



Project Result 3

SEISMO-Lab online platform and space for teachers

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W/P Task	2
Title	SEISMO-Lab online platform and space for teachers
Due Date	28 February 2024
Submission Date	30 November 2022
Abstract	<p>The SEISMO-Lab online platform and space for teachers has a two-fold aim: a) To install additional devices in schools all over the participating countries to expand the network of School seismometers b) To provide a common space for educators and teachers to design new projects for their labs and to exchange knowledge and ideas with teachers from other schools. In SEISMO-Lab the goal is to expand the existing network of seismic instruments placed at schools to 100 SEISMO-Lab Schools. The schools will be either equipped with low-cost seismometers (e.g., TC1 seismometer, RaspberryShake) or instructed to build home-made devices to be developed by the students (in the framework of their project work or in the framework of students' contests initiated by the project). The network will include schools from Greece, Romania, Italy, and Cyprus. During the implementation in the previous years, vast data of seismographic activities have been collected. The extended version of the existing platform will utilize this scientific material and transform it into an educational learning hub, a tool that will allow a) The integration of the existing Romanian school seismometers into the existing network of seismometers coordinated by NOA. b) Access to all data of all existing and new seismometers to all teachers and schools around the globe. c) Entry to a section with teaching resources shared by SEISMO-Lab partners and teachers of participating schools.</p> <p>Furthermore, SEISMO-Lab will facilitate the cooperation with and connection of participating schools, teachers and students to their local community by allowing them to act as hubs of education and awareness about earthquakes, through the activities and projects designed in the school labs. For this to be feasible and successful it is essential that participant schools, teachers and students will be able to easily share and visualize the data they collect with their installed devices. To achieve this in an effective, semi-automated and user-friendly way the project plans to apply a dedicated software tool/plugin that will facilitate this task. All the data collected by the foreseen installed instruments (of the order of 100 across 5 countries) will be continuously uploaded and stored in a central public data bank. The data will be available in standard seismological format (sac files) and will be freely available not only to the schools of the network but also to schools, researchers and scientists worldwide.</p>
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Reviewer(s)	
Dissemination level	<input type="checkbox"/> Internal <input checked="" type="checkbox"/> Public <input type="checkbox"/> Confidential

Table of Contents

1. Introduction	5
2. Project Network	6
3. Seismograms Database	8
4. Automatic Alerts System.....	9
5. Data Download.....	12
6. Software.....	13
7. Educational Material Space for Schools and Students	14
8. Project Results.....	15
9. Conclusions	16

1. Introduction

The Seimo-Lab online platform features a unique collection of free seismological services aimed to educate and promote seismology in schools. It is an upgrade of the earlier SNAC platform, enriched with more stations and data, with new map application programming interfaces (APIs) and with extensive educational material and examples.

2. Project Network

(<https://seismolab.gein.noa.gr/project-network/>)

