



Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation

Report

Networking of school seismology groups across Europe evaluation report

Activity:	<i>Networking School Seismology programs</i>
Activity number:	<i>NA8, Tasks 8.5, 8.6</i>
Deliverable:	<i>Networking of school seismology groups across Europe evaluation report</i>
Deliverable number:	<i>8.4</i>
Responsible activity leader:	<i>Paul Denton</i>
Responsible participant:	<i>Istituto Nazionale di Geofisica e Vulcanologia</i>
Author:	<i>Stefano Solarino</i>

**Seventh Framework Programme
EC project number: 262330**



ABSTRACT	3
INTRODUCTION	4
THEMATIC SESSIONS	4
SUMMER SCHOOLS FOR TEACHERS	5
AIMS AND ORGANIZATION	5
ATTENDANCE	6
THE LECTURES	11
THE HANDS ON ACTIVITIES (WITH PHOTOGRAPHS...)	13
THE TEACHERS' CORNER, THE POSTERS, THE PRESENTATIONS.....	15
THE FIELD TRIP.....	17
FEEDBACKS AND EVALUATION	18
COMMENTS AND DISCUSSION	33
OUTLOOK AND FUTURE PLANS	34
REFERENCES.....	36

Abstract

NERA NA8 aims at fostering the integration of school seismology projects across Europe and create the organization to facilitate new national projects to be initiated and to join in. In particular, the WP goals are to design and establish a dedicated facility necessary for a European-wide school seismology program, for the efficient sharing of data across national programs and for the scientific use of the data collected by this distributed infrastructure.

This deliverable (8.4) aims at providing an evaluation report of tasks 8.5 (Promote awareness for school seismology programs) and 8.6 (Evaluate the success of school seismology programs). Both tasks are very “applicative” in that they represent a real and physical link between the teachers and the project participants through initiatives where researchers describe and report about the collaboration with teachers (in devoted sessions of selected meetings) or lead summer schools attended by teachers. In this document a brief description is given of both workshops and thematic sessions run alongside existing Geosciences meetings in Europe and the international seismic summer schools for teachers run in different countries.

In particular, in the period 2010-2014, 3 thematic sessions have been held in international meetings. These sessions proved to be very important for exchanging opinions, discussing the topics of school seismology and advertising the summer schools. In fact within the time frame of the project, three summer schools were organized. The first was held in Napoli, Italy, from 4 to 8 June 2012 (figure 1); the second in Valbonne, France, from 21 to 25 October 2013. The third took place in Sion, Switzerland in the period 20-24 October 2014.

The schools were organized to provide a common scientific base to the teachers; to furnish a general view on the seismological data processing and the work of seismologists; to provide an update on the most recent developments in the fields of observational and applicative seismology; to deliver the basis for an efficient communication of natural hazards to raise the awareness and preparedness in the students and possibly their families; to increase the skills in processing seismological data by practising with software designed or adapted within the project; to establish a network of teachers possibly cooperating in the sharing of data, experiences and activities after the school.

In order to fulfil these requirements, the schools were organized into four main kinds of activity. Lectures on some of the topics above described to establish a common technical vocabulary were given in the morning. In the afternoon practical activities mostly linked to the topic of the morning classes have been carried out.

A short field trip has also been organized in each edition to let the teachers have the feeling about the outdoor work of scientists. In fact in all trips (Campi Flegrei and Malpasset Dam, Suisse Alps) teachers were required to make short activities to describe the phenomena that act in the visited areas.

Finally, a series of activities were organized to let the teachers describe the experiences with their students and to introduce themselves. In this frame the “teachers’ corner”, the posters exhibition and the short oral presentations have been carried out.

In principle the feedbacks from the attendees are very positive, confirming that NERA has provided a very productive framework for networking educational seismology groups across Europe.

Introduction

In Europe several schools own a professional or semi-professional seismic station and steady record seismological data. The number and locations of these schools were indexed in the inventory of deliverable 8.1. The waveforms are collected, processed and shared with other users using a variety of data processing and analysis programs. Although the single country uses well established and efficient protocols and data format, however sharing data, experiences and software among countries is not as efficient. NERA NA8 aims at fostering the integration of school seismology projects across Europe and create the organization to facilitate new national projects to be initiated and to join in.

In particular, the WP goals are to design and establish a dedicated facility necessary for a European-wide school seismology program, for the efficient sharing of data across national programs and for the scientific use of the data collected by this distributed infrastructure. The NA8 aim is to integrate different school seismology projects so that they can easily share their data and learning approaches and develop a framework that will enable this integrated structure to link with other similar groups around the world, and so to enable and facilitate new European groups to join the structure. NA8 is organized into 6 tasks and is meant to deliver four products.

Deliverable 8.4 aims at providing an evaluation report of tasks 8.5 (Promote awareness for school seismology programs) and 8.6 (Evaluate the success of school seismology programs).

Both tasks are very “applicative” in that they represent a real and physical link between the teachers and the project participants through initiatives where researchers describe and report about the collaboration with teachers (in devoted sessions of selected meetings) or lead summer schools attended by teachers.

The tasks give the opportunity to teachers to share experiences and discuss the different models of education in their countries and to establish a network all over participating nations while offering to the project participants a unique chance to evaluate the results of the activities and education methods developed in the project.

In this document a brief description is given of both workshops and thematic sessions run alongside existing Geosciences meetings in Europe and the international seismic summer schools for teachers run in different countries.

Thematic sessions

In the period 2010-2014 a few thematic sessions dealing with the main topic of the NA8 have been organized within existing Geosciences meetings in Europe. The importance of these sessions stand in the fact that they are not limited to the participants of the project but offer a chance to enlarge the audience and to get hints and suggestions from potentially interested scientists. In some case, given the close relationship between these researchers and teachers in their country, not only they report back about the educational initiatives of the NA8 but also their presentations are based on the experiences of the single school or national school network, contributing to enlarge the number of people “in touch” with the NERA project.

In particular, in the period 2010-2014, the following sessions have been held:

XXXIII Meeting of the European Seismological Commission, Moscow 2012 **Session EO-3 Risk reduction. Preparedness and Response & Seismology in Schools**

General Assembly 2013 of the European Geosciences Union: **GIFT Workshop for teachers**

IAHS/IAPSO/IASPEI Joint Assembly (22-26 July 2013, Gothenburg, Sweden) S601S1 - **Educational Seismology in Schools, Universities, and Informal Settings**

II European Conference on Earthquake Engineering and Seismology, ECEES, Istanbul 2014

Session Communication and education: making seismology accessible to society

Summer schools for teachers

Aims and organization

Within the time frame of the project, three summer schools were organized. The first was held in Napoli, Italy, from 4 to 8 June 2012 (figure 1); the second in Valbonne, France, from 21 to 25 October 2013. All editions profited from the full funding provided by the EU Comenius program. The third took place in Sion, Switzerland in the period 20-24 October 2014. The cost of the school, meals and accommodations have been sustained by the organization, while teachers organized independently their trip.

