ITALIAN STRONG MOTION NETWORK
RAN, ITALY

RANLive Web Tool

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KINEMETRICS

Advancement Through Innovation

GEOVIS

Introduction

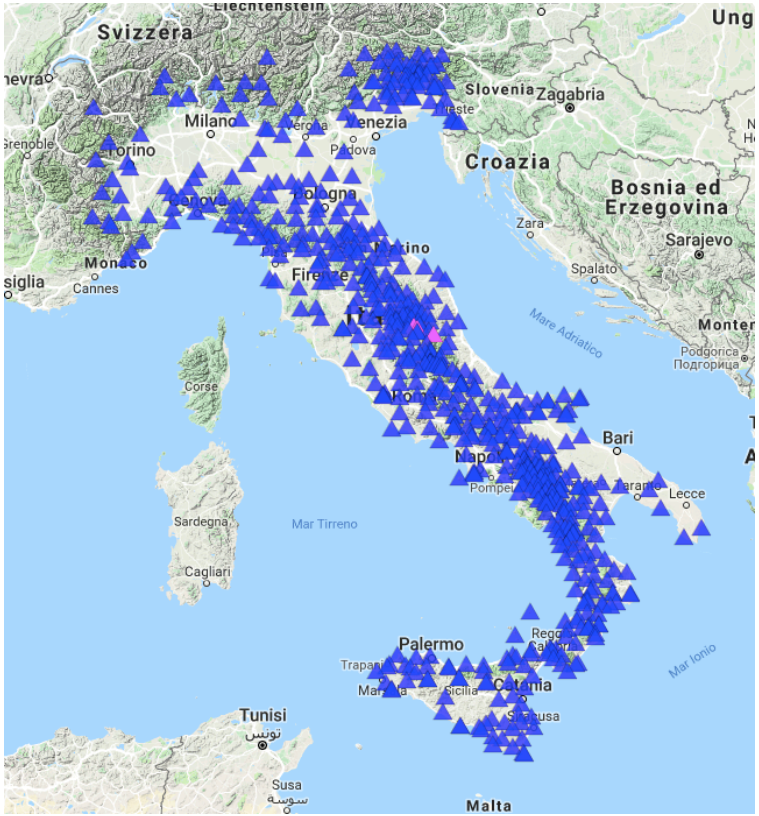
What is the RAN?

- RAN (*Rete Accelerometrica Nazionale*) is the Italian Strong Motion Network managed by the Civil Protection Department (**DPC**)

- The network consists of 573 accelerometric stations, and the maintenance of (currently) 310 stations and the operation of the Data Center (CAED) is carried out by Kinemetrics operating in Italy through GEOVIS

- BRTT's ANTELOPE software does the core data acquisition and processing acquisition including DATASCOPE database

- The system includes extensive customizations for processing and data storage



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Introduction

Restricted access to RAN

- The CAED is hosted within DPC's headquarters
- Access to RAN data and servers is very restrictive
- If you want to access RAN data and servers from outside the DPC, you need an on-demand VPN

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Introduction

Needs and Request of DPC

DPC requested a tool with following main features:

- Sharing of the ground motion parameters and downloading of the waveforms data in SAC and ASCII format
- Easy access for everyone and from everywhere without knowledge of how to access DataScope
- Easy integration of RAN data with the DPC tools (e.g. SIT-DPC)

RAN's Data Products

Antelope data on the Web

We had to find an easy way to share data with DPC users, researchers, students, institutions and in general with any citizen

- The simplest channel for sharing Antelope data and post-processing results is via browser
- A web page can be easily reached by any user using a computer or a smartphone without knowledge of the backend system generating the information
- The user who connects to a web page does not have to have a particular skill, a web page is usually very user-friendly

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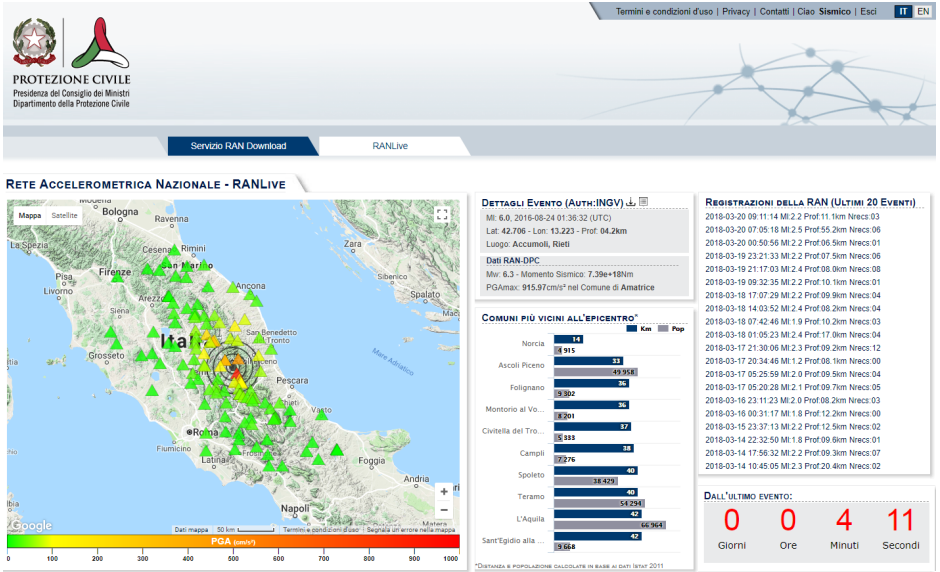
RANLive

What is RANLive?