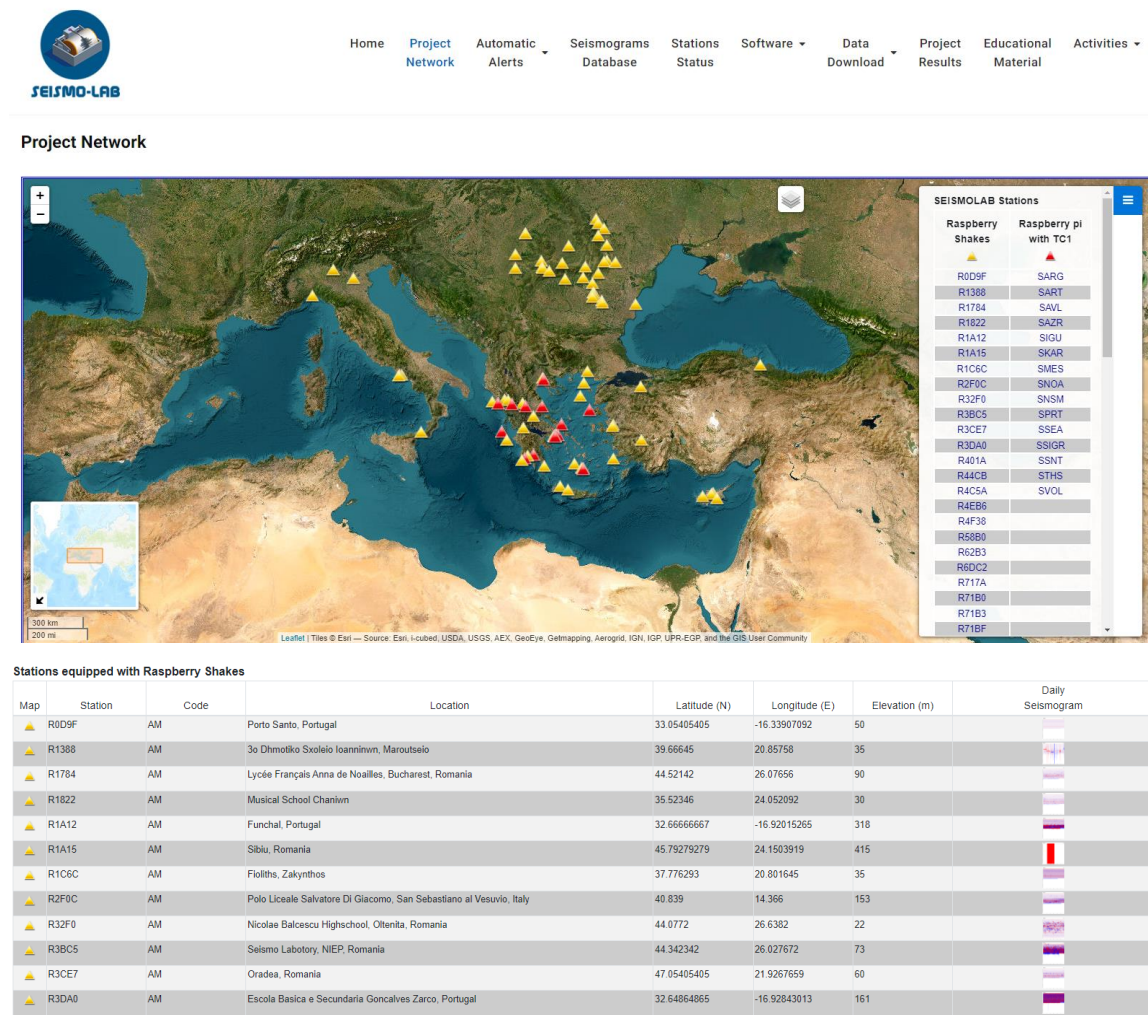


Image 1. Seismo-Lab Project Network consisting of 89 stations that by the end of the project will be 100.

The whole website has been redesigned anew and the new elaborate map API offers a clearer display of the project network. The project network includes stations from Greece, Romania, Italy, Turkey and Cyprus. Most stations are Raspberry Shake 1D and some are TC1 seismometer with Raspberry PI. More home-made seismometers, developed by schools and students are expected to be added as well.

All the school stations data are available real-time through the platform. Any seedlink client (<https://www.seiscomp.de/doc/apps/seedlink.html>) can connect to the following address:

seismolab.gein.noa.gr:18000

and freely acquire online the available platform stations.