The schools were organized according to the following targets:

- provide a common scientific base to the teachers. It has to be underlined that there are several different curricula that allow teaching Geosciences in the different countries. These curricula may vary from M.Sc. in biology to mathematics, geology, physics, natural science.
- provide a general view on the seismological data processing and the work of seismologists. This aspect is peculiar for those teachers that do not have a seismic instrument in their schools or are apprentice having only recently joined the seismology@school network. It is also fundamental for those teachers that want to join the community and need hints on the kind of instrument to adopt or the educative potential of the resulting database.
- provide an update on the most recent developments in the fields of observational and applicative seismology. Seismology underwent significant improvements in the last years that being novel, although partly disseminated by the scientific community for the importance they reflect on the society, are not yet completely understood by teachers. Examples of these improvements are the hazard and risk maps or the studies about site effects.
- provide the basis for an efficient communication of natural hazards to raise the awareness and preparedness in the students and possibly their families.
- increase the skills in processing seismological data by practising with software designed or adapted within the project. About half of the activities in the schools were aiming at increasing the familiarity of the teachers toward the data processing because it is firmly believed that the "learning by doing" approach has a strong pedagogical impact.
- establish a network of teachers possibly cooperating in the sharing of data, experiences and activities after the school

In order to fulfil these requirements, the schools were organized into four main kinds of activity. Lectures on some of the topics above described to establish a common technical vocabulary were given in the morning, to homogenize the knowledge and establish a common base on the various topics and to introduce the practical activities. Following any lecture a discussion has been organized to clear doubts or give more detailed explanation when necessary ; for topics directly linked to society (preparedness, awareness, communication, education) round tables have given the teachers a chance to explain the approach to the topics in their countries, discussing pros and cons and allowing a comparison with different systems.

In the afternoon practical activities mostly linked to the topic of the morning classes have been carried out. Teachers were organized in small groups or couples and were given a short introduction and the tools to achieve a target (location of an earthquake, computation of magnitude, phase recognition) and were assisted during the activity. It is worth noting that a great effort has been done to reduce the required IT knowledge to basics in order to make the activity feasible for teachers not particularly skilled.

A short field trip has also been organized to let the teachers have the feeling about the outdoor work of scientist. In fact in all trips (Campi Flegrei and Malpasset Dam, Suisse Alps) teachers were required to make short activities to describe the phenomena that act in the visited areas.

Finally, a series of activities were organized to let the teachers describe the experiences with their students and to introduce themselves. In this frame the "teachers' corner", the posters exhibition and the short oral presentations have been carried out.

Attendance

As expected, it has not been easy to disseminate the information about the NERA seismology@school summer courses because, although it has been quite simple to inform researchers (emails, NERA meetings, workshops), it has been very difficult for them to transmit the information to the teachers and schools. However there has been a steady increase of "informed people" between the two editions, especially thank to the word of mouth, and the 2013 course in Valbonne was attended by more teachers than the 2012 edition. In fact after the first course teachers spread the news and some colleagues decided to join. Moreover, a few teachers attended more than one course; although this was in principle a positive aspect, it created a little problem in the organization of the following courses (as described later in this report) because the program of the following schools had to take care of both requirements, being a basic course for some teachers and an advanced one for some others.

However in all cases the number of attendees was very close to the maximum expected attendance; most of the teachers were from countries already included in the seismology@school projects, that is from countries where seismic stations in schools do operate.

In particular, the 2012 Naples school was attended by 24 teachers from 5 countries as shown in figure 2. The 2013 Valbonne was instead attended by 35 teachers, from 9 countries. It has to be remarked that two teachers came from outside Europe, Philippines and United States. Figure 3 shows a zoom on Europe only.

The 2014 edition has been attended by 44 participants from 9 countries as shown in the table (1) shown below. In principle the number of participants shows that the interest for the school has grown of about 48% from the first to the second school and

some 23% from the second to the last. The number of attendees from the first to the last edition was almost doubled.

Country	2012 (Naples)	2013 (Valbonne)	2014 (Sion)	Total
Italy	6	2	1	9
France	1	14	3	18
UK	11	5	5	21
Portugal		5	19	24
Romania		4	7	11
Switzerland	3	1	7	11
Albania			1	1
Turkey			1	1
EIRE	3			3
Faroe		2		2
US		1		1
Philippines		1		1
Total	24	35	44	103

Table 1: participants and countries



Seismology@School

Training course Department of Physics, University of Naples Federico II - Italy

JUNE 4-8, 2012

The training course for secondary school science teachers is aimed at providing the scientific background, laboratory practices and new ideas on earthquakes and related risks.

Topics Earthquakes and waves
Observations and measurements in seismology
Seismic signal processing and data analysis
Data modelling and interpretation

Lecturers Jean-Luc Borenger, Centre National de la Recherche Scientifique, France
Antonella Bobbio, Vesuvius Observatory, INGV, Italy
Paul Denton, British Geological Survey, United Kingdom
Antonio Emolo, Department of Physics, University of Naples Federico II, Italy
Gaetano Festa, Department of Physics, University of Naples Federico II, Italy
Anne Sauron, Eidgenössische Technische Hochschule, Switzerland
Stefano Solarino, National Earthquake Center, INGV, Italy
Alda Zollo, Department of Physics, University of Naples Federico II, Italy

Figure 1: the flyer of the Summer school in Naples, 2012



Figure 2: origin country of the 24 teachers attending the 2012 summer school in Naples