- RANLive is born. A web-accessible tool that allows to visualize the locations of seismic events
- Within 2 minutes of an automatic event location it is possible to view the epicenter of the event and the stations that contributed to the localization
- Access to RANLive is reserved only for DPC users. There is also an "open" version without authentication (RANDownload)

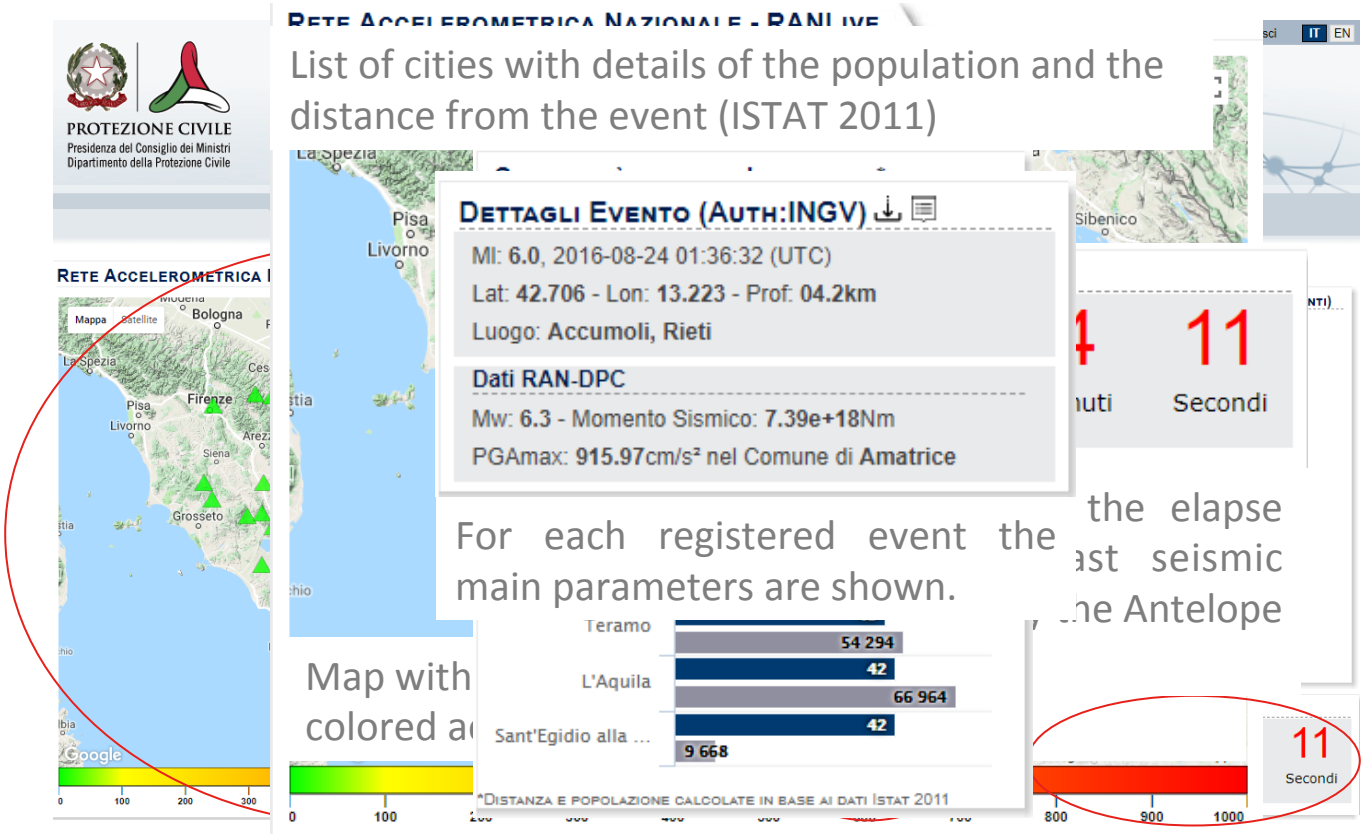


The RANLive web address is:

http://ran.protezionecivile.it/IT/live.php

RANLive

The elements of RANLive



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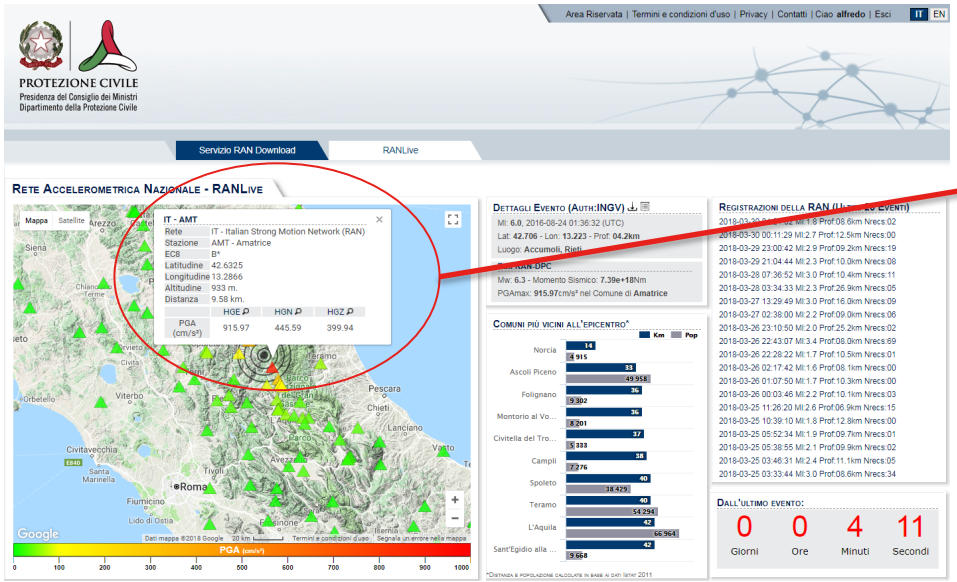
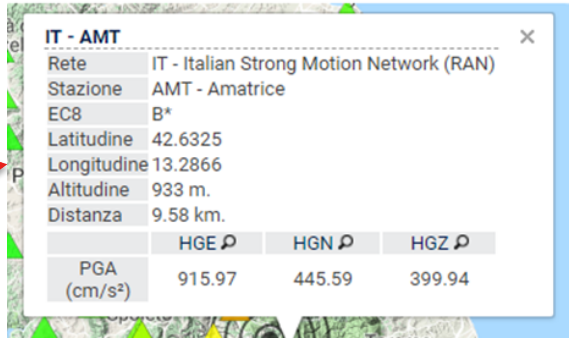
RANLive

