

Exploitation of Research results In School practice



Guide



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Sharing data - chasing earthquakes

Guide

“Sharing data - chasing earthquakes” is aimed at students between 13 and 15 years of age, which is to say at students in lower secondary school and at students of grades 7 and 8 of primary schools depending on the educational system of the country. Some materials from the package may be used when discussing about Earth interior, internal forces, natural disasters, seismic waves.

The package can be used during lessons following the core curriculum and also during extracurricular lesson or school trips. In the second case the teacher has more freedom in terms of the amount of time and can devote to the materials included in the package, and combine the package with other additional materials (for example, the weblink page).

Title	Sharing data - chasing earthquakes – basic package
Author	Dr. Dragos Tataru National Institute for Earth Physics, Romania
Age of students	13-15
Stage of education	Lower secondary school / grades 7-8 of primary schools
Subject	Geography, Physics, Geology
Overview of package content	
The study of earthquakes made possible to look into the deep inaccessible interior of the Earth at depths of up to thousands of kilometres, to extract information and communicate the very essence of science, raise the enthusiasm and excitement of students for scientific discoveries and show the importance of understanding the complexity of our planet. Even if, at a first glance, all behind seismology seems to be a quite complicated research, in fact, many fundamental theories and facts can be comprehended from the very first educational grades. The purpose of this package is to provide an extension to the information on Earth Science, in general, and earthquakes, in particular, subjects represented in most European schools’ curricula, at all levels. Most of the time, science teaching is done in an integrated and transdisciplinary way only in primary school; for the upper classes different subjects appear within compulsory disciplines (e.g.: geography, physics), and the educational approach most often without proper correlation with reality.	

The package is a mix of theoretical facts, practical activities (tasks to be completed by students) and interactive quizzes intended to offer students an scientific itinerary from legends to facts about Earth interior and earthquakes. Will be introduced one by one notions about seismic waves and energy, about the size and effects that some earthquakes have on the natural and built environment. Words like “destructive” and “catastrophic” are always used to describe the energy released by an earthquake. However, the Earth, with all its beautiful mountains and valleys, depends on these processes to create the landforms that we see.

The core of the package is represented by the multimedia presentation and an interactive digital application. The presentations have been created in PowerPoint and come with notes, which are supposed to help the teacher during the presentation stage. The presentations can be edited and adjusted to the interests of particular groups and their current level of knowledge. Symbols indicate the existence of additional materials or required actions.



The presentation is also accompanied by a recorded video with a running commentary provided by the author of the package. The videos can be played in class or can also be used by teachers before the lesson to help them prepare in case they prefer to deliver the presentation.

The practical part contains tasks to be completed by the students. There are either small experiments proper explained in the presentation (using common materials), worksheets delivered as ready-to-print pages in the package or interactive quiz intercalated at certain moment during the presentation, if the time and technical setup allowed (the students need to use their mobile phones connected to internet). One special task, the one that teach students how to the access and visualise freely available earthquake data, the students need to use computers and internet connection, as well as having more time to familiarize with dedicated software or online application.

Assumed educational aims

The student knows:

- About the Earth, our active planet: earthquakes, crust rupture, faults, waves propagation
- Volcanoes, Mountains, Plate tectonic
- Natural Hazards, mitigation

The student understands:

- What ancient civilizations believed to be the causes of earthquakes
- How to discover the internal structure and dynamic of the Earth by using seismology as a tool
- How complex seismic waves propagate through the Earth
- How to measure the size of an earthquake (magnitude and intensity scales)
- Concepts as: tectonic plate, plate boundaries, faults, plate interaction

The student can:

- Search for earthquakes and visualize seismic records on the web
- Observe differences between seismograms coming from the same earthquakes or between two different events

Package content

1. [Package description EQ_EN_secondary](#)
2. [EQ methodological guide_secondary.](#)
3. [Presentation „Sharing data - chasing earthquake” EQ_EN_secondary](#)
4. [Worksheet 1 Earthquake parameters](#)
5. [Worksheet 2 Earth interior_secondary](#)
6. [Evaluation file 1 Earthquake parameters_secondary](#)
7. [Evaluation file 2 Internal layers of the Earth_secondary](#)
8. [Printouts: Sheet1 & Sheet2](#)
9. Continental Drift video youtube: <https://www.youtube.com/watch?v=NS6R7nZi8nA>
10. Earthquakes causes and effects youtube: <https://www.youtube.com/watch?v=nc3yb1TKbWQ&t=26s>

Supplementary materials

- **Weblinks with resources**
 - <http://www.roeduseis.ro/category/resurse-educationale/>
 - <http://www.earthscienceeducation.com>
 - <http://www.bgs.ac.uk/discoveringGeology/hazards/earthquakes>
 - <http://www.iris.edu/hq/programs/epo/educators/>
- **Online application**
 - www.mobee.info/aplicatii
 - <http://www.roeduseis.ro/category/cutremure-si-date/>
- Link to online quiz:

<https://play.kahoot.it/#/k/1c1a092b-bc57-4f37-b034-e848fadee43a>

Lesson 1

Subject: Sharing data - chasing earthquakes

Lesson plan for “Sharing data - chasing earthquakes”

Necessary materials and equipment:

- multimedia projector, computer, loudspeakers;
- printed materials for each student:
 - Earthquake parameters - worksheet,
 - Earth interior – worksheet
 - Sheet 1 & 2 – for Earthquake and volcanoes battleship
- „traffic lights” cards;
- physical map of Europe or the world;
- mobile phone with internet connection for playing kahoot game;

Lesson aims:

General and specific aims as specified in “Sharing data - chasing earthquakes” package

Methodological suggestions:

- expository methods: lecture, talk;
- demonstration methods: presentation, video;
- activation methods: brainstorming, traffic lights;
- practical methods: worksheets
- evaluation: quiz test (paper or kahoot)

Lesson procedure:

1. Start of the lesson, administrative activities, checking the register.
2. Information (or reminder) on how to use “traffic lights” cards.
3. Introduction of the topic. The teacher asks the group following questions and moderates the brainstorm:

Question	Expected answer
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On what occasion did you get in contact or receive the information about the earthquakes?	<i>I felt an earthquake</i> <i>From the news, from school, during earthquake simulations, from a book (atlas), from parents and friends...etc</i>
Are there any earthquakes in your country? Large earthquakes?	<i>No/yes</i>
Can you tell me why earthquakes occur?	<i>Because of plate tectonic interaction.</i> <i>Because of volcanoes eruption / meteorite crash / human activities...etc</i>
What did you think you will experience/notice during an earthquake and how long it will last ?	<i>Shakings, building collapse, tree falling, animals noise</i> <i>Couple of seconds / minutes</i>

- Students will be introduced to the PowerPoint presentation content, with the mention that, as much as the time will allowed, there will be interactions and hands on activities.
- Students will be introduce to a real earthquake scenario, aiming to get their attention and project the subject in the real world.

A magnitude 7 earthquake scenario is step by step introduced to children using simple cascade images with shaking effects. Before revealing the magnitude, students are asked to estimate the size of the earthquake based on the effects described.

- Students will watch the presentation that comes with a running commentary provided by the author of the package. Throughout the duration of the presentation, the teacher should monitor to ensure that everything is clear and provide additional explanations whenever necessary.
- The interactive application “Earthquake cases and effects” introduced during the presentation could be interactively access by the students, or used as a follow up activity for a deeper understanding of the notions presented
- To conclude the lesson, the group may use the two worksheet delivered in the package or complete the evaluation tests. A possible alternative is to do the quiz in an interactive way with the help of kahoot.it.