municipalities
- 216 Civil protection Municipality Groups
- 23 Districts
- Regional Civil protection
 Operative Center in
 Palmanova: SOR/SOUP/CCS

REGIONE AUTONOMA FRIVLI VENEZIA GUUA





Emergence examples





29 th August 2003 Flood in Val Canale - Canal del Ferro Pontebba - Pietratagliata



293 mm / 4 hours

Pietratagliata (Pontebba) – Fella river and Rio Geloviz Confluence



4th September 2009 – Flood Val Canale - Canal del Ferro - Val Dogna







Main tools for risk management and realisation of prevention actions

- **Regional Operative Room (SOR)** in Palmanova
- Territory real-time control and monitoring systems
- Emergency planning
- Prevention, fast intervention and restoration works
- Civil protection personnel, volunteers and population training



CIVIL PROTECTION OPERATIVE ROOM

- h24 control room
- Monitoring networks and logistic
- Regional Radio network
- Coordinates the operations of civil protection
- Connected with National civil protection Department (DPC)





Territory real-time control and monitoring systems

The data from all of the Civil Protection Monitoring Networks are collected in the Operative Centre in Palmanova :

- Hydro-Meteo-Marine monitoring network
- Hydro Geological monitoring network
- Meteorological Radars for nowcasting
- Satellite observations (Meteosat MSG)

Seismic Monitoring Network

Hydro Meteo Marine monitoring network



Real time monitoring ground effects of meteorological events by automatic monitoring network managed by regional civil protection :

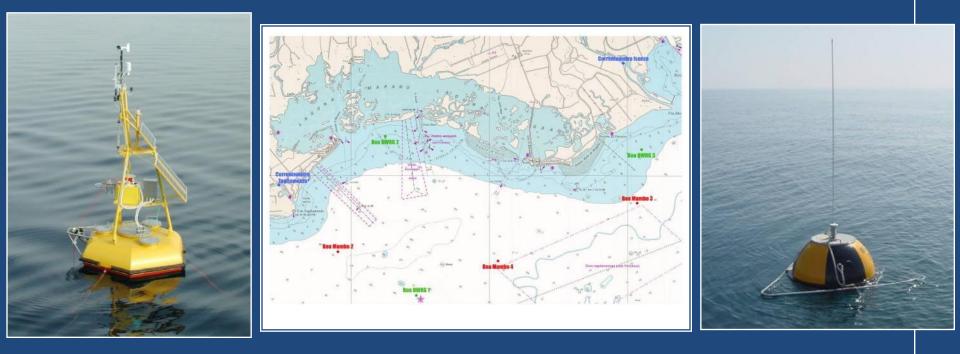
- 191 monitoring stations
- 111 hydrometers
- 112 rain gages
- 27 barometers
- 100 air thermometers
- 5 sea level sensors
- 18 snow level sensors
- 4 present weather sensors





Hydro Meteo Marine Monitoring Network





6 marine buoys (3 meteo-oceanographic + 3 for waves monitoring)

Real time monitoring system based on fixed buoys on which different oceanographic and meteorological sensors are installed.



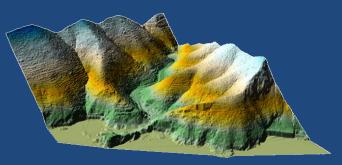
Hydro Geological monitoring

Example of laserscan relief elaboration Flood Liguria Region – November 2011



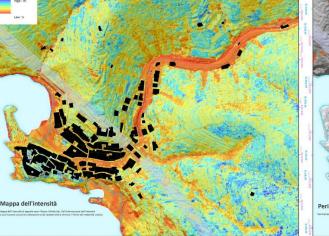
- Area: **200 km²**
- Lidar points density > 4 points/m²
- Ortofoto: ground resolution 15 cm/pixel

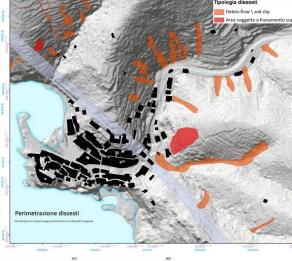




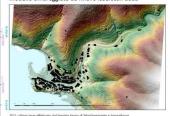
In the early days of the emergency, due to the calculation of the difference between the DTM created by the laserscan relief and the DTM already in the possession of the Liguria Region, landslides and estimated volumes have been identified.