The elements of RANLive

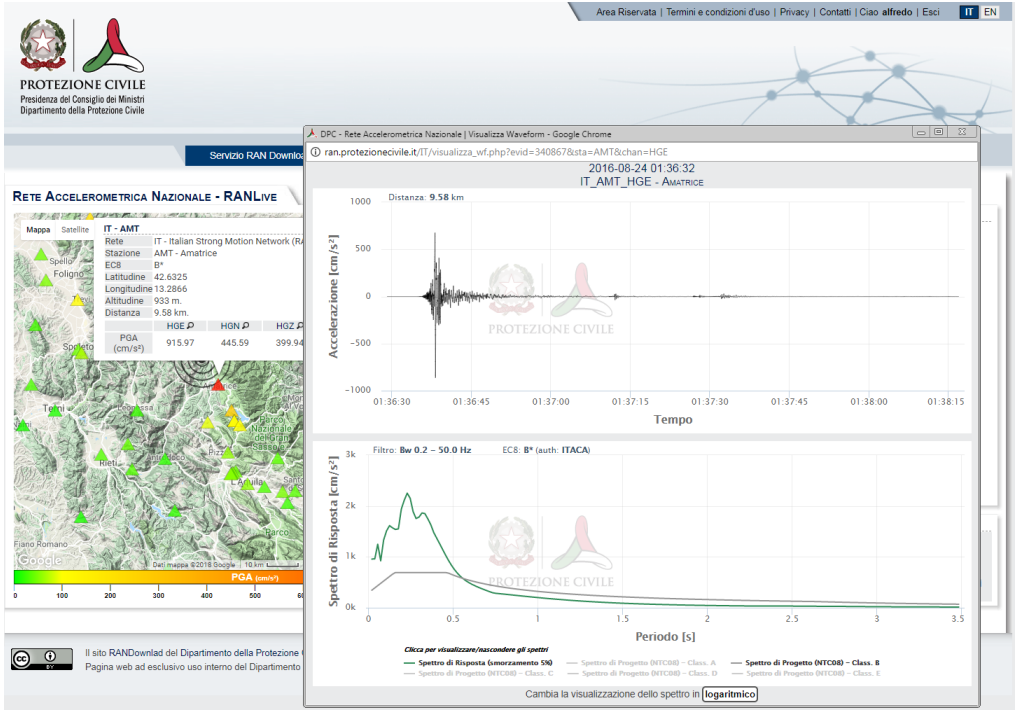




By clicking on a station icon, you access a layer with detailed station information and details of the PGA values measured per channel.

RANLive

The elements of RANLive



Furthermore, clicking on the name of the channel accesses a layer with the graph of the recorded waveform and the relative response and design spectrum.

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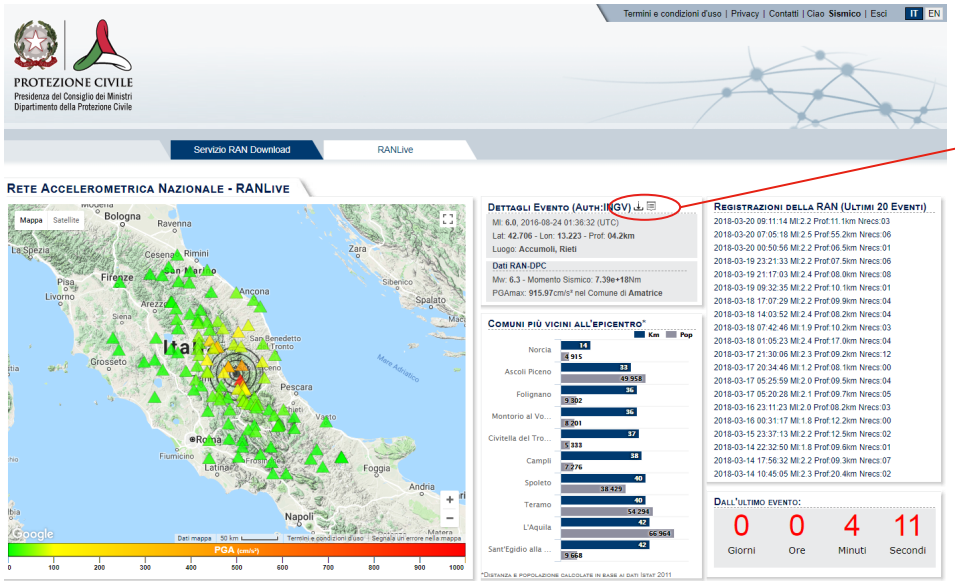
RANLive

The elements of RANLive



Moreover, for each event it is possible to consult the summary data in tabular format and to download the waveforms in SAC and ASCII format.