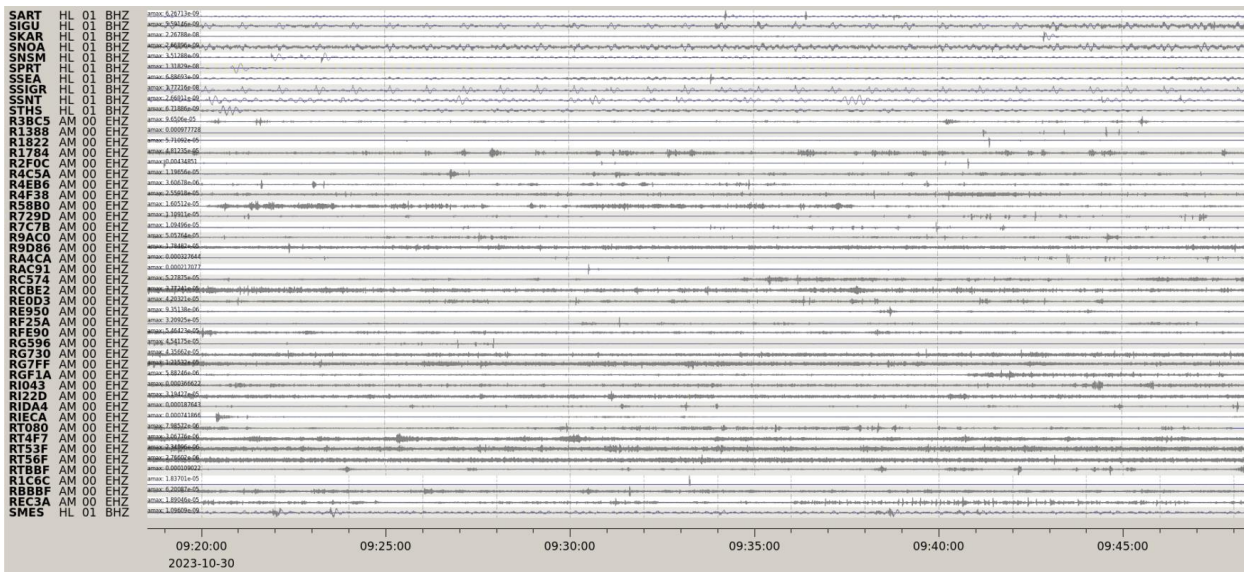


Image 2. Seismo-Lab Project Network Real-Time Data

3. Seismograms Database

(<https://seismolab.gein.noa.gr/seismograms-database/>)

A comprehensive Seismograms Database allows filtered search for all available stations and time periods.

Seismograms Database

Select Station - Date (Day/Month/Year) to view recording: SNOA, GEIN NOA Athens / 29 / 10 / 2023

