

## Integrating Activities for Advanced Communities



### D7.6 – List of conducted online lessons

Project No.871120– INTERACT

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Lead partner for deliverable: IG-PAS

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the Consortium (including the Commission Services)	
CO	Confidential, only for members of the Consortium (including the Commission Services)	

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## Publishable Executive Summary

The current report pertains to the Deliverable D7.6 List of conducted online lessons. The report concerns Task 7.4 Online lessons for secondary schools, described in the Annex 1 PART A of the EC/REA GA, within WP7: Preparing for a future world: improving education and awareness at all societal levels.

The report presents general overview of conducted lessons: thematic areas, number of conducted lessons. General information on the purpose of the online lessons, their topics and overall number of participants are described.

The main body of this report contains a list of conducted online lessons – with teaser description, name of the person conducting the lesson, date and the link to the recording (when available). There were 70 lessons in total, conducted mainly in English (49) and some in Polish (21) with 176 participating groups (schools).

Report also provides information of the promotion of the lessons and means of communication with teachers.

The main conclusions from implementation of this activity are included, and recommendations on conducting the online lessons from pedagogical, organisational and technical points of view are provided.

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## 1. General information on the online lessons

### **1.1. Introduction**

Webinars for schools are a tool, which helps to establish strong links between the research and education communities by connecting – even in real time – schools to scientists working in various places in the world. Online lessons conducted by researchers allow to inspire students to engage in the learning process and to better understand the role of scientific research in the modern world, scientific messages and scientific language. They may help to increase their knowledge about nature, geography, natural resources, and social sciences and to raise awareness about environmental issues and climate change. They may also encourage young people to choose STEM careers, so crucial for the development of knowledge-based societies.

The range of research topics of online lessons delivered within INTERACT was wide and covered environmental sciences, geography, geomorphology, climatology, climate change, atmospheric chemistry and physics, hydrology, ecology, microbiology, marine biology, biodiversity, zoology, and terrestrial biology. Topics of online lessons were generally related to polar or subpolar areas and their natural conditions, some polar stations (mainly Polish Polar Station Hornsund in Svalbard and NIBIO-Svanhovd station in Norway) and the research carried out there.

INTERACT online lessons started on **5<sup>th</sup> October 2022** (first lesson) and lasted till **5<sup>th</sup> December 2023** (last lesson). In total **70** lessons were offered and 176 groups participated.

### **1.2. Participants**

The INTERACT online lessons were offered to STEM teachers and educators registered in the EDU-ARCTIC project (in total 2502 teachers from 70 countries). EDU-ARCTIC was an European project funded by the EC within Horizon 2020 Programme and implemented in 2016-2019. EDU-ARCTIC offered online lessons from polar stations participating in the project. Due to the big interest of teachers and educators from many countries, the INTERACT Consortium agreed to offer a new set of lessons for this community of teachers.

The map below presents the countries of origin of the registered teachers.



### **1.3. Technical information**

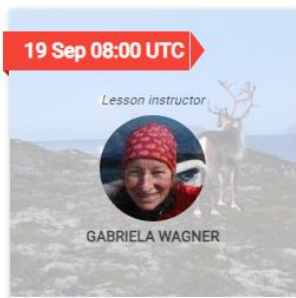

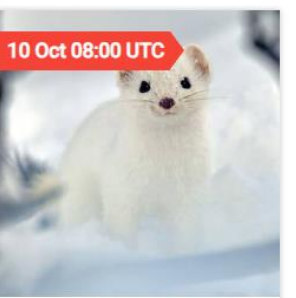

Online lessons were conducted with the use of a special teleconference tool (CISCO WEBEX), which enables simultaneous participation of many groups in each webinar. The webinars were conducted in English and some of them in Polish. Lessons were hosted by a technical assistant, who ensured the uninterrupted transmission, managed chat box, assisted teachers and lecturer, and was resolving technical issues.

Lessons were not limited to lectures, instead, they were enriched with multimedia materials – videos, infographics, figures. To some extent presenters used additional activities like worksheets for students, quizzes etc.

### **1.4. Promotion of lessons**

Lessons were announced in advance on the EDU-ARCTIC online portal in a calendar with links to brief teaser texts with photos, linking further to a page giving more detailed information about the lesson as well as the option to enrol. The lessons were also widely disseminated (mainly via newsletters sent to registered teachers).

An example of how lessons were presented in the EDU-ARCTIC online portal:

 <p><b>19 Sep 08:00 UTC</b></p> <p>Lesson instructor GABRIELA WAGNER</p> <p><b>INTERACT: CAN THE...</b></p> <p>Reindeer are incredibly adapted to withstand snow and cold. They dig through... and find enough food to survive long winters. Even though they dig through... form thick ice crusts that the reindeer cannot dig through. Summers are also getting...</p> <p><b>Available places: 96</b></p>	 <p><b>27 Sep 08:00 UTC</b></p> <p><b>INTERACT: Why is pe...</b></p> <p>You will learn what permafrost is and where it occurs. Next, we will dive into the topic of thawing permafrost and how it affects climate and finally we will find the answer: why is thawing permafrost dangerous? This lessons will help to understand permafrost related processes.</p>	 <p><b>10 Oct 08:00 UTC</b></p> <p><b>INTERACT: SURVIVI...</b></p> <p>Have you always wondered how animals can live and even thrive in the extreme climates of the Arctic? If they freeze and feel miserable during winter, or if they actually feel as comfortable as we do in our own living-room? In this webinar, you will get the answers, and learn about the...</p>	 <p><b>24 Oct 08:00 UTC</b></p> <p><b>INTERACT: WHAT O...</b></p> <p>About half of your body consists of microbiota, which are bacteria, protists, viruses, and fungi! They are crucial to life - even in the Arctic! In this webinar you will learn how the microorganisms affect immunity, hormones and even the behaviour of animals. We will use fish as our main stu...</p>
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In total 13 newsletters promoting the online lessons were sent to teachers (27.09.2022; 2.11.2022; 05.12.2022; 03.01.2023; 1.02.2023; 07.03.2023; 05.04.2023; 4.05.2023; 12.06.2023; 05.09.2023; 10.2023, 11.2023, 30.11.2023).

