NERA

Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation

Report

Current School Seismology Activities in Europe

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Activity number:	*NA8 : Task 8.1*
Deliverable:	*Report on Current School Seismology Activities in Europe*
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Responsible participant:	*NERC/BGS*
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Seventh Framework Programme
EC project number: 262330

NERA PROJECT

SEISMIC STATIONS IN SCHOOLS: PRELIMINARY INVENTORY

Draft April 2011
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SEISMIC SCHOOLS IN EUROPE: PRELIMINARY INVENTORY

Foreword

Making an inventory is always a tough task, especially if the information are not easily available, a bit confused or date back to many years behind. The WP 8 with the NERA project aims at contacting teachers and schools potentially interested or already involved in the topic of school seismology. Having available a list of entries is therefore of paramount importance, and it is the right starting point.

This document shows the result of a preliminary inventory of seismic stations that operated or are currently operating in schools. The search has been performed by looking at the internet, collecting papers on the topic, contacting scientists potentially able to possess information about past or current projects, publishing a form to collect information on the web.

As expected, many problems arose during the compilation that complicated an apparently very easy situation. Not only the inventory is probably incomplete, but it is also not correct because sometimes it has been very difficult to understand for how long the single station was in operation, what kind of instrument was it based on, if any data have ever been available. For example, coordinates of the stations are often computed using Google Maps because were never disseminated.

The report is subdivided into short chapters describing the evolution of the “seismology at schools” initiatives, the distribution of the stations in Europe and in the European Community and the kind of instruments used. Since the choice of an instrument has to do with the design of the project, that chapter also describes the philosophy behind. Finally, the inventory itself is organized into sub-chapters, one for each country, describing number and characteristics, if available, of the school network.

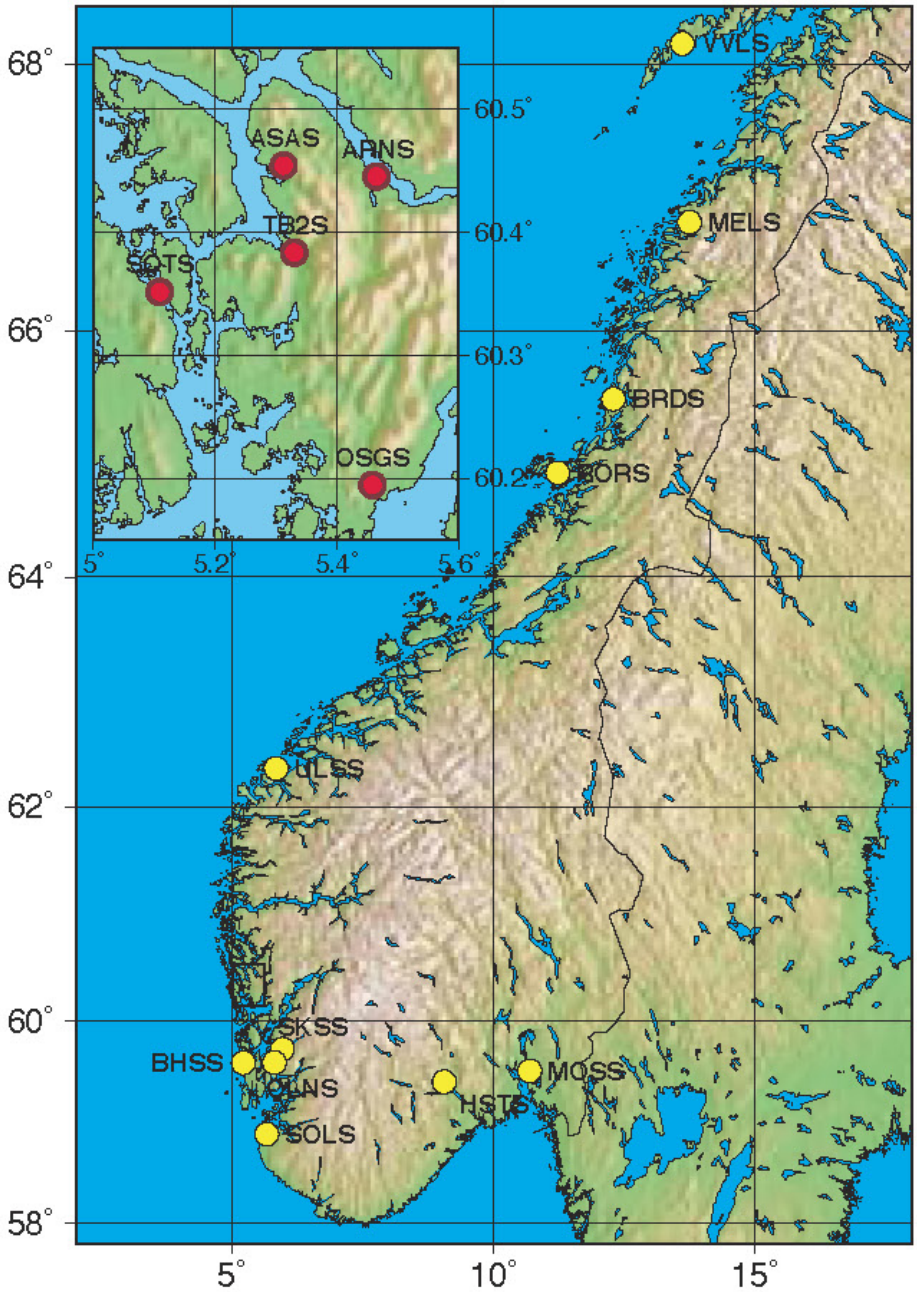
Short history of “Seismology at school projects”

Most of the attempts to established seismic stations or networks in schools of Europe were linked to specific projects (especially at the end of the ’90) and followed the destiny of such initiatives. Thus the majority of these efforts were born and developed with the research programs so when the projects expired the networks survived for a limited amount of time, thanks to the leading action of the single school, or were immediately terminated.

The level of success of the projects in Europe varies very much. In some cases the seismic network was only designed and the stations that were supposed to be part of it were never bought or installed; in some other instances, only a part of the stations were effectively operating . Finally, in the most successful cases stations were effectively installed, were working during the project and a rose of educational activities were organized within their operation time Fortunately a few initiatives could profit from additional or local funds or were simply maintained operative by the schools and are still active. However only a few installations (say, 50 % of the total) survived through the years. The majority of them still provides data. The main structure of this “seismology at school network” consists in the numerous stations run in UK, France and Ireland; recently there has been a growth in Switzerland and Italy. Initiatives were taken in Greece and Portugal From the geographical point of view, it is evident that most of the stations are located in the western side of the continent.

The first educational program in Europe dates back to 1995 (Bobbio and Zollo, 2009); the idea was based on the successful experience of the Princeton Earth Physics Project

(PEPP) in the USA. The Educational Seismology Project (EduSeis) was a scientific and educational effort which involved high schools, scientific museums, and research institutes in four different European countries: France, Italy, Portugal, and Germany. The project ended in 2002. Recently, the O3E (**O**bservation de l'**E**nvironnement à but **É**ducatif pour l'**É**cole) project gathered several institutions from Italy, France and Switzerland and established a network of seismic stations in schools in the area bordering the three countries. More details are given in the rest of this document.



Stations installed (red circles) and planned within the SEIS-SCHOOL project

Europe and European Community

In the following pages, info about the stations that are currently running are reported. The countries included in the inventory are those that belong to “Europe” from the political point of view (European Community or European Union, 27 countries since year 2007), except of course Switzerland which is partner of the project although it does not belong the

European Union. Some schools are located in territories that are far from Europe as a continent but belong to it (like the French overseas “departements”) or the instruments installed within are run by countries of Europe. The total number of stations installed in the “enlarged” Europe sums up to 484. However only a part of them are sharing data and activities and can be considered active.
It must be remarked that in few cases countries belonging to the “geographical” Europe (48 nations) were leader or simply involved in relevant projects in the field of school seismology. It is the case of Norway, where in 2000 a project named SEIS-SCHOOL was launched. The project brought to the installation of 6 seismic stations in school’s yards and the establishment of a web based protocol for data exchange and download. Several e-learning tools were designed to guide, in a very captivating manner, the apprentice scientists through the basics of seismology (Bulaenko, et al, 2003).
The project was based on the very cheap home-made seismometers Cossack Ranger (Fedorenko et al., 2000; 2008 and references within). Figure 1 shows the first 4 stations installed close to Bergen (in red) and those that were planned (in yellow). The network operated for a limited time.

