APPLICATION OF THE PRESTo EARTHQUAKE EARLY WARNING (EEW) AND ALERT MANAGEMENT SYSTEM IN NORTH-EASTERN ITALY, SLOVENIA AND AUSTRIA: EXPERIENCE WITH THE CE³RN NETWORK

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http://www.rissclab.unina.it
From an original figure of Tom Jordan redrawn by Stefan Wiemer.
Objective: To estimate in a fast and reliable way the earthquake’s damage potential.

**Network Based (or Regional) Approach**

- Seismic Network
- Detection and Location
- Magnitude Estimation
- Peak Ground Motion Prediction

**Lead-time:**
(S-arrival time at the target) - (first-P at the network)

**Single Station (or On-Site) Approach**

- Seismic Station
- Early Ground Motion Measurement
- Peak Ground Motion Prediction

**Lead-time:**
(S-arrival time at the target) - (P-arrival at the target)
EEWS a pragmatic and viable means for the implementation of protective measures

Event’s nucleation

2-to-4 sec. of P wave records

t. Location and Magnitude estimation

Targets

t. Mitigation Actions

Operational Time of a Regional Early Warning

S-wave at the Target

Lead-Time

EEW must be accompanied by training and preparedness of the population

School Alert

3-6s

Safety Sensitive Env.

Making Safe men at work
Automatic procedures for the probabilistic and evolutionary estimation of source parameters and prediction of ground motion shaking.

An integrated software platform for real data processing and seismic alert notification.

Satriano & Elia (2010). PRESTo, the earthquake early warning system for Southern Italy: Concepts, capabilities and future perspectives. Soil Dyn Earthquake Eng
THE POTENTIAL DAMAGE ZONE

A real-time P-waves prediction of the damage zone

On-Site (Pd vs. PGV)

Regional Alarm
- Location
- Magnitude
- PGx
- Secs to S-waves

Epicenter [Regional]

I_{EMS} > VII

Potential Damaged Zone (PDZ)

Modified from Zollo et al., 2010
http://prestoews.org

PRESTO - Probabilistic and Evolutionary early warning System

Documentation

Downloads

FREE SOFTWARE (GPL)

PRESTO distribution
CE$^3$RN – Central Eastern Europe Earthquake Research Network

The Trans-National Seismological Network in the South-Eastern Alps

~ 100 stations

from Bragato et al (2011)
Test of PRESTo @ CE3RN

In real-time since the begin of 2014

20 SM Stations

http://www.rissclab.unina.it
Playback of the 1976 Friuli (Italy) Mw 6.5 Eqk

Epicenter
Station Alert Level
Vulnerable Site
Depth
Magnitude

Accelerograms
P- and S-waves Windows

S-Waves wavefront

PRESTo PLUS

P, S waves Windows

Magnitudes

Alert Levels

Site

Epicenter

Vulnerable Site
Playback of the 1976 Friuli (Italy) Mw 6.5 Eqk
Given the 1976 network configuration, the Blind Zone (BZ) is about 40 km.

Macroseismic observations of the 1976 Friuli earthquake (after Giorgetti, 1976)
POTENTIAL DAMAGE ZONE VS MACROSEISMIC OBSERVATIONS

Macroseismic observations of the 1976 Friuli earthquake (after Giorgetti, 1976)

POTENTIAL DAMAGE ZONE (P-WAVES BASED)

Pd → PGV
PGV → I_{MCS}
(Faenza & Michelini, GJI 2010)
Alert released 10 seconds after the first P arrival detection.
Performance

Since end of May, 15 Alert sent (1 False event)

~ 100 stations

NEXT STEP

Date (yy-mm-dd) and Time (UTC) | ML_BULL | ML_FW
--- | --- | ---
2014-05-29 07:24:18.63 | 3.8 | 3.5
2014-06-02 02:15:03.02 | 2.0 | 2.0
2014-06-19 11:26:21.40 | 2.6 | 2.8
2014-06-24 22:43:25.39 | 2.7 | 2.8
2014-06-29 18:39:32.15 | 2.1 | 1.9
2014-07-05 15:01:14.57 | 1.7 | 1.8
2014-07-05 15:47:05.50 | 1.6 | 1.7
2014-07-07 10:50:38.87 | 2.8 | 3.1
2014-10-05 07:09:23 | 2.5 | 3.9
2014-07-25 06:32:00.58 | 1.9 | 1.6
2014-08-08 12:14:16.38 | 2.6 | 3.1
2014-09-12 15:50:52.85 | 2.2 | 2.0
2014-09-12 15:53:45.06 | 2.0 | 2.0
2014-09-18 14:24:41.45 | 2.2 | 1.8
2014-11-22 3:22:35.41 | 1.9 | 2.0

Figure 2. Map of the real-time seismic stations of the GCS-CRS.
Coming soon: integration of different networks

Example at the ISNET network
The END

Thanks for your attention