An example of newsletter promoting the online lessons:

Dear Teachers!

Be invited to the online lessons about the Arctic and polar research.

Find out the educational offer in December:

6 Dec at 8 UTC: [Polar bear - the king of the Arctic](#)

7 Dec at 9 UTC: [the Unknown world beneath our feet](#)

9 Dec at 8 UTC: [Written in the Arctic: paleoclimatology](#)



Additionally, lessons were announced and promoted on the Facebook fanpage of IG PAS and EDU-ARCTIC2. Moreover, invitation for the lessons was also spread during various educational events and conferences. INTERACT educational resources and lessons were presented at the 4<sup>th</sup> Scientix International Conference, which took place online on 18 and 19 November 2022. The conference provided an overview of the challenges and opportunities in science education in Europe and highlighted the potential and possibilities that the Scientix community can bring about. Around 1.200 teachers, educators, policymakers, science education researchers, STEM professionals, industry representatives, and project managers attended the conference, which featured 32 parallel talks on several STEM topics, 15 STEM projects presented in plenary sessions (with INTERACT among them) and several keynote speeches.

## 2. List of online lessons

70 INTERACT online lessons were offered to schools: 49 in English and 21 in Polish.

### 2.1. Online lessons in English

<b>TITLE: IS LIFE BELOW WATER THREATENED BY INVASIVE FISH?</b>	
<b>SHORT DESCRIPTION:</b> What happens in a river when a new fish species arrives that does not belong there? In this lesson, you will learn how an invasive fish species in the Arctic can impact their environments, other species, and the economy. You will also get an introduction to animal invasions in general, and learn why with climate change, we expect the number of invasive species to grow.	
<b>PRESENTER: Cornelya Klutsch, NIBIO</b>	<b>DATE: 12 Oct 2022 08:00</b>
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/xD7-0clKIB0?si=YJtuZXb3c3XMGJVE">https://youtu.be/xD7-0clKIB0?si=YJtuZXb3c3XMGJVE</a>	

<b>TITLE: Ocean currents and climate</b>	
<b>SHORT DESCRIPTION:</b> Learn all about the most spectacular dance of water on our planet. Did you know, it all starts in the Arctic? No matter where you live: they affect your life every day! Learn how currents are formed, how do they work, where are they, what is their role, how they influence our lives and what is their relation with climate.	
<b>PRESENTER: Anna Wielgopolan, IG-PAS</b>	<b>DATE: 18 Oct 2022 08:00</b>

<b>TITLE: Stories of sea ice</b>	
<b>SHORT DESCRIPTION:</b> How is sea ice different from an iceberg? How does sea ice extent change over the seasons and over the years? What is the Arctic amplification? How does this affect the Earth's climate? We will answer these and similar questions during the lesson.	
<b>PRESENTER: Agata Goździk, IG-PAS</b>	<b>DATE: 26 Oct 2022 07:00</b>
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/OTWkfxdJNiM?si=OM9M7_u2qY7kzKPU">https://youtu.be/OTWkfxdJNiM?si=OM9M7_u2qY7kzKPU</a>	

<b>TITLE: Plants adaptations to the Arctic climate</b>	
<b>SHORT DESCRIPTION:</b> Be invited for classes about Arctic plants adaptations! On the one hand, the term "flora" in polar regions might sound a little bit confusing. Let's see how the Arctic plants cope with Arctic conditions!	
<b>PRESENTER:</b> Dagmara Bożek, IG-PAS	<b>DATE:</b> 28 Oct 2022 07:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/SRZEXqfaMHw?si=jXXxdsssQ-8WnbCV">https://youtu.be/SRZEXqfaMHw?si=jXXxdsssQ-8WnbCV</a>	

<b>TITLE: HELP FROM NEW BIOTECHNOLOGY</b>	
<b>SHORT DESCRIPTION:</b> Genetics is the study of the genes and traits that children inherit from their parents. Recent biotechnology has opened new ways to study this in great detail even for wild animals and fish. In this webinar, you will learn how genetics and genomics can be used to study the impacts of human activities on wildlife populations, particularly in the very north.	
<b>PRESENTER:</b> Cornelya Klutsch, NIBIO	<b>DATE:</b> 02 Nov 2022 09:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/Vz1Ev3l6Uzk?si=Xtg7WHuTMMqQMLwG">https://youtu.be/Vz1Ev3l6Uzk?si=Xtg7WHuTMMqQMLwG</a>	

<b>TITLE: Written in the Arctic: paleoclimatology</b>	
<b>SHORT DESCRIPTION:</b> What is paleoclimatology, what are archives and proxies? Has climate change occurred in the past and how do we know it? How do scientists interpret natural records? What kind of history records can be found in the Arctic, and not only there? Do we owe "Frankenstein" to a volcano eruption?	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 04 Nov 2022 09:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/-ddRJg92WQs?si=OHrbHeYoR6h2iqzS">https://youtu.be/-ddRJg92WQs?si=OHrbHeYoR6h2iqzS</a>	

<b>TITLE: The life of glaciers</b>	
<b>SHORT DESCRIPTION:</b> There are about 200,000 glaciers in the world. They can be as tiny as a football pitch or as big as half a country. They can transform the landscape, control climate, supply freshwater, be the place of living. In this lesson, you will learn about glacier's life cycle and life blooming in and on the glaciers.	
<b>PRESENTER:</b> Bartłomiej Luks, IG-PAS	<b>DATE:</b> 07 Nov 2022 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/N7G81EMTKv0?si=e6AFMTDVI6BJDVme">https://youtu.be/N7G81EMTKv0?si=e6AFMTDVI6BJDVme</a>	