The instrument philosophy

When designing a professional seismic network, several aspects are taken into account (sensitivity and frequency band of the sensor, amount of data that can be stored, kind of data storage, internet connection, precision of the internal clock) but, generally speaking, they do not include the cost of the equipment. Conversely for an educational project, that often has available only a limited amount of money, the cost of the instruments is of paramount importance; moreover, a very expensive and delicate instrument would not be adequate for the environments where it has to be installed, like schools. The manufactures of seismic instruments have then designed some low price equipments by downgrading professional items to semi-professional ones with the aim to make available on the market instruments with a high quality/price ratio. The French “sismo à l’ècole” network is based on the sensors and acquisition systems produced by the company AGECODAGIS; stations have been bought through the years with the money of the single school or through specific projects proposed for establishing first and enlarging then the school seismology network.
However, these instruments are very expensive when compared to the economic possibilities of schools, where money for labs and experimental activities are limited, and educative projects that, although the costs are sustained by the funding agencies, should support as many schools as possible. Moreover, in some projects, like for example in UK, the aims of the seismology at school initiative were sensibly different from simply “installing and watch”. In fact the philosophy in this case has been to inspire a few students in each school to take a “hands on” practical interest in seismology and to learn to run their own seismometer. Bearing this in mind, a cheap and easy seismometer has been specifically designed and marketed by MUTR. More than 400 seismometers have been sold, a significant number of which has been paid by commercial sponsors. This kind of approach, that is to use the same instrument all over the network, simplifies very much the link between each station, the creation of a database or the establishment of common educative activities.
In some other cases, a hybrid approach has been carried out by letting the single school to buy or build its own seismometer. This approach proves to be efficient in term of number of schools involved but turns to be more problematic when trying to assemble a database or design common practical activities.

References

Bobbio A. and Zollo A., (2009). Toward a new way of thinking about educational seismology.EMSC Newsletter, 24, 22-23

Bulaenko, M.E., Husebye, E.S., (2003). Electronic learning modules for high school students in seismology. *Seismological Research Letters*, 74, 570–577.

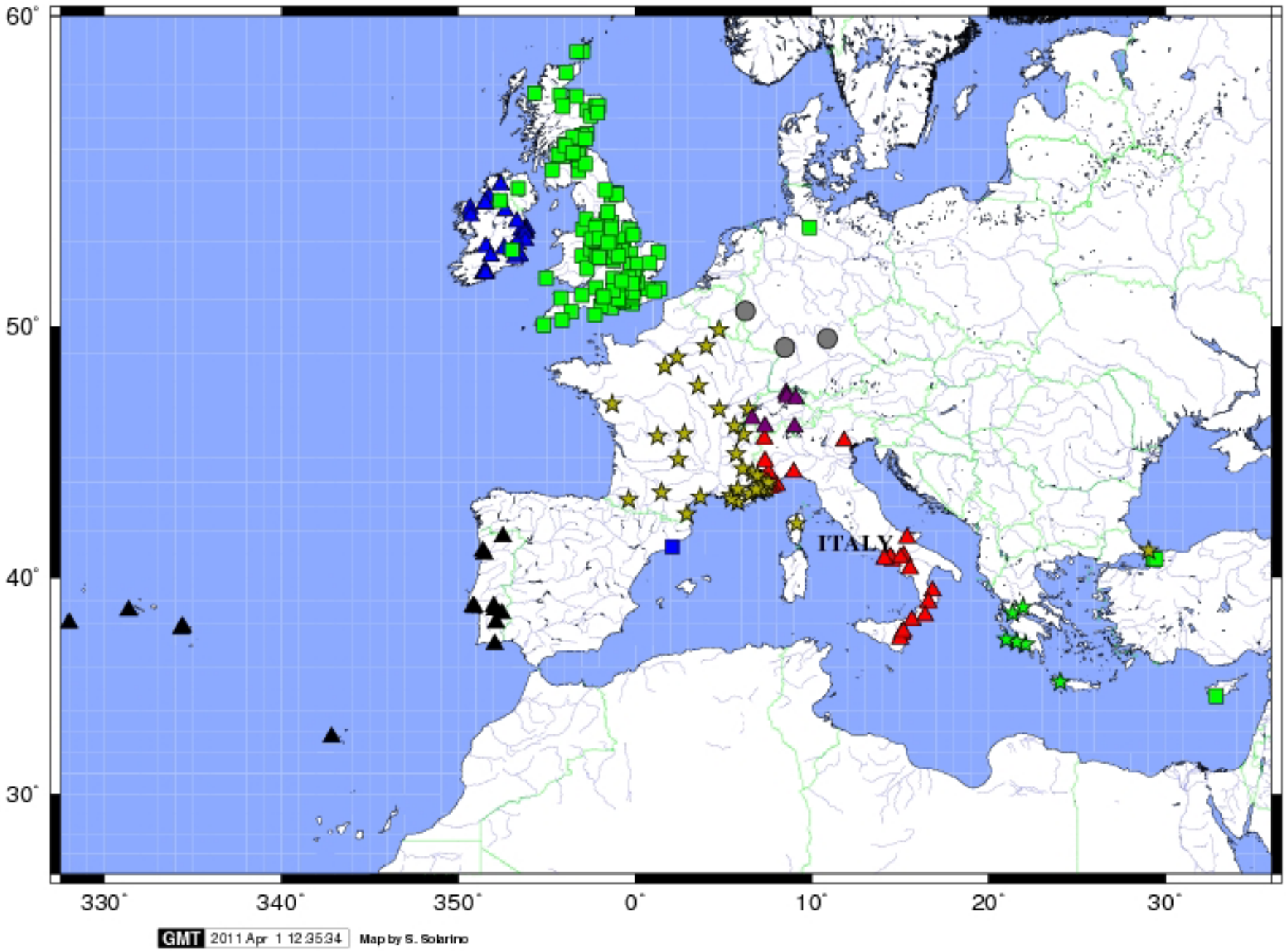
Fedorenko, Yu. V., E. S. Husebye and E. Boulaenko (2000). School Yard Seismology, Orfeus Newsletter, Vol. 2, No. 3.

Fedorenko, Yu. V., E. S. Husebye and T. Matveeva (2008). Cossack Ranger II – A High Quality, Versatile and Affordable 3-Component Short-Period Seismograph. E.S. Husebye (ed.), Earthquake Monitoring and Seismic Hazard Mitigation in Balkan Countries. Springer Science + Business Media B.V. , 171-187

INVENTORY

COUNTRY	SEARCH	STATIONS	NOTE
Austria	Email	0	•
Belgium	Email	0	•
Bulgaria	Email	•	•
Cyprus	•	•	•
Czech Republic	Email	•	•
Denmark	Email	•	•
Estonia	Email	•	•
Finland	Email	•	•
France	Internet	49	•
Germany	Internet, email	8	•
Greece	Publications, email, form	6	•
Hungary	Email	0	•
Ireland	Internet, email	28	•
Italy	Internet, email	26	•
Latvia	•	•	•
Lithuania	•	•	•
Luxembourg	•	•	•
Malta	Email	•	•
Netherlands	Email	•	•
Poland	Email	0	•
Portugal	Internet, email	19	•
Romania	Email	•	•
Slovakia	Email	•	•
Slovenia	Email	•	•
Spain	Internet, email	2	•
Sweden	Email	•	•
Switzerland	Internet	7	•
United Kingdom	Internet, email	339	•

Search: kind of action to get info
Number: preliminary number of stations that were or are operating. Only a part is still active, and out of this part only some regularly provide data.
0 means that the search confirmed no stations existing, blank means no information have been given (yet?)


60°
50°
40°
30°
330°
340°
350°
0°
10°
20°
30°
ITALY
GMT 2011 Apr 1 12:35:34
Map by S. Solarino

AUSTRIA

Dear Mr. Solarino,

there are no seismic stations in Austria - according to my knowledge.
However, we support museums with our live-seismogram via the Internet. Private users can visit the demo-version, which runs 10 minutes under

http://geoweb.zamg.ac.at/index.html.en

With kind regards,

Wolfgang Lenhardt

At 12:01 21.03.2011, you wrote:

Dear Colleagues,

I apologize for bothering you.
In the frame of the NERA project, WP8, we are trying to compile an inventory as complete as possible of seismic stations (professional, semi or non professional) installed in chools. We are primarily interested in operating instruments, but also information about formerly running stations are welcome.
Unfortunately, many schools do not advertise their activity on the web or if they do not always it is simple to find such information.
As seismologists, you may be aware of situations of interest for us in your country, so we kindly ask you to let us have any information or contact that may be of help.
Thanks for your cooperation. Best Regards.

BELGIUM

Stefano,

To my knowledge, in Belgium there are no schools equipped with an kind of seismometers.

I have had a lot of discussion with J.L. Berenguier about "Sismo à l'école" and have been to the opening ceremony of the station in Monthermé (France). I also have contacts with Tom Blake (DIAS), I know they have also a nice "seismo@school-program".