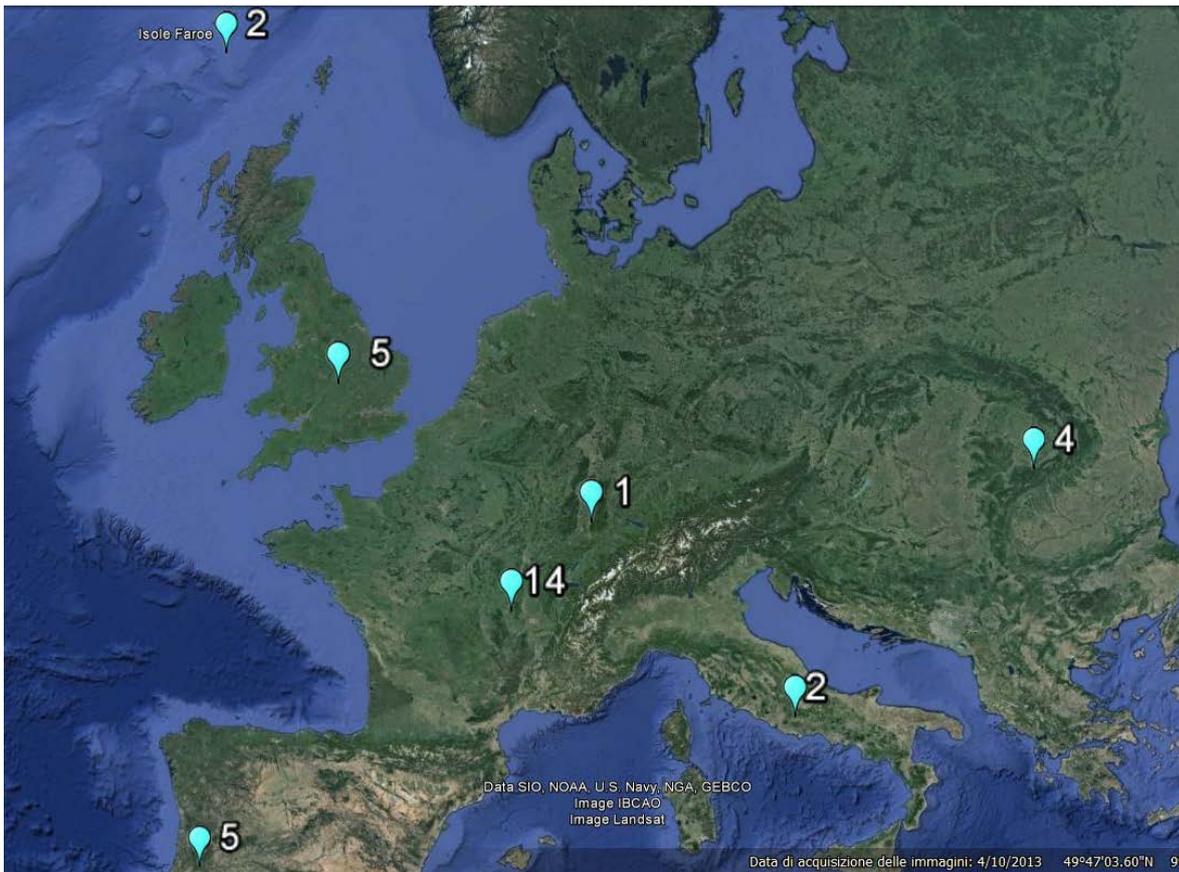


Figure 3: attendees of the 2013 summer course. The figure displays a zoom on Europe. Two more teachers from US and Philippines attended the school.

The lectures

Lectures dealt with topics spanning from basic (waves, plate tectonics) to advanced and applicative (site effects, seismic hazard and risk) topics with a special eye on the techniques that are currently use to record, store and locate earthquakes.

In particular table 2 displays the title of the lectures per day per school.

In all editions some room has been left to the peculiar aspect of the seismicity of the hosting country. In particular some attention has been placed on the seismicity related to volcanoes in Napoli while in Valbonne both earthquakes at sea and tsunamis have been treated. In the Sion school some attention has been devoted to the problems linked to seismic hazard in touristic areas and the relationship between seismicity and secondary effects on the environment (avalanches, landslides) have also been discussed.

Finally, some short lectures have been devoted to the relationship between science and society and the role of seismologists.

	Napoli (2012)	Valbonne (2013)	Sion (2014)
Day 1	Introduction to seismology Earthquake and waves Seismology@school: the European experience Earthquake early-warning at schools in the REAKT Project	Introduction to seismology Earthquakes Seismology and plate tectonics	Introduction to Seismology and Geodynamics Earthquakes and waves Evolution of plate tectonics and Seismology How earthquakes occur ? Data, wave picking, earthquake locations
Day 2	Observation and measurements in seismology Monitoring seismicity: the observatory practise	Observation and measurements in seismology Study of the Ligurian earthquake 1887 Learning from the small earthquakes	Observation, measurements and natural hazard From site effects to induced phenomena: liquefaction and triggered landslides Seismic risk in the Alpine structure
Day 3	Seismic signal processing and data analysis Locating the earthquakes: the theory behind is much but not all Signal processing tools for schools Seismological analysis and visualization tools for schools.	Seismic Hazards Earthquake and Site effect Seismic risk and prevention	Seismic risk and mitigation Defeating earthquakes: how to build ? Expected earthquakes and seismic risk mitigation in Palestine Community earthquake preparedness and disaster education in Turkey
Day 4	Data modelling and interpretation Forward modelling Introduction to inverse problems	Ocean and seismology Adopt a float with Mermaid Project, Tsunami & tsunami risk, Mediterranean tsunami alert center	Seismic risk assesment The role of numerical simulation and risk assesment Extreme consequences of earthquakes Earthquake risk in building codes and beyond

Table 2: lectures

The hands on activities (with photographs...)

The hands on-activities are the core of the schools in that they make teachers get acquainted with the software provided by the organization to the attendees. This software is designed to be used with professional or semi-professional data, and can then be used with the seismograms recorded in schools. Since the software is handed to the teachers on USB keys that they carry back home, it gives the teachers the chance to establish a “virtual” lab in their schools by simply using computer with (optional) internet connection.

In addition few activities are also proposed to learn how to assemble a very simple seismometer (figure 4 a,b, 5) , to set up a small shaking table (figure 6), to build a model of the earthquake cycle (figure 7).

Teachers are divided in groups and then in couples within each group in order to let them really do the experiment or lab. The IT requirement to use the software is very basic; moreover the teachers are assisted by the NERA researchers.

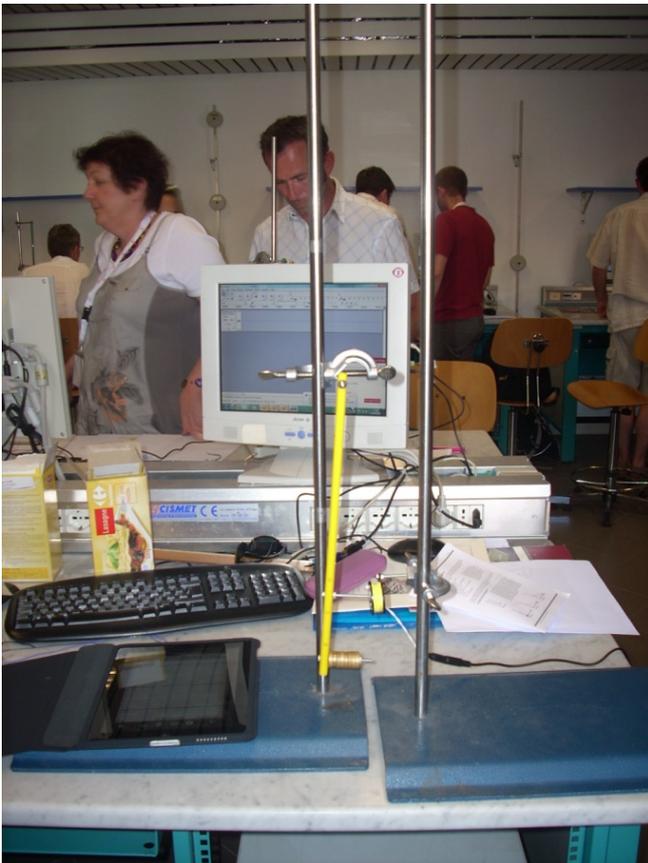


Figure 4 a,b : hands on activities, assembling a simple seismometer

a)

b)