<b>TITLE: Northern lights</b>	
<b>SHORT DESCRIPTION:</b> Northern lights are a phenomenon that has fascinated people for centuries. <b>Colourful</b> lights illuminating the night sky have already been observed in ancient China or in Greece. Meanwhile, in the 21st century the northern lights are a well-known phenomenon. We can explain the mechanisms that control it. We conduct regular observations and measurements from both the earth and the space. We have mathematical models that help us predict when and where the aurora will appear. What is and how is this phenomenon formed?	
<b>PRESENTER:</b> Agata Goździk, IG-PAS	<b>DATE:</b> 10 Nov 2022 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/LtPR8Fnhvbg?si=hFXKsvdYftfa9R0f">https://youtu.be/LtPR8Fnhvbg?si=hFXKsvdYftfa9R0f</a>	



<b>TITLE: WHAT ON EARTH IS MICROBIOTA?</b>	
<b>SHORT DESCRIPTION:</b> About half of your body consists of microbiota, which are bacteria, protists, viruses, and fungi! They are crucial to life - even in the Arctic! In this webinar you will learn how the microorganisms affect immunity, hormones and even the behaviour of animals. We will use fish as our main study object. Because fish and many mammals like humans are not that different after all (we all came from a fishlike ancestor), you will learn about yourself too.	
<b>PRESENTER: Cornelya Klutsch, NIBIO</b>	<b>DATE:</b> 16 Nov 2022 09:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/YMjXZ8kODMk?si=f9eL3SQFzEhp8-t-">https://youtu.be/YMjXZ8kODMk?si=f9eL3SQFzEhp8-t-</a>	

<b>TITLE: Plankton in the Arctic</b>	
<b>SHORT DESCRIPTION:</b> The smallest animal organisms that are hard to observe with the bare eyes - or the most important organisms in the Arctic? Unable to resist the movement of the water in which they live, or participants in the greatest migration on the planet? Discover the secrets of the Arctic Plankton!	
<b>PRESENTER: Anna Wielgopolan, IG-PAS</b>	<b>DATE:</b> 18 Nov 2022 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/DhQZgsXNNzY?si=g-sRs0K6hhC0ci99">https://youtu.be/DhQZgsXNNzY?si=g-sRs0K6hhC0ci99</a>	

<b>TITLE: Comparison of Arctic and Antarctic Fauna</b>	
<b>SHORT DESCRIPTION:</b> What polar regions of the Earth have in common? What are the weather and climate like in the far South and North? What type of fauna can we observe in the coldest places of our planet? Be invited for the classes about the animals of polar regions! We prepared for you a lot of engaging activities and facts!	
<b>PRESENTER: Dagmara Bożek, IG-PAS</b>	<b>DATE:</b> 29 Nov 2022 10:00

<b>TITLE: THE UNKNOWN WORLD BENEATH OUR FEET</b>	
<b>SHORT DESCRIPTION:</b> Did you know that one quarter of all species are found in soil? Although soil organisms make up a large proportion of global biodiversity, we do not know much about these species and their ecological functions. Enrol in this webinar to learn about some soil species, particularly in the Arctic, and how scientists try to find more about them as well as what you can do to have healthy soils.	
<b>PRESENTER: Cornelya Klutsch, NIBIO</b>	<b>DATE:</b> 07 Dec 2022 09:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/1Q2H1N7qGDY?si=Qk8cXiKfhrnGFfjw">https://youtu.be/1Q2H1N7qGDY?si=Qk8cXiKfhrnGFfjw</a>	

<b>TITLE: Polar bear - the king of the Arctic</b>	
<b>SHORT DESCRIPTION:</b> When we are thinking of the northernmost region of Earth - the Arctic - what comes to our mind first? Of course, polar bears! Those animals have high adaptive capacity to the unfriendly, Arctic climate, and every meeting with them is an unforgettable experience.	
<b>PRESENTER: Dagmara Bożek, IG-PAS</b>	<b>DATE:</b> 09 Dec 2022 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/LjJcNuFccQ?si=FUT7Aq3Me-rr1k2T">https://youtu.be/LjJcNuFccQ?si=FUT7Aq3Me-rr1k2T</a>	

<b>TITLE: Written in the Arctic: paleoclimatology</b>	
<b>SHORT DESCRIPTION:</b> What is paleoclimatology, what are archives and proxies? Has climate change occurred in the past and how do we know it? How do scientists interpret natural records? What kind of history records can be found in the Arctic, and not only there? Do we owe "Frankenstein" to a volcano eruption?	
<b>PRESENTER: Anna Wielgopolan, IG-PAS</b>	<b>DATE:</b> 09 Dec 2022 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/-ddRjg92WQs?si=qa1IE4YA60r2QZVp">https://youtu.be/-ddRjg92WQs?si=qa1IE4YA60r2QZVp</a>	

<b>TITLE: Air pollution in polar regions</b>	
<b>SHORT DESCRIPTION:</b> This lesson is focused on the problem of air quality in polar regions. It explains how to define air pollution, presents main air pollutants, their local sources and the problems that they cause in polar environments.	
<b>PRESENTER: Daniel Kępski, IG-PAS</b>	<b>DATE:</b> 15 Dec 2022 09:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/oz7ms1eoHHI?si=1HwOOPPcMoZgiV_M">https://youtu.be/oz7ms1eoHHI?si=1HwOOPPcMoZgiV_M</a>	

<b>TITLE: Ocean currents and climate</b>	
<b>SHORT DESCRIPTION:</b> Learn all about the most spectacular dance of water on our planet. Did you know, it all starts in the Arctic? No matter where you live: they affect your life every day! Learn how currents are formed, how do they work, where are they, what is their role, how they influence our lives and what is their relation with climate.	
<b>PRESENTER: Anna Wielgopolan, IG-PAS</b>	<b>DATE:</b> 16 Dec 2022 08:00

