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RAISING EARTHQUAKE AWARENESS IN ROMANIA THROUGH AN EDUCATIONAL PROJECT (ROEDUSEIS)

Bogdan GRECU (1) Dragos TATARU (1) Bogdan ZAHARIA (1) Constantin IONESCU (1) Speranta TIBU (1, 2) Emil-Sever GEORGESCU (3) and Nicoleta BICAN-BRISAN (4)

(1) National Institute for Earth Physiscs, Magurele, bgrecu@infp.ro (2) Institute of Educational Sciences, Bucharest (3) National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development, Bucharest (4) Babeş-Bolyai University, Faculty of Environment Science and Engineering, Cluj

INTRODUCTION

The **Romanian Educational Seismological Network (ROEDUSEIS)**, started in 2012, is the first educational initiative in Romania in the field of seismology involving two research institutes (the ***National Institute for Earth Physics - NIEP*** as coordinator, the ***National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development*** - URBAN – INCERC, Bucharest branch), one university (the ***Babeş-Bolyai University - BBU - Faculty of Environmental Sciences and Engineering***) and one private company in software developing (***BETA Software***). Following similar initiatives already existing in western countries (France and Italy – The Educational Seismology Project, *Zollo et al., 2014*, *Berenguer et al., 2013*; UK – School Seismology Project), in USA (IRIS – Seismographs in Schools), ROEDUSEIS is focused on increasing the level of knowledge of teachers and pupils on earthquake phenomena, earthquake effects, preparedness measures and is also promoting the role of education and schools in disaster risk reduction.ROEDUSEIS project is implemented in 9 school units in different cities (**Brasov**, **Bucharest**, **Cluj**, **Constanta**, **Focsani**, **Iasi**, **Sibiu**, **Timisoara**, **Zalau**).

Figure 1. Earthquakes and their effects book covers

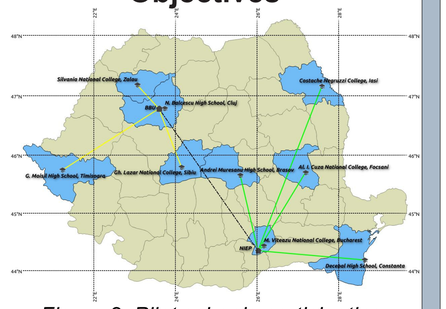

Figure 2. Pilot schools participating in the project

ROEDUSEIS NETWORK

The ROEDUSEIS seismic network was set-up by installing nine educational seismometers in the participating schools (Figure 2). Two more educational seismometers were installed in Magurele at NIEP and in Cluj at BBU. Every seismic station from each participating school contains one **SEP seismometer** and one desktop PC with **jAmaseis** (***http://www.iris.edu/hq/programs/education_and_outreach/software/jamaseis***) package software installed for data acquisition. The purpose of the educational seismic network is to:

i) train students and teachers how to make analysis and interpretation of seismological data; **ii)** make science more interesting for students; **iii)** raise awareness of geoscience as a scientific discipline for pre-university students; **iv)** reinforce and develop relationships between participating schools and research institutes; **v)** create an earthquake database this will be used by students and teachers for educational purposes.

Figure 6. SEP seismometer installed in a high-school, Costache Negruzzi National College - Iasi

Nr. Crt.	Origin time	Epicenter coordinates	Magnitude	Depth (km)	Region
1.	03.04.2014 12:38:57	45.47 N; 26.40 E	4.6	124	Vrancea, Romania
2.	29.03.2014; 19:18:05	45.61 N; 26.48 E	5.0	134	Vrancea, Romania
3.	03.02.2014; 03:08:45	38.26 N; 20.32 E	6.0	2	Greece
4.	03.02.2014; 00:26:31	45.67 N; 26.47 E	4.3	134	Vrancea, Romania
5.	26.01.2014; 13:55:43	38.19 N; 20.41 E	6.1	18	Greece
6.	23.01.2014; 06:15:05	45.42 N; 26.26 E	4.7	126	Vrancea, Romania
7.	25.10.2013; 17:10:17	37.22 N; 144.69 E	7.1	10	Off East Coast of Honshu, Japan
8.	15.10.2013; 19:33:12	45.64 N; 26.56 E	4.7	136	Vrancea, Romania
9.	06.10.2013; 01:37:21	45.64 N; 26.69 E	5.5	134	Vrancea, Romania

Table 1. Parameters of the earthquakes recorded by ROEDUSEIS network

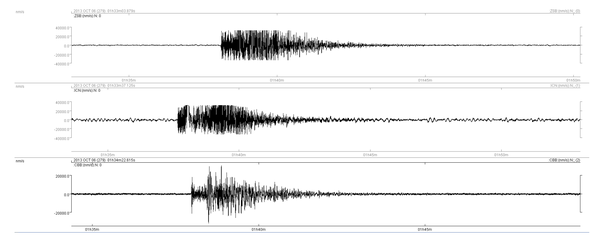

Figure 7. October 6, 2013 ML = 5.5 Vrancea earthquake recorded by ROEDUSEIS network

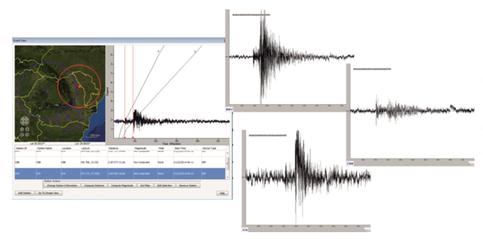

Figure 8. January 23, 2014 ML = 4.7 Vrancea earthquake recorded and located by ROEDUSEIS network

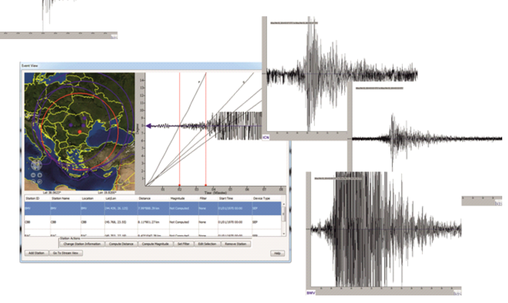

Figure 9. February 3, 2014 Mw = 6.0 regional earthquake from Greece recorded and located by ROEDUSEIS network

NEEDS ANALYSIS

The needs analysis has been carried out between **October-December 2012**, with the aim to identify the teachers` and children's opinions before starting the collaboration with the schools. At the study participated ***266 children*** aged 9-18 years and **75 teachers** from 7 counties, who filled in an online questionnaire on the earthquake theme. Results revealed that more than **60%** of the pupils participating in the survey know very little or nothing on how to behave in case an earthquake occurs, while **79%** declared that they have never participated in any activity on the earthquake theme. The interest of the children in activities on earthquakes theme is very high: **70%** of the children declared that they are willing to take part in activities on the earthquake theme if they are to be organised in schools, **95%** are interested in learning how a seismograph works and **81%** are interested din accessing an online platform offering information on the earthquakes. The educational materials developed within the project have largely integrated the suggestions outputted by this needs analysis study.

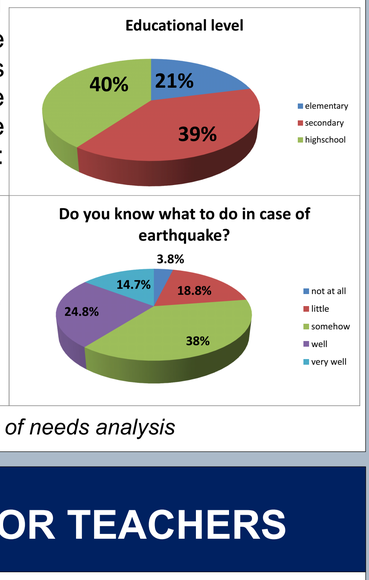

Figure 3. Results of needs analysis

E-LEARNING PLATFORM

The E-Learning platform (***http://www.roeduseis.ro***), still in development stage, includes information about the project (objectives, partners, participating schools, activities and results), offers access to the developed educational materials, integrates a tool (Forum) for interaction between the members of the consortium of the project and the members of the developed educational network and the general public and hosts specials sections where participating schools can upload materials developed within school activities (in the form of photos, videos and text). There is also a section which shows the recent earthquakes occurred in Romania and neighboring countries that is updated regularly.

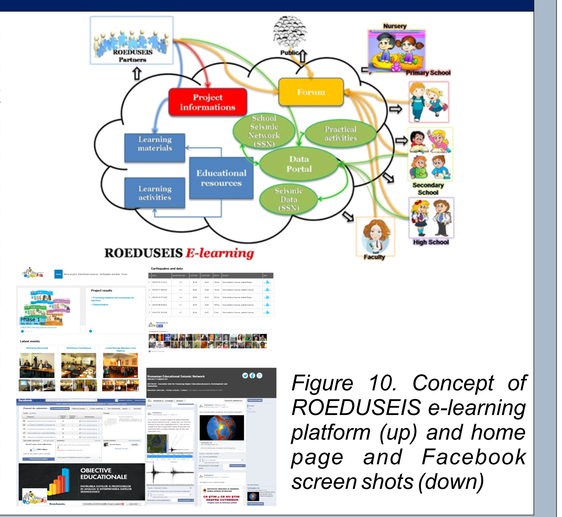

Figure 10. Concept of ROEDUSEIS e-learning platform (up) and home page and Facebook screen shots (down)

PROMOTING THE INITIATIVE AND WORKSHOPS FOR TEACHERS

During **March – April 2013** the ROEDUSEIS consortium made visits to all participating schools in the project. Throughout these visits the project and the collection of educational materials that aim to be used in school classes were presented to interested teachers and school boards.

In **summer of 2013** were organized two regional workshops in Cluj and Bucharest for the teachers from the participating schools. The purpose of the workshops was to show how Earth Science topics can be learned in schools, in other ways than the traditional ones, the workshops being more concentrated on activities and experiments and guided by the principle "**learning by doing**".

Figure 4. Presentation of the project in workshops for teachers and schools managers in each participating school

Figure 5. Training workshops for teachers in Cluj and Bucharest

CONCLUSIONS

New educational materials for kindergarten, primary, secondary and high school were developed based on the results of a needs analysis . The topics of the materials cover all the aspects related to earthquake phenomena, from defining an earthquake to prevention measures before, during and after an earthquake.

Development of the educational seismic network consisting of 9 SEP educational seismometers installed in the participating schools, one at NIEP and one at BBU in Cluj.

Very good feedback from the participant teachers to the training workshops. The positive aspects mentioned are related to: the practical activities in which they have been involved during the training, the quality of the training materials and the trainers' competence. Participants declared that they will further use the practical activities, demonstration and experiments in their daily teaching activity in science with children.

Further development of the e-learning platform: data portal for the data recorded by the ROEDUSEIS network, educational modules (courses, activities, questionnaires, games).

Recommendation for decision makers will be formulated at the end of the project and efforts will be made in order to largely disseminate the results of the project, for the benefit of the whole Romanian educational community.

ACKNOWLEDGEMENTS
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