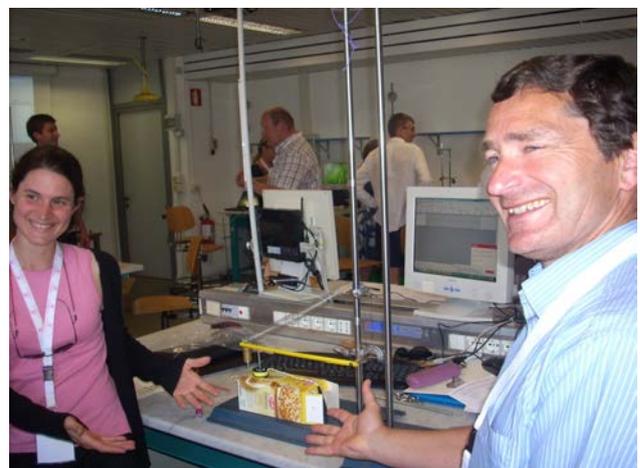




Figure 5: hands on activities, teachers "at work"



Figure 6: hands on activities, shaking table

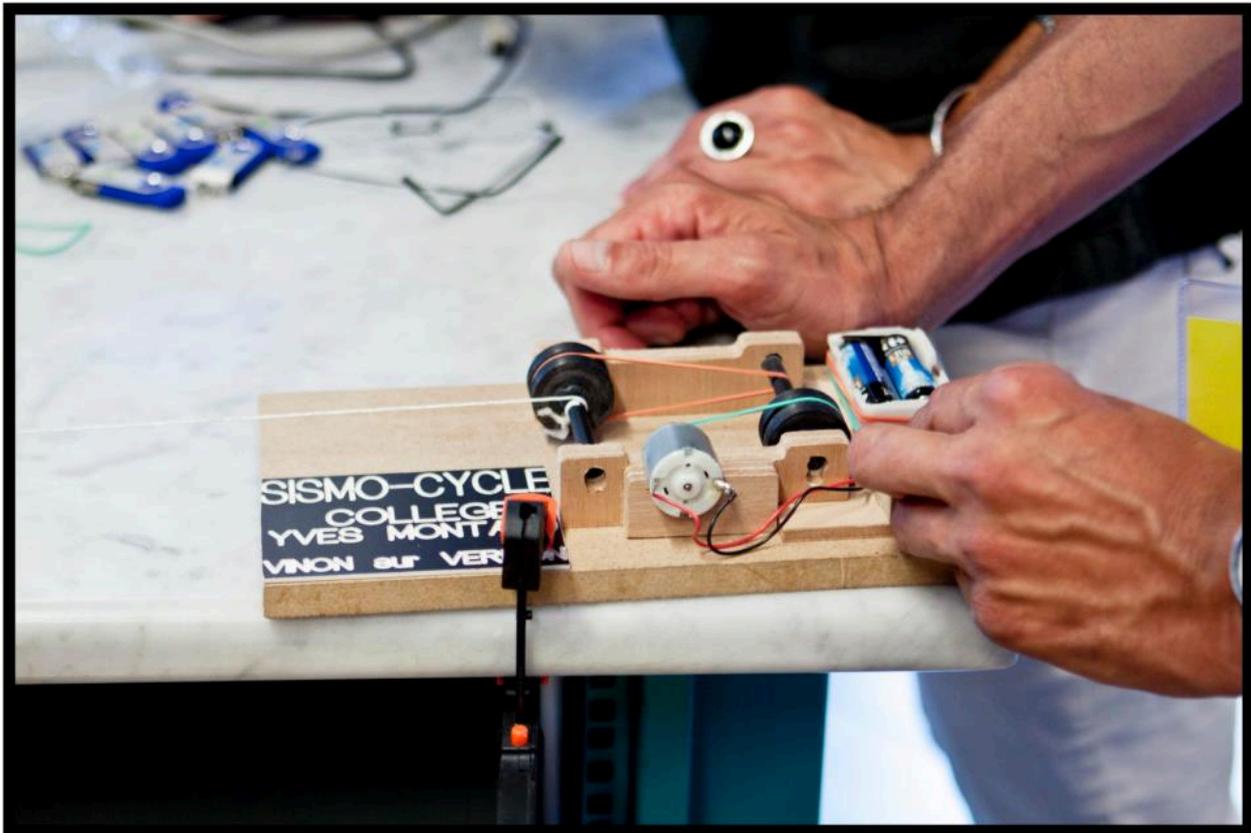


Figure 7: hands on activities, earthquake cycle

The teachers' corner, the posters, the presentations

In order to either establish a cooperation among teachers and to share their experiences, several activities lead by teachers are organized.

In the teachers' corner every interested teacher can set up a short presentation or a lab activity organized within its school. At the end the attendees can ask questions or share their own experiences.

In the poster session (figure 8 a,b) teachers show a poster relative to their own or their students' study about an area of their country. Also in this case some debate is organized to let the teachers discuss about their results.

Finally some room among the morning lectures is left for the teachers to deliver short presentations about the activity in their school. This activity is compulsory. However teachers are also required to make a report and a presentation about the scientific content of the field trip. Although this last activity is not mandatory, however it is strongly recommended because proved to be very useful to share and homogenize the diverse approaches (partly due to the different "culture and skills" of the teachers).



Figure 8 a,b: teachers’s posters

a)



b)

The field trip

The trips have been designed to let the teachers have a view of geologic situations that might differ from experiences in their country. In particular, the Campi Flegrei (Naples, 2012) the Malpasset Dam (Valbonne, 2013, figure 9 a,b) and a peculiar sector of the Swiss Alps (Sion 2014) have been visited. In all cases attendees were required to make activities (use geologic or topographic maps, compass; draw geologic sketches to infer the stratigraphy); in particular in the second summer school they were asked to deliver a short presentation after the trip with the results of their study.

Moreover, during the 2013 summer school, visits to university and research centre (Geoazur, ACRI IN) have been organized in order to give the teachers the feeling about the research activities in professional labs.