That's all I can provide as information,

Cheers,

Thomas

BULGARIA

Dear Stefano,
we do not have any seismic stations installed in schools on the territory of Bulgaria. I am sorry we cannot be of help for you

CZECH REPUBLIC

DENMARK

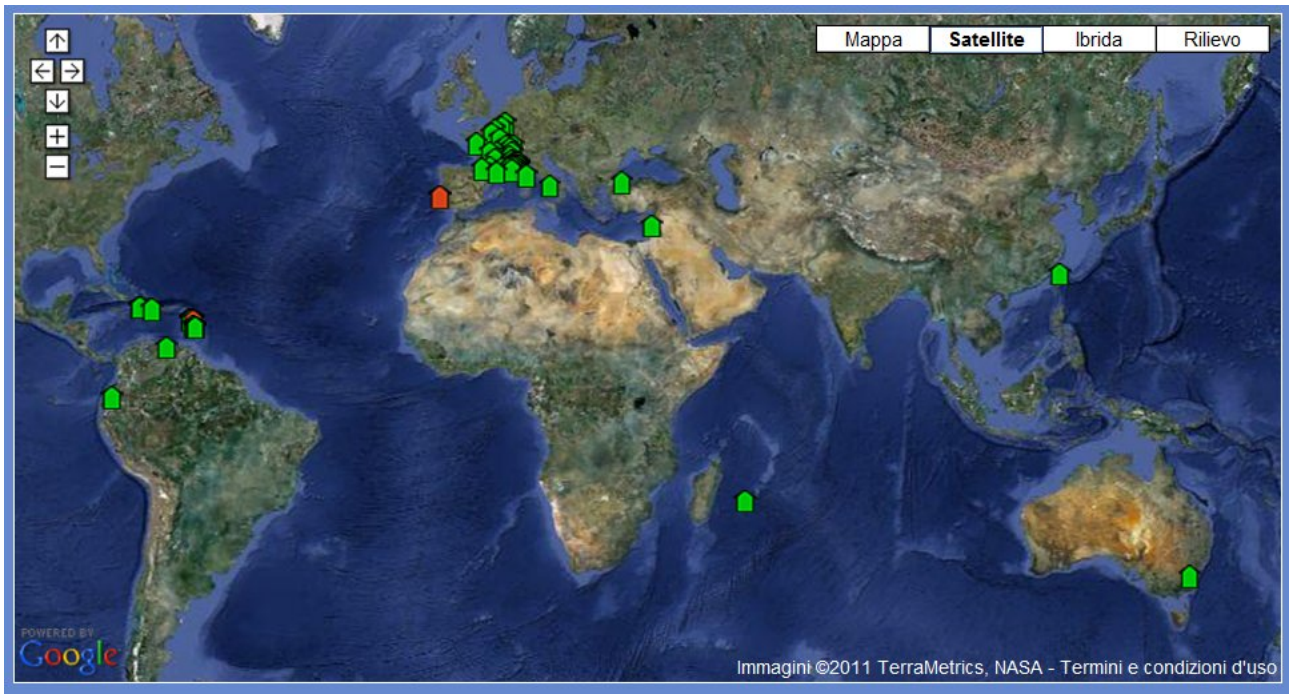
ESTONIA

FINLAND

Mail sent; waiting for reply

FRANCE

The activity was designed in 1996 at the Centre International de Valbonne and after two years period of test, five stations were successfully installed. Since 2006 the program “SISMOS a l’Ecole”, which is a part of the broader project “Sciences a l’Ecole, has extended the educational seismological network throughout the French country. The updated position of the school stations is reported in the figure underneath.



Current distribution of the stations installed within the Seismo a L’Ecole program

Most of the stations are equipped with the instruments marketed by Agecodagis. The SAGE acquisition system is shown in the figure underneath. The activities and data sharing are based on the web site **http://www.edusismo.org/**, where many facilities and documents are available to students and teachers.

SAGE acquisition system by Agecodagis

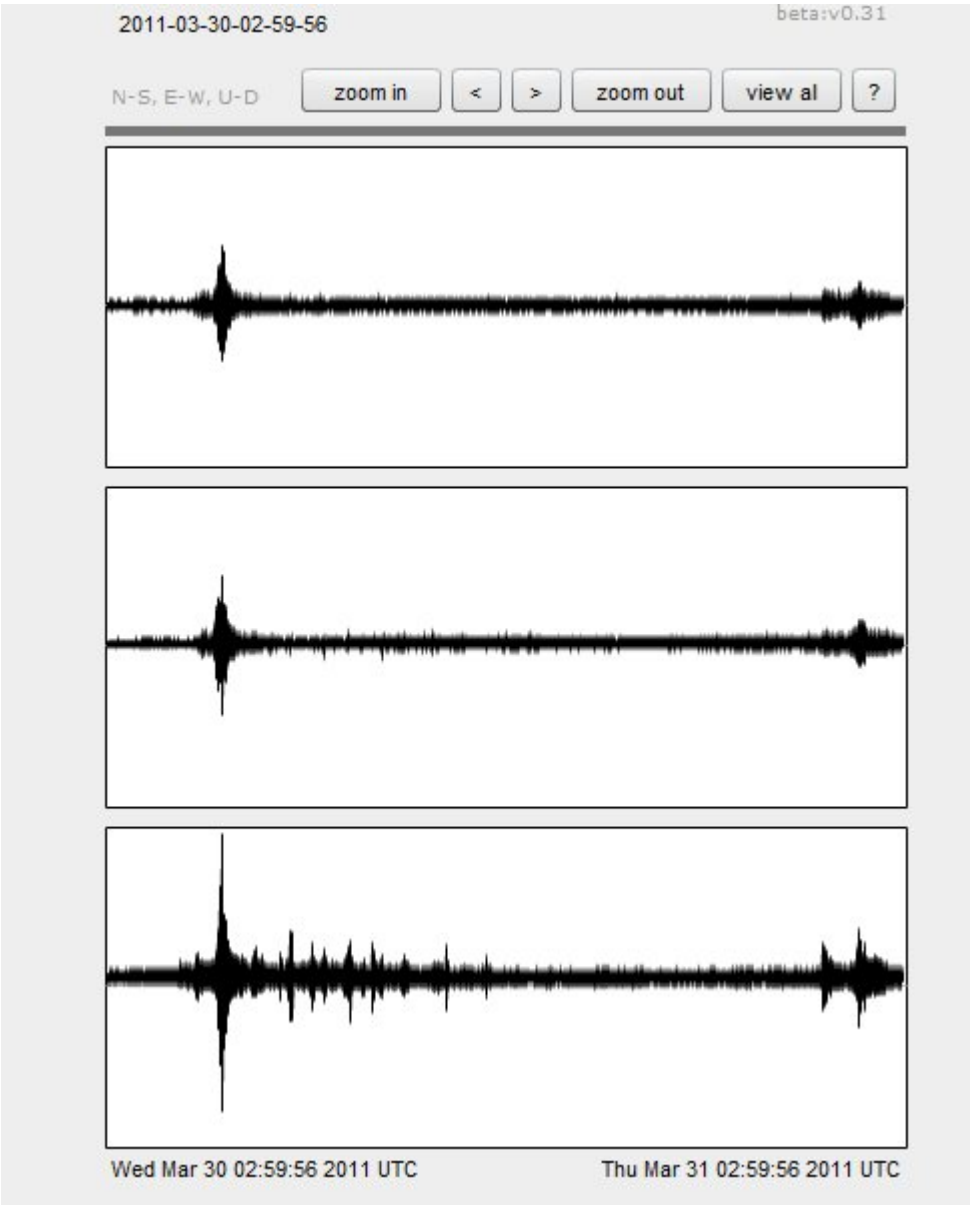
The NoeMax 20 s sensor

GERMANY

A project named 'Jugend forscht' ('Young researchers') started in 1994 at the St.-Michael-Gymnasium at Monschau. Later on, a few stations :

Copernicus- Gymnasium
Gymnasium Herzogenaurach
Vöhlin-Gymnasium Memmingen
Willibald-Gluck-Gymnasium Neumarkt
Maria-Theresia-Gymnasium Augsburg
Paul Gehardt Gymnasium Gräfenhainichen
Faust-Gymnasiun Staufen

were equipped with home made instruments. It is very difficult to realize for how long (and actually also if) these stations provided data. Apparently, the only still currently operating is the one in Monschau.



GREECE

The Hellenic School Educational Seismology Network “Egelados”

The thematic network Egelados was established in 2004, on a volunteer basis, as a collaboration between educators (geologists), researchers (seismologists) and engineers from schools, universities, research institutions and the Bureau of Environmental Education in Messinia prefecture.

The aim of the network is to improve scientific literacy, spark student interest in scientific research, increase their understanding of natural hazards, and to actively engage them in real-world scientific research. In order to achieve this aim the network promoted at secondary school level the use of “educational seismographs” and processing of recorded seismic data. The objectives of the network are to give to the students the basic information about the earthquake generation and the ways this phenomenon affects our life. To make students understand that earthquakes are natural phenomena, connected with the landscape formation; are frequent in Greece and thus essential for us to understand and face by constructing appropriate houses and acting in a certain way when an earthquake occurs (Fermeli et al. 2006).

The educational seismograph

The most interesting tool for educational activities in the framework of Egelados network is the seismograph. This is a pedagogical tool designed specifically, by the University of Patras, Seismology Laboratory and the Industrial Systems Institute, for educational purposes (Foundas, P., and Germenis, N., 2007). The educational seismograph is a low power and low cost digital acquisition system. It was designed for monitoring of seismic events or other geophysical parameters. The device consists of two parts, a sensor and a digitizer. The sensor converts earth movement to a current (analogue signal) and is an inexpensive geophone. Both three component and one component designs are available in order to reduce the systems cost even further. The digitizer converts analogue to digital signals with a dynamic range of up to 132 dB. It is based on a powerful, wide dynamic range delta-sigma analog–to-digital converter (ADC), with very low noise characteristics and excellent power supply rejection. The sampling rate was set to 100 samples per second. Each digitizer can support up to three analogue channels. Therefore, three ADCs can be used which operate simultaneously and independently. Each converter operates from a single power supply and utilizes fully differential inputs. The differential inputs provide common-mode rejection eliminating much of the system noise imposed on the input signal.