<b>TITLE: Snow in the Arctic ecosystem</b>	
<b>SHORT DESCRIPTION:</b> How does snow form? Is Arctic snow different from that of the lower latitudes? How do researchers study snow and why? What is the impact of snow cover on vegetation and the inanimate environment? What lives in the snow? During the classes you will find answers to aforementioned questions!	
<b>PRESENTER: Daniel Kępski, IG-PAS</b>	<b>DATE:</b> 12 Jan 2023 10:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/kZ78xCw1ZYM?si=USO3P4BD7Uwd2JS-">https://youtu.be/kZ78xCw1ZYM?si=USO3P4BD7Uwd2JS-</a>	

<b>TITLE: Is it time to build a new Noah's Arc? A few facts about global sea level rise</b>	
<b>SHORT DESCRIPTION:</b> A dramatic account of an ancient flood can be found not only in Bible, but also folklore and myths all over the world. Today, sea level rise – along with its catastrophic impact on islands and coastal cities – is listed among the most serious consequences of ongoing climate change. What does it really mean, though, and what processes bring it about? To say that it's because the ice in the Arctic is melting is a gross oversimplification. Let's explain these phenomena.	
<b>PRESENTER: Anna Wielgopolan, IG-PAS</b>	<b>DATE:</b> 13 Jan 2023 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/wt9O7WVzIHY?si=tS2l8zkBpBs_CBFc">https://youtu.be/wt9O7WVzIHY?si=tS2l8zkBpBs_CBFc</a>	

<b>TITLE: Polar illusion - sneaking through nature's tricks</b>	
<b>SHORT DESCRIPTION:</b> Polar regions hold many mysteries, including some of the last places on Earth yet to be reached by man. Scientists do their best to see the invisible, without being led astray by appearances, which tend to be particularly deceptive in ice-covered lands. Extraordinary polar conditions favour illusion, which tricked the Vikings and even today – initially at least – might make us think of aliens. As usual, however, bewildering though they are, the phenomena can all be explained by science.	
<b>PRESENTER: Anna Wielgopalan, IG-PAS</b>	<b>DATE:</b> 20 Jan 2023 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/8oNECeBJVM4?si=9V9z3XkrhztvhrZw">https://youtu.be/8oNECeBJVM4?si=9V9z3XkrhztvhrZw</a>	

<b>TITLE: Plastic in the Arctic</b>	
<b>SHORT DESCRIPTION:</b> Plastic found in the Arctic is a global problem – the tip of the iceberg. It is a result not only of the production and industry development but of our daily life habits as well. The plastic waste and more dangerous microplastic are found everywhere: in the oceans, ice, animals' stomachs or even snow.	
<b>PRESENTER: Dagmara Bożek, IG-PAS</b>	<b>DATE:</b> 26 Jan 2023 08:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/9WZz9yb4MuE?si=Nd_VFs-NgX4FJjCC">https://youtu.be/9WZz9yb4MuE?si=Nd_VFs-NgX4FJjCC</a>	

<b>TITLE: Svalbard</b>	
<b>SHORT DESCRIPTION:</b> Svalbard is an archipelago halfway between Norway and the North Pole. It is the northernmost year-round populated place on Earth. Learn about the nature, landscape, and settlements of these remote islands of the High Arctic.	
<b>PRESENTER: Tomasz Wawrzyniak, IG-PAS</b>	<b>DATE:</b> 08 Feb 2023 09:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/SW2ZiK4-Do4?si=4XpTEjNKo3pEAZcP">https://youtu.be/SW2ZiK4-Do4?si=4XpTEjNKo3pEAZcP</a>	

<b>TITLE: IS LIFE BELOW WATER THREATENED BY INVASIVE FISH?</b>	
<b>SHORT DESCRIPTION:</b> What happens in a river when a new fish species arrives that does not belong there? In this lesson, you will learn how an invasive fish species in the Arctic can impact their environments, other species, and the economy. You will also get an introduction to animal invasions in general, and learn why with climate change, we expect the number of invasive species to grow.	
<b>PRESENTER: Cornelya Klutsch, NIBIO</b>	<b>DATE:</b> 14 Feb 2023 09:00
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/mZNBjKS4QBg?si=dx-VcwNjqfdqKib2">https://youtu.be/mZNBjKS4QBg?si=dx-VcwNjqfdqKib2</a>	

<b>TITLE: Is it time to build a new Noah's Arc? A few facts about global sea level rise</b>	
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phenomena.	
<b>PRESENTER: Anna Wielgopolan, IG-PAS</b>	<b>DATE: 17 Feb 2023 09:30</b>
<b>LINK TO THE RECORDING: <a href="https://youtu.be/wt9O7WVzIHY?si=kz6dD1SUryYJgz1B">https://youtu.be/wt9O7WVzIHY?si=kz6dD1SUryYJgz1B</a></b>	

<b>TITLE: Surviving the Arctic</b>	
<b>SHORT DESCRIPTION:</b> Living in cold environment is a challenge, that's why some plants create a few ways of adaptation to the Arctic climate. How high are trees in Arctic forests or how many colours does tundra have in the summer?	
<b>PRESENTER: Dagmara Bożek, IG-PAS</b>	<b>DATE: 22 Feb 2023 10:00</b>
<b>LINK TO THE RECORDING: <a href="https://youtu.be/F7eBsmTFEeY?si=5AGb_ZGSasPOiPKB">https://youtu.be/F7eBsmTFEeY?si=5AGb_ZGSasPOiPKB</a></b>	

<b>TITLE: Arctic hydrology</b>	
<b>SHORT DESCRIPTION:</b> Water in the Arctic that either fell as rain or melted from snow and ice, flows via different paths before reaching the ocean. Runoff regime and hydrological processes shape the landscape and influence dynamics of glaciers. Glaciers have complicated drainage systems - meltwater can flow on the surface of glacier (supraglacially), within glacier in tunnels (englacially), or drain to the glacier base through moulins and flow along or within the bed (subglacially).	
<b>PRESENTER: Tomasz Wawrzyniak, IG-PAS</b>	<b>DATE: 15 Mar 2023 10:00</b>
<b>LINK TO THE RECORDING: <a href="https://youtu.be/LxYlvGDRsul?si=ItKOHmVDq0dFbDdS">https://youtu.be/LxYlvGDRsul?si=ItKOHmVDq0dFbDdS</a></b>	