Seismogram Plotting of station SNOA, GEIN NOA Athens for 29/10/2023

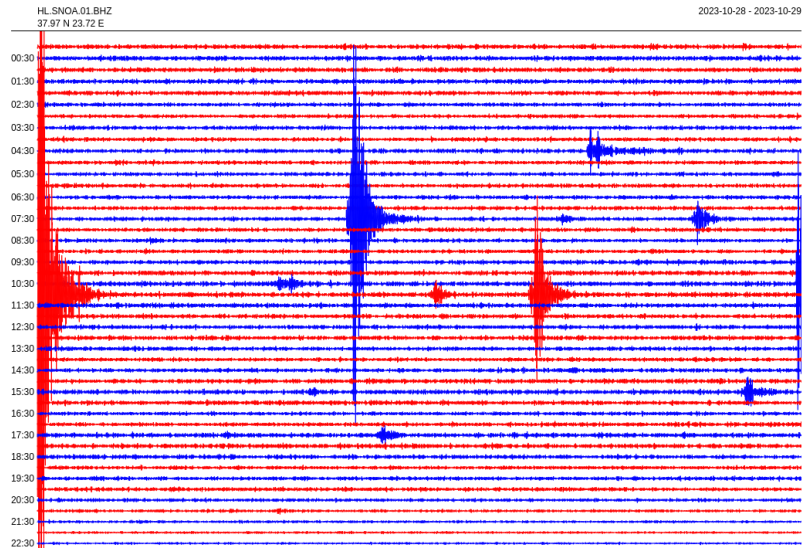
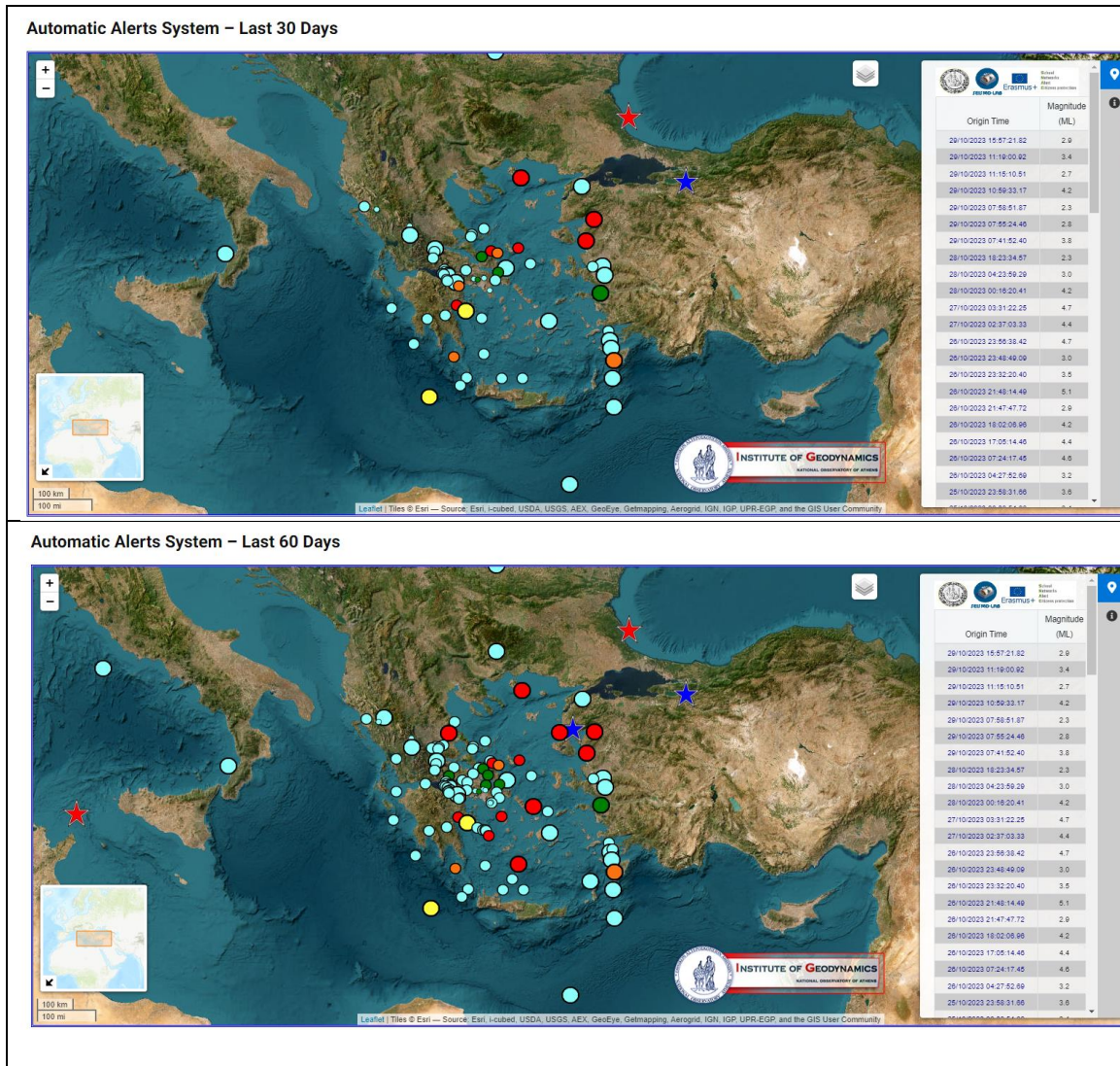


Image 3. Seismo-Lab Project Seismograms Database

4. Automatic Alerts System

(<https://seismolab.gein.noa.gr/snac-automatic-alerts-all/>)

A new Automatic Alert System API has been redesigned that shows the automatic located events by the Seismo-Lab school network, for last 30, 60, 90, 120 days and also all available events.



