

## Teachers' Guidelines

**Title of the package:** Ocean currents and climate change

### Information about the package

**Brief description:** The package is dedicated to the movements of ocean water. It is built in such a way that students learn about the phenomena occurring in the oceans from the most obvious to the more complex. The package includes various activities - both information provided in text form, as well as videos, graphics and animations. Thanks to the use of various games, quizzes, and activities, students are engaged at every stage. It also allows to inspire students to their own thoughts and conclusions, e.g. in the field of assessing the possibilities of developing energy based on the use of turbines powered by the movement of sea water. It also includes instructions for making your own experiments.

The package also includes references to English sources (English terms, original articles and videos), which makes it a helpful tool in bilingual education.

### How does the package relate to STEAM education:

The thematic scope of the package is focused on science and includes elements of mathematics.

In the field of science, the package covers issues related to the movement of ocean water, the formation and occurrence of ocean currents. The role of ocean currents in the natural environment was shown - in particular in relation to the climate, as well as their impact on human life. In mathematics, students can solve the problem using speed and wavelength and frequency.

**Keywords:** global ocean, tides, waves, currents

**Age:** 14-16

**Didactical hours:** 2 hours + additional time individual students spend on completing tasks and exercises (e.g. in the form of homework)

Student:

- indicates the oceans on the map and gives their names;
- explains the causes of ocean water movements;
- describes the principles of operation of sea current measuring apparatus;
- performs math operations based on speed, wavelength and frequency;
- creates interactive maps using the National Geographic MapMaker application;
- shows ocean currents on the map and knows their names;
- assesses the importance of ocean water movements in energy transfer.

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EDU-ARCTIC 2: from polar research to scientific passion – innovative nature education in Poland, Norway and Iceland receives a grant of ca. 245 000 EUR received from Iceland, Liechtenstein and Norway under EEA funds. The purpose of the EDU-ARCTIC 2 project is to: enhance the knowledge about nature, geography, natural resources, political specificities concerning polar regions and increase awareness of environmental issues and climate change, increase of interest in pursuing STEM education and careers due to enhancement of knowledge about scientific research, and their place in the modern world, familiarizing young people with scientific career opportunities; introduce innovative tools by way of an e-learning portal and effective methods of teaching science in schools

## Content of the package

Link to the package:

<https://cloud.graasp.eu/en/pages/5f842f00fe79954849bb5440/subpages/5f842f00fe79954849bb5444>

### 1. Introduction

- a. The division of the global ocean
- b. "name the frame" activity - match the names to the oceans on the map.
- c. "Tides, Ocean Currents and Waves" - a video on the movements of sea water.
- d. Activity - see the definition card.

### 2. Inquiry

- a. "What sets the water in motion - presentation
- b. Activity - read information about the two basic types of ocean currents
- c. Global thermohaline circulation
  - Map
  - Video presentation
  - Tool - causes and effects
  - Mind map
- d. Why are currents so important? - presentation
- e. How is climate change affecting ocean currents?

### 3. Research

- a. Five methods of tracking the water movement in the ocean - article
- b. Task - complete the table based on the article
- c. „Friendly floatees” –how did coincidence contribute to science

### 3. Activities

- a. Exercise - calculations based on wavelength, wavelength and frequency
- b. National Geographic MapMaker interactive tool
- c. Sea currents - rebuses
- d. Film - demonstration of an experiment on the mixing of hot and cold currents
- e. Description of the experiment - how the thermohaline circulation works
- f. Game - Go with the flow

### 4. Ideas

- a. Energy of sea currents
- b. Drawing - diagram of the turbine
- c. Advantages and disadvantages of using ocean currents as an energy source

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## 5. Wrap-up

- Where do ocean currents come from and what is their role? - "fill the gaps" activity.
- Activity "True or false?" – which current am I?
- Answer the questions.

### Additional resources, links and references:

#### 1. Polarpedia definition:

Ocean current <https://polarpedia.eu/en/ocean-current/>

Gyre <https://polarpedia.eu/en/gyre/>

#### 2. Videos:

*Learn about Tides, Ocean Currents and Waves*

[https://www.youtube.com/watch?v=l1WF8b6HZLM&feature=emb\\_logo](https://www.youtube.com/watch?v=l1WF8b6HZLM&feature=emb_logo)

*Scientists Explore Ocean Currents Through Supercomputer Simulations*

[https://www.youtube.com/watch?v=0PiCPbrXmis&feature=emb\\_logo](https://www.youtube.com/watch?v=0PiCPbrXmis&feature=emb_logo)

*Warm and cold currents - demonstration*

[https://www.youtube.com/watch?v=A2nEh0Zlqo8&feature=emb\\_logo](https://www.youtube.com/watch?v=A2nEh0Zlqo8&feature=emb_logo)

#### 3. Additional materials:

“Five Methods for Tracking the Ocean's Motion”

<https://ocean.si.edu/conservation/gulf-oil-spill/five-methods-tracking-oceans-motion>

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