<b>TITLE: How do humans (including polar researchers) cope with cold</b>	
<b>SHORT DESCRIPTION:</b> Changes in the intensity of abiotic factors affect the functioning of organisms and determine their occurrence in a given environment. If these changes are within the range of ecological tolerance, adaptive capacity will allow the organism to adapt and survive. If these changes are outside the range of ecological tolerance, the organism perishes, and humans are no exceptions. How to cope with unfavourable temperature?	
<b>PRESENTER: Anna Wielgopolan, IG-PAS</b>	<b>DATE: 17 Mar 2023 09:30</b>
<b>LINK TO THE RECORDING: <a href="https://youtu.be/KgipiUmfPk4?si=Vxcv0MVMliwPsE1Z">https://youtu.be/KgipiUmfPk4?si=Vxcv0MVMliwPsE1Z</a></b>	

<b>TITLE: Plants adaptations to the Arctic climate</b>	
<b>SHORT DESCRIPTION:</b> Be invited for classes about Arctic plants adaptations! On the one hand, the term "flora" in polar regions might sound a little bit confusing. Let's see how the Arctic plants cope with Arctic conditions!	
<b>PRESENTER: Dagmara Bożek, IG-PAS</b>	<b>DATE: 28 Mar 2023 09:30</b>
<b>LINK TO THE RECORDING: <a href="https://youtu.be/SRZEXqfaMHw?si=7gJr5_gTe6eN9cjP">https://youtu.be/SRZEXqfaMHw?si=7gJr5_gTe6eN9cjP</a></b>	

<b>TITLE: Climate of Svalbard</b>	
<b>SHORT DESCRIPTION:</b> Svalbard archipelago, a high Arctic region is undergoing rapid climate	

change. At the Polish Polar Station Hornsund over the last 40 years temperatures have increased by 4.5 degrees Celsius - six times above average global warming. The increasing air temperatures go hand-in-hand with the decline of the Arctic sea-ice extent. Learn more about climate of Svalbard from this lesson.

**PRESENTER:** Tomasz Wawrzyniak, IG-PAS

**DATE:** 14 Apr 2023 11:00

**LINK TO THE RECORDING:** [https://youtu.be/Z-ZHm8W6dGo?si=R3se\\_7jADL0PeT5q](https://youtu.be/Z-ZHm8W6dGo?si=R3se_7jADL0PeT5q)

#### **TITLE: HELP FROM NEW BIOTECHNOLOGY**

**SHORT DESCRIPTION:** Genetics is the study of the genes and traits that children inherit from their parents. Recent biotechnology has opened new ways to study this in great detail even for wild animals and fish. In this webinar, you will learn how genetics and genomics can be used to study the impacts of human activities on wildlife populations, particularly in the very north.

**PRESENTER:** Cornelya Klutsch, NIBIO

**DATE:** 18 Apr 2023 09:00

**LINK TO THE RECORDING:** <https://youtu.be/Vz1Ev3l6Uzk?si=KHbCFR2K05y3PqYP>

#### **TITLE: SURVIVING IN A FREEZER - HOW DO ARCTIC ANIMALS DO IT?**

**SHORT DESCRIPTION:** Have you always wondered how animals can live and even thrive in the extreme climates of the Arctic? If they freeze and feel miserable during winter, or if they actually feel as comfortable as we do in our own living-room? In this webinar, you will get the answers, and learn about the amazing and sometimes odd ways Arctic animals have adapted to living a life at the extreme.

**PRESENTER:** Jo Jorem Aarseth, NIBIO

**DATE:** 20 Apr 2023 09:00

**LINK TO THE RECORDING:** <https://youtu.be/slehVXZMycl?si=ZnsVN9osKDeqjvlw>

#### **TITLE: Climate of Svalbard**

**SHORT DESCRIPTION:** Svalbard archipelago, a high Arctic region is undergoing rapid climate change. At the Polish Polar Station Hornsund over the last 40 years temperatures have increased by 4.5 degrees Celsius - six times above average global warming. The increasing air temperatures go hand-in-hand with the decline of the Arctic sea-ice extent. Learn more about climate of Svalbard from this lesson.

**PRESENTER:** Tomasz Wawrzyniak, IG-PAS

**DATE:** 21 Apr 2023 11:20

**LINK TO THE RECORDING:** <https://youtu.be/Z-ZHm8W6dGo?si=vWlYyDtx0lyjsqO->

#### **TITLE: LIFE AND ORIGIN OF SLED DOGS**

**SHORT DESCRIPTION:** Polar dogs look more like wolves than any other breed – but are they really closer to their ancestors? Why are they not bothered by cold? How can they run, run, run for miles on end and how did they help humans to settle in the Arctic? Is climate change a threat for sled dogs? Join us to find the answers!

**PRESENTER:** Gabriela Wagner, NIBIO

**DATE:** 25 Apr 2023 08:00

<b>TITLE: Glaciers and glacial landforms</b>	
<b>SHORT DESCRIPTION:</b> You often hear that with the global warming, the glaciers are melting. But have you wondered what the glaciers are and how are they formed? Did you know that there are several types of glaciers and they do grow larger and become shorter from time to time? And that the glaciers shape and form many different types of landforms on the Earth. Join us in this lecture to learn all about it!	
<b>PRESENTER: Dhruv Maniktala, IG-PAS</b>	<b>DATE: 12 May 2023 11:00</b>
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/DQe9bOXerYo?si=sJTUjPTSNdAcQdK">https://youtu.be/DQe9bOXerYo?si=sJTUjPTSNdAcQdK</a>	