The digitizer also includes a complete on-board calibration circuit to correct internal offsets and gain errors or limit external system errors. Internal calibration procedures run automatically on power up. The device ensures high stability and reliable continuous operation. In order to prevent unpredictable malfunctions, a watch-dog timer function for auto self-reset on failures is also provided. Data synchronization is the process of establishing consistency among data from a source to target data storage and vice versa and the continuous harmonization of the data over time. It is fundamental to a wide variety of applications, including file synchronization and data comparison. The data synchronization is achieved using a real time clock and a phase locked loop circuit, which generates a pulse per second (PPS) signal. The first sample of data is aligned to the PPS

signal. The time reference for both circuits is provided by a 12 channels GPS receiver. Connection of the digitizer to a PC is via RS232 port, which establishes a two way communication between them. Data and status information are transmitted from the digitizer to the PC and there the information is organized into packets and stored.

Various processing software is available for seismic data analysis, namely: a) DataMonitor b) DataViewer and c) Helicorder.

DataMonitor controls the serial communication and organizes the packets in data files; a new file is created every 10 minutes, absolutely synchronized to the world time.

DataViewer allows the user to work with files that were created by DataMonitor. Using the DataViewer, the user can zoom in and out in a graph, find specific features, select features that meet certain criteria, estimate the distance from the seismic event, its magnitude, and more.

The Helicorder shows 24-hour period graph of the data. The graph is "read" like a book, from left to right and top to bottom (this is the direction that time increases). As with a book, the right end of any horizontal line "connects" with the left end of the line below it (Fig. 1).

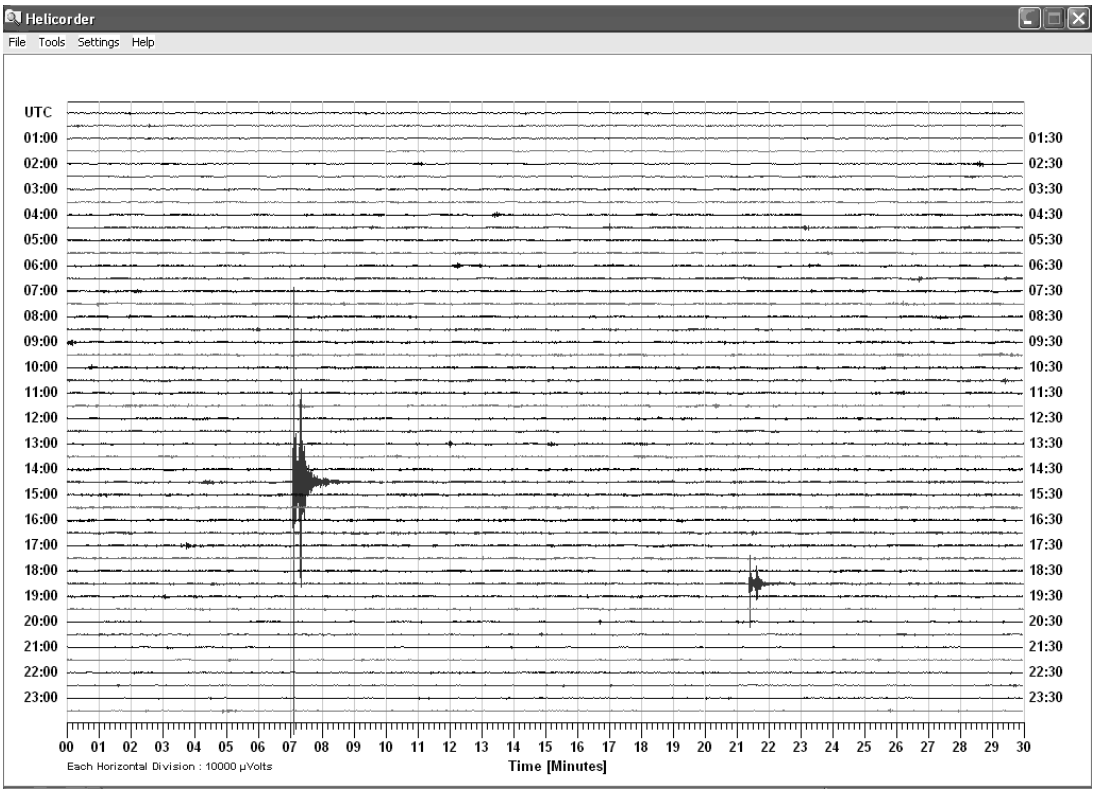


Fig. 1 Helicorder display

Five seismographs were installed in the first two years of this collaboration: 1) Bouga's School in Kalamata, 2) Lyceum of Filiatra 3) High School and Lyceum of Kyparissia 4) High School and Lyceum of Kandyla and 5) High School and Lyceum of Etoliko (Fig. 2).

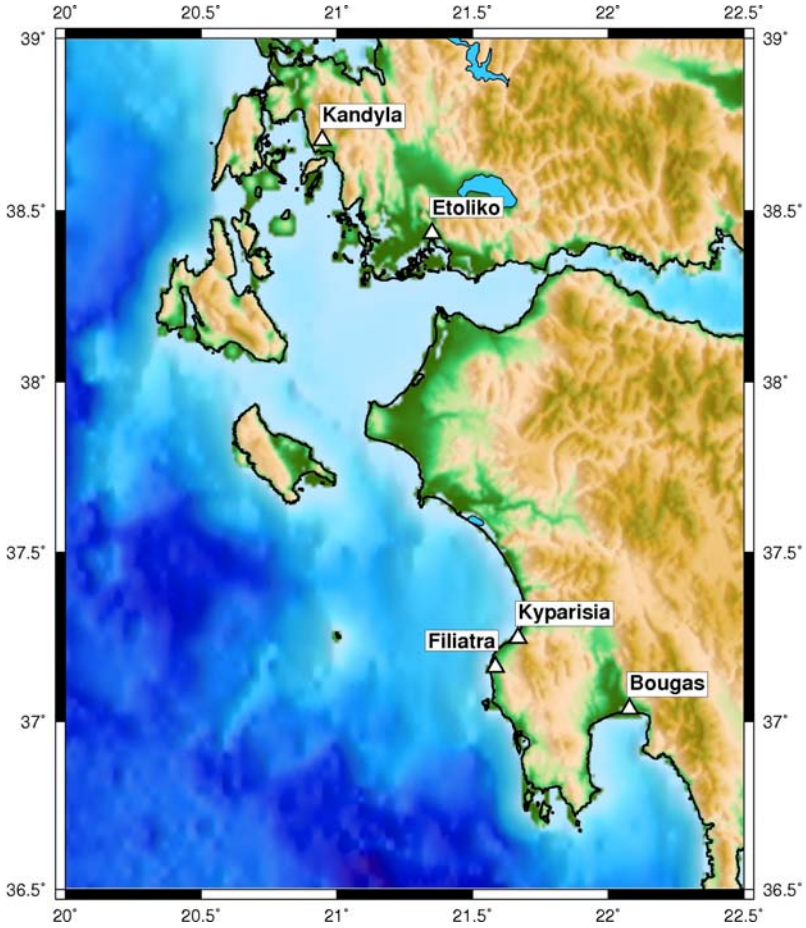
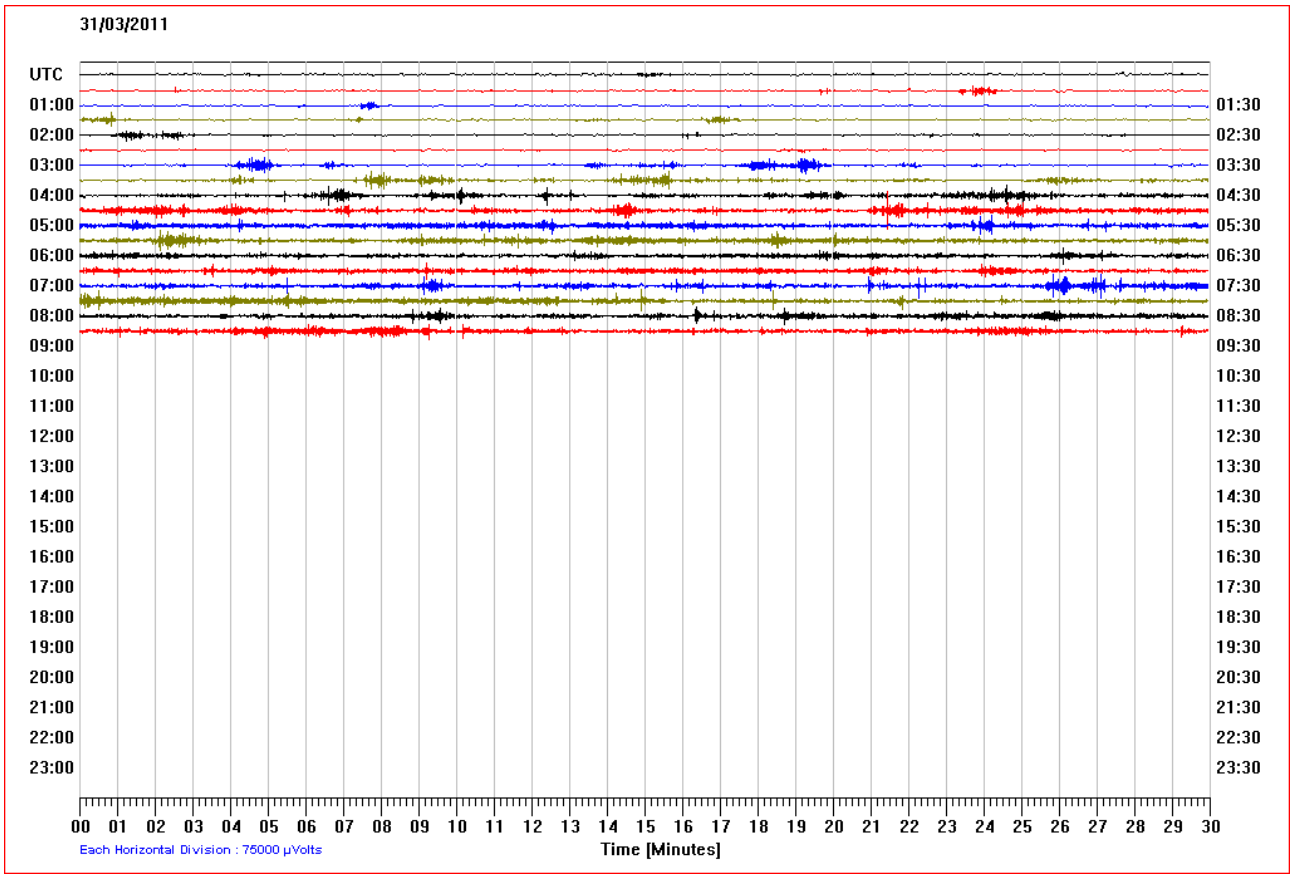