Figure 9 a, b: Campi Flegrei and Malpasset dam



Feedbacks and evaluation

The evaluation of impact of the school-seismology action is fundamental to verify the effectiveness of the followed approach. For this reason an evaluation form has been distributed on the last day of the summer schools. The aim was either to rate the school and to get hints about possible problems, failures and suggestions to be taken into account in the next editions.

The form compiled by the teachers in the 2012 Naples summer school is displayed in figure 10; the graph with the results is instead displayed in figure 11. The statistics is relative to the answer on 17 teachers. The number of counts is absolute. Questions 10 to 13 were aiming at getting comments or suggestions. The answers are reported in table 3. Only one question got a low rate (2); the question regards the amount of material covered by the course. It must be remarked that few teachers attending the summer school in Naples were already involved in similar, local, initiatives before. However the average rate for this question and for number 7 (were the methods to deliver the training effective) are lower than the rest, that means that teachers were expecting more topics and they probably did not completely understand some of those treated, as confirmed by answers to questions 11 and 12, where some teachers were complaining about a too technical language or at least more suited to science and geography teachers.

The form compiled by teachers in the 2013 school in Valbonne is displayed in figure 12 and the graph with the results in figure 13. The plot is drawn using the score from 30 attendees. None teacher rated poor or very poor, and only few were not satisfied with the accommodation (Q5), with the lectures and their participation to the discussion (Q7 and Q8). However the rate of the overall workshop is very positive and many teachers would recommend the course to other colleagues.

The comments of the teachers are also reported. Most of them show a significant improvement on the satisfaction of the attendees. Some comments show that the design of lectures is not optimal yet; one comment reads that the lectures are too detailed while one remarks that some of the arguments are too basics. It must be remarked that this second course had an additional problem in that some of the participating teachers were at their second experience, having attended the course in Naples. However they have been warned about the lectures being organized for "apprentices", although a great effort has been done to go beyond the basic arguments to render the course more appealing also to "expert" attendees.

One important comment is that there has been some overlapping among the lectures and some more cooperation is needed among trainers. This remark is correct, but cannot be easily solved. In fact with only one school as a previous experience, the difficulty in meeting before the school and the necessity to add new arguments at each editions, the general organization of the school suffers from some overlapping or worse lacks.

Finally, the evaluation of feedbacks relative to the Sion 2014 school is reported in figure 14. None question has been rated "poor" and very few activities were rated "average" or "good" by the attendees. In principle the percentage of excellent is the majority with respect to the other rates except for the answers about encouraging participation and questions. This is still a weak point in the general organization; although the lecturers made their best to invite attendees to discussion, the participation of the teachers to discussion has been very limited. Probably the "question time" should be held a few hours after the lectures in order to give the attendees more time to think about the content of the lecture. In fact most of the topics are very new to the teachers attending the school. Moreover, teachers are probably "shy" to ask questions especially when the topic is technical.



EVALUATION SESSION

Training Evaluation Form

To help us improve the quality of our training, we would appreciate your feedback.

Please indicate your response to the questions below by circling the appropriate number

Rating scale: 1-Very poor 2-Poor 3-Average 4-Good 5-Excellent

1. Overall, how would you rate the course?..... 1 2 3 4 5
2. Was your interest held? 1 2 3 4 5
3. Would you recommend this course to others? 1 2 3 4 5
4. Would you recommend these trainers to others?..... 1 2 3 4 5
5. Did the trainers encourage participation and questions?..... 1 2 3 4 5
6. Was the length of training appropriate?..... 1 2 3 4 5
7. Were the methods used to deliver the training effective?..... 1 2 3 4 5
8. How was the amount of material covered?..... 1 2 3 4 5
9. How would you rate the organization?..... 1 2 3 4 5

10. What did you like most about the course?
11. What would you recommend changing about the course?
12. Now that you have completed this course, what additional training (if any) would be helpful?
13. Other comments, observations, suggestions:

Figure 10: evaluation form, Naples 2012

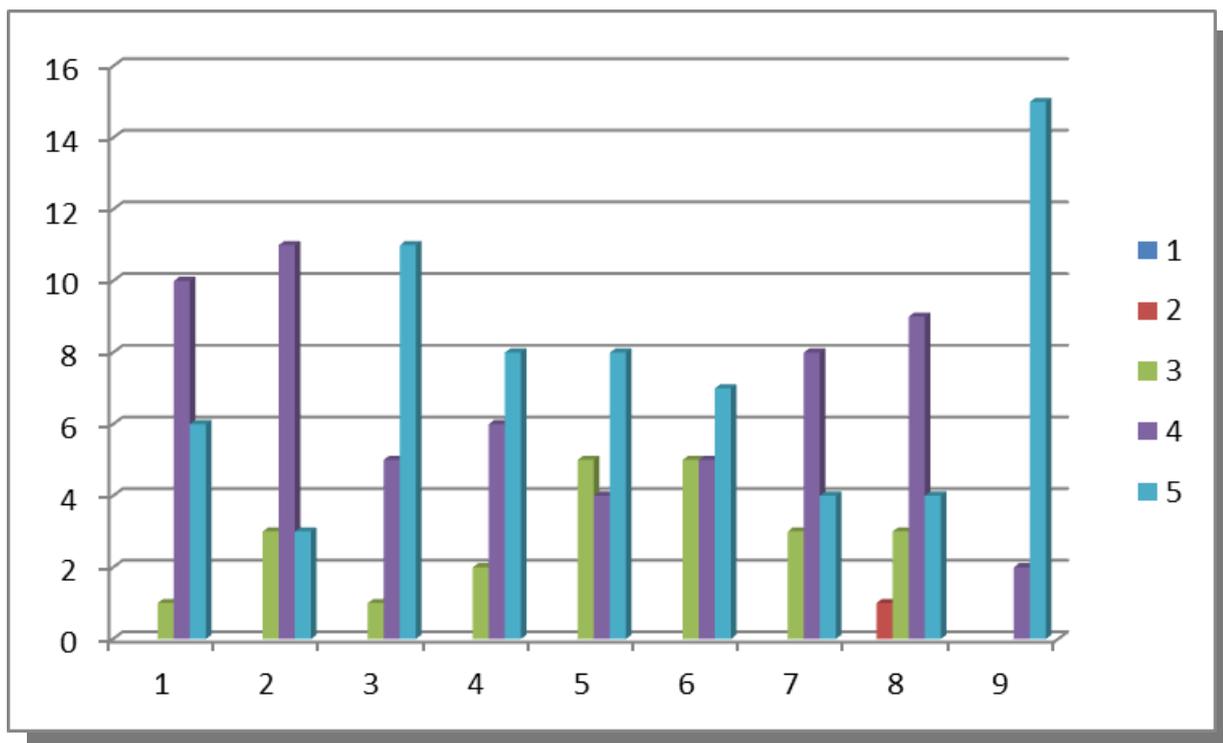


Figure 11: plot of results of the evaluation, Naples 2012. 1) very-poor 2) poor 3) average 4) good 5) excellent. Y-axis in counts.