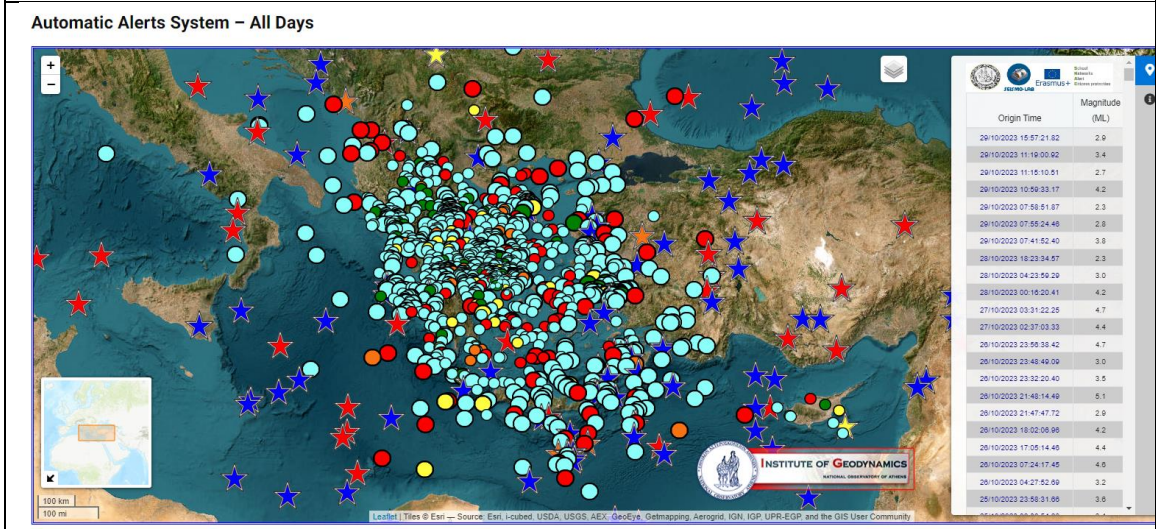
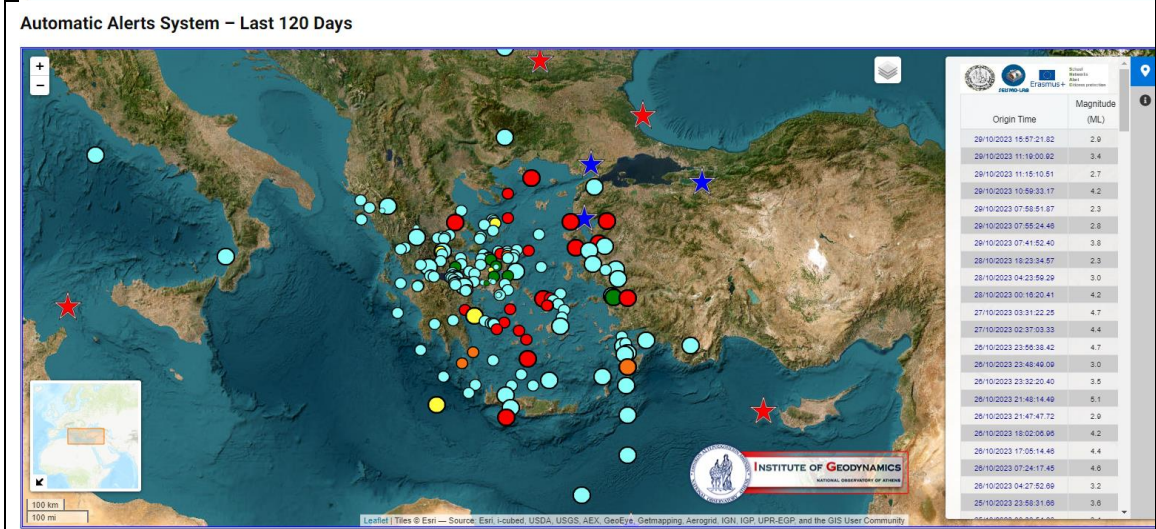
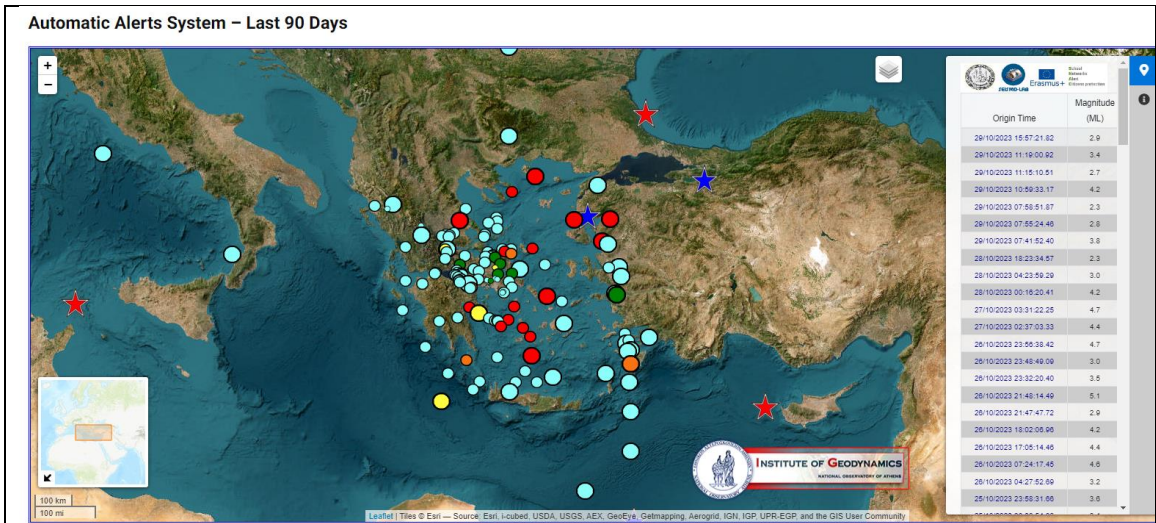