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RANLive

The elements of RANLive: Table of calculated parameters

Ground Motion Parameters

Event Data (auth: INGV): Ml 6.0, 2016-08-24 01:36:32 (UTC) - Accumoli, Rieti

Net	Sta	Can	Lat (°)	Lon (°)	Nome Stazione		Filtro Hz				dist km	PGA cm/s²	PGV cm/s	PGD cm	PSA03 cm/s²	PSA10 cm/s²	PSA30 cm/s²	Td s	Arias cm/s	Housner cm	EC8
IT	AMT	HGE	42.6325	13.2866	Amatrice	Ba	0.2	6	50.0	6	9.58	915.97	44.25	2.96	1,786.88	199.93	20.85	3.89	171.23	130.40	B*
IT	AMT	HGN	42.6325	13.2866	Amatrice	Ba	0.2	6	50.0	6	9.58	445.59	39.11	7.03	566.87	356.08	41.43	3.60	65.80	135.27	B*
IT	AMT	HGZ	42.6325	13.2866	Amatrice	Ba	0.2	6	50.0	6	9.58	399.94	27.45	4.46	414.57	328.56	57.23	5.25	51.82	94.64	B*
IT	RQT	HGE	42.8130	13.3110	Arquata_Del_Tronto	Ba	0.2	6	50.0	6	13.91	447.87	13.85	2.05	938.23	75.56	21.78	6.87	136.68	47.05	B*
IT	RQT	HGZ	42.8130	13.3110	Arquata_Del_Tronto	Ba	0.2	6	50.0	6	13.91	396.54	9.16	1.92	411.45	42.19	19.67	6.07	88.59	34.37	B*
IT	NOR	HGE	42.7924	13.0924	Norcia	Ba	0.2	6	50.0	6	14.25	192.12	31.06	8.20	306.03	411.44	69.77	10.78	50.90	137.85	C*
IT	NOR	HGN	42.7924	13.0924	Norcia	Ba	0.2	6	50.0	6	14.25	165.66	15.21	4.33	442.27	242.97	51.25	17.84	31.25	80.39	C*
IT	NOR	HGZ	42.7924	13.0924	Norcia	Ba	0.2	6	50.0	6	14.25	258.33	14.68	2.82	279.99	120.86	18.62	8.69	28.24	47.81	C*
IT	NRC	HGE	42.7925	13.0964	Norcia	Ba	0.2	6	50.0	6	14.25	331.61	29.20	6.25	711.12	237.14	51.36	6.31	94.72	108.96	B
IT	NRC	HGN	42.7925	13.0964	Norcia	Ba	0.2	6	50.0	6	14.25	376.96	19.16	5.67	631.13	193.98	48.16	7.51	75.39	84.24	B
IT	NRC	HGZ	42.7925	13.0964	Norcia	Ba	0.2	6	50.0	6	14.25	208.60	8.74	2.27	563.85	100.20	17.27	6.14	34.71	42.87	B
IT	CSC	HGE	42.7190	13.0122	Cascia	Ba	0.2	6	50.0	6	17.45	104.40	5.46	0.90	196.47	74.73	7.50	9.01	7.20	24.19	B
IT	CSC	HGN	42.7190	13.0122	Cascia	Ba	0.2	6	50.0	6	17.45	91.91	5.47	1.11	197.07	51.42	7.28	8.45	8.15	19.01	B
IT	CSC	HGZ	42.7190	13.0122	Cascia	Ba	0.2	6	50.0	6	17.45	64.32	2.27	0.67	94.74	39.26	6.27	10.46	3.74	10.74	B
IT	PCB	HGE	42.5580	13.3380	Poggio_Cancelli	Ba	0.2	6	50.0	6	18.91	190.70	10.64	1.33	372.79	110.44	13.82	8.55	18.35	33.32	B*
IT	PCB	HGN	42.5580	13.3380	Poggio_Cancelli	Ba	0.2	6	50.0	6	18.91	287.02	10.67	1.73	528.22	148.39	19.45	9.03	29.35	44.59	B*
IT	PCB	HGZ	42.5580	13.3380	Poggio_Cancelli	Ba	0.2	6	50.0	6	18.91	80.89	5.43	1.09	218.86	103.23	17.50	7.89	3.62	26.71	B*
IT	MTR	HGE	42.5240	13.2448	Montereale	Ba	0.2	6	50.0	6	20.15	88.90	9.35	2.22	141.88	120.78	20.96	15.82	5.26	39.69	B*
IT	MTR	HGN	42.5240	13.2448	Montereale	Ba	0.2	6	50.0	6	20.15	69.30	6.82	2.30	156.79	96.64	35.02	12.84	5.61	27.88	B*
IT	MTR	HGZ	42.5240	13.2448	Montereale	Ba	0.2	6	50.0	6	20.15	39.16	5.75	1.77	74.61	75.13	25.64	15.89	2.24	18.63	B*
IT	MSC	HGE	42.5268	13.3508	Mascioni	Ba	0.2	6	50.0	6	22.42	109.38	9.45	1.53	273.21	145.50	11.87	11.16	7.64	36.75	B*
IT	MSC	HGN	42.5268	13.3508	Mascioni	Ba	0.2	6	50.0	6	22.42	83.51	6.30	1.70	130.50	91.81	18.29	12.67	6.52	27.92	B*

The table contains the following parameters:

- Distance
- PGA
- PGV
- PGD
- PSA03
- PSA10
- PSA30
- Td
- Arias
- Housner
- EC8

The Ground Motion Parameters are automatically calculated by custom Antelope programs developed by the SeisRaM group at the University of Trieste, under an agreement with DPC.