<b>TITLE: Northern lights</b>	
<b>SHORT DESCRIPTION:</b> Northern lights are a phenomenon that has fascinated people for centuries. Colourful lights illuminating the night sky have already been observed in ancient China or in Greece. Meanwhile, in the 21st century the northern lights are a well-known phenomenon. We can explain the mechanisms that control it. We conduct regular observations and measurements from both the earth and the space. We have mathematical models that help us predict when and where the aurora will appear. What is and how is this phenomenon formed?	
<b>PRESENTER: Agata Goździk, IG-PAS</b>	<b>DATE: 22 May 2023 07:00</b>
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/LtPR8Fnhvbg?si=NhkNvMTaH_nFFHGn">https://youtu.be/LtPR8Fnhvbg?si=NhkNvMTaH_nFFHGn</a>	

<b>TITLE: Who's up for (freezing) trip? Polar migration patterns</b>	
<b>SHORT DESCRIPTION:</b> For animals in the Arctic, life is a balancing act. Seasonal cues, such as warmer spring temperatures or cooler temperatures in the fall, tell animals when to mate, when and where to find food and-when and where to migrate. Do they travel far? Who is a record holder? What dangers do they face? And ...what's the point?	
<b>PRESENTER: Anna Wielgopalan, IG-PAS</b>	<b>DATE: 26 May 2023 08:30</b>
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/9L5Re3c7wI8?si=DTusgqeNAtxg6Czg">https://youtu.be/9L5Re3c7wI8?si=DTusgqeNAtxg6Czg</a>	

<b>TITLE: Arctic hydrology</b>	
<b>SHORT DESCRIPTION:</b> Water in the Arctic that either fell as rain or melted from snow and ice, flows via different paths before reaching the ocean. Runoff regime and hydrological processes shape the landscape and influence dynamics of glaciers. Glaciers have complicated drainage systems - meltwater can flow on the surface of glacier (supraglacially), within glacier in tunnels (englacially), or drain to the glacier base through moulins and flow along or within the bed (subglacially).	
<b>PRESENTER: Tomasz Wawrzyniak, IG-PAS</b>	<b>DATE: 26 May 2023 08:40</b>
<b>LINK TO THE RECORDING:</b> <a href="https://youtu.be/LxYIvGDRsul?si=RLEUqEssF0QKjhV1">https://youtu.be/LxYIvGDRsul?si=RLEUqEssF0QKjhV1</a>	

<b>TITLE: Polar illusion - sneaking through nature's tricks</b>	
<b>SHORT DESCRIPTION:</b> Polar regions hold many mysteries, including some of the last places on Earth yet to be reached by man. Scientists do their best to see the invisible, without being led	

astray by appearances, which tend to be particularly deceptive in ice-covered lands. Extraordinary polar conditions favour illusion, which tricked the Vikings and even today – initially at least – might make us think of aliens. As usual, however, bewildering though they are, the phenomena can all be explained by science.

**PRESENTER:** Anna Wielgopalan, IG-PAS

**DATE:** 13 Jun 2023 06:00

**LINK TO THE RECORDING:** <https://youtu.be/8oNECeBJVM4?si=mQV28pyr53Gyunxw>

**TITLE:** Why is permafrost dangerous for Earth's climate?

**SHORT DESCRIPTION:** You will learn what permafrost is and where it occurs. Next, we will dive into the topic of thawing permafrost and how it affects climate and finally we will find the answer: why is thawing permafrost dangerous? This lesson will help to understand permafrost related processes.

**PRESENTER:** Agata Goździk, IG-PAS

**DATE:** 20 Jun 2023 11:00

**TITLE:** CAN THE MOST NORTHERN DEER COPE IN A WARMING CLIMATE?

**SHORT DESCRIPTION:** Reindeer are incredibly adapted to withstand snow and cold. They dig through piles of snow and find enough food to survive long winters. But the snow is changing due to climate change. It can form thick ice crusts that the reindeer cannot dig through. Summers are also getting warmer and wetter. Will the reindeer cope?

**PRESENTER:** Gabriela Wagner, NIBIO

**DATE:** 19 Sep 2023 08:00

**TITLE:** Why is permafrost dangerous for Earth's climate?

**SHORT DESCRIPTION:** You will learn what permafrost is and where it occurs. Next, we will dive into the topic of thawing permafrost and how it affects climate and finally we will find the answer: why is thawing permafrost dangerous? This lesson will help to understand permafrost related processes.

**PRESENTER:** Agata Goździk, IG-PAS

**DATE:** 27 Sep 2023 08:00

**TITLE:** SURVIVING IN A FREEZER - HOW DO ARCTIC ANIMALS DO IT?

**SHORT DESCRIPTION:** Have you always wondered how animals can live and even thrive in the extreme climates of the Arctic? If they freeze and feel miserable during winter, or if they actually feel as comfortable as we do in our own living-room? In this webinar, you will get the answers, and learn about the amazing and sometimes odd ways Arctic animals have adapted to living a life at the extreme.

**PRESENTER:** Jo Jorem Aarseth, NIBIO

**DATE:** 10 Oct 2023 08:00

**LINK TO THE RECORDING:** <https://youtu.be/slehVXZMycl?si=lxPYcBYCgPUHT2Bh>

**TITLE:** WHAT ON EARTH IS MICROBIOTA?

**SHORT DESCRIPTION:** About half of your body consists of microbiota, which are bacteria, protists, viruses, and fungi! They are crucial to life - even in the Arctic! In this webinar you will learn how

the microorganisms affect immunity, hormones and even the behaviour of animals. We will use fish as our main study object. Because fish and many mammals like humans are not that different after all (we all came from a fishlike ancestor), you will learn about yourself too.

**PRESENTER:** Cornelya Klutsch, NIBIO

**DATE:** 24 Oct 2023 08:00

**LINK TO THE RECORDING:** <https://youtu.be/YMjXZ8kODMk?si=yyq8WF3NZFRxG1uz>

#### **TITLE: 5 polar (science) riddles**

**SHORT DESCRIPTION:** No stress, just a little bit of challenge. Do you know the answers to all of them? But most importantly ...do you know WHY? Let's dive deep into science-based fun. Some of the answers are very recent discoveries in geophysics/polar research! Can you actually hear aurora singing, why is water even more incredible than we thought and what does making ice cream in Tanzania have to do with it ...and much more!