Image 4. Seismo-Lab Project Automatic Alerts

Each event can be clicked on the map and the available data can be downloaded from the contributing stations in a zipped file with the data streams in sac format.

Also, a search tool is available for more advanced queries, using the International Federation of Digital Seismograph Networks Web Services (FDSNWS) standard.

SeisComP3 FDSNWS Event - URL Builder

Time constraints	
Start Time	<input type="text"/>
End Time	<input type="text"/>
Geographic constraints	
<input type="radio"/> None	
<input type="radio"/> Bounding Box	
<input type="radio"/> Circle	
Service specific constraints	
Minimum Depth (km)	<input type="text" value="0.0"/>
Maximum Depth (km)	<input type="text" value="300.0"/>
Minimum Magnitude	<input type="text" value="2.0"/>
Maximum Magnitude	<input type="text" value="5.0"/>
Magnitude Type	<input type="text" value="M"/>
All Origins	<input type="checkbox"/>
All Magnitudes	<input type="checkbox"/>
Arrivals	<input type="checkbox"/>
Exclude Picks	<input type="checkbox"/>
Focal Mechanism	<input type="checkbox"/>
All Focal Mechanisms	<input type="checkbox"/>
MT Station Contributions	<input type="checkbox"/>
Include Comments	<input type="checkbox"/>
Event ID	<input type="text"/>
Limit	<input type="text" value="20"/>
Offset	<input type="text" value="1"/>
Order By	<input type="text" value="Time descending (default)"/>
Catalog	<input type="text"/>
Contributor	<input type="text" value="agency"/>
Update After	<input type="text"/>
Output control	
Format	<input type="text" value="QuakeML (default)"/>
Formatted	<input type="checkbox"/>
No Data 404	<input checked="" type="checkbox"/>
URL	
http://seismolab.gein.noa.gr:8080/fdsnws/event/1/query?nodata=404	

Image 5. Seismo-Lab Project Advanced Event Search using FDSNWS.

5. Data Download

(<https://seismolab.gein.noa.gr/data-search/>)

An advanced search tool is available for data queries and download using the International Federation of Digital Seismograph Networks Web Services (FDSNWS) standard.

SeisComP3 FDSNWS DataSelect - URL Builder

Time constraints	
Start Time	<input type="text"/>
End Time	<input type="text"/>
Channel constraints	
Network	<input type="text" value="AB,C?"/>
Station	<input type="text" value="ABC,D*"/>
Location	<input type="text" value="00"/>
Channel	<input type="text" value="BH?"/>
Service specific constraints	
Quality	<input type="text" value="B"/>
Minimum Length (s)	<input type="text" value="0.0"/>
Longest Only	<input type="checkbox"/>
Authentication	<input type="checkbox"/>
Output control	
Format	<input type="text" value="miniseed"/>
No Data 404	<input checked="" type="checkbox"/>
URL	
http://seismolab.gein.noa.gr:8080/fdsnws/dataselect/1/query?nodata=404	

Image 6. Seismo-Lab Project Advanced Data Search using FDSNWS.