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RANLive

The elements of RANLive : Downloading data

DOWNLOAD SAC & ASCII

ESCLUSIONE DI RESPONSABILITA', CONDIZIONI D'USO E POLITICA DEI DATI

PROCEDURA AUTOMATICA

Scarica le registrazioni accelerometriche della RAN in formato SAC e ASCII, selezionate automaticamente per i terremoti annunciati da INGV (responsabile della sorveglianza sismica in Italia), e i relativi PARAMETRI calcolati per la descrizione dello scuotimento.
La selezione, le registrazioni ed i valori dei parametri sono soggetti ad eventuale revisione.

DATI STRONG-MOTION

Le forme d'onda sono disponibili sia in formato SAC che in formato ASCII. Nell'intestazione dei files è indicata, tra l'altro, la polarità del segnale. I dati di accelerazione sono riportati in nm/sec2, l'unità standard per le forme d'onda di accelerazione in formato SAC.
Il valore medio del segnale non è stato rimosso così come il trend.
Il data set delle forme d'onda è reso disponibile senza fare alcuna selezione sulla qualità del segnale.

CONDIZIONI D'USO E POLITICA DEI DATI

Il sito RANDownlad del Dipartimento della Protezione Civile-Presidenza del Consiglio dei Ministri è distribuito con Licenza Creative Commons Attribuzione 3.0 Unported.

Per ulteriori informazioni sulla RAN, fare riferimento a http://www.protezionecivile.gov.it/jcms/it/ran.wp

DOWNLOAD SAC - DOWNLOAD ASCII

For each seismic event it is possible to download the waveforms in SAC and ASCII format.

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RANLive

How it works and how it integrates with Antelope

- Due to security restrictions it was not possible to integrate RANLive directly to the Antelope database
- It was necessary to export data to a MySQL database in order to
  - connect to the SIT-DPC proprietary software
  - provide easy access for creating the web pages
- The MySQL database contains a set of tables that are replications of DataScope tables and others created "ad hoc" to provide the functionalities of RANLive
- The MySQL database is constantly synchronized with Antelope's production database

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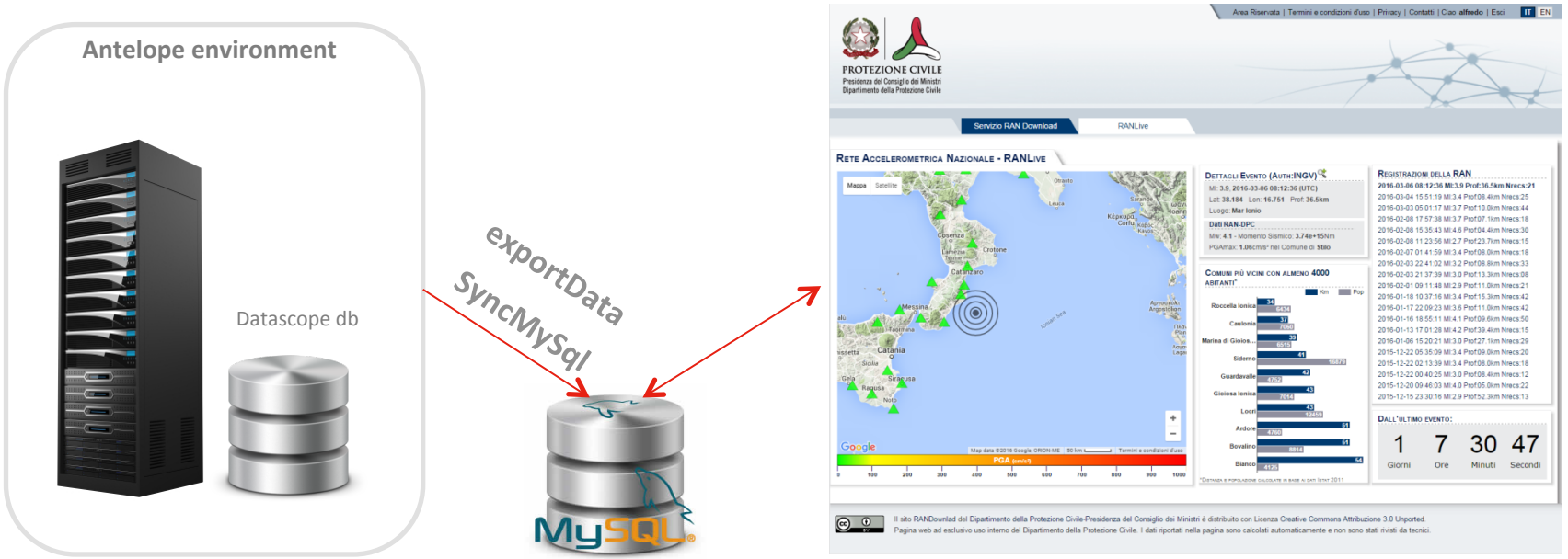
RANLive

Simplified view of the architecture



RANLive

Database synchronization: Program SyncMySql

The **SyncMySql** process performs a daily synchronization of the following Antelope database tables with the corresponding tables in MySQL:

- **datascope**: site → **mysql**: ant_site
- **datascope**: instrument → **mysql**: ant_instrument
- **datascope**: sensor → **mysql**: ant_sensor
- **datascope**: sitechan → **mysql**: ant_sitechan
- **datascope**: stage → **mysql**: ant_stage
- **datascope**: affiliation → **mysql**: ant_affiliation
- **datascope**: Geosite → **mysql**: ant_geosite
- **datascope**: Polsite → **mysql**: ant_polsite
- **datascope**: Spetpar → **mysql**: ant_spetpar