Fig. 2 Labels show network's schools in which educational seismographs operate.

References

Fermeli, G., Alexandropoulou, S., Sokos, E., Foundas, P., and Germenis, N., 2006:Earthquakes and school community – thematic network Egelados _ ID 1916. *First European Conference on Earthquake Engineering and Seismology*. *3-8 September 2006, Geneva, Switzerland*.

Foundas, P., and Germenis, N., 2007. *"Educational Seismograph", User manual*, Patras, Industrial Systems Institute and University of Patras, Seismology Laboratory, 33pp.



Data of the station FILIATRA

HUNGARY

Dear Stefano,

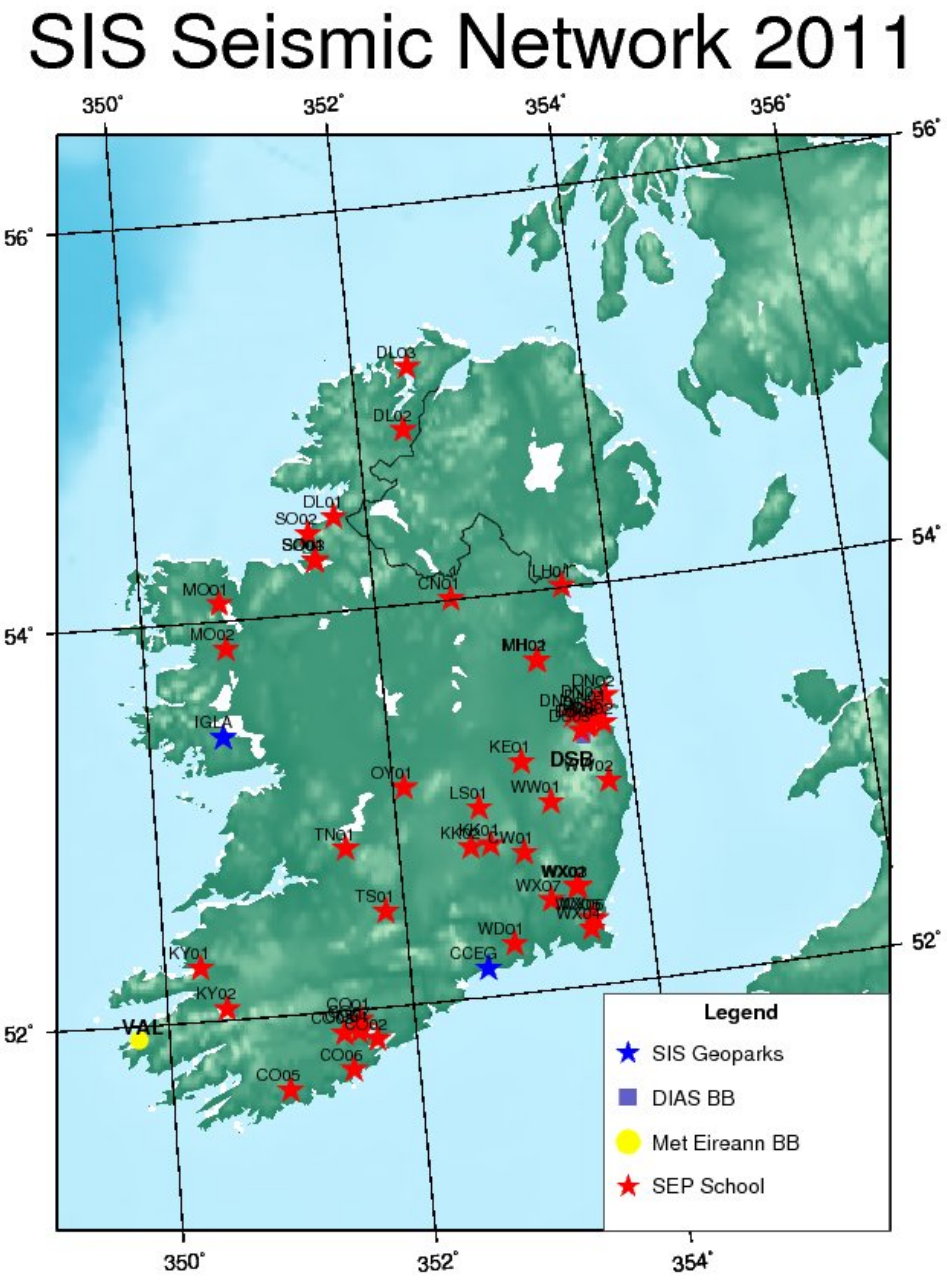
Neither me nor my colleagues knows about any seismic station installed in school in Hungary.

Best regards,

Péter Mónus
Seismological Observatory, Hungarian Academy of Sciences
H-1112 Budapest
Meredek 18
HUNGARY

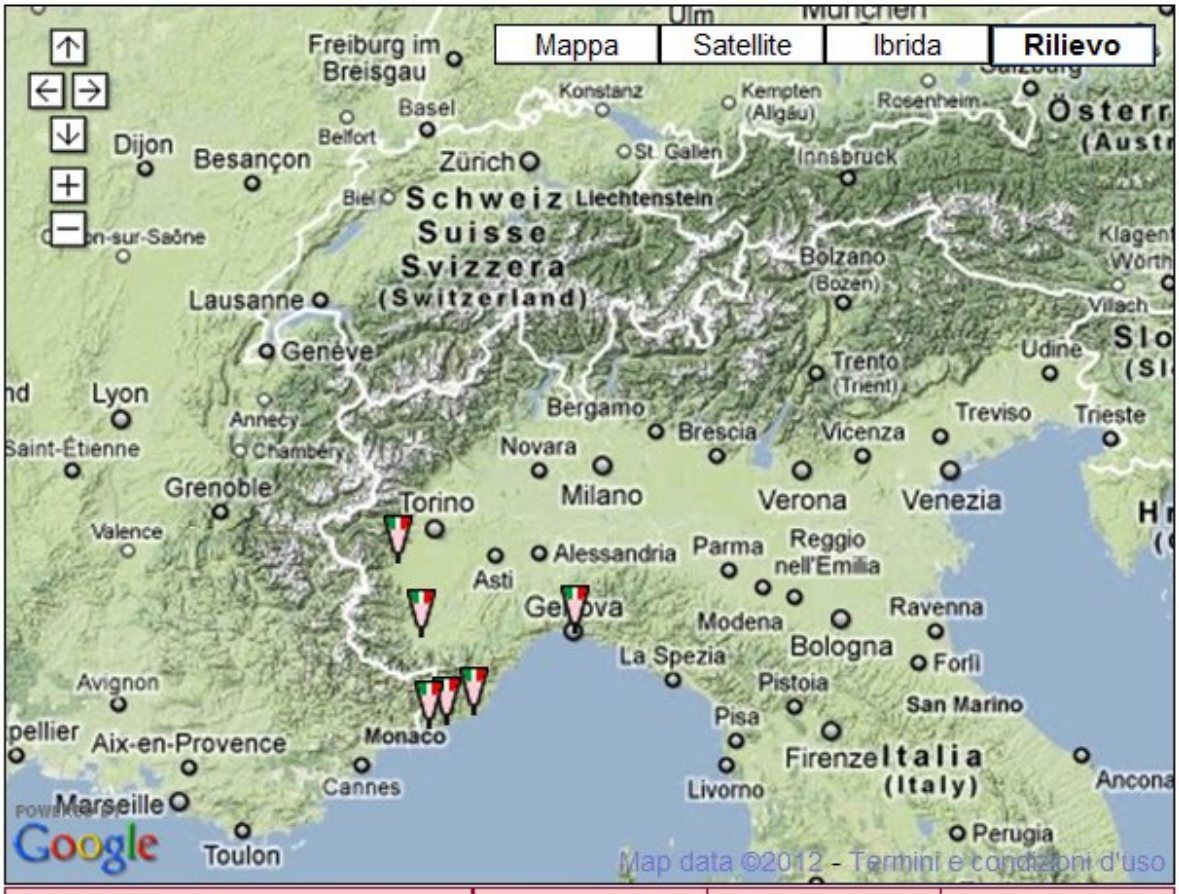
IRELAND

An Outreach pilot programme called Seismology in Schools (Seismeolaíocht sa Scoil) was introduced by the Dublin Institute for Advanced studies to 50 primary and secondary schools throughout Ireland. Using the seismometer and associated software distributed in this programme, students are able to record and study earthquakes from the other side of the world in real-time.The next phase of the programme for 2009 - 2010 is to consolidate the learning and data collection techniques in the participating schools outlined in the training days and practiced by the students for the last year. Ultimately students will be in a position to share their earthquake data with other schools initially in Ireland, the UK, and USA. The experience of the seismology in schools pilot programme reinforces the idea that when science is relevant, learners become more engaged and see how science is reflected in the reality of their own lives and by what they read in the media.
Most stations are equipped with the SEP instruments