**PRESENTER:** Anna Wielgopalan, IG-PAS

**DATE:** 27 Oct 2023 07:00

**LINK TO THE RECORDING:** <https://youtu.be/HUse-mzAzII?si=gvhc1C3TiKRt69I2>

#### **TITLE: 5 polar (science) riddles**

**SHORT DESCRIPTION:** No stress, just a little bit of challenge. Do you know the answers to all of them? But most importantly ...do you know WHY? Let's dive deep into science-based fun. Some of the answers are very recent discoveries in geophysics/polar research! Can you actually hear aurora singing, why is water even more incredible than we thought and what does making ice cream in Tanzania have to do with it ...and much more!

**PRESENTER:** Anna Wielgopalan, IG-PAS

**DATE:** 17 Nov 2023 09:00

**LINK TO THE RECORDING:** <https://youtu.be/HUse-mzAzII?si=gvhc1C3TiKRt69I2>

#### **TITLE: Northern lights**

**SHORT DESCRIPTION:** Northern lights are a phenomenon that has fascinated people for centuries. **Colourful** lights illuminating the night sky have already been observed in ancient China or in Greece. Meanwhile, in the 21st century the northern lights are a well-known phenomenon. We can explain the mechanisms that control it. We conduct regular observations and measurements from both the earth and the space. We have mathematical models that help us predict when and where the aurora will appear. What is and how is this phenomenon formed?

**PRESENTER:** Agata Goździk, IG-PAS

**DATE:** 20 Nov 2023 12:20

**LINK TO THE RECORDING:** [https://youtu.be/LtPR8Fnhvbg?si=al\\_ZUYXCOW4zFmYT](https://youtu.be/LtPR8Fnhvbg?si=al_ZUYXCOW4zFmYT)

#### **TITLE: HELP FROM NEW BIOTECHNOLOGY**

**SHORT DESCRIPTION:** Genetics is the study of the genes and traits that children inherit from their parents. Recent biotechnology has opened new ways to study this in great detail even for wild animals and fish. In this webinar, you will learn how genetics and genomics can be used to study the impacts of human activities on wildlife populations, particularly in the very north.

**PRESENTER:** Cornelya Klutsch, NIBIO

**DATE:** 21 Nov 2023 09:00



**LINK TO THE RECORDING:** [https://youtu.be/Vz1Ev3I6Uzk?si=Jj\\_yoRyYVFQ8e6Zl](https://youtu.be/Vz1Ev3I6Uzk?si=Jj_yoRyYVFQ8e6Zl)

**TITLE: Northern lights**

**SHORT DESCRIPTION:** Northern lights are a phenomenon that has fascinated people for centuries. Colourful lights illuminating the night sky have already been observed in ancient China or in Greece. Meanwhile, in the 21st century the northern lights are a well-known phenomenon. We can explain the mechanisms that control it. We conduct regular observations and measurements from both the earth and the space. We have mathematical models that help us predict when and where the aurora will appear. What is and how is this phenomenon formed?

**PRESENTER:** Agata Goździk, IG-PAS

**DATE:** 22 Nov 2023 14:00

**LINK TO THE RECORDING:** <https://youtu.be/LtPR8Fnhvbg?si=igDs3-BAo8k8kCuJ>

**TITLE: The changing Arctic**

**SHORT DESCRIPTION:** Genetics is the study of the genes and traits that children inherit from their parents. Recent biotechnology has opened new ways to study this in great detail even for wild animals and fish. In this webinar, you will learn how genetics and genomics can be used to study the impacts of human activities on wildlife populations, particularly in the very north.

**PRESENTER:** Agata Goździk, IG-PAS

**DATE:** 28 Nov 2023 08:00

**LINK TO THE RECORDING:** <https://youtu.be/1b6hrQmP5wc>

**TITLE: Polluted Arctic – What are the main threats?**

**SHORT DESCRIPTION:** The Arctic is no longer an untouched and pure area. The harmful impact of human activity is evident in that region in its various types. Plastic pollution, global warming, oil and gas development are indicated among many threats that affect the natural Arctic environment.

**PRESENTER:** Dagmara Bożek, IG-PAS

**DATE:** 05 Dec 2023 09:30

**LINK TO THE RECORDING:** <https://youtu.be/3Gmj22iTDg0>

## 2.2. Online lessons in Polish

As the biggest group of teachers registered in the EDU-ARCTIC program are Poles, 21 online lessons were conducted in Polish. They were not recorded. Below is the list with titles (in Polish and in English), presenters and dates.

**TITLE (Polish):** Przystosowanie roślin do klimatu Arktyki

**TITLE (English):** Plants adaptations to the Arctic climate

**PRESENTER:** Dagmara Bożek, IG-PAS

**DATE:** 05 Oct 2022 09:00

<b>TITLE (Polish): Gleby w Arktyce</b>	
<b>TITLE (English): Arctic soils</b>	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 10 Oct 2022 08:00

<b>TITLE (Polish): Życie lodowców</b>	
<b>TITLE (English): The life of glaciers</b>	
<b>PRESENTER:</b> Bartłomiej Luks, IG-PAS	<b>DATE:</b> 14 Nov 2022 10:00

<b>TITLE (Polish): Zorza polarna – magiczny spektakl na niebie</b>	
<b>TITLE (English): Northern lights – a magic spectacle in the sky</b>	
<b>PRESENTER:</b> Agata Goździk, IG-PAS	<b>DATE:</b> 22 Nov 2022 09:00

<b>TITLE (Polish): Fauna Arktyki i Antarktyki</b>	
<b>TITLE (English): Arctic and Antarctic fauna</b>	
<b>PRESENTER:</b> Dagmara Bożek, IG-PAS	<b>DATE:</b> 24 Nov 2022 10:00

<b>TITLE (Polish): Niedźwiedź polarny - król Arktyki</b>	
<b>TITLE (English): Polar bear – the king of the Arctic</b>	
<b>PRESENTER:</b> Dagmara Bożek, IG-PAS	<b>DATE:</b> 14 Dec 2022 09:00