Modello ombreggiato da rilievo laserscan 2011



della Protezione Civile della Regione Autonoma Friuli Venezia Giulia con densità superiore a 4 punti al mq

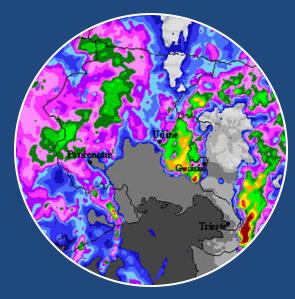


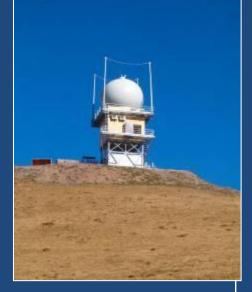
Reservation de la constructione a cura della Reservatione Civile della Regione Friuli Venezia Giulia

Meteorological Radars for nowcasting









Fossalon Radar

Mount Zouf Plan Radar

- Meteorological radar data are used for civil protection purposes in order to detect and monitor critical events and, during the phase of meteorological nowcasting
- The meteorological radar of DPC installed on Mount Zouf Plan grants the maximum coverage of the mountain area of FVG and also of part of Carinzia region (Austria) and Slovenia



Flood monitoring

The High-water service



"High-water service" ("Servizio di piena") consists of procedures and activities for the monitoring of river embankment status, in the case of water level exceeding fixed warning levels. Are established 4 phases:

- I) Planning phase
- II) Monitoring and Meteorological alerting phase
- III) Embankment surveillance phase
- VI) Management and quick Intervention phase for prevention ed restoration



Task supported by volunteers of Civil protection Municipality Groups

Task of Regional Civil protection

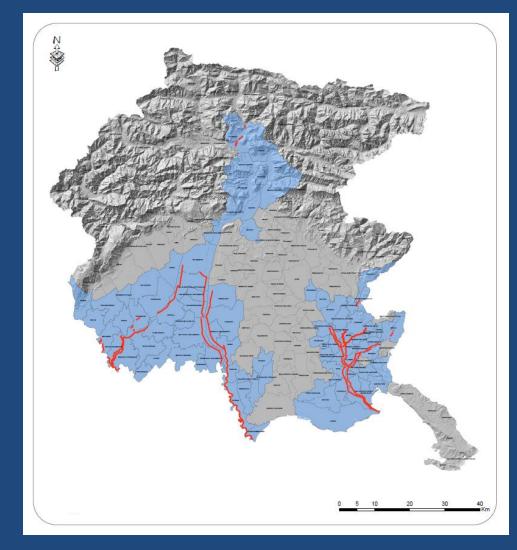
(PCR) and Public Works Offices



Task of PCR and Public Works Offices

Organized high-water service on Embanked rivers





This service is organized for the selected and classified reaches of the main water courses, where embankments are of first and second or third category of importance.

Total length of the embankments: 235 Km





Meduna river - Prata di Sopra (PN) - 27 Nov 2002



Livenza river – Loc. Traffe (PN) - 28 Nov 2002

Embankments surveillance phase

Civil protection municipality Groups are in charged of the surveillance of the embankments in order to permit a prompt "hydraulic quick intervention" in case of damages avoiding ruptures and flooding of inhabited areas

Embankment surveillance phase



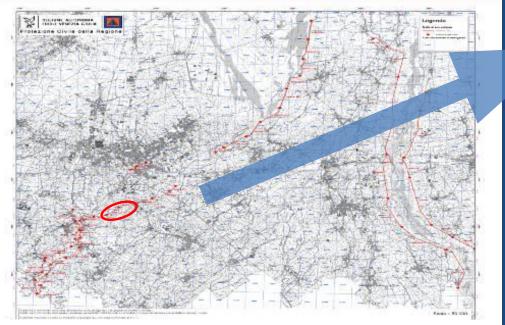
Infiltration



Cracks

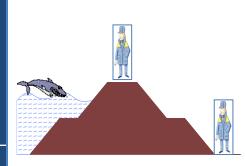


Cartography Support for High-water service



Cartografia delle tratte di sorveglianza









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REGIONAL OPERATIVE ROOM

High-water service Coordination Technical-scientific activity Institutional relations

High-water service Coordination : alerting levels

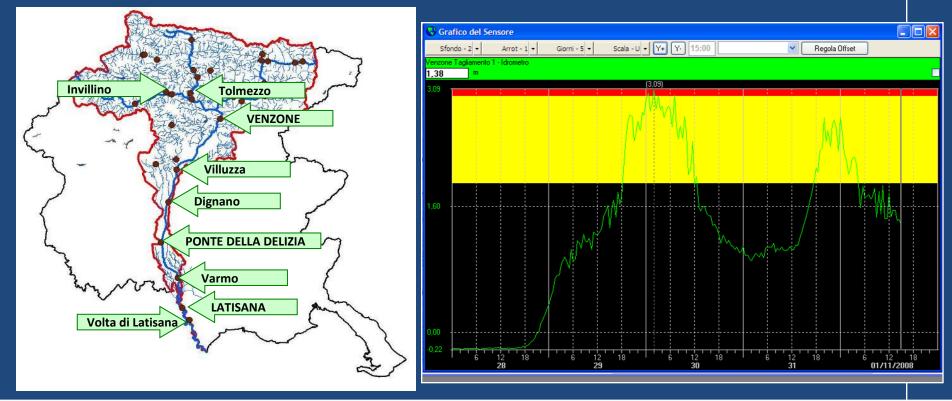


Continouous Monitoring of river levels on reference points to activate planned actions:

- Attention (Guard) level :
- 1° presidium level :

2° presidium level :

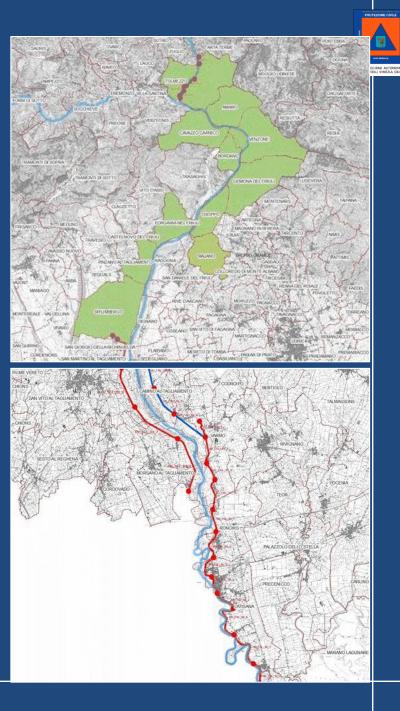
- activation of hydraulic officers;
 - activation of surveillance of embankments with <u>volunteers of civil</u> <u>protection municipality Groups</u>;
 - intensification of surveillance with more <u>volunteers of civil protection</u> <u>municipality Groups</u>



High-water service Coordination: Real-time GIS implementation



Immediate perception and visualization of situation on field





High-water service: activity on field

Embankment surveillance with men has an irreplaceable importance in order to allow prompt intervention, avoiding that an high-water event becomes a catastrophic inundation



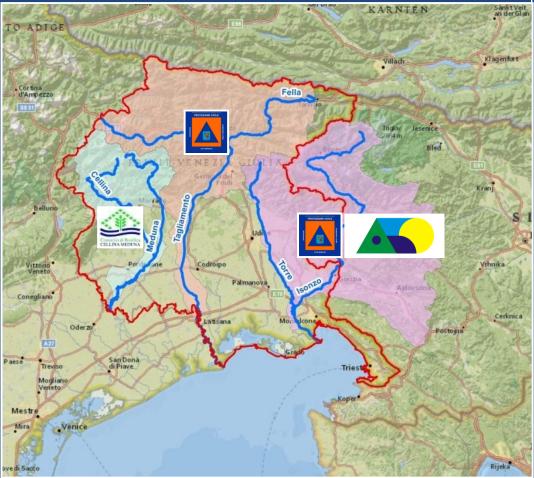


The hydrological forecasting and management system of Friuli Venezia Giulia

The Friuli Venezia Giulia Region has hydrological and hydraulic models for::

- basin of rivers Cellina-Meduna
- basin of river Tagliamento
- basin of river **Isonzo**

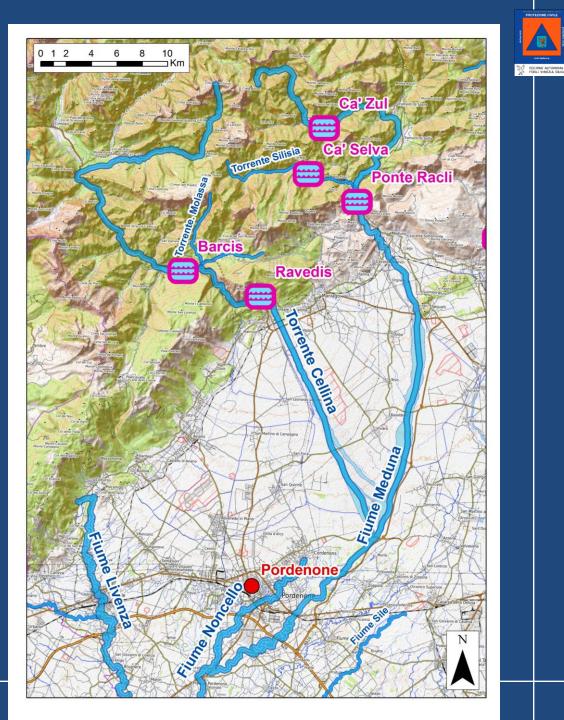
with GIS interface for environmental monitoring and "high water" real-time forecasting.





The dams of the basin Cellina-Meduna

Coordination between Civil Protection and Dam Managers to laminate the floods and mitigate downstream effects





Prevention, quick intervention and restoration works



3rd February 2003



water courses maintenance





14th April 2003



Flood 2003 (Ugovizza)



Gravel and material removal from the creek bed



Concrete screening of embankments (Latisana)





Civil protection personnel, volunteers and population training



Torre creek - bed cleaning











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