ITALY

Three main initiatives took place in Italy. The Educational Seismology Project (Eduseis, Cantore et al., 2003), a scientific and educational effort which involved high schools, scientific museums, and research institutes in four different European countries: France, Italy, Portugal, and Germany; the O3E project, financed by the Alcotra program and held in the period 2009-2011, and a project paid for by a national / regional institution in Southern Italy (Progetto Mercalli). The total number of stations (May 2011) is 26; many of them are simply planned, some are not operating any more. By the time of this document, the only ones that are running and providing data are those installed within the O3E project. Since the project is over, they may be removed soon.

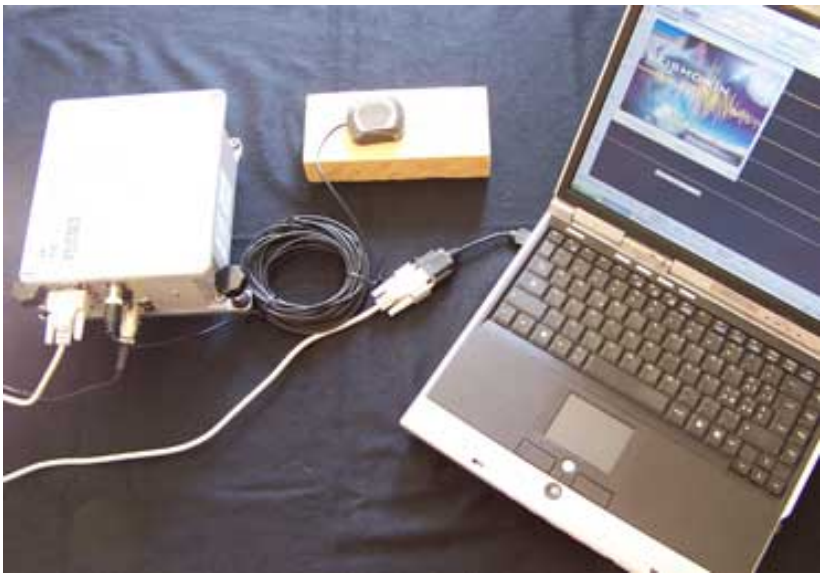


Stations installed in northern Italy within the O3E project. All sites are equipped with AGECODAGIS instruments

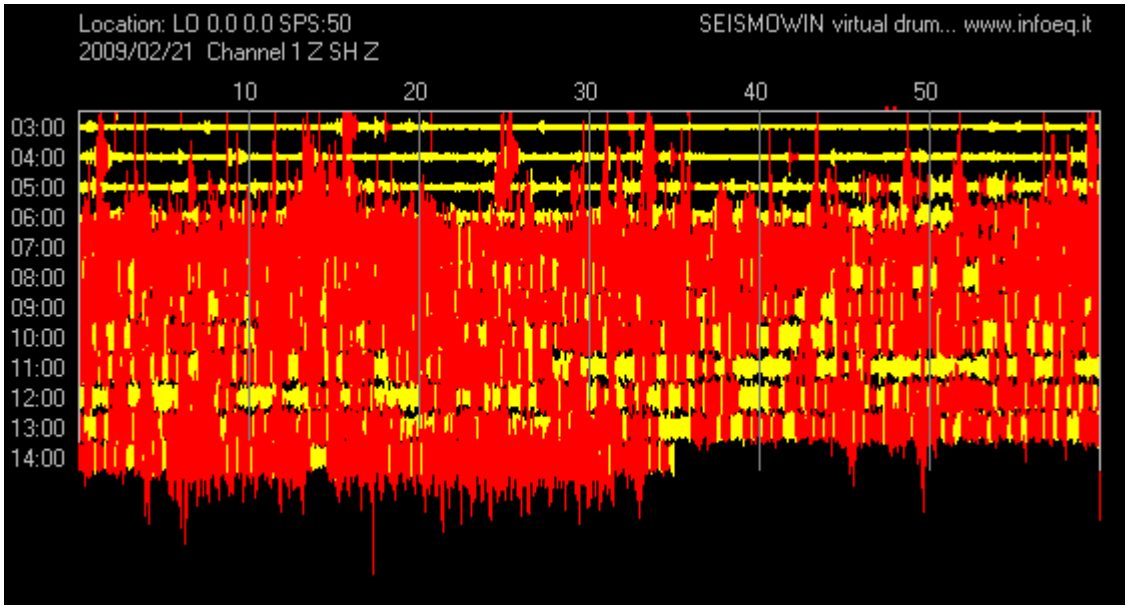
The Progetto Mercalli aimed at installing seismic stations in some schools of Southern Italy. The project has been paid for by the Regions involved in the educational activity. The stations were designed and manufactured by the Opus Lab brand (http://sismica.opus-lab.it/lamura/?id=3)
The table underneath shows the technical characteristics of the instrument.

- Analogue channels: 3
- Anti alias filter: 1 poles 20Hz low-pass filter
- Band-pass: standard DC to 20Hz (customizable)
- A/D converter: 24 bit sigma delta
- Type: Differential input
- Gain: fixed gain
- Input range: +/- 1V
- Overvoltage protection: zener diode up to 1kV for few mS
- Damping: geophones internally damped, external sensor damping with external resistors
- Input Impedance: typically >= 1 Mohm
- Noise level: typically < 2.5 counts at 100 SPS
- Crosstalk rejection: > 140dB
- Skew time: zero (simultaneously sampling on all 3 channel)
- Dynamic range: 140dB at 25 SPS
- Clock: 10ppm stability
- Precision: 5ppm at 20°C
- Sincronization: GPS receiver included
- GPS Antenna: Amplified antenna with 10mt of coaxial cable and BNC connector
- Comunication: 1 RS232 port at 38400 baud
- Protocol: binary proprietary supported by SEISLOG and SEISMOWIN
- Sample frequency: 10, 20, 25, 50, 100, 200 SPS
- Power supply: 10-25Vdc - 4.5W
- Operating temperature: -20/+70 °C
- Cabling: RS232 and power cable provided with the unit
- Weight: 1,5 Kg

Stations planned or installed in Southern Italy within the Progetto Mercalli.



Acquisition system developed for the Progetto Mercalli



Seismogram recorded at the LSS Don Carlo la Mura, Angri, SA

The seismic recording data on the internet for the stations included in the Mercalli project apparently ends in 2011, but in most cases they are available until 2009 only.

References

Cantore L., Bobbio A., Di Martino F., Petrilio A., Simini M. and Zollo A. (2003). The EduSeis Project in Italy: An Educational Tool for Training and Increasing Awareness of Seismic Risk Seismological Research Letters September/October 2003 v. 74 no. 5 p. 596-602

MALTA

NETHERLANDS

Mail sent; waiting for reply

POLAND

Dear Dr. Solarino,

I don't know of any such deployments in our country.
Some time ago we have tried to get some schools interested, but it was always the same story all over:
the costs of electric power the station would use (no matter how minimal) and the concern over the station's safety and the related need for insurance and the costs thereof. Sometimes also was the concern that the school could get accused of spending any money on the seismic station instead of paying it to teachers or financing meals for the poorest kids.

We had a few seismic station presentations at schools but it was not any sort of semi-continuous operation.

In a few instances we had equipment installed on school premises within some seismic profiling projects, but the stations were still in our operation. Besides, we have lost track of those projects, some of them performed over a decade ago and long ago finished.

Best regards,
Pawel Wiejacz

PORTUGAL

Dear Stefano,

Please find attached a summary of the schools in Portugal that have and/or had seismometers and seismo-at-school programs. We have been able to account for almost 20 schools with seismometers running at some point since 1996. There may be other schools that we are still unaware of. Among these, only 2–6 should be recording data at the present time (again, to the best of our knowledge). The instruments in schools include Lehman, short-period, broadband and strong-motion sensors. The schools are located both in mainland Portugal and in the Azores. In many of the schools the projects were abandoned after the projects (and funding) ended. But there are a number of good contacts that can be reactivated in future initiatives.

This list attached should be almost complete, but there may be a few schools/projects missing.

Other than this, there are a number of educational and outreach activities that are carried out at the seismological labs/research units (involving shake tables, experiments, seismographs – old and new, etc). But I don't think this is the focus of your work. Please let me know if you need any further info.

I hope this helps!

Please keep us up-to-date of you developments.