RANLive

Database synchronization: Program SyncMySql

- The tables synchronized by SyncMySql concern the metadata of the stations -> Therefore daily synchronization is sufficient
- The program performs a daily check if new records have been added since the last synchronization
- New records are read from the Antelope database and inserted into the MySQL database
- A "sync" table is used to check whether new records have been added to the Antelope tables since the last synchronization

Sync table:

RAN.sync: 9 righe totali (circa)

nome_tabella	last_upd
ant_site	2018-03-22 10:48:59
ant_instrument	2018-02-23 09:37:33
ant_sensor	2018-03-22 10:49:02
ant_sitechan	2018-03-22 10:49:02
ant_stage	2018-03-22 10:49:02
ant_geosite	2017-11-20 13:25:50
ant_polsite	2017-11-27 09:15:40
ant_affiliation	2017-11-20 13:25:32
ant_spetpar	2017-11-20 13:29:04

RANLive

Database synchronization: Program exportData

- The **exportData** program synchronizes the MySQL database every time Antelope records a new event
- The data of the new earthquake are displayed on the RANLive web pages within 2 minutes
- The according waveforms in SAC and ASCII format, as well as the spectra files are exported to RANLive

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RANLive

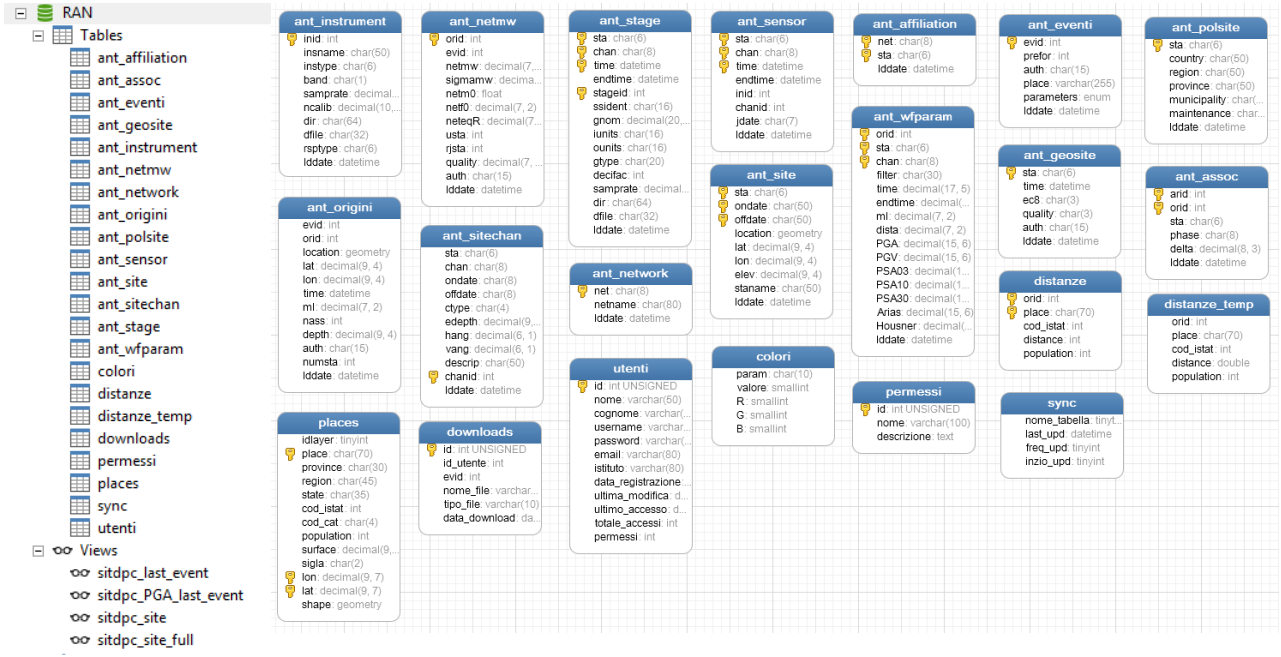
Database synchronization: Program exportData

MySQL tables updated by the **exportData** synchronization are:

- ant_netmw
- ant_wfparam
- ant_wfdamage
- ant_assoc
- ant_netmag
- ant_eventi
- ant_origini
- wffiles

RANLive

Database schema of the MySQL database



The MySQL database schema presents some tables that are a copy of the DataScope tables plus other tables necessary for the functioning of the web pages. There are also views for integration with the SIT-DPC software owned by the DPC.

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RanWeb
Access statistics

- Accesses to ran.protezionecivile.it mostly occur after felt, moderate earthquakes
- In 2016 and 2017 several moderate earthquakes were recorded in Italy