<b>TITLE (Polish): Zanieczyszczenie powietrza w rejonach polarnych</b>	
<b>TITLE (English): Polar bear – the king of the Arctic</b>	
<b>PRESENTER:</b> Daniel Kępski, IG-PAS	<b>DATE:</b> 20 Dec 2022 10:00

<b>TITLE (Polish): Plastik w Arktyce</b>	
<b>TITLE (English): Polar bear – the king of the Arctic</b>	
<b>PRESENTER:</b> Dagmara Bożek, IG-PAS	<b>DATE:</b> 10 Jan 2023 11:00

<b>TITLE (Polish): Śnieg w ekosystemie Arktyki</b>	
<b>TITLE (English): Snow in the Arctic ecosystem</b>	
<b>PRESENTER:</b> Daniel Kępski, IG-PAS	<b>DATE:</b> 17 Jan 2023 09:00

<b>TITLE (Polish): Svalbard</b>	
<b>TITLE (English): Svalbard</b>	
<b>PRESENTER:</b> Tomasz Wawrzyniak, IG-PAS	<b>DATE:</b> 06 Feb 2023 10:00

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<b>TITLE (Polish):</b> Jak przetrwać w Arktyce	
<b>TITLE (English):</b> Surviving the Arctic	
<b>PRESENTER:</b> Dagmara Bożek, IG-PAS	<b>DATE:</b> 09 Feb 2023 08:00

<b>TITLE (Polish):</b> Procesy hydrologiczne w Arktyce	
<b>TITLE (English):</b> Arctic hydrology	
<b>PRESENTER:</b> Tomasz Wawrzyniak, IG-PAS	<b>DATE:</b> 14 Mar 2023 09:30

<b>TITLE (Polish):</b> Przystosowania roślin do klimatu Arktyki	
<b>TITLE (English):</b> Plants adaptations to the Arctic climate	
<b>PRESENTER:</b> Dagmara Bożek, IG-PAS	<b>DATE:</b> 23 Mar 2023 08:00

<b>TITLE (Polish):</b> Jak ludzie (w tym polarnicy) radzą sobie z zimnem?	
<b>TITLE (English):</b> How do humans (including polar researchers) cope with cold	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 31 Mar 2023 08:30

<b>TITLE (Polish):</b> Klimat Svalbardu	
<b>TITLE (English):</b> Climate of Svalbard	
<b>PRESENTER:</b> Tomasz Wawrzyniak, IG-PAS	<b>DATE:</b> 13 Apr 2023 09:00

<b>TITLE (Polish):</b> Klimatyczny wehikuł czasu, czyli czy na Antarktydzie rosy palmy?	
<b>TITLE (English):</b> Climate time machine, or did palm trees grow in Antarctica?	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 21 Apr 2023 08:30

<b>TITLE (Polish):</b> Polarna iluzja	
<b>TITLE (English):</b> Polar illusion	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 28 Apr 2023 08:30

<b>TITLE (Polish):</b> Klimatyczny wehikuł czasu, czyli czy na Antarktydzie rosy palmy?	
<b>TITLE (English):</b> Climate time machine, or did palm trees grow in Antarctica?	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 12 May 2023 08:30

<b>TITLE (Polish):</b> Klimatyczny wehikuł czasu, czyli czy na Antarktydzie rosy palmy?	
<b>TITLE (English):</b> Climate time machine, or did palm trees grow in Antarctica?	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 16 Jun 2023 08:30

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<b>TITLE (Polish): Klimatyczny wehikuł czasu, czyli czy na Antarktydzie rosły palmy?</b>	
<b>TITLE (English):</b> Climate time machine, or did palm trees grow in Antarctica?	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 16 Nov 2023 08:00

<b>TITLE (Polish): Klimatyczny wehikuł czasu, czyli czy na Antarktydzie rosły palmy?</b>	
<b>TITLE (English):</b> Climate time machine, or did palm trees grow in Antarctica?	
<b>PRESENTER:</b> Anna Wielgopolan, IG-PAS	<b>DATE:</b> 04 Dec 2023 13:30

### 3. Conclusions

As there is still a lack of sufficient awareness and acknowledgement across society of the scope and impacts of global change and the Arctic's role, education on all possible levels plays a crucial role to change the situation. It is the younger generation that will experience the most profound impacts of climate and environmental change, so it is our duty to empower them with knowledge and tools to adapt.

The INTERACT online lessons organised for secondary schools in Europe and beyond were dedicated to polar issues and results of research conducted at the stations participating in the project. They were prepared and conducted by scientists involved in research in polar regions and offered to the network of teachers and educators participating previously in the EDU-ARCTIC educational programme (H2020 project).

In total 176 groups participated in the lessons. Taking into account an average number of students in one class (ca. 25), we estimate that ca. 4.400 students became familiar with the global challenges connected with the rapidly changing Arctic. Based on some discussions after many lessons, we assume that the impact of the lessons goes far beyond the numbers presented in this report. Many teachers are treating the webinars as a great source of up-to-date knowledge about climate change, the changing Arctic and some global challenges which are tightly connected with what is happening in the Arctic. With the rapidly ageing group of teachers in many countries, it is crucial to provide them with updated information. The INTERACT online lessons could be treated as in-service training for teachers.

There were also some challenges in implementation of the lessons. First of all, it is very difficult to offer time slots which suit many schools. Therefore in the final months we were offering additional lessons on the already presented topics conducted in time slots requested by some especially interested schools.

Participation in STEM lessons in foreign language was another challenge for students. For majority of students English was not their mother tongue and they faced a big challenge of understanding scientific issues presented by researcher in foreign language. Therefore, we organised so many Polish lessons, as the Polish community within EDU-ARCTIC represents about the half of the whole group.

Most of the lessons were recorded, post-produced and published on the INTERACT YouTube channel, which makes them available also after the project's closure.