Monitorização Sísmica da Região de Évora

Descrição do Projecto

Através da implementação de uma Rede Sismológica a distribuir pela região do Alentejo (RESEAL), com ligação à Universidade de Évora e a três escolas da sua zona geográfica, Escola Secundária André de Gouveia de Évora, Escola Secundária de Reguengos de Monsaraz e Escola Básica 2, 3 Cunha Rivara de Arraiolos, pretende-se monitorizar e divulgar a sismicidade da região.

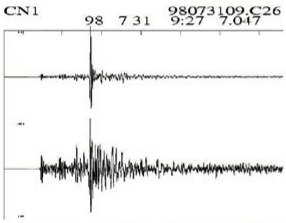
Na primeira fase, que corresponde ao tempo de instalação dos recursos técnicos, treinar-se-ão estudantes e professores do ensino secundário em actividades de aquisição e tratamento de dados sismológicos. Após esta fase, já com a rede a debitar dados, e mediante uma planificação de distribuição de tarefas, far-se-á o tratamento desses dados que serão complementados com os de outras redes em operação, nomeadamente com a rede do Centro de Geofisica de Évora (EVA). À medida que os resultados forem surgindo construir-se-á uma base de dados partilhada a disponibilizar na página www do projecto. Essa informação será complementada com trabalhos a realizar pelos alunos, sobre temas tais como: procedimento em caso de catástrofe sismica; causas dos sismos; sismicidade histórica; o risco sismico em Portugal; localização de sismos... .

A divulgação dos resultados do projecto, que conta com a página www já referida, será complementada com a elaboração de um artigo a ser submetido a uma revista de educação. Por outro lado, no fim, montar-se-á uma exposição com todos os materiais construídos até então e que percorrerá algumas escolas onde simultaneamente serão dinamizadas conferências e debates promovidos por alunos e professores participantes.

Monitorização Sísmica da Região de Évora

Objectivos a atingir

- Familiarização com a actividade sísmica do meio, uma vez que a região se caracteriza por uma sismicidade histórica e instrumental relevante no contexto Nacional (ver figura 2).
- Promover a aplicação da metodologia investigativa , utilizando técnicas e conceitos de sismologia (análise de sismogramas, identificação das fases, localizações epicentrais, determinação de magnitudes, relação entre dados sismológicos e estrutura geológica local e regional).
- Sensibilizar para a importância da prevenção sísmica e para atitude cooperante que o cidadão deve assumir em situações de catástrofe.
- Incentivar a utilização de meios tecnológicos de acesso à informação no sentido de facilitar a resolução de problemas.
- Dotar os professores de meios tecnológicos que reforcem a motivação dos estudantes para o estudo das ciências.
- Permitir que os cientistas divulguem os seus conhecimentos e as suas actividades para além dos limites do seu meio.
- Reforçar a cobertura da rede existente de forma a que haja à disposição da comunidade científica mais dados que permita fazer investigação mais detalhada sobre a região de interesse.



Exemplo de um registo sísmico obtido por uma estação da rede de Évora. Este registo corresponde a um evento de magnitude 4.1 com epicentro próximo de Arraiolos.

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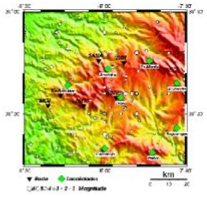


Figura 2 - Sismicidade (histórica e instrumental) da região.

Figura 3 - Distribuição geográfica das estações sísmicas cujos dados serão utilizados no projecto.

Monitorização Sísmica da Região de Évora

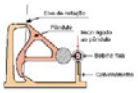
Recursos a envolver

A- INSTRUMENTAIS

- Três estações sísmicas digitais com GPS e sistema de comunicação telefónico com sismómetros de curto período (ou banda larga)
- Quatro estações sísmicas digitais (REFTEK) com GPS e sismómetros MARK de curto período.
- Servidor com sistema de comunicação telefónico com as estações e ligado à rede www, que albergará os dados recolhidos das estações a disponibilizar (mediante uma password) às escolas do projecto para tratamento. E este servidor que acolherá a página www do projecto bem como todos os materiais que vierem ser criados.
- Três computadores ligados à rede (um por escola) com acesso ao servidor e equipados com o software de tratamento de dados requerido.
- Um computador portátil para trabalho de campo e de apoio a actividades de treino e divulgação.

B- HUMANOS

- Quatro docentes/investigadores da Universidade de Évora, dois doutorados na área de sismologia e dois com mestrados nessa área, os quais facilitarão todo o apoio logístico de instalação e manutenção da rede e do server e promoverão nas escolas sessões de divulgação e de trabalho com vista ao treino de recolha, tratamento e analise de dados sísmicos. Estes investigadores também apoiarão na elaboração dos materiais de divulgação (páginas www e artigos)
- Professores da disciplina de Ciências da Terra e da Vida que lecionarão os conteúdos programáticos relacionados com o tema e acompanharão o desenvolvimento das actividades extra curriculares previstas.
- Cerca de 150 alunos dos 7º ao 12º anos de escolaridade das escolas participantes.
- Dois técnicos da Universidade de Évora que colaboram na instalação e manutenção da rede.



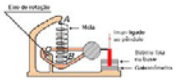


Figura 4 - Esquema simplificado de um sismómetro. Em (A)- Sismómetro horizontal. Em (B)- Sismómetro vertical.

Figura 5 - Em (A) fotografia de uma estação sísmica digital do tipo das usadas na rede de Évora, onde se vê o sistema de painéis solares para carga das baterias e abrigo da estação. Em (B) aspecto de sala de comunicações com estações sísmicas, onde é visível o sistema de comunicação telefónica e computadores de para armazenamento e tratamento de dados.

ROMANIA

SLOVAKIA

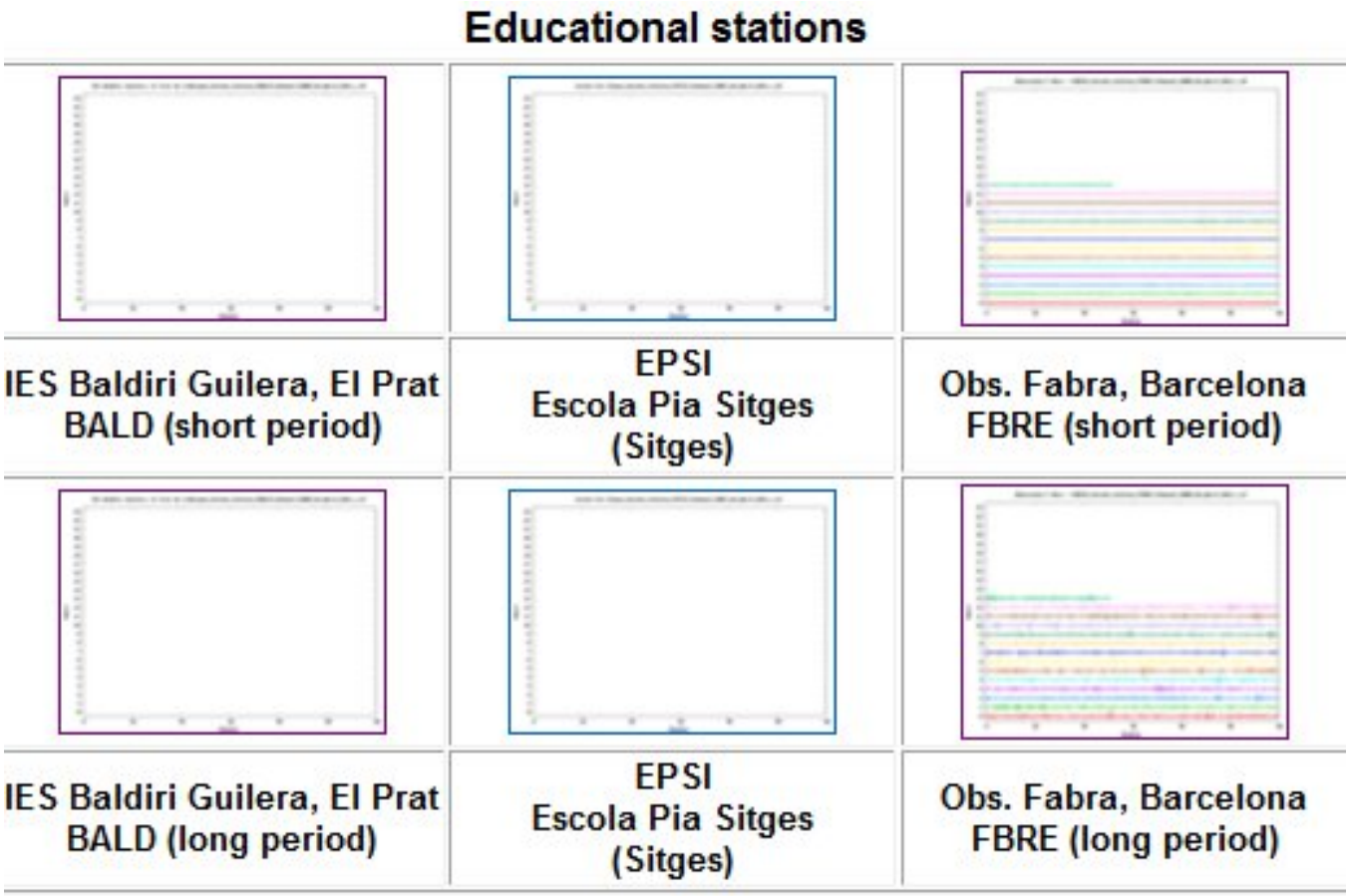
SLOVENJA

Mail sent; waiting for reply

SPAIN

The data from a few “educational stations (two of which apparently located in schools) can be found at the address: http://sismic.iec.cat/

However, there seem to be problems with these stations.