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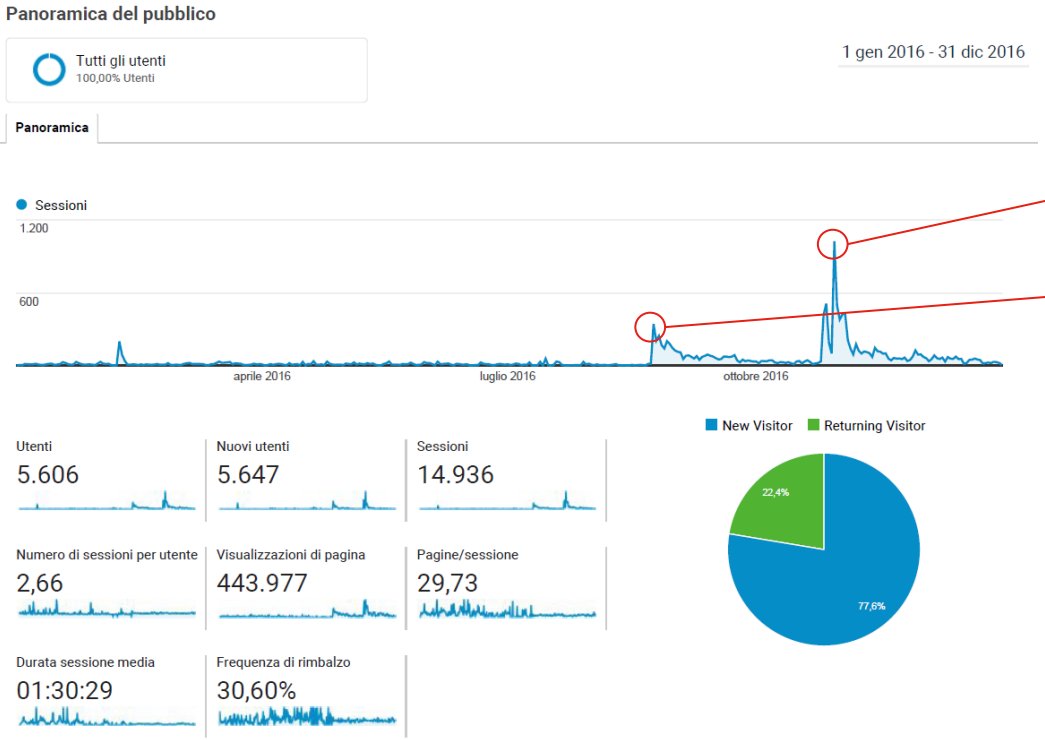
RanWeb

Access statistics: Year 2016



30 October 2016 - ML 6,1 Norcia

24 August 2016 - ML 6,0 Amatrice

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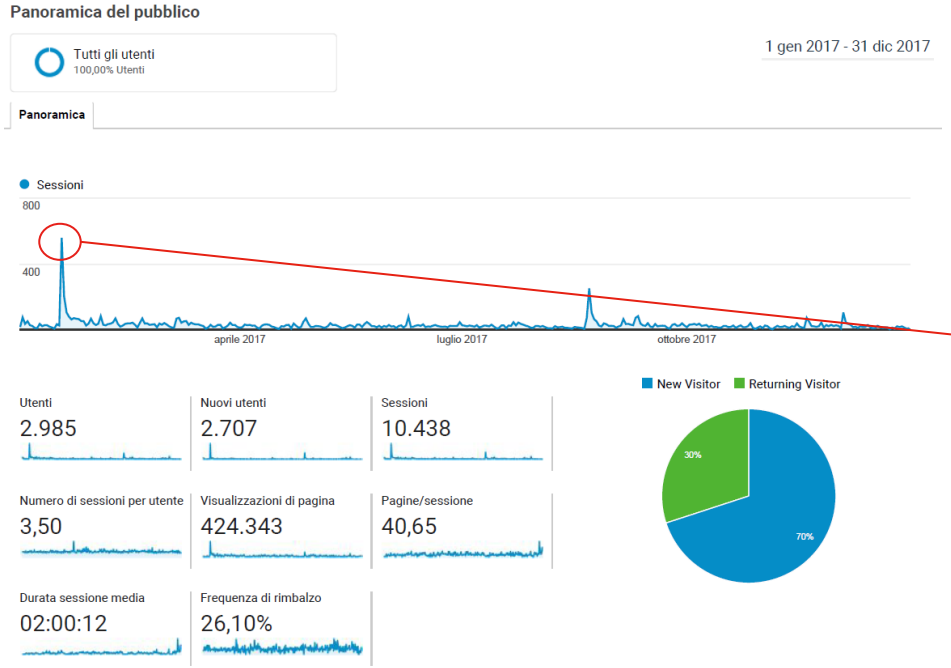
RanWeb

Access statistics: Year 2017



4 different events greater than ML 5 in the province of L'Aquila

- 18 January 2017 - ML 5,3 L'Aquila
- 18 January 2017 - ML 5,4 L'Aquila
- 18 January 2017 - ML 5,3 L'Aquila
- 18 January 2017 - ML 5,1 L'Aquila

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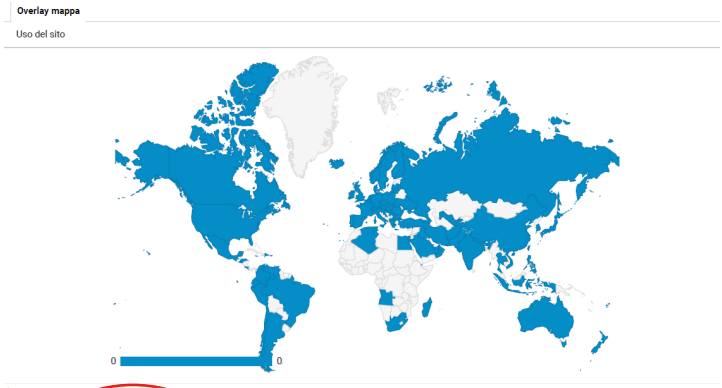
RanWeb