EVALUATION SESSION FEEDBACK (QUESTIONS 10 – 13)

10. What did you like most about the course?

- Sharing experience with teachers different for age, background, experience
- Hands-on activities
- Field trip

11. What would you recommend changing about the course?

- Depth and difficulty of some lectures (too technical/ the level of information beyond some teachers)
- More focused for teaching science and geography
- More hands-on activities

12. Now that you have completed this course, what additional training (if any) would be helpful?

- Installing and using seismometers and then signals interpretation
- More geography/geology (more about tectonic process/plate tectonics – how earthquake occur)
- More about volcanoes to complete the Earth dynamics comprehension and to know the perception of the children in different countries of the volcanic hazard

13. Other comments, observations, suggestions:

- Staying in touch/ Creating a community on line that continues the experience
- Participating in a common project
- More practicals and more time for practicals
- The length of the day (make it shorter)

Table 3: questions and answers 10-13



Seismology@School
EVALUATION SESSION
Training Evaluation Form

To help us improve the quality of our training, we would appreciate your feedback. Please indicate your response to the questions below with the appropriate rate.

		<i>very poor</i>	<i>poor</i>	<i>average</i>	<i>good</i>	<i>excellent</i>
1	Overall, how would you rate the workshop ?					
2	How would you rate the lectures ?					
3	How would you rate the hands-on sessions?					
4	How would you rate the field and labs trips?					
5	How would you rate the accommodation in CIV ?					
6	Was the length of training appropriate ?					
7	Were the methods used to deliver the training effective ?					
8	Did the trainers encourage participation and questions ?					
9	How was the amount of material covered ?					
10	Would you recommend this course to others ?					

More ...

How would you recommend changing about the course ?

.....

.....

.....

.....

Now that you have completed this course, what additional training (if any) would be helpful ?

.....

.....

.....

.....

Other comments, observations, suggestions :

.....

.....

.....

.....

.....

Thanks !

Figure 12: evaluation form, Valbonne 2013

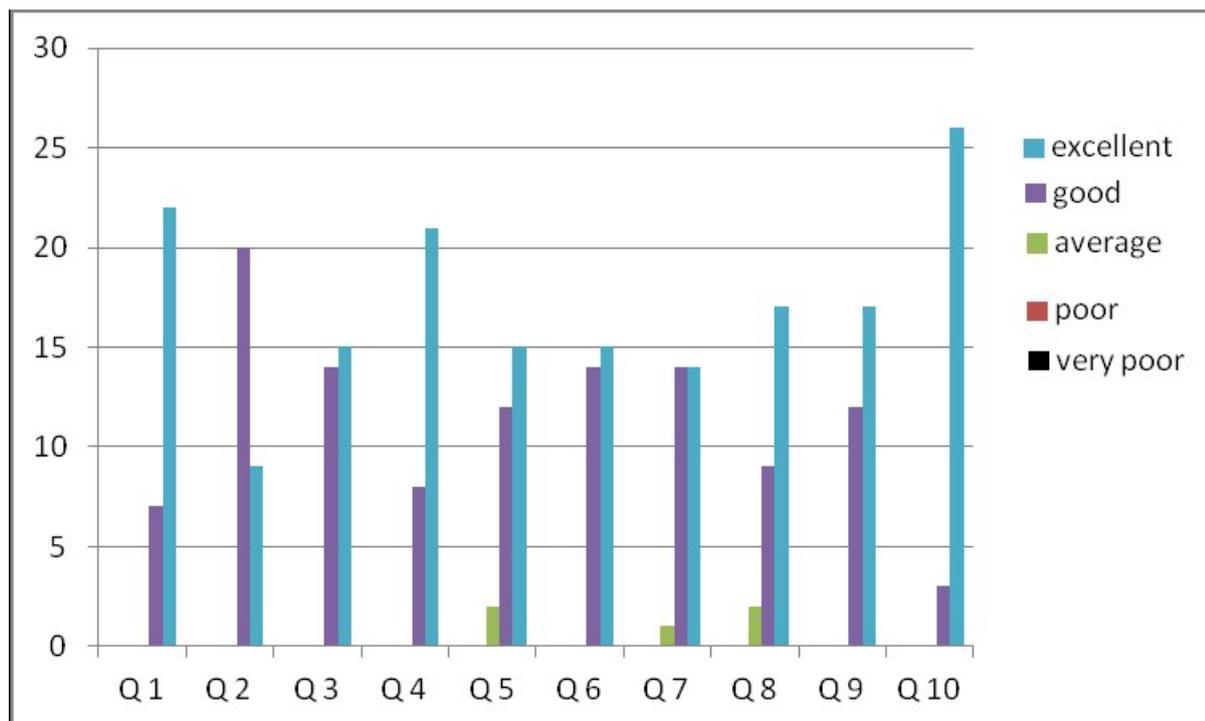


Figure 13: evaluation graph, Valbonne 2013.

More ...

How would you recommend changing about the course ?

Nothing, I see that the format works at best
(I can compare this course with other European
courses I participated in past years.)

Now that you have completed this course, what additional training (if any) would be helpful ?

I need to practice the new materials (especially
the software that I have not used in the past) and
I hope - if I need and ask - to receive advice
through e-mail -

Other comments, observations, suggestions :

Everything in the course was interesting and
ran smoothly - The lecturers and the teachers,
in spite of obvious differences, were all inspiring,
friendly and collaborative : all were highly
motivated and willing to share skills and experiences
The French food and wines were excellent, too
much for a teachers course --- (I am joking!)

Thank you for all, and see you - I hope -

Thanks !



More –

How would you recommend changing about the course ?

I would like to have discussion groups at the end of each day, trying to work out some specific ideas for ~~best~~ lesson in the classroom.

Now that you have completed this course, what additional training (if any) would be helpful ?

networking between participants.

Other comments, observations, suggestions :

All is all an excellent course, and looking forward to come again some other time.

Thanks !



More ...

How would you recommend changing about the course ?

- Some of the presentations might have been improved by structure / time management
- The hands-on activities were very interesting; however, some of them are too expensive, time-consuming or hard to understand for students \Rightarrow teachers should be more involved in ^{the planning of the hands-on activities.}

Now that you have completed this course, what additional training (if any) would be helpful ?

Fieldwork \rightarrow What can we do with seismometers, geophones etc. out in the field, without making it too complicated for the students / teachers ?