“Drum plot” for educational stations in Spain. The two located in schools are apparently not running

SWEDEN

Mail sent; waiting for reply

SWITZERLAND

The Seismo at School project is an educational program, which aims to promote public awareness of major environmental hazards, especially earthquakes. The installation of seismic stations in schools requires that the teachers be trained and are involved even after the training.To accomplish this, the SED (Schweizerischer Erdbebendienst) offers educational workshops organized at the schools and at focusTerra (http://www.focus-terra.ethz.ch) during the teacher's inservice.
The project started in 2007; currenly, there are 7 schools involved in the Seismo at School project.

#	C & T	ID	LATITUDE	LONGITUDE	HEIGHT	PLACE	DATA
1		EBELL	46.1965	9.01394	225 m	Bellinzona	
2		EBUEL	47.5183	8.5481	427 m	Kantonsschule Zürcher Unterland, Bülach	
3		ELAUS	46.5279	6.62214	530 m	Gymnase de Beaulieu - Lausanne - Switzerland	
4		ELFMC	47.3855	8.5996	650 m	Lycée Français de Marie Curie, Zürich-Gockhausen	
5		ESION	46.2264	7.34797	483 m	College des Creusets, Sion - Switzerland	
6		EWATT	47.3012	9.08763	612 m	Kantonsschule - Wattwil - Switzerland	
7		BECH	46.1966	9.01394	225 m	Bellinzona, 6500 Switzerland	

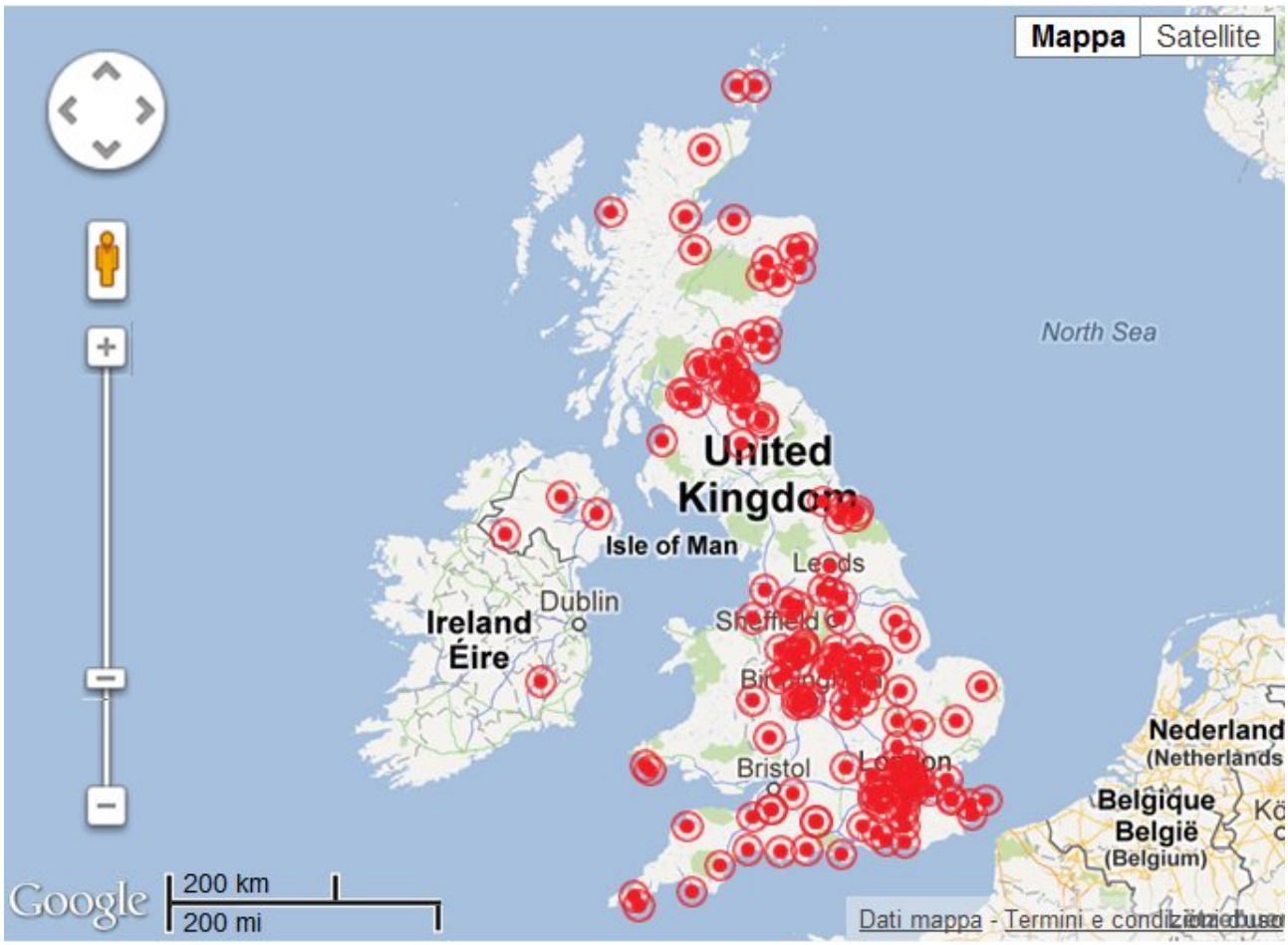
One additional station seems to have been operating at the Jugendelektronik-Zentren beider Basel.

UNITED KINGDOM

The “UK school seismology” project was launched in May 2007 by the BGS and set up several partnerships with organizations that had a proven and expertise in creating educational resources and science teacher training. The project profited from the designing and assembling of a school seismometer system (SEP) by MUTR, a school science equipment manufacturer and supplier. The main characteristics of these instruments are:

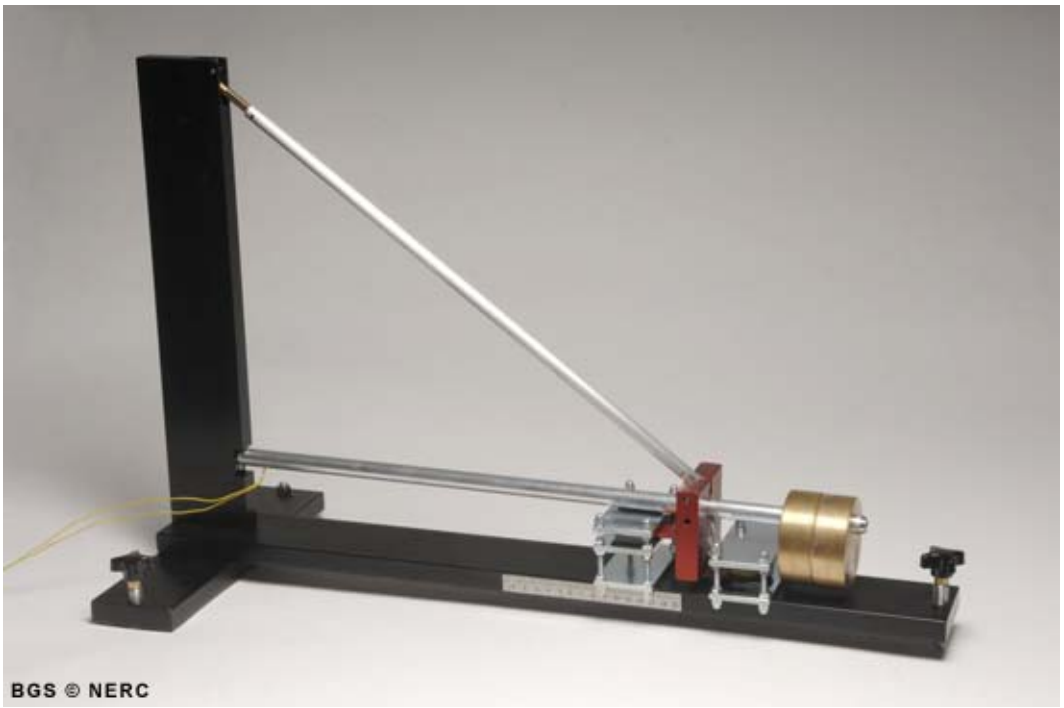
- horizontal pendulum 15-20 seconds natural period (adjustable)
- Eddy current damping (adjustable)
- Amplifier x 100, filters at 60 sec-HP and 5Hz LP
- 16 bit 20 sps digitiser
- Low price (currently less than 500 pounds in UK)

The number of schools involved grew very fast and by Sept. 2009 more than 400 instruments have been sold and possibly installed in schools. Not all of them are currently sharing data or participating to the activities. The current location of active stations is reported in the figure underneath.



Stations currently included in the “UK school seismology” project

Most of the stations are equipped with the SEP seismometers; however a few use GURALP-EDU, Rockwave-HS3, AS-1 or home-made instruments.



The SEP seismometer

Many educational activities accompany the project (http://www.bgs.ac.uk/schoolseismology/)