The distribution of accesses



Paese	Utenti	Sessioni	Pagine/sessione	Durata sessione media	% nuove sessioni	Frequenza di rimbalzo
	8.947 % del totale: 100,00% (8.947)	28.713 % del totale: 100,00% (28.713)	38,69 Media per vista: 38,69 (0,00%)	02:01:27 Media per vista: 02:01:27 (0,00%)	32,17% Media per vista: 32,17% (0,00%)	28,15% Media per vista: 28,15% (0,00%)
1. Italy	7.070 (78,39%)	25.817 (89,91%)	41,19	02:07:38	28,39%	26,05%
2. United States	395 (4,38%)	610 (2,12%)	33,36	02:35:19	64,75%	53,44%
3. United Kingdom	319 (3,54%)	402 (1,40%)	9,59	00:34:05	78,86%	63,68%
4. China	155 (1,72%)	259 (0,90%)	17,39	01:01:07	59,46%	31,27%
5. Brazil	106 (1,18%)	107 (0,37%)	1,44	00:01:44	99,07%	94,39%
6. (not set)	96 (1,06%)	111 (0,39%)	8,54	00:26:32	79,28%	57,66%
7. Japan	88 (0,98%)	174 (0,61%)	9,60	00:22:12	50,57%	27,01%
8. France	85 (0,94%)	144 (0,50%)	31,90	02:21:13	59,03%	25,69%
9. Germany	80 (0,89%)	129 (0,45%)	10,00	00:35:28	60,47%	44,96%

RANLive receives access from many countries in the world

1.	Italy	7.070 (78,39%)
2.	United States	395 (4,38%)
3.	United Kingdom	319 (3,54%)
4.	China	155 (1,72%)
5.	Brazil	106 (1,18%)
6.	(not set)	96 (1,06%)
7.	Japan	88 (0,98%)
8.	France	85 (0,94%)
9.	Germany	80 (0,89%)

The distribution of accesses is as follows :

- 78% Italy
- 4% USA
- 3% Great Britain
- Almost 2% China
- Brazil, Japan, France and Germany to 1%
- Other countries around 2%

PROTEZIONE CIVILE GEOVIS KINEMETRICS

Conclusions

- RANLive is a tool that allows near real-time access to earthquake information and data
- RANLive is an easy to use web interface

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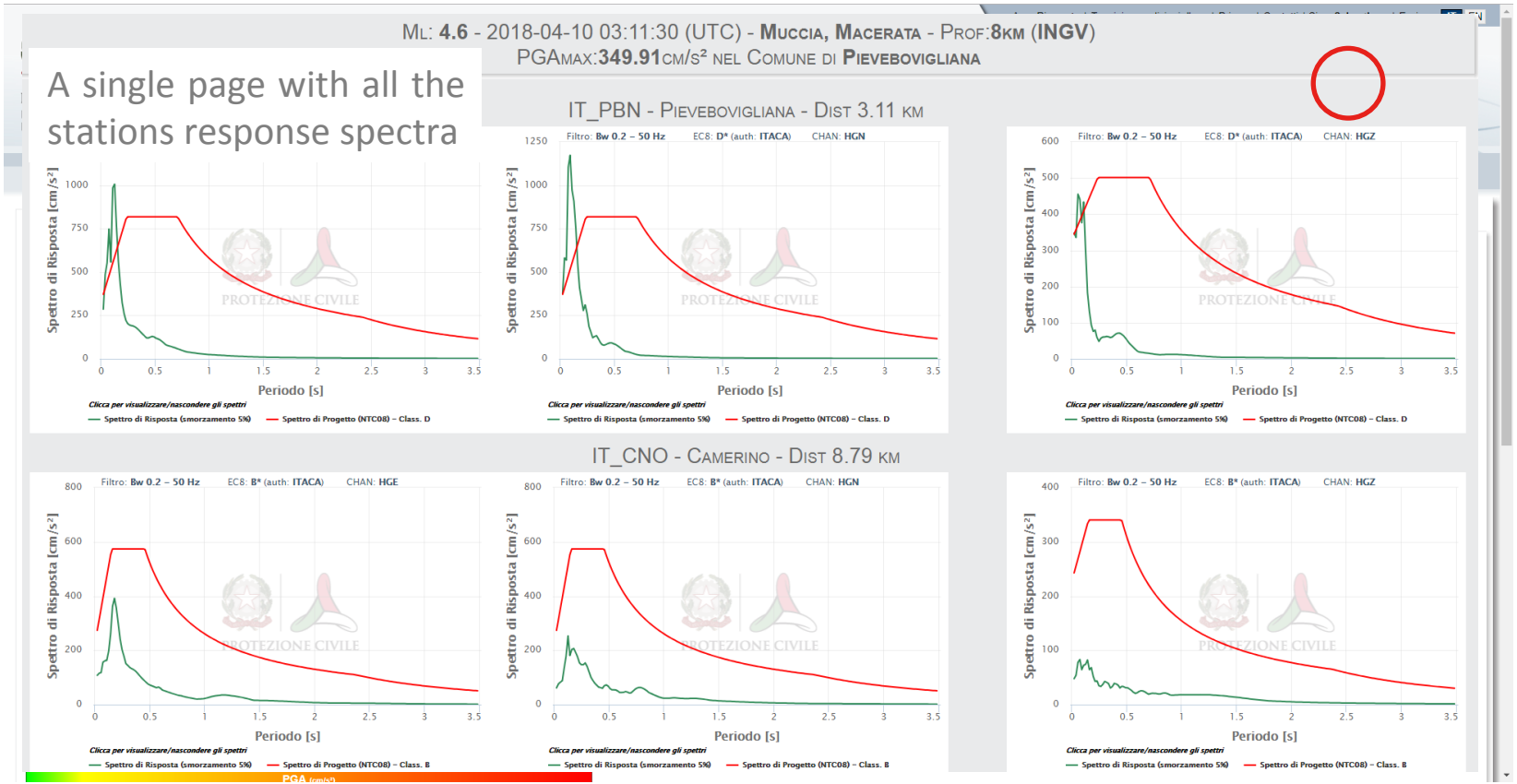
Upcoming developments

A single page with all the stations response spectra



Thank you

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