Other comments, observations, suggestions :

Thank you for everything! I especially enjoyed the field trip, the visit in Antibes and the exquisite food! It was a great stay in France!

Thanks !



More ...

How would you recommend changing about the course ?

Some of the lectures were slightly too detailed to be relevant for use in schools. More emphasis on how they could be transformed into lessons would help.

Now that you have completed this course, what additional training (if any) would be helpful ?

More information on using the software would be helpful, a practical session of building the snake turtles would be great.

Other comments, observations, suggestions :

Overall an excellent course with friendly, accommodating and knowledgeable staff. I enjoyed it very much and feel full of new ideas that I can use in my lessons back in the classroom.

Thankyou for this excellent opportunity!

Thanks !



More ...

How would you recommend changing about the course ?

① Focussing on small groups of teacher - to allow collaborative work - provide facilities for materials to be uploaded to an FTP site for later use at school.

Now that you have completed this course, what additional training (if any) would be helpful ?

- plate tectonics
- Hazards eg. landslides
- fault activation.

Other comments, observations, suggestions :

Excellent to be on-line - allowed much more sharing of resources (information).

Thanks !



More ...

How would you recommend changing about the course ?

more collaboration between delegates in producing educational resources

Now that you have completed this course, what additional training (if any) would be helpful ?

I need time to try out the activities in my classroom
I will then probably have lots of questions I will need answering

Other comments, observations, suggestions:

Thanks !



More ...

How would you recommend changing about the course ?

MORE HANDS ON ACTIVITIES WITH PRESENTATION OF THE RESULTS

Now that you have completed this course, what additional training (if any) would be helpful ?

Other comments, observations, suggestions :

ANY LECTURE REPEAT BASIC CONCEPTS, LIKE WHAT IS P AND WAV
AND SO ON...

Thanks !



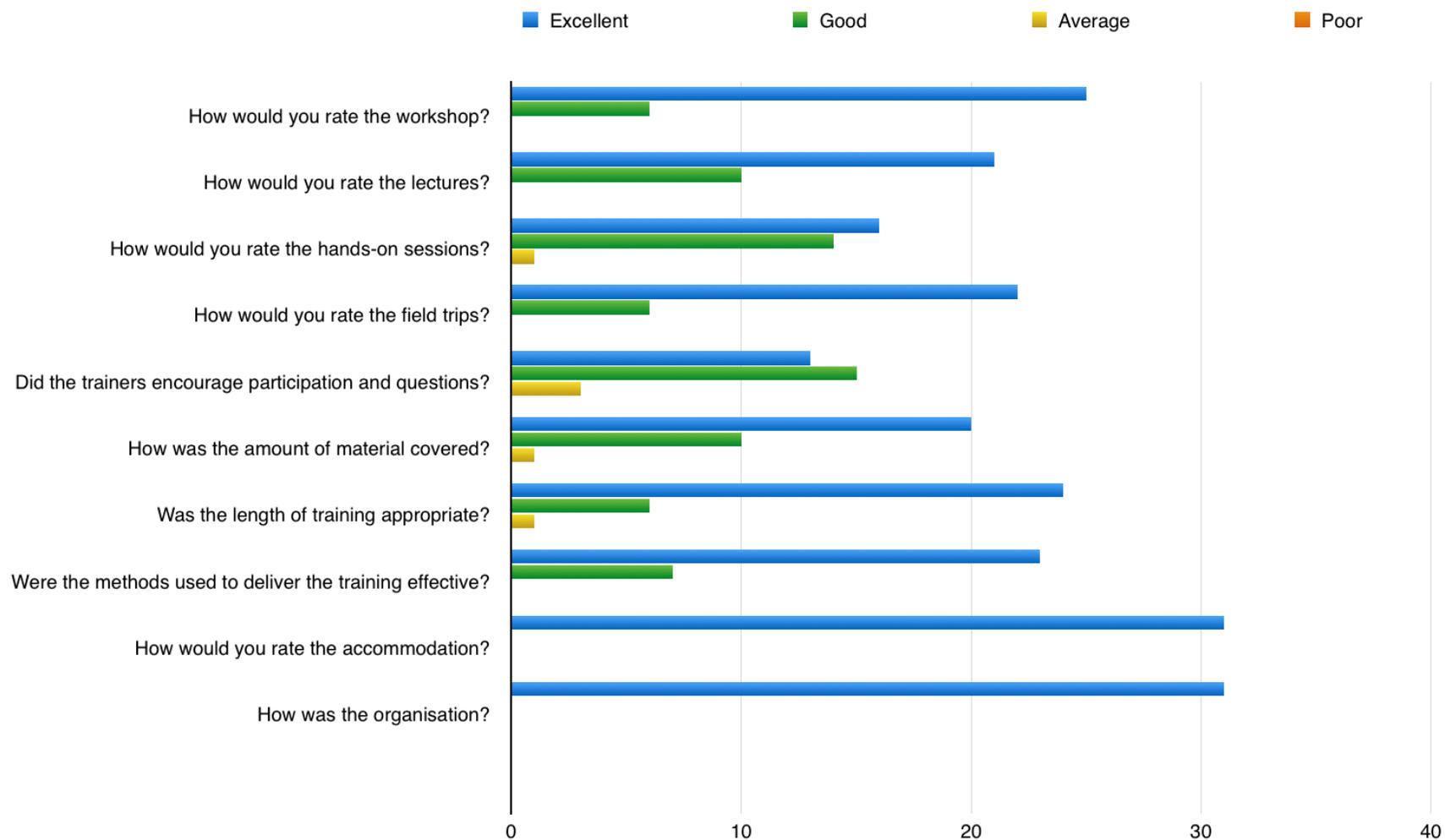


Figure 14: evaluation for the 2014 Sion school

Comments and discussion

The evaluation of the success of the summer schools described in this chapter profits from both the comments of the trainers and the attendees for the first two schools (Napoli 2012 and Valbonne 2013). Although the feedbacks for the Sion edition are already available (see figure 14), however the details about these data are still under processing. The chapter also reports about an initiative carried out by some teachers attending the `seismology@school` summer courses leading to the successful application to a call for projects from the EU.

For what regards the evaluation, it must be remarked that although most of the suggestions, remarks, comments and criticisms have been fixed on the evaluation forms, however some were also discussed or reported personally to trainers during the “social” time (dinner, lunches, travels). In fact the share of these events of both attendees and trainers turned to be important not only for the construction of a network among teachers but also for a fruitful discussion about the different aims and needs of the worlds of school and research. It must be remarked that many suggestions from the two first editions have been taken in care in the organization of the third school (which will be held in Sion in October 2014), where most of the innovations were based on the comments and observations of the former attendees.

The questionnaire of the two editions are very similar in the main skeleton but while the first one is aiming at knowing more general information (about the organization of the course, the quality of lectures and so on), the second one is more oriented to have detailed information about the single activity.

The statistics compiled from these documents is made of the answers from about 80% of the attendees. Of course the evaluation session has been carried at the end of the summer schools, on the last afternoon. Unfortunately some teachers could not be present due to tight schedule for their flight / train. However the sample, being made of 47 out of 59 attendees, can still be considered valid. The data of the questionnaires shows that the overall rate of satisfaction of the teachers for the two courses is very high (see figures 11 and 13), with 61% (29 out of 47) of the attendees rating excellent and 36% rating good. It is worth noting that the top rate almost doubled from the first to the second edition (35% versus 76%, 6 out of 17 in the first versus 23 out of 30 in the second course). After the first edition, a great effort has been done to take care of the suggestions and comments of the attendees; this was probably the main cause of the improvement. In particular one main problem in the structure of the schools derives from the different culture and skills of the attendees; the summer schools are in fact open to teachers with various background and education (mathematics physics, natural and geo science, biology). This problem was only partly solved in the second course; however most of the “negative” comments were about a redundancy of topics and details, that in turn were probably considered positive by the remaining, less-expert teachers.

The statistics (figure 3, Q 3) show that the “hands on” activities proved to be the most interesting and stimulating for the teachers. Many attendees asked for more practical even after the second edition. The reasons for this are intuitive: in such activities teachers can test their knowledge and capacities; they can export some of the experiences to their students; they can easily set up lab experiments by using the software provided by the organizers. Moreover, the guidance of researchers render the comprehension and usage of the software much easier than trying on their own.

Finally, teachers liked very much the field and lab trips (Figure 13, Q 4) that were giving them the chance to see “researchers at work” and get the feeling about the many activities included in a research study.

In principle it can be stated that the seismology@school summer course filled a gap in the instructional system with regard to Geosciences and, in particular, seismology. In fact it offered to the teachers a chance to get a refresher course, to design laboratory activities to be proposed to their students, to get innovative software and an adequate training on how to use it and, last but not least, proved to be an unique chance for a contact between the worlds of research and schools.

As a consequence of the experience, some teachers were stimulated to further improve some of the topics treated in the courses and to find a way to be able to continue the experience. A pool of them gathered to submit a proposal to the ERASPLUS PLUS program KA2 - Cooperation and Innovation for Good Practices Action Strategic Partnerships for school education. The group was granted a funding for 95000 euros over 2 years. Most of the aims and activities in the funded project very much resemble those of the NERA NA8. In fact the project aims to develop a set of materials that are low cost and portable to help with the practical aspects of teaching seismology. This will involve the use of Raspberry Pi computers and "slinky spring" seismometers. The project will look at working with partner schools in India and in Kenya to develop their understanding of seismic risk and giving them practical tools to enable them to take seismic readings and allow them to contribute to the global schools seismic network. In detail the activities included in the program are: [1]. Development of computer software to enable Raspberry Pi computers to be used for the recording of seismic signals; [2]. Development of a reliable and robust, yet cheap and accurate seismometer ("Slinky Spring" seismometer); [3]. Collaboration between international partners to enable validation of results obtained; [4]. Opportunities for school students from participating institutions to travel and participate in the development of the project; [5]. Mobilities for the staff involved in the project. The schools involved in the proposal are the Torquay Girls' Grammar School (Torquay), the Fulneck School (Leeds), the Centre International de Valbonne (Nice) and the ITIS Ettore Majorana (Naples).

In this very case it is straightforward to estimate the impact and success of the courses. However in all other cases a few queries remain open and could be only solved by a "follow-up" project. In fact it is not possible to estimate how much of the contents of the school have been transferred by the teachers to their students or to other colleagues not attending the school and, in general, to the society. Moreover it is not possible to evaluate how much improvement in the awareness towards natural hazards (and risks) has been gained by the attendees. It would also be worth to understand if the teachers could get a more "open minded" approach towards seismological issues after understanding and acknowledging the problems deriving from the uncertainties, the inaccuracies and the variable quality of the seismological data. In this regard the "hands on" activities were certainly helping the teachers to be aware of the limits of the data in relation to the needs of the society.

Outlook and Future Plans

NERA has provided a very productive framework for networking educational seismology groups across Europe. Several positive outcomes from this project will endure and ensure that this collaboration will be maintained.

- It is intended to continue running teacher training workshops with funding from ERASMUS+ program
- One school strategic partnership (with ERASMUS+ funding) has already been created and funded as a result of NERA workshops and others are in the process of making applications

- Future co-operation between educational seismology groups is being maintained through work on seismology outreach programs associated with forthcoming Mars seismology mission in 2016
- UNESCO has funded a Global Educational Network to enable educational seismology groups across the world to affiliate and share ideas.

The outlook for educational seismology within Europe is strong, with new groups and networks starting in Portugal, Romania, Cyprus and Greece. Developments in sensor and microcomputer technology is driving a convergence with education programs in computer science and citizen science programs designed to rapidly collect large amounts of strong motion and aftershock data from areas of high seismicity.

References

- Amoroso O., Colombelli S., De Landro G., Serlenga V., Serra M., Adinolfi G.M., Bobbio A., Brondi P., Del Gaudio S., Scala A. and Zollo A. WWW.SISMOSCHOLAR.IT : web platform for sharing and management of seismic data acquired in schools and dissemination activities. XXXIV General Assembly European Seismological Commission, Istanbul 2014. 1558-1559
- Denton P. and NERA working group Software advances in educational seismology. XXXIV General Assembly European Seismological Commission, Istanbul 2014. 1550-1551
- Riccardi S., Emolo A., Colombelli S., Amoroso O. and Zollo A. Earthquake parameters determination from single station record. XXXIV General Assembly European Seismological Commission, Istanbul 2014. 1570-1571
- S. Solarino Seismograms recorded in schools: education tools or scientific data ? XXXIII General Assembly European Seismological Commission, Moscow 2012
- S. Solarino Are seismograms recorded in schools educational tools only ? Atti del 31° Convegno Nazionale GNGTS, Vol.1, 97-101. ISBN 978-88-902101-1-2 Solarino S., Denton P, Berenguer J.L., Zollo A., Sauron A. and Courboulex F. Seismology @ school training courses: when teachers become students. XXXIV General Assembly European Seismological Commission, Istanbul 2014. 1554-1555
- Zollo A., Bobbio A., Berenguer J.L., Courboulex F., Denton P., Festa G., Sauron A., Solarino S., Haslinger F. and Giardini D. The European experience of educational seismology. In Tong, V. C. H. (ed.), Geoscience Research and Outreach: Schools and Public Engagement, Springer, 145-157, 2014.