6. Software

A selection of seismological software tools are available along with video tutorials and examples (SWARM, JAmaSeis, SeisGram2K and others). All these are free to use software that are well documented with examples, so students can use them to visualize the stations data and perform exercises.

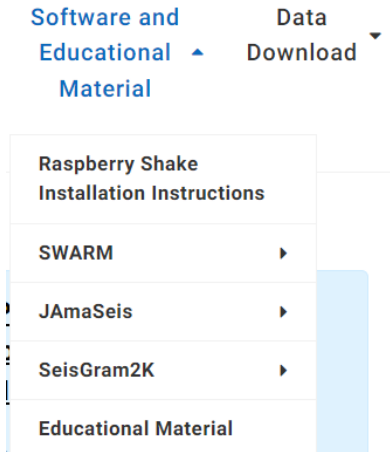


Image 7. Available software for download

7. Educational Material Space for Schools and Students

(<https://seismolab.gein.noa.gr/educational-material/>)

All the educational material along with good practices are available for students to use.

Educational Material

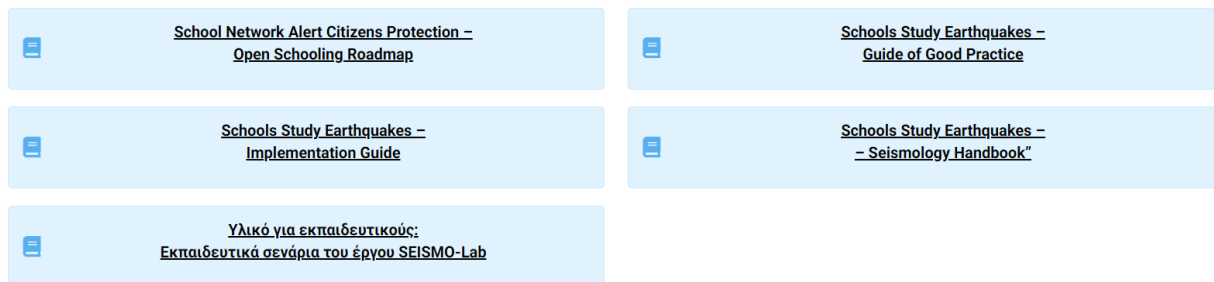


Image 7. Seismo-Lab Project Educational Material

8. Project Results

(<https://seismolab.gein.noa.gr/project-results/>)

The project results are publicly available for download.

Project Results

**PR1 –
SEISMO-Lab Framework for Establishing
STEAM School Competence Labs
(EA)**

30-10-2022

**PR2 –
SEISMO-Lab Demonstrators
(INFP)**

31-12-2022

**PR2 – GREEK
SEISMO-Lab Demonstrators**

31-12-2022

**PR2 – TURKISH
SEISMO-Lab Demonstrators**

31-12-2022

**PR2 – ROMANIAN
SEISMO-Lab Demonstrators**

31-12-2022

**PR3 – SEISMO-Lab online platform
and space for teachers**

31-12-2022

PR4 – The SEISMO-Lab Toolkit

31-10-2023

9. Conclusions

The SEISMO-Lab online platform combines a large collection of real-time and archived data from schools from several countries (Greece, Cyprus, Turkey, Italy, Romania and others) which are free to use. The data are available through the most state of the art services (SEEDLINK, FDSNWS) that ensure the quality and robustness of data. The project results, the educational material, the software and the activities that are available in the platform construct a solid framework from within the students can make their first steps in the world of seismology, get acquainted with this phenomenon and in the process of exploring it, learn valuable programming skills and understand physics better.

It must be mentioned that the platform was delivered in November 2022 to facilitate the implementation of the project which was based on the availability of